

CP-17662
Revision 0

Radiological Characterization Report for the 233-S Plutonium Concentration Facility Demolition Project

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

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P.O. Box 1000
Richland, Washington

Contractor for the U.S. Department of Energy
Richland Operations Office under Contract DE-AC06-96RL13200

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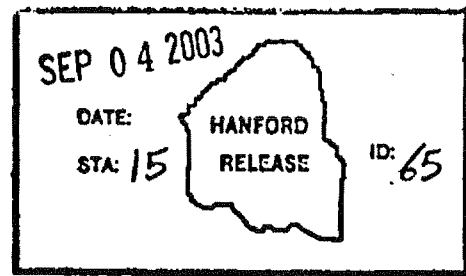
August 2003

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Nancy A. Fouad 9-4-03
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EDC- 03-17661	FMP-
EDT-	ECN-
Project No.:	Division: CP
Document Type: TR	Page Count: 41

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Abstract		Summary		Full Paper		Visual Aid	
Conference Name:							
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Publication Date:							

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RADIOLOGICAL CHARACTERIZATION REPORT FOR THE 233-S PLUTONIUM CONCENTRATION FACILITY DEMOLITION PROJECT

1.0 INTRODUCTION

Information on the extent and level of radiological contamination is critical to planning for the demolition of the 233-S Plutonium Concentration Facility (233-S). Extensive radiological surveys have been performed, as well as detailed nondestructive assay measurements (NDA). However, these were deemed insufficient in two areas: 1) waste disposal planning for the purpose of minimizing transuranic waste (TRU), and 2) evaluating specific demolition methodologies and mitigation techniques to minimize the release of radiological materials during the demolition process. A sampling plan was developed (Attachment 1) to collect additional radiation dose rate measurements with the goal of correcting this deficiency. The measurements were collected using standard radiation survey instrumentation specially modified and calibrated to provide results specifically meaningful to the 233-S Demolition Project. Dose rate to activity conversion factors were determined using MicroShield™¹, a computerized radiation shielding program.

This report provides a detailed description of the technical basis of the modifications to the radiation survey instrumentation, its use, and limitations, and data reduction techniques (Section 2.0). In Section 3.0, the results are presented with respect to eliminating the deficiencies identified above. Estimates of the total TRU waste present in 233-S will be provided, in addition to the mass of TRU radionuclides on facility surfaces. Conclusions are presented in Section 4.0.

2.0 Materials and Methods

Radiation dose rate measurements were collected using standard radiation survey instrumentation. Sample locations on facility surfaces specified in the sampling plan (Attachment 1) were identified on maps for use in recording data in the field. Surfaces requiring detailed survey grids were marked prior to data collection using chalk lines. Both contact and field (30 cm) measurements were collected. The distance was carefully determined prior to recording the measurement to ensure repeatability.

2.1 Survey Instrument Details

Three instrument types were modified for ²⁴¹Am dose rate measurements at 233-S. These were a Ludlum 44-2 1"X1" NaI detector with an Eberline E-600 meter, a Ludlum Model 19 microrem meter (also a 1"X1" NaI detector internal to a meter), and a Bicon microrem meter (tissue equivalent dose rate meter).

¹ Microshield is a trademark of Grove Engineering (A Framatome ANP Company), Olney, Maryland

The calibration/instrument services group at PNNL performed the modifications and calibrations. The detector of each instrument was shielded with 1/16" (1.59 mm) of lead on all sides except the "front" of the detector. The tenth-value layer for 70 keV potential x-ray beams is 0.52mm of lead. The 70 keV potential was selected from the published tables instead of 50 keV since the table used some attenuating layer to harden the beam and 70 keV potential will give x-rays ranging from 70 keV down. Since gamma and x-rays will behave identically and 70 keV potential will create x-rays up to 70 keV, this value should be conservative but close to the actual tenth-value layer thickness for the gamma emissions from ^{241}Am . This would reduce the response of the detectors by a factor of 1000 from all directions but the unshielded end making them quite directional. Testing at PNNL showed this to be the case; a ~200 μrem field measured from the responsive end was too low to measure from all other directions with the shielded detector.

The instruments were calibrated using a NIST traceable ^{241}Am well source at PNNL at all scales. All instruments were adjusted so that the reading on the instrument matched the calculated dose, no correction factors were necessary. Wide beam geometry was used, and no unfavorable geometry (point, narrow beam) corrections were developed. PNNL agreed that 30 cm distance from an area source should match this calibration well.

2.2 Data Reduction Methods

Dose rate data was collected at the sampling locations identified in Attachment 1 and using the instrumentation described in Section 2.1, above. Conversion factors are necessary to relate the measured dose rate information activity present. Since the measured dose rate results primarily from photons emitted by ^{241}Am the conversion factors must also relate the measured dose rate the total activity of TRU radionuclides. The conversion factors are based on the shielding model results, physical and radiological properties of the radionuclides present, as well as the isotopic activity and weight distributions for contamination found in 233-S. A detailed description of the conversion derivation is provided in Attachment 2. The factors are summarized in Table 2-1.

Table 2-1 Conversion Factors for Dose Rate Data Reduction

C. F.	Purpose	Factor	Units
C_{241}	Relates ^{241}Am dose rate to activity	2.37e+05	$\frac{d/m/100\text{cm}^2 (^{241}\text{Am})}{\mu\text{rem/h}}$
f_{TRU}	Relates ^{241}Am activity to total TRU	2.39	$\frac{d/m(\text{TRU})}{d/m(^{241}\text{Am})}$
SpA_{TRU}	Relates TRU activity to TRU mass	0.126	$\frac{\text{Ci}(\text{TRU})}{\text{g}(\text{TRU})}$

Each sample location is comprised of 2421 cm² of surface area. This area is defined by the distance from the surface to be measured and the solid angle formed around the detector axis by the lead collimator. The total TRU activity is calculated from the dose rate determined at 30 cm from that location using the values in Table 2-1:

$$A_{\text{TRU}} = \frac{DR\left(\frac{\mu\text{rem}}{\text{h}}\right) \times CF_{241} \times f_{\text{TRU}} \times 24.21}{2.22e+03 \frac{d/m}{\text{nCi}}} = \text{nCi}(\text{TRU})$$

Where: 24.21 = conversion from activity per 100 cm² to total in sample region

The total mass, W_{TRU} , of TRU in the sample region is calculated:

$$W_{\text{TRU}} = A_{\text{TRU}} (\text{nCi}) \times 10^{-9} \frac{\text{Ci}}{\text{nCi}} \times \text{SpA}_{\text{TRU}} = \text{g}(\text{TRU})$$

3.0 CHARACTERIZATION RESULTS

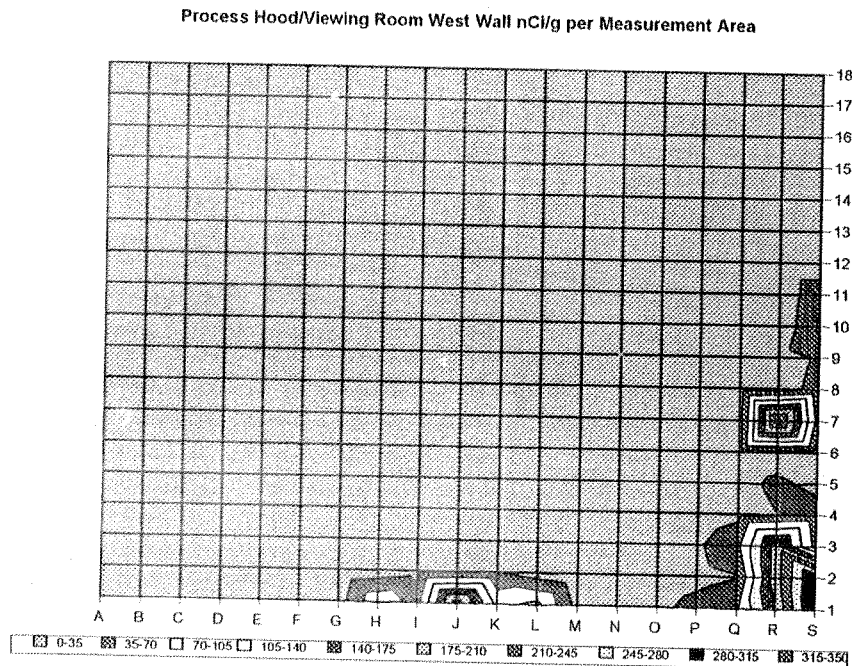
This section presents the characterization results with regard to estimates for the activity and mass TRU radionuclides. This information will be presented within the context of estimating the volume of TRU waste generated during the demolition of 233-S and quantifying the source term for use in calculating on-site and off-site impacts from potential releases.

3.1 TRU Waste Estimates

TRU waste estimations were determined by taking the total nCi of calculated activity and dividing by the mass for a particular shot area.

The limit for the ERDF (Environmental Restoration Disposal Facility) is ~92.5 nCi/g. To provide a degree of conservatism to the analysis, a value of 70 nCi/g was used to help define the TRU segments. This method identified 3 primary TRU segments on the West Wall of the Process Hood, represented by the areas >70 nCi/g (Figure 3-1).

Figure 3-1



There were also three areas on the North Wall of the Process Hood that contained >70 nCi/g of material. Two of those areas were very small (see coordinates A7 and A10 on Figure 3-2), with activities between 70 and 105 nCi/g and when packaged for disposal will be well below 70 nCi/g.

The Second floor of the stairwell on the east wall contains an isolated spot at 315-350 nCi/g (Figure 3-3). This area is well below 70 nCi/g as a segment packaged for disposal. All other areas of the building analyzed contained no measurements that were significantly above background, and do not contain TRU waste.

Figure 3-2

Process Hood/Viewing Room North Wall nCi/g in Measurement Area

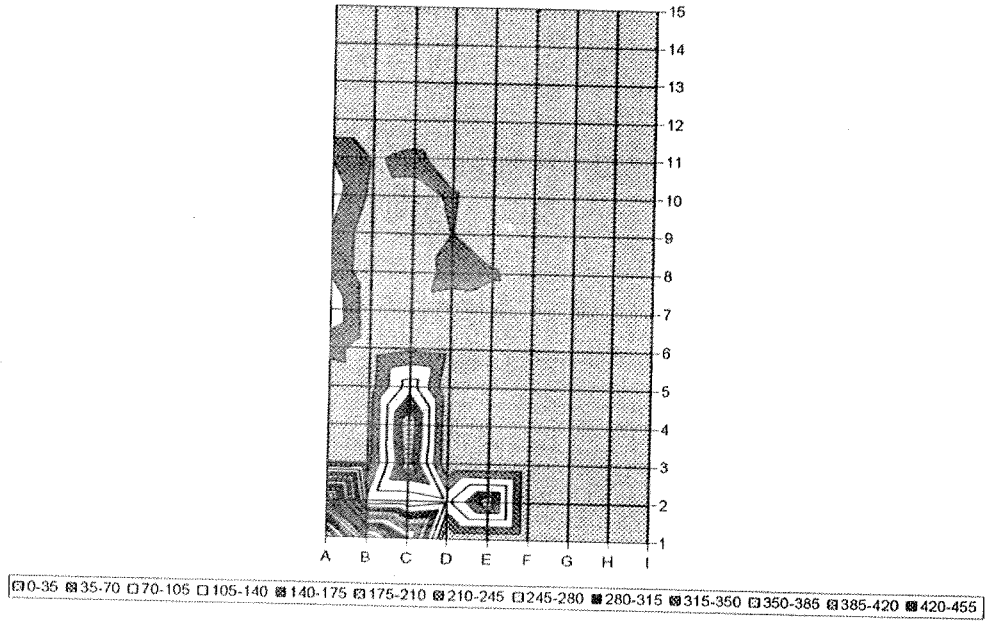
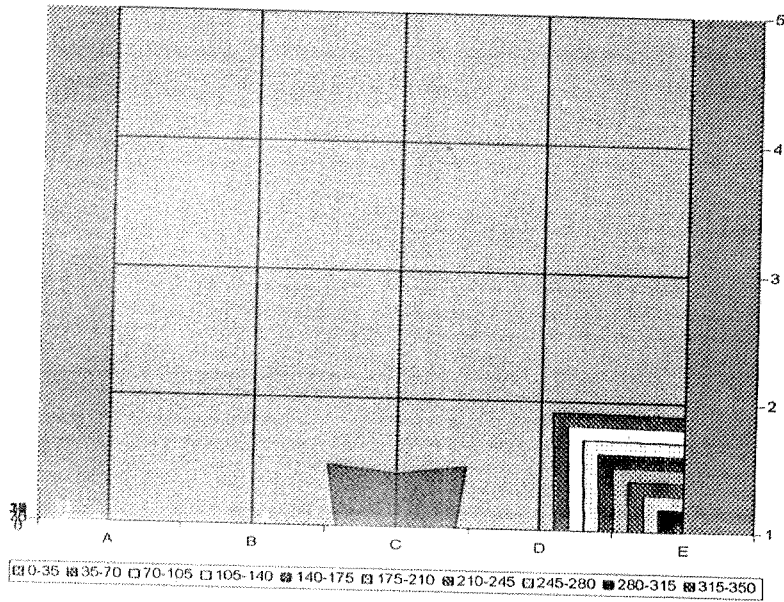


Figure 3-3

Stairwell 2nd Level Walls nCi/g Measurement Area



3.2 Release Source Term Estimates

The total TRU mass reported for each surface (wall or ceiling) was determined using a stepwise process.

1. The total surface area was divided by the total number of measurements collected on that surface to provide the area related to each measurement.
2. The determined for the measurement area of 2421 cm² is applied the larger area determined in Step 1, above.
3. The results from Step 2 are summed for each surface to provide the total activity or mass for that surface.
4. Process Hood areas where measurements were collected utilizing the 0.5 meter x 0.5 meter grid were treated as unique from other areas on the same surface.

The method can be described mathematically as follows:

$$W_s = \sum \left(\frac{A_s}{N} \times \frac{W_i}{2421 \text{ cm}^2} \right)$$

Where: W_s = Total TRU mass on Surface, S
 N = Number of measurements collected on Surface, S
 A_s = Area of Surface S, cm²
 W_i = TRU mass determined from measurement, i

The TRU mass determined from each measurement W_i is provided in Attachment 3. The total TRU mass for each area of the 233-S Facility are presented in Table 3-1.

Table 3-1 TRU Mass Estimates for 233-S Locations

Location	TRU (grams)
Can Storage Room	0.061
SWP/Equipment Room	0.054
Pipe Gallery	0.141
PR Can Storage	0.039
PR Can Loadout	0.081
Stairwell - 1 st Floor Wall	0.024
Stairwell - 2 nd Floor Wall	0.055
Stairwell - 3 rd Floor Wall	0.026
Stairwell - 4 th Floor Wall	0.018
Stairwell - 1 st Floor Landing	0.023
Stairwell - 2 nd Floor Landing	0.049
Stairwell - 3 rd Floor Landing	0.037
Stairwell - 4 th Floor Landing	0.016
Stairwell Ceiling	0.002
Process Hood - West Wall	5.682
Process Hood - North Wall	6.175
Process Hood - South Wall	0.038
Process Hood - East Wall	0.828
Process Hood - Ceiling	0.037
Total	13.39

4.0 CONCLUSIONS

This report describes the characterization method and results for the 233-S Plutonium Concentration Facility. The purpose of the characterization was to determine the total activity or mass of radionuclides on the walls of the facility prior to demolition. Remediation of radioactivity present on the facility floor is not included in the present demolition project.

The method relies on the detection of photons emitted by ²⁴¹Am present on the contaminated surfaces. In this respect it is similar to the NDA methodology used previously to provide estimates of radionuclide activity or mass present in the facility (Clinton, 2003). However, the total mass of alpha-emitting radionuclides estimated by this method is 13.39 grams, compared to the previous estimate of 46.2 grams. This difference is believed to primarily result for the following reasons:

1. A layer of concrete was added to the floor of the Process Hood after the previous study was conducted reducing the contribution from contamination on the floor to measurement of the wall activity.
2. The photon detector was modified to make its response highly directional. This modification allowed the more accurate determination of activity on a given surface by reducing interference from activity adjacent surfaces.

3. A method was developed for more accurately determining subtracting the contribution from background radiation levels.
4. Excess radioactive materials (waste, equipment, etc) were removed prior to collecting the current measurements.

5.0 REFERENCES

(Clinton, 2003) Clinton, R. *233-S Residual Contamination Location and Source Term Determination*, CP-15397. Fluor Hanford, Inc. Richland Washington. March 19, 2003

6.0 ATTACHMENTS

- Attachment 1 – 233-S Plutonium Concentration Facility Demolition Project – Radiological Survey Plan
- Attachment 2 – Derivation of Dose to Activity Conversion Factors for Use in 233-S Characterization
- Attachment 3 – 233-S Americium Dose Rate Data

ATTACHMENT 1
233-S PLUTONIUM CONCENTRATION FACILITY
DEMOLITION PROJECT - RADIOLOGICAL SURVEY PLAN

1.0 INTRODUCTION

The planning effort for the 233-S Plutonium Concentration Facility (233-S) requires additional information with regard to the extent and level of radiological contamination. Extensive radiological surveys have been performed, as well as detailed nondestructive assay measurements (NDA). However, these are insufficient in two areas: 1) waste disposal planning for the purpose of minimizing transuranic waste (TRU), and 2) evaluating specific demolition methodologies and mitigation techniques to minimize the release of radiological materials during the demolition process.

Radiological surveys were performed for the purpose of radiological safety. For this reason, a large number of the data are reported as being less than a certain exposure level of interest, i.e. 5 milliroentgens per hour (mR/h). Use of these data would result in a large overestimation of the level of contamination for the areas where the measurements were collected. The quantity of TRU waste would be overestimated by a factor of at least 10. Planning for demolition will be more restrictive than actually necessary leading to an increase in project cost and schedule.

Similarly, the NDA data provides an upper bound to the mass of radionuclides actually thought to exist in 233-S. This conservatism resulted in assumptions required by uncertainties related to measurement conditions, as well as measurement interference from radioactive materials other than those of interest. Use of this data alone for waste disposal or demolition decisions will also lead to increased project costs and schedule.

Neither data set provides sufficient information to determine the areal extent of several hot spots within 233-S. This determination is necessary to minimize the amount of waste designated TRU.

This plan will describe the sampling methods and locations required to collect radiological survey data sufficient to achieve the following goals:

1. Characterize areas with "less than" survey data with regard to waste designation, i.e. TRU or low-level waste.
2. Determine the extent of hot spots to provide a better estimate of the quantity of TRU waste.
3. Characterize all areas sufficiently to either confirm or refine the radionuclide activity estimates based on NDA measurements.

2.0 APPROACH

The radiological survey will provide radiological exposure rate data collected at the specific locations identified in Section 3.0 and using the instrumentation described below. The exposure rate at the specified sampling locations will be measured on contact with the surface and/or at a distance of 30 cm. A means of reliably determining the appropriate distance will be provided to the Radiological Control Technicians performing the measurements. Scanning measurements may be utilized as needed to locate areas of elevated activity.

2.1 Sampling Method

Exposure rates less than or equal to 50 mR/h will be measured using a Ludlum Model 19 MicroR Meter, Fberline E-600 rate meter equipped with a Ludlum Model 44-2 probe, a Bicron microrem meter, or other appropriate radiation protection instrumentation. The detectors for the Ludlum instruments consist of a 1 inch by 1-inch Sodium Iodide detector coupled to a photomultiplier tube. The Bicron meter is a plastic scintillator detector. The detectors are shielded with 1/16 inch lead sheet on all sides except the front to minimize interference from contaminants on surfaces other than the one being measured. The detectors will be calibrated to the ~60 keV gamma emitted by ^{241}Am , the primary gamma-emitting radionuclide present. The background exposure rate will be determined by placing a 1/16 inch lead shield over the unshielded face of the detector and recording the reading. The additional shield effectively eliminates all exposure due to ^{241}Am but has little effect on higher energy photons (i.e., cosmic rays, ^{137}Cs , or radon daughters). The background exposure rate will be determined for each area where measurements are taken.

Exposure rates greater than 50 mR/h will be measured using an ionization chamber. The aluminum/phenolic material of the detector chamber will provide some directional capability for the instrument. The instrument will provide a verification of previous measurements.

Measurements will require at least 2 individuals; one to verify sampling locations and record data, and one to operate the instrument and convey the readings.

2.2 Data Analysis

A conversion factor relating exposure rate to curies of ^{241}Am will be calculated using Microshield², a computer based shielding code. The activities of other radioisotopes will be determined using the isotopic distribution previously reported in the 233-S Safety Basis.

² Microshield is a trademark of Grove Engineering (A Framatome ANP Company), Olney, Maryland

2.3 Preliminary Activities

Prior to implementing the sampling plan described below, packaged waste within 233-S should be removed/moved, as should any equipment, materials or other items that could impede the performance of the surveys or increase the radiation background. A layer of grout will be poured on the floor of the Viewing Room and Process Hood to reduce the radiation background. The expected grout thickness is 10 inches and 6 inches in the Viewing Room and Process Hood, respectively.

3.0 SURVEY PLAN

This section describes the locations where radiation exposure rate data will be taken, the type of measurement required, and data/information recording requirements. The measurements may be done in any order as well as concurrently and repeated as necessary.

3.1 Can Storage Room

The Can Storage Room is currently posted as a Radiological Buffer Area with no measurable radiation exposure utilizing standard radiation survey instruments. For this reason, it is believed that contamination, if any, will be evenly distributed and at low levels.

Static Surveys

Radiation exposure rate readings will be obtained at contact and 30 cm from the approximate midpoint of each wall, and the ceiling. The measurements will be recorded on a radiological survey report form (BD-6000-010).

Scan Surveys

A scan survey will be performed at contact along the joints of the wall panel. If areas of elevated contamination are discovered (as compared to the adjacent wall), static measurements will be obtained at contact and 30 cm. The approximate location and extent of the elevated activity, along with the static measurements will be recorded on a radiological survey report form (BD-6000-010).

3.2 PR Can Storage Room

The PR Can Storage Room is used as an access/egress route for the PR Can Loadout Room. The north one-half of the room is posted as a Radiological Buffer Area. The south one-half of the room contains a containment tent used which is posted as a high contamination and airborne radioactivity area. Radiological surveys indicate that contamination is evenly distributed over the PR Can Storage Room walls and ceiling.

Static Surveys

Radiation exposure rate readings will be obtained at contact and 30 cm from the approximate midpoint of each wall and the ceiling. The measurements will be recorded on a radiological survey report form (BD-6000-010).

Scan Surveys

A scan survey will be performed at contact along the joints of the wall panel. If areas of elevated contamination are discovered (as compared to the adjacent wall), static measurements will be obtained at contact and 30 cm. The approximate location and extent of the elevated activity, along with the static measurements will be recorded on a radiological survey report form (BD-6000-010).

3.3 PR Can Loadout Room

The PR Can Loadout Room is posted as a high contamination, airborne radioactivity, and radiation areas. It is assumed that the contamination is primarily uniformly distributed.

Static Surveys

A measurement collection grid will be established on the room surfaces by equally dividing each surface into four equal sections. Radiation exposure rate measurements will be collected at contact and 30 cm at the node (four corners and center) of each grid. The room surfaces are described below:

1. On the section of the south wall between the east wall and the intersection of the Process Hood west wall.
2. On the section of the south wall between west wall and the intersection of the Process Hood west wall.
3. On the entire west wall
4. On the entire north wall
5. On the entire ceiling

The measurements will be recorded on a radiological survey report form (BD-6000-010).

Scan Surveys

No scan surveys are required for the PR Can Loadout Room.

3.4 SWP Change Room and Equipment Room

The SWP Change Room and Mechanical Room are posted as a Radioactive Material Area. Radiological survey data indicates that the contamination is uniformly distributed.

Static Surveys

Radiation exposure rate measurements will be collected at contact and at 30 cm. in the following locations:

1. The east wall of the SWP Change Room, midway between north wall and the entrance to the PR Can Loadout Room.
2. The west Wall of the SWP Change Room, midway between the north entrance and the south wall.
3. The midpoint of the east wall of the Equipment Room.
4. The midpoint of the west wall of the Equipment Room.
5. The midpoint of the SWP Change Room Ceiling
6. The midpoint of the Equipment Room Ceiling.

The measurements will be recorded on a radiological survey report form (BD-6000-010).

Scan Surveys

No scan surveys are required for the SWP Change Room and Equipment Room.

3.5 Pipe Gallery

The Pipe Gallery is a High Contamination and Airborne Radioactivity Area. There are two known areas of elevated contamination, a hot spot, and the area around a junction box on the east wall. The remainder of the contamination is assumed to be primarily uniformly distributed.

Static Surveys

A measurement collection grid will be established on the room surfaces by equally dividing each surface into four equal sections. Radiation exposure rate measurements will be collected at contact and 30 cm at the node (four corners and center) of each grid. The room surfaces to be surveyed are the west, south, and east walls and the ceiling.

The measurements will be recorded on a radiological survey report form (BD-6000-010).

Scan Surveys

A scan survey will be performed at hot spot and junction box to determine the extent of the elevated activity. Static measurements will be taken at contact and 30 cm from the center of each area. The approximate location and extent of the elevated activity, along with the static measurements will be recorded on a radiological survey report form (BD-6000-010).

3.6 Process Hood/Viewing Room

The Process Hood/Viewing Room areas are the most highly contaminated of the entire 233-S Facility. The bulk of the contamination is thought to exist in areas of the north and west walls on the first and second levels.

Contamination on the walls outside of these areas is much lower activity and is assumed to be evenly distributed. The main sampling goal in these areas is to better define the extent of the contamination for waste designation purposes. Sampling grids will be established over the Process Hood/Viewing Room surfaces as described below:

1. A 0.5 meter x 0.5 meter sampling grid will be established on the first two levels of the north wall and west walls.
2. The area comprised of the third and fourth levels of the north and west walls will be equally divided into four surfaces.
3. A 0.5 meter x 0.5 meter sampling grid will be established on the lower north quadrant of the third level of the west wall.
4. A 0.5 meter x 0.5 meter sampling grid will be established on the first level of the south wall.
5. The area comprised of the second, third, and fourth levels of the south wall will be equally divided into four surfaces.
6. The entire east wall will be equally divided into four surfaces.
7. The ceiling will be divided into four surfaces.

Static Surveys

1. Radiation exposure measurements will be collected at contact and at 0 cm over each node of the sampling grids described above. For the areas equally divided into four surfaces, the nodes are located at each corner of the grid plus the center. The measurements will be recorded on a radiological survey report form (BD-6000-010).

Scan Surveys

Scan surveys will be performed along the vertical steel I-beams attached to the north and south walls of the process hood. The survey will focus on detecting contamination that may be trapped between the I-beam and wall. The approximate location and extent of the elevated activity, along with the static measurements will be recorded on a radiological survey report form (BD-6000-010).

3.7 Stairwell

The Stairwell is a metal structure on the east side of 233-S containing stairs leading to the four levels of the facility. There is a metal landing at each level. The Stairwell is posted as a high contamination and airborne radioactivity area.

Sampling grids will be established on the north, east, south, and west walls of the Stairwell at each level (i.e., levels 1-4) by equally dividing each surface into four surfaces.

Static Surveys

Radiation exposure measurements will be collected at contact and 30 cm at the following locations:

1. At each node (each corner and the center) of the sampling grids.
2. At the middle of the metal landing on each floor.
3. At the midpoint of the Stairwell ceiling

The measurements will be recorded on a radiological survey report form (BD-6000-010).

Scan Surveys

Scan surveys will be performed along the C-channel attaching each landing to the walls at each level. The approximate location and extent of the elevated activity, along with the static measurements will be recorded on a radiological survey report form (BD-6000-010).

ATTACHMENT 2 DERIVATION OF DOSE TO ACTIVITY CONVERSION FACTORS FOR USE IN 233-S CHARACTERIZATION.

1.0 Introduction

As described in Section 2.0 of the main body of this report, the approach to characterization of the 233-S Plutonium Concentration Facility relies on measuring the dose rate resulting from ^{241}Am present in contamination on the facility surfaces. To relate the measured information to total TRU activity, it is necessary to derive conversion factors. The converted data can then be used to make decisions regarding radioactive waste designation or the use of specific demolition methodologies. This attachment presents the basis for deriving the conversion factors.

2.0 Conversion Factor Derivation

The conversion factors derived in this attachment are based on the following information:

1. The calculated dose rate from an assumed (i.e., 1 curie) ^{241}Am evenly distributed over the area seen by the detector described in Section 2.1.
2. The known radiological and physical properties of the radionuclides believed to be present in the contamination on 233-S surfaces. The radionuclides present have been previously determined using laboratory analysis.
3. The activity and mass isotopic distribution of the radionuclides present as determined by laboratory analysis. The isotopic distributions are presented in Table 1, below.

2.1 Dose Rate to ^{241}Am Activity Determination

The dose rate at 30 cm. from 1 curie (Ci) of evenly ^{241}Am activity was calculated to be $3.867e+05$ microrem per hour ($\mu\text{rem h}^{-1}$). This value was determined using MicroShield^{TM3} 5.03, a computerized shielding code. The source was modeled as a disk with an area of 2421 cm^2 . The activity concentration in the area of interest is:

$$C_a = \frac{1\text{Ci} \times 2.22e+12 \frac{\text{d/m}}{\text{Ci}}}{2421\text{cm}^2} \times 100 = 9.17e+10 \frac{\text{d/m}}{100\text{cm}^2}$$

So, the factor, CF_{241} , to convert dose rate to ^{241}Am activity is:

³ Microshield is a trademark of Grove Engineering (A Framatome ANP Company), Olney, Maryland

$$CF_{241} = \frac{9.17e+10 \frac{d/m}{100cm^2}}{3.867e+05 \frac{\mu rem}{h}} = 2.37e+05 \frac{d/m/100cm^2}{\mu rem/h}$$

2.2 Total Transuranic (TRU) Activity from the ²⁴¹Am Dose Rate

The isotopic activity distribution for the TRU radionuclides present in 233-S contamination is known and reported in the [Sampling and Analysis Plan]. The activity fraction, f_i , is the fractional activity of each radionuclide relative to the total activity present, such that:

$$f_i = \frac{A_i}{A_T}$$

Where: A_i = Activity of TRU isotope, i
 A_T = Total activity

The activity of ²⁴¹Am is determined from the measured dose rate and the method described in Section 2.1 above. Dividing each of the activity fraction values by that of ²⁴¹Am provides a new fraction, f_j , that relates the activity of each TRU radionuclide to ²⁴¹Am. The factor, f_j , is dimensionless.

$$f_j = \frac{f_i}{f_{am}} = \frac{A_i/A_T}{A_{am}/A_T} = \frac{A_i}{A_{Am}}$$

Where: A_{am} = ²⁴¹Am activity

The fraction of the total TRU activity relative to that of ²⁴¹Am can be calculated by summing each of the values of f_j .

$$f_{TRU} = \sum f_j = \sum \frac{A_i}{A_{am}} = \frac{\sum A_i}{A_{Am}} = \frac{A_{TRU}}{A_{Am}}$$

Where: A_{TRU} = Total TRU activity
 f_{TRU} = Fraction of TRU activity relative to ²⁴¹Am

The values of f_i , f_j , and f_{TRU} are shown in Table A1-1.

Table A1-1. Activity Fractions of TRU Radionuclides

Radionuclide	f_a	f_i
²³⁸ Pu	0.077	0.293
²³⁹ Pu	0.190	0.722
²⁴⁰ Pu	0.099	0.376
²⁴² Pu	0.0001	3.80e-04
²⁴¹ Am	0.263	1.0
²³⁷ Np	5e-07	1.90e-06
	$f_{TRU} =$	2.39

Since f_{TRU} relates the total TRU activity to that of ²⁴¹Am, multiplying by the dose to curie conversion factor for ²⁴¹Am determined above will provide a conversion factor relating measured dose to total TRU activity.

$$CF_{TRU} = CF_{241} \times f_{TRU}$$

$$CF_{TRU} = 2.39 \times 2.37e+05 \frac{d/m/}{\mu rem/h} \frac{100cm^2}{h} (^{241}Am) =$$

$$CF_{TRU} = 5.66e+05 \frac{d/m/}{\mu rem/h} \frac{100cm^2}{h} (TotalTRU)$$

2.3 Total TRU Mass from the ²⁴¹Am Dose Rate

The mass of TRU present in the area "seen" by the microR meter can be calculated using the following stepwise process. The results are summarized in Table A1-2 at the end of this section.

1. The isotopic weight distribution as determined by sampling and analysis and reported in the 233-S Authorization Basis provides the weight fraction of each radionuclide relative to the total weight of all radionuclides:

$$fw_i = \frac{w_i}{w_T}$$

where: fw_i = weight fraction of each TRU isotope, i , relative to the total weight of all isotopes
 w_i = weight of isotope, i
 w_T = weight of all isotopes

Summing, the fw_i , values for the TRU radionuclides will provide the total mass of TRU isotopes relative to the total mass:

$$\sum fw_i = \frac{\sum w_i}{w_T} = \frac{w_{TRU}}{w_T} = 0.9926$$

2. Dividing each value of fw_i by 0.9926 provides the mass fraction of each TRU isotope relative to the total TRU mass:

$$\frac{w_i}{w_T} \div 0.9926 = \frac{w_i}{w_{TRU}}$$

3. The specific activity can be used to determine the activity for each TRU isotope relative the total mass of TRU. If w_i and w_{TRU} from above have the units of grams (g):

$$\frac{A_i}{g_{TRU}} = \frac{w_i}{w_{TRU}} \left(\frac{g_i}{g_{TRU}} \right) \times SpA_i \left(\frac{Ci}{g_i} \right)$$

where: A_i = Activity (Ci) of isotope, i .
 SpA_i = Specific Activity (Ci/g) of isotope, i .

Summing the values determined above for each isotope results in an overall specific activity value relating total TRU activity to the mass of TRU. If the TRU activity is in the units, curies:

$$\sum \frac{A_i}{g_{TRU}} = \frac{A_{TRU}}{g_{TRU}} = 0.126 \frac{Ci_{TRU}}{g_{TRU}}$$

4. Using the overall specific activity calculated in Step 3, the dose rate to total TRU activity conversion factor can be transformed into a factor that will relate dose rate to TRU mass, CF_{mass} :

$$CF_{TRU} = 5.66e+05 \frac{\frac{d/m}{\mu rem}}{h} = 5.66e+03 \frac{d/m}{\mu rem \cdot cm^2} \cdot \frac{h}{h}$$

$$CF_{max} = \frac{5.66e+03 \frac{d/m}{\mu rem \cdot cm^2} \cdot h}{2.22e+12 \frac{d/m}{Ci}} + 0.126 \frac{Ci_{TRU}}{g_{TRU}} = 2.02e-08 \frac{g_{TRU}}{cm^2} = 4.90e-05 \frac{g_{TRU}}{shot}$$

Table A1-2. Mass Fractions of TRU Radionuclides

TRU Radionuclide	f_{wi} (w_i/w_T)	g_i/g_{TRU}	SpA_i (Ci/g_i)	A_i/w_{TRU} (Ci/g_i)
²³⁸ Pu	0.0007	7.05e-04	17.2	.0121
²³⁹ Pu	.8405	8.47e-01	.0616	.0522
²⁴⁰ Pu	.1046	1.05e-01	.228	.0240
²⁴² Pu	.0059	5.94e-03	3.88e-03	2.3e-05
²⁴¹ Am	.0108	1.09e-02	3.47	.0378
²³⁷ Np	.0301	3.03e-02	7.02e-04	2.13e-05
	$w_{TRU}/w_T=0.9926$			$A_{TRU}/w_{TRU}=0.126$

ATTACHMENT 3
233-S Americum Dose Rate Data

shorthand labels are used for location and portion. Survey point and readings match RSRs. Portion codes are first several characters are surface designator, such as (east)wall, (north)wall, etc. which is followed by a point location when needed. These include u(per), m(d), and (lower) and (center) when needed for center grid locations which is followed by (left), m(right), r(right) and combinations for more than three. Some ceilings require directional designators

location	portion	survey point	hls	contact shielded	contact unshielded	30cm shielded	30cm unshielded	meters/m2	metric/dps	Am241/Dose	gpm/100cm2	gTRU/cm2	MDA Fltg	MDA Fltg	gTRU in area	GTRU surface	room	Shed area, m2	Fltg II, >70 nC/d
CR	well	1	4	4	4	4	4	1	Bicron	0	118E+06	4.20E-08	MDA	3.30E+05	0.013843394	0.061101	7790449		
CR	well	2	4	4	4	4	4	1	Bicron	0	118E+06	4.20E-08	MDA	1.81E+05	0.007595634		7790449		
CR	ceiling	3	4	4	4	4	4	1	Bicron	0	118E+06	4.20E-08	MDA	4.34E+05	0.018212736				
CR	well	4	4	5	4	5	4	1	Bicron	0	118E+06	4.20E-08	MDA	3.30E+05	0.013843394				
CR	well	5	4	6	6	6	6	1	Bicron	0	118E+06	4.20E-08	MDA	1.81E+05	0.007595634	0.054093		0.10177	
CR	well	6	4	6	6	6	6	1	Bicron	0	118E+06	4.20E-08	MDA	1.81E+05	0.007595634				
CR	well	7	4	6	6	6	6	1	Bicron	0	118E+06	4.20E-08	MDA	1.81E+05	0.007595634				
CR	well	8	4	6	6	6	6	1	Bicron	0	118E+06	4.20E-08	MDA	1.81E+05	0.007595634				
CR	well	9	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	1.81E+05	0.007595634				
CR	well	10	4	6	4	6	4	1	Bicron	0	118E+06	4.20E-08	MDA	1.81E+05	0.007595634				
CR	well	11	4	6	6	6	6	1	Bicron	0	118E+06	4.20E-08	MDA	1.81E+05	0.007595634				
CR	well	12	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	1.81E+05	0.007595634				
CR	well	13	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	1.81E+05	0.007595634				
CR	well	14	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	1.81E+05	0.007595634				
CR	well	15	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	1.81E+05	0.007595634				
CR	well	16	4	15	20	15	30	15	Bicron	15	8.49E+06	3.03E-07	MDA	2.15E+04	0.00681145				
CR	well	17	4	20	20	4	1	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	18	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	19	4	7	7	7	7	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	20	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	21	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	22	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	23	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	24	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	25	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	26	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	27	4	4	4	4	4	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	28	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	29	4	7	7	7	7	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	30	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	31	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	32	4	4	4	4	4	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	33	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	34	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	35	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	36	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	37	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	38	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	39	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	40	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	41	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	42	4	4	4	4	4	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	43	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	44	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	45	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	46	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	47	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	48	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	49	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	50	4	6	6	6	6	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	51	4	6	6	6	6	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	52	4	6	6	6	6	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				
CR	well	53	4	5	5	5	5	1	Bicron	0	118E+06	4.20E-08	MDA	2.15E+04	0.00681145				

Shot area
HCS
270 nC&G

STIRVJ
Surfact

STIRVJ n. area

MDA Flag
area (cm²)

STIRVJ/cm²

ppm/100cm²

Am241Poz

meters/m²

meters/m²

30cm
shielded
unshielded

30cm
shielded
unshielded

30cm
shielded
unshielded

30cm
shielded
unshielded

30cm
shielded
unshielded

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unshielded

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shielded
unshielded

30cm
shielded
unshielded

Location	Position	Survey point	Big	Contact shielded	Contact unshielded	30cm shielded	30cm unshielded	meters/m ²	meters/m ²	Am241Poz	ppm/100cm ²	STIRVJ/cm ²	MDA Flag area (cm ²)	STIRVJ n. area	STIRVJ Surfact	Room	Shot area HCS	File # 270 nC&G
Starwell 4 wellhead		17	1	1	1	1	1	1	2	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		18	1	1	1	1	1	2	2	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		19	1	3	3	2	2	2	2	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		20	1	0.6	0.6	1	1	2	2	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		21	1	1	1	3.8	3.8	2	2	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		22	1	1	1	5	5	1	1	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		23	5	5	5	5	5	1	1	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		24	5	5	5	5	5	1	1	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		25	5	5	5	5	5	1	1	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		26	5	5	5	5	5	1	1	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		27	5	5	5	5	5	1	1	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		28	5	5	5	5	5	1	1	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		29	5	5	5	5	5	1	1	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		30	5	5	5	5	5	1	1	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		31	5	5	5	5	5	1	1	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		32	5	5	5	5	5	1	1	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		33	5	5	5	5	5	1	1	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		34	5	5	5	5	5	1	1	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		35	5	5	5	5	5	1	1	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		36	5	5	5	5	5	1	1	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		37	5	5	5	5	5	1	1	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		38	5	5	5	5	5	1	1	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		39	5	5	5	5	5	1	1	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		40	5	5	5	5	5	1	1	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		41	5	5	5	5	5	1	1	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		42	5	5	5	5	5	1	1	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		43	5	5	5	5	5	1	1	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		44	5	5	5	5	5	1	1	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		45	1	2.4	2.4	15	15	2	2	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		46	5	5	5	5	5	1	1	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		47	5	5	5	5	5	1	1	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		48	1	1	1	1	1	2	2	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		49	1	1	1	1	1	2	2	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		50	1	4	4	1	1	2	2	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		51	1	1	1	1	1	2	2	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		52	1	1.5	1.5	4.6	4.6	2	2	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
Starwell 4 wellhead		53	1	0.6	0.6	0.6	0.6	2	2	0	588E+05	2.10E-08	103E+04	0.000216119			0 050885	
phwell A		5	15	48	20	50	50	1	1	30	1.70E+07	6.06E-07	2.50E+03	0.001515	0.681604		0 879753	
phwell B		5	16	56	54	76	76	1	1	20	1.13E+07	4.04E-07	2.50E+03	0.001901			0 68317	
phwell C		5	12	208	5	208	208	1	1	195	1.10E+08	3.94E-06	2.50E+03	0.0098475			6 263411	
phwell D		5	7	1.9	1.9	1.9	1.9	1	1	90	5.09E+07	1.82E-06	2.50E+03	0.004545			2 939266	
phwell E		5	15	808	8	408	408	1	1	392	2.22E+08	7.92E-06	2.50E+03	0.019796			12 80214	
phwell F		5	20	1.808	1.5	500	500	1	1	485	2.75E+08	9.80E-06	2.50E+03	0.0244925			15 83938	
phwell G		5	50	1.808	1.6	600	600	1	1	584	3.31E+08	1.18E-05	2.50E+03	0.029492			19 07257	
phwell H		5	60	7008	15	3008	3008	1	1	2985	1.69E+09	6.03E-05	2.50E+03	0.1507425			97 48567	above limit
phwell I		5	208	9008	15	1708	1708	1	1	1685	9.54E+08	3.40E-05	2.50E+03	0.0650925			55 02296	
phwell J		5	1308	14000	14	7008	7008	1	1	6988	3.95E+09	1.41E-04	2.50E+03	0.352793			228 1524	above limit
phwell K		5	108	9008	70	3008	3008	1	1	2930	1.66E+09	5.92E-05	2.50E+03	0.147365			95 66545	above limit
phwell L		5	208	9500	50	3508	3508	1	1	3450	1.95E+09	6.92E-05	2.50E+03	0.174225			112 6719	above limit
phwell M		5	35	2008	20	808	808	1	1	760	4.41E+08	1.59E-05	2.50E+03	0.03939			25 47364	
phwell N		5	20	180	20	110	110	1	1	100	5.66E+07	2.02E-06	2.50E+03	0.00505			3 265852	
phwell O		5	70	3500	30	808	808	1	1	770	4.36E+08	1.56E-05	2.50E+03	0.038805			25 14708	
phwell P		5	108	3500	58	1508	1508	1	1	1450	8.21E+08	2.93E-05	2.50E+03	0.073225			47 35485	
phwell Q		5	108	6008	198	2008	2008	1	1	1900	1.08E+09	3.84E-05	2.50E+03	0.09595			62 05118	
phwell R		5	358	18008	158	3508	3508	1	1	5350	3.03E+09	1.08E-04	2.50E+03	0.270175			174 7231	above limit
phwell S		5	508	25000	148	18008	18008	1	1	9860	5.53E+09	1.99E-04	2.50E+03	0.00117295			322 013	above limit
phwell A		5	15	15	12	10	10	1	1	-2	1.31E+06	4.69E-08	2.50E+03	0.000117295			0 075565	
phwell B		5	18	15	12	18	18	1	1	6	3.40E+06	1.21E-07	2.50E+03	0.000303			0 195951	
phwell C		5	5	60	4	50	50	1	1	66	3.74E+07	1.33E-06	2.50E+03	0.003333			2 155462	
phwell D		5	5	60	4	50	50	1	1	46	2.60E+07	9.29E-07	2.50E+03	0.002325			1 502292	
phwell E		5	18	108	8	70	70	1	1	62	3.51E+07	1.25E-06	2.50E+03	0.003131			2 024028	
phwell F		5	16	148	7	119	119	1	1	123	6.96E+07	2.48E-06	2.50E+03	0.0062115			4 016997	
phwell G		5	16	808	12	158	158	1	1	138	7.81E+07	2.79E-06	2.50E+03	0.008989			4 908975	
phwell H		5	12	108	12	408	408	1	1	388	2.20E+08	7.84E-06	2.50E+03	0.019584			12 6715	
phwell I		5	18	3008	15	700	700	1	1	685	3.88E+08	1.38E-05	2.50E+03	0.0346925			22 37108	

west well hot area
S 816202

location	point	survey point	big	contact shielded	contact unshielded	30cm shielded	30cm unshielded	metereads	Am241Dose	50m100cm2	100cm2	MDA Flg	greatcm2	g(TRU) in area	room	Flg L	Flg R
phwall	J	2	5	20	400	15	1000	1	985	5.58E+08	1.99E-05	2.50E+03	0.0497425	0.075855	32	15884	2.0 m
phwall	K	2	5	20	1000	30	1100	1	1070	6.06E+08	2.16E-05	2.50E+03	0.054035	0.075855	34	94481	2.0 m
phwall	L	2	5	15	100	20	500	1	480	2.72E+08	9.70E-06	2.50E+03	0.02424	0.261268	15	67609	2.0 m
phwall	M	2	5	15	50	25	120	1	105	5.94E+07	2.12E-06	2.50E+03	0.0053025	1.959511	3	429144	2.0 m
phwall	N	2	5	10	50	20	80	1	360	3.40E+07	1.21E-06	2.50E+03	0.00303	0.65317	11	75707	2.0 m
phwall	O	2	5	25	450	40	400	1	1030	2.04E+08	7.27E-06	2.50E+03	0.01818	22.88096	33	63827	2.0 m
phwall	P	2	5	25	350	50	750	1	700	3.96E+08	1.41E-05	2.50E+03	0.03335	191.3789	191	3789	above limit
phwall	Q	2	5	250	7500	140	6000	1	5860	3.32E+09	1.18E-04	2.50E+03	0.29593	318.4205	318	4205	above limit
phwall	R	2	5	1000	10000	240	10000	1	9750	5.52E+09	1.97E-04	2.50E+03	0.482375	0.075855	0	075855	2.0 m
phwall	S	3	5	10	15	8	10	1	2	1.31E+06	4.69E-08 MDA	2.50E+03	0.000117295	0.075855	0	075855	2.0 m
phwall	T	3	5	7	10	8	10	1	2	1.31E+06	4.69E-08 MDA	2.50E+03	0.000117295	0.359244	0	359244	2.0 m
phwall	U	3	5	5	10	7	10	1	11	6.23E+06	2.22E-07	2.50E+03	0.0005955	0.261268	1	69633	2.0 m
phwall	V	3	5	8	12	10	10	1	8	4.53E+06	1.62E-07	2.50E+03	0.000404	1.959511	1	959511	2.0 m
phwall	W	3	5	12	90	10	70	1	45	2.55E+07	9.09E-07	2.50E+03	0.0022725	0.65317	0	65317	2.0 m
phwall	X	3	5	10	130	40	60	1	60	3.40E+07	1.21E-06	2.50E+03	0.00101	1.959511	1	959511	2.0 m
phwall	Y	3	5	10	70	10	70	1	60	3.40E+07	1.21E-06	2.50E+03	0.00101	2.61268	2	61268	2.0 m
phwall	Z	3	5	10	60	10	90	1	60	3.40E+07	1.21E-06	2.50E+03	0.00101	1.959511	1	959511	2.0 m
phwall	AA	3	5	10	60	10	70	1	60	3.40E+07	1.21E-06	2.50E+03	0.00101	1.959511	1	959511	2.0 m
phwall	AB	3	5	10	25	20	50	1	35	1.98E+07	7.07E-07	2.50E+03	0.0017675	1.13048	1	13048	2.0 m
phwall	AC	3	5	8	25	15	20	1	15	8.49E+06	3.03E-07	2.50E+03	0.0007575	0.489878	0	489878	2.0 m
phwall	AD	3	5	5	25	20	35	1	15	8.49E+06	3.03E-07	2.50E+03	0.0007575	0.489878	0	489878	2.0 m
phwall	AE	3	5	25	450	55	500	1	445	2.52E+08	8.99E-08	2.50E+03	0.0224725	14.53304	14	53304	2.0 m
phwall	AF	3	5	30	1200	90	1000	1	910	5.15E+08	1.94E-05	2.50E+03	0.045955	29.71925	29	71925	2.0 m
phwall	AG	3	5	60	2000	100	2000	1	1900	1.08E+09	3.84E-05	2.50E+03	0.09595	62.05118	62	05118	2.0 m
phwall	AH	3	5	160	2500	145	6000	1	5855	3.31E+09	1.18E-04	2.50E+03	0.2956775	191.2156	191	2156	above limit
phwall	AI	3	5	90	4000	140	2000	1	1860	1.05E+09	3.76E-05	2.50E+03	0.09383	60.74484	60	74484	2.0 m
phwall	AJ	4	5	2	2	2	5	1	3	1.70E+06	6.06E-08 MDA	2.50E+03	0.0001515	0.097976	0	097976	2.0 m
phwall	AK	4	5	3	4	3	4	1	8	1.31E+06	4.69E-08 MDA	2.50E+03	0.000117295	0.075855	0	075855	2.0 m
phwall	AL	4	5	3	4	3	16	1	8	4.53E+06	1.62E-07	2.50E+03	0.000404	0.261268	0	261268	2.0 m
phwall	AM	4	5	3	7	3	16	1	7	3.96E+06	1.41E-07	2.50E+03	0.0003535	0.326585	0	326585	2.0 m
phwall	AN	4	5	6	16	6	16	1	10	5.66E+06	2.02E-07	2.50E+03	0.000505	0.376585	0	376585	2.0 m
phwall	AO	4	5	5	20	5	20	1	25	1.42E+07	5.09E-07	2.50E+03	0.0012625	0.816463	0	816463	2.0 m
phwall	AP	4	5	5	45	5	45	1	35	1.98E+07	7.07E-07	2.50E+03	0.0017675	1.13048	1	13048	2.0 m
phwall	AQ	4	5	5	20	5	25	1	20	1.13E+07	4.04E-07	2.50E+03	0.0017675	0.65317	0	65317	2.0 m
phwall	AR	4	5	5	10	10	20	1	10	5.66E+06	2.02E-07	2.50E+03	0.000505	0.326585	0	326585	2.0 m
phwall	AS	4	5	5	20	10	20	1	20	1.13E+07	4.04E-07	2.50E+03	0.000505	0.326585	0	326585	2.0 m
phwall	AT	4	5	5	15	10	35	1	25	1.42E+07	5.09E-07	2.50E+03	0.0012625	0.816463	0	816463	2.0 m
phwall	AU	4	5	8	20	15	20	1	15	8.49E+06	3.03E-07	2.50E+03	0.0007575	0.489878	0	489878	2.0 m
phwall	AV	4	5	5	20	8	30	1	22	1.25E+07	4.44E-07	2.50E+03	0.001111	0.716467	0	716467	2.0 m
phwall	AW	4	5	20	350	20	250	1	230	1.30E+08	4.65E-06	2.50E+03	0.011615	7.511459	7	511459	2.0 m
phwall	AX	4	5	20	170	45	350	1	305	1.73E+08	6.16E-06	2.50E+03	0.0154025	9.960847	9	960847	2.0 m
phwall	AY	4	5	60	700	120	900	1	780	4.41E+08	1.58E-05	2.50E+03	0.03939	29.47384	29	47384	2.0 m
phwall	AZ	4	5	40	950	40	1100	1	1060	6.00E+08	2.11E-05	2.50E+03	0.02333	34.61803	34	61803	2.0 m
phwall	BA	4	5	45	1000	45	1400	1	1355	7.67E+08	2.74E-05	2.50E+03	0.0684275	44.25229	44	25229	2.0 m
phwall	BB	4	5	10	15	8	10	1	2	1.31E+06	4.69E-08 MDA	2.50E+03	0.000117295	0.075855	0	075855	2.0 m
phwall	BC	4	5	10	12	10	12	1	2	1.31E+06	4.69E-08 MDA	2.50E+03	0.000117295	0.075855	0	075855	2.0 m
phwall	BD	4	5	15	20	20	25	1	5	2.03E+06	1.01E-07	2.50E+03	0.0002525	0.163293	0	163293	2.0 m
phwall	BE	4	5	15	25	20	30	1	10	5.66E+06	2.02E-07	2.50E+03	0.000505	0.326585	0	326585	2.0 m
phwall	BF	4	5	30	45	30	50	1	20	1.13E+07	4.04E-07	2.50E+03	0.00101	0.65317	0	65317	2.0 m
phwall	BG	4	5	30	130	45	105	1	60	3.40E+07	1.21E-06	2.50E+03	0.00101	1.959511	1	959511	2.0 m
phwall	BH	4	5	30	160	25	120	1	95	5.34E+07	1.92E-06	2.50E+03	0.0047975	3.102589	3	102589	2.0 m
phwall	BI	4	5	15	50	35	70	1	43	2.55E+07	9.09E-07	2.50E+03	0.0022725	1.469633	1	469633	2.0 m
phwall	BJ	4	5	20	35	35	50	1	15	8.49E+06	3.03E-07	2.50E+03	0.0007575	0.489878	0	489878	2.0 m
phwall	BJ	4	5	20	40	30	45	1	15	8.49E+06	3.03E-07	2.50E+03	0.0007575	0.489878	0	489878	2.0 m

Location	Section	Survey Point	ESG	Contact Electrical	Contact Unshielded	30cm shielded	30cm unshielded	meter/ft	meter/ft	Ant 2410228	50m/100cm	QTR (V) cm	MDA P25	QTR (V) in area	QTR (V) Surface	Room	Spot area sq-ft	Plan #
phwall	K	5	5	48	40	39	85	1	Bicon	55	3 11E+07	1 11E+06		2 50E+03	0 0027775		1 786218	
phwall	L	5	5	20	48	40	90	1	Bicon	50	2 43E+07	1 01E+06		2 50E+03	0 002525		1 632926	
phwall	M	5	5	10	40	18	70	1	Bicon	60	3 40E+07	1 21E+06		2 50E+03	0 00303		1 959511	
phwall	N	5	5	18	80	15	145	1	Bicon	130	7 36E+07	2 61E+06		2 50E+03	0 008585		4 245607	
phwall	O	5	5	15	175	38	350	1	Bicon	320	1 81E+08	6 46E+06		2 50E+03	0 01616		20 45073	
phwall	P	5	5	10	700	68	700	1	Bicon	640	3 62E+08	1 29E+05		2 50E+03	0 03232		20 90145	
phwall	Q	5	5	90	700	70	950	1	Bicon	880	4 88E+08	1 78E+05		2 50E+03	0 04444		28 73949	
phwall	R	5	5	100	600	100	1300	1	Bicon	1200	6 79E+08	2 42E+05		2 50E+03	0 0606		39 19022	
phwall	S	5	5	100	500	100	1800	1	Bicon	900	5 09E+08	1 82E+05		2 50E+03	0 04545		29 39266	
phwall	A	6	6	7	10	8	10	1	Bicon	2	1 31E+06	4 69E+08 MDA		2 50E+03	0 000117295		0 075855	
phwall	B	6	6	5	10	12	14	15	Bicon	4	2 26E+06	6 08E+08		2 50E+03	0 0002202		0 130634	
phwall	C	6	6	5	12	30	15	40	Bicon	25	1 42E+07	5 05E+07		2 50E+03	0 0012625		0 816463	
phwall	D	6	6	5	7	30	10	30	Bicon	20	1 13E+07	4 04E+07		2 50E+03	0 00101		0 65317	
phwall	E	6	6	5	10	40	12	50	Bicon	38	2 15E+07	7 68E+07		2 50E+03	0 001919		1 241024	
phwall	F	6	6	5	15	60	28	70	Bicon	50	2 83E+07	1 01E+06		2 50E+03	0 002525		1 632926	
phwall	G	6	6	5	15	50	15	60	Bicon	45	2 55E+07	9 08E+07		2 50E+03	0 0022725		1 469633	
phwall	H	6	6	5	18	40	10	50	Bicon	30	1 70E+07	6 06E+07		2 50E+03	0 001515		0 978755	
phwall	I	6	6	5	15	50	20	50	Bicon	60	3 40E+07	1 21E+06		2 50E+03	0 00303		1 959511	
phwall	J	6	6	5	12	30	20	50	Bicon	30	1 70E+07	6 06E+07		2 50E+03	0 001515		0 978755	
phwall	K	6	6	5	14	40	20	60	Bicon	30	1 70E+07	6 06E+07		2 50E+03	0 001515		0 978755	
phwall	L	6	6	5	10	45	10	60	Bicon	40	2 26E+07	8 08E+07		2 50E+03	0 00202		1 306341	
phwall	M	6	6	5	10	65	20	140	Bicon	50	2 83E+07	1 01E+06		2 50E+03	0 002525		1 632926	
phwall	N	6	6	5	30	65	20	140	Bicon	120	6 79E+07	2 42E+06		2 50E+03	0 00806		3 919022	
phwall	O	6	6	5	35	90	20	200	Bicon	180	1 02E+08	3 64E+06		2 50E+03	0 00909		5 878533	
phwall	P	6	6	5	90	600	30	500	Bicon	470	2 66E+08	9 49E+06		2 50E+03	0 023735		15 3495	
phwall	Q	6	6	5	60	600	20	700	Bicon	680	3 85E+08	1 37E+05		2 50E+03	0 03434		22 20779	
phwall	R	6	6	5	70	900	60	800	Bicon	720	4 08E+08	1 45E+05		2 50E+03	0 03636		23 51413	
phwall	S	6	6	5	60	700	70	600	Bicon	530	3 00E+08	1 07E+05		2 50E+03	0 028765		17 30901	
phwall	A	7	7	5	2	15	5	10	Bicon	5	2 83E+06	1 01E+07		2 50E+03	0 0002525		0 163293	
phwall	B	7	7	5	5	10	5	5	Bicon	0	1 31E+06	4 69E+08 MDA		2 50E+03	0 000117295		0 075855	
phwall	C	7	7	5	10	25	10	30	Bicon	20	1 13E+07	4 04E+07		2 50E+03	0 00101		0 65317	
phwall	D	7	7	5	10	60	18	40	Bicon	30	1 70E+07	6 06E+07		2 50E+03	0 001515		0 978755	
phwall	E	7	7	5	15	60	10	50	Bicon	40	2 26E+07	8 08E+07		2 50E+03	0 00202		1 306341	
phwall	F	7	7	5	20	500	15	150	Bicon	135	7 64E+07	2 73E+06		2 50E+03	0 0068175		4 4089	
phwall	G	7	7	5	10	85	10	90	Bicon	80	4 53E+07	1 62E+06		2 50E+03	0 00404		2 612681	
phwall	H	7	7	5	10	30	20	40	Bicon	20	1 13E+07	4 04E+07		2 50E+03	0 00101		0 65317	
phwall	I	7	7	5	5	20	10	30	Bicon	20	1 13E+07	4 04E+07		2 50E+03	0 00101		0 65317	
phwall	J	7	7	5	10	45	25	65	Bicon	20	1 13E+07	4 04E+07		2 50E+03	0 00101		0 65317	
phwall	K	7	7	5	10	45	25	65	Bicon	40	2 26E+07	8 08E+07		2 50E+03	0 00202		1 306341	
phwall	L	7	7	5	1	80	1	93	Bicon	92	5 21E+07	1 86E+06		2 50E+03	0 004648		3 904583	
phwall	M	7	7	5	1	200	1	345	Bicon	344	1 95E+08	6 95E+06		2 50E+03	0 017372		11 23453	
phwall	N	7	7	5	1	205	17	180	Bicon	163	9 23E+07	3 29E+06		2 50E+03	0 007777		5 323338	
phwall	O	7	7	5	1	403	18	172	Bicon	154	8 72E+07	3 11E+06		2 50E+03	0 0082315		5 029411	
phwall	P	7	7	5	30	500	50	500	Bicon	450	2 55E+08	9 09E+06		2 50E+03	0 022725		14 69633	
phwall	Q	7	7	5	30	500	20	600	Bicon	500	3 28E+08	1 17E+05		2 50E+03	0 02928		18 94194	
phwall	R	7	7	5	80	800	30	800	Bicon	7970	4 51E+09	1 61E+04		2 50E+03	0 402485		260 2684 above limit	
phwall	S	7	7	5	7	200	20	1800	Bicon	1780	1 01E+09	3 60E+05		2 50E+03	0 008989		58 13216	
phwall	A	8	8	5	2	5	5	5	Bicon	0	1 31E+06	4 69E+08 MDA		2 50E+03	0 000117295		0 075855	
phwall	B	8	8	5	2	3	3	3	Bicon	1	1 31E+06	4 69E+08 MDA		2 50E+03	0 000117295		0 075855	
phwall	C	8	8	5	1	4	2	5	Bicon	3	1 70E+06	6 06E+08 MDA		2 50E+03	0 0001515		0 097976	
phwall	D	8	8	5	2	6	3	6	Bicon	3	1 70E+06	6 06E+08 MDA		2 50E+03	0 0001515		0 097976	
phwall	E	8	8	5	10	20	30	40	Bicon	10	5 66E+06	2 02E+07		2 50E+03	0 000505		0 326585	
phwall	F	8	8	5	20	50	20	40	Bicon	20	1 13E+07	4 04E+07		2 50E+03	0 00101		0 65317	
phwall	G	8	8	5	15	60	30	90	Bicon	60	3 40E+07	1 21E+06		2 50E+03	0 00303		1 959511	
phwall	H	8	8	5	15	60	30	90	Bicon	60	3 40E+07	1 21E+06		2 50E+03	0 00303		1 959511	
phwall	I	8	8	5	2	25	2	31	Bicon	28	1 64E+07	5 86E+07		2 50E+03	0 0014645		0 947097	
phwall	J	8	8	5	2	24	2	45	Bicon	43	2 43E+07	8 89E+07		2 50E+03	0 0021715		1 404316	
phwall	K	8	8	5	2	30	2	40	Bicon	38	2 15E+07	7 68E+07		2 50E+03	0 001919		1 241024	

Location	Formion	Survey Point	bs	contact	30cm	30cm	metcode	metentry	Am241Dose	gpm/100cm2	RCRTRUPcm2	MDA.Fiber	RCRTRUP in area	CRTBL	room	Spot Area	Fiber
				unsuspended	suspended	unsuspended								surface		m ²	*10 m ² CA
phwall	L	8	9	2	35	2	56	1	Bicron	48	2 72E+07	9 70E-07	2 50E+03	0 002424		1 567609	
phwall	M	8	5	2	93	2	82	1	Bicron	80	4 53E+07	1 62E-06	2 50E+03	0 00404		2 612681	
phwall	N	8	5	2	48	1	134	1	Bicron	128	7 24E+07	2 59E-06	2 50E+03	0 006464		4 18029	
phwall	O	8	5	2	140	2	208	3	Bicron	298	1 69E+08	6 02E-06	2 50E+03	0 015049		9 732236	
phwall	P	8	5	80	400	20	308	1	Bicron	280	1 58E+08	5 68E-06	2 50E+03	0 01414		9 144384	
phwall	Q	8	5	70	400	20	500	1	Bicron	480	2 72E+08	9 70E-06	2 50E+03	0 02424		15 67609	
phwall	R	8	5	50	700	50	800	1	Bicron	750	4 25E+08	1 52E+05	2 50E+03	0 037875		24 49389	
phwall	S	8	5	5	240	5	1100	1	Bicron	1295	7 33E+08	2 62E-05	2 50E+03	0 0653975		42 29278	
phwall	A	9	5	5	20	5	10	1	Bicron	5	2 83E+06	1 01E-07	2 50E+03	0 0002525		0 163293	
phwall	B	9	5	6	6	10	12	1	Bicron	2	1 31E+06	4 69E-08 MDA	2 50E+03	0 000117295		0 075855	
phwall	C	9	5	10	28	6	50	1	Bicron	44	2 49E+07	8 89E-07	2 50E+03	0 002222		1 436975	
phwall	D	9	5	10	50	10	50	1	Bicron	40	2 26E+07	8 08E-07	2 50E+03	0 00202		1 306341	
phwall	E	9	5	10	50	6	40	1	Bicron	34	1 92E+07	6 87E-07	2 50E+03	0 001717		1 11039	
phwall	F	9	5	9	50	4	60	1	Bicron	56	3 17E+07	1 13E-06	2 50E+03	0 002828		1 828877	
phwall	G	9	5	30	70	30	60	1	Bicron	30	1 70E+07	6 06E-07	2 50E+03	0 001515		0 879755	
phwall	H	9	5	10	10	10	30	1	Bicron	20	1 13E+07	4 04E-07	2 50E+03	0 00101		0 65317	
phwall	I	9	5	1	18	1	24	1	Bicron	23	1 30E+07	4 69E-07	2 50E+03	0 0011615		0 751146	
phwall	J	9	5	1	20	1	19	1	Bicron	28	1 59E+07	5 66E-07	2 50E+03	0 001414		0 814430	
phwall	K	9	5	1	27	1	23	1	Bicron	31	1 75E+07	6 20E-07	2 50E+03	0 0015655		1 012414	
phwall	L	9	5	1	27	1	41	1	Bicron	58	3 28E+07	1 17E-06	2 50E+03	0 002929		1 306341	
phwall	M	9	5	1	42	1	59	1	Bicron	40	2 28E+07	8 08E-07	2 50E+03	0 001616		1 894194	
phwall	N	9	5	1	85	1	33	1	Bicron	32	1 81E+07	6 46E-07	2 50E+03	0 001616		1 045073	
phwall	O	9	5	1	190	1	90	1	Bicron	89	5 04E+07	1 80E-06	2 50E+03	0 004945		2 906608	
phwall	P	9	5	200	500	20	160	1	Bicron	140	7 92E+07	2 83E-06	2 50E+03	0 00707		4 572192	
phwall	Q	9	5	50	400	30	400	1	Bicron	370	2 09E+08	7 47E-06	2 50E+03	0 016685		12 08365	
phwall	R	9	5	1000	8000	50	700	1	Bicron	650	3 68E+08	1 31E-05	2 50E+03	0 032825		21 22604	
phwall	S	9	5	400	2400	60	1200	1	Bicron	1190	6 74E+08	2 40E-05	2 50E+03	0 060095		38 86363	
phwall	A	10	5	7	7	7	9	1	Bicron	0	1 31E+06	4 69E-08 MDA	2 50E+03	0 000117295		0 075855	
phwall	B	10	5	7	7	7	9	1	Bicron	2	1 31E+06	4 69E-08 MDA	2 50E+03	0 000117295		0 075855	
phwall	C	10	5	9	50	5	40	1	Bicron	55	3 11E+07	1 11E-06	2 50E+03	0 0027775		1 796218	
phwall	D	10	5	5	70	5	50	1	Bicron	45	2 58E+07	9 09E-07	2 50E+03	0 0027775		1 469633	
phwall	E	10	5	1	60	2	85	1	Bicron	83	4 70E+07	1 68E-06	2 50E+03	0 0041915		2 710657	
phwall	F	10	5	1	60	1	63	1	Bicron	82	3 51E+07	1 29E-06	2 50E+03	0 003131		2 024828	
phwall	G	10	5	1	13	1	22	1	Bicron	21	1 19E+07	4 24E-07	2 50E+03	0 0010605		0 665629	
phwall	H	10	5	1	15	1	22	1	Bicron	21	1 95E+07	4 24E-07	2 50E+03	0 0010605		0 665629	
phwall	I	10	5	1	16	1	26	1	Bicron	25	1 42E+07	5 09E-07	2 50E+03	0 0012675		0 816463	
phwall	J	10	5	1	24	1	30	1	Bicron	29	1 64E+07	5 86E-07	2 50E+03	0 0014645		0 947097	
phwall	K	10	5	1	20	1	28	1	Bicron	27	1 53E+07	5 49E-07	2 50E+03	0 0013635		0 86178	
phwall	L	10	5	1	20	1	35	1	Bicron	34	1 92E+07	6 87E-07	2 50E+03	0 001717		1 11039	
phwall	M	10	5	1	60	1	48	1	Bicron	47	2 68E+07	9 49E-07	2 50E+03	0 0023735		1 35495	
phwall	N	10	5	1	26	1	59	1	Bicron	58	3 28E+07	1 17E-06	2 50E+03	0 007929		1 894194	
phwall	O	10	5	2	39	2	102	1	Bicron	100	5 65E+07	2 02E-06	2 50E+03	0 0027775		3 265852	
phwall	P	10	5	10	50	5	60	1	Bicron	55	3 11E+07	1 11E-06	2 50E+03	0 0027775		1 796218	
phwall	Q	10	5	10	130	12	120	1	Bicron	100	6 11E+07	2 18E-06	2 50E+03	0 005454		3 52712	
phwall	R	10	5	10	100	15	150	1	Bicron	135	7 64E+07	2 79E-06	2 50E+03	0 0068175		4 4089	
phwall	S	10	5	4	240	3	210	1	Bicron	2007	1 31E+09	4 69E-05	2 50E+03	0 1165035		75 3432 above limit	
phwall	A	11	5	5	7	8	10	1	Bicron	2	1 31E+06	4 69E-08 MDA	3 09E+04	0 00148784		0 075855	
phwall	B	11	5	5	7	8	10	1	Bicron	2	1 31E+06	4 69E-08 MDA	2 50E+03	0 000117295		0 075855	
phwall	C	11	5	8	20	10	30	1	Bicron	20	1 13E+07	4 04E-07	2 50E+03	0 00101		0 65317	
phwall	D	11	5	10	15	12	20	1	Bicron	8	4 53E+06	1 62E-07	2 50E+03	0 000404		0 261268	
phwall	E	11	5	1	37	1	39	1	Bicron	38	2 15E+07	7 68E-07	2 50E+03	0 001919		1 241024	
phwall	F	11	5	1	10	1	19	1	Bicron	17	1 02E+07	3 64E-07	2 50E+03	0 000909		0 587853	
phwall	G	11	5	1	18	1	18	1	Bicron	18	1 02E+07	3 43E-07	2 50E+03	0 0008365		0 555195	
phwall	H	11	5	1	15	1	23	1	Bicron	20	1 13E+07	4 04E-07	2 50E+03	0 00101		0 65317	
phwall	I	11	5	1	13	1	22	1	Bicron	21	1 19E+07	4 24E-07	2 50E+03	0 0010605		0 665629	
phwall	J	11	5	1	15	1	25	1	Bicron	24	1 36E+07	4 85E-07	2 50E+03	0 014970139		0 783804	
phwall	K	11	5	1	16	1	26	1	Bicron	25	1 42E+07	5 09E-07	2 50E+03	0 0012675		0 816463	
phwall	L	11	5	1	17	1	33	1	Bicron	32	1 81E+07	6 46E-07	2 50E+03	0 001616		1 045073	

Location	Portion	Survey Point	BL	Contact shielded	Contact unshielded	30cm shielded	30cm unshielded	metercode	metercode	Am241Dose	gsm100cm2	gTRUJcm2	MDA File	gTRUJ in area	Surface	Room	Std Area	Plan #
phwall	N1	11	5	1	24	1	42	1	Bicron	41	2.32E+07	8.28E-07	2.50E+03	0.0020705		1.33899	270	PC28
phwall	N	11	5	1	47	1	55	1	Bicron	54	3.08E+07	1.09E-06	2.50E+03	0.002727		1.76356		
phwall	O	11	5	1	138	1	59	1	Bicron	58	3.28E+07	1.17E-06	2.50E+03	0.002929		1.89494		
phwall	P	11	5	5	15	10	38	1	Bicron	20	1.13E+07	4.04E-07	2.50E+03	0.00101		0.65317		
phwall	Q	11	5	8	68	8	98	1	Bicron	82	4.64E+07	1.66E-06	2.50E+03	0.004141		2.67798		
phwall	R	11	5	7	180	18	130	1	Bicron	120	6.79E+07	2.47E-06	2.50E+03	0.00608		3.91922		
phwall	S	11	5	9	1.569	3	1.008	1	Bicron	1997	1.13E+09	4.03E-05	2.50E+03	0.1008485		65.21908		
phwall	A		5					1	Bicron	0	1.31E+06	4.69E-08 MDA	0.00E+00	0		0.075855		
phwall	B		5					1	Bicron	0	1.31E+06	4.69E-08 MDA	0.00E+00	0		0.075855		
phwall	C		5					1	Bicron	0	1.31E+06	4.69E-08 MDA	0.00E+00	0		0.075855		
phwall	D		5					1	Bicron	0	1.31E+06	4.69E-08 MDA	0.00E+00	0		0.075855		
phwall	E		5					1	Bicron	0	1.31E+06	4.69E-08 MDA	0.00E+00	0		0.075855		
phwall	F		5					1	Bicron	0	1.31E+06	4.69E-08 MDA	0.00E+00	0		0.075855		
phwall	G		5					1	Bicron	0	1.31E+06	4.69E-08 MDA	0.00E+00	0		0.075855		
phwall	H		5					1	Bicron	0	1.31E+06	4.69E-08 MDA	0.00E+00	0		0.075855		
phwall	I		5					1	Bicron	0	1.31E+06	4.69E-08 MDA	0.00E+00	0		0.075855		
phwall	J	12	5	18	20	11	25	1	Bicron	13	7.36E+06	2.63E-07	2.50E+03	0.0008565		0.075855		
phwall	K	12	5	18	25	12	25	1	Bicron	13	7.36E+06	2.63E-07	2.50E+03	0.0008565		0.075855		
phwall	L	12	5	18	25	15	30	1	Bicron	15	8.49E+06	3.03E-07	2.50E+03	0.0007575		0.424561		
phwall	M	12	5	18	26	18	25	1	Bicron	15	8.49E+06	3.03E-07	2.50E+03	0.0007575		0.489878		
phwall	N	12	5	18	26	13	25	1	Bicron	22	1.25E+07	4.44E-07	2.50E+03	0.0007575		0.489878		
phwall	O	12	5	19	25	28	35	1	Bicron	15	8.49E+06	3.03E-07	2.50E+03	0.0007575		0.718487		
phwall	P	12	5	5	13	10	15	1	Bicron	5	2.83E+06	1.01E-07	2.50E+03	0.002525		0.489878		
phwall	Q	12	5	8	40	5	56	1	Bicron	45	2.55E+07	9.09E-07	2.50E+03	0.022725		0.163293		
phwall	R	12	5	8	70	18	60	1	Bicron	50	2.83E+07	1.01E-06	2.50E+03	0.002525		1.469633		
phwall	S	12	5	8	58	8	60	1	Bicron	52	2.94E+07	1.09E-06	2.50E+03	0.002628		1.632926		
phwall	A		5					1	Bicron	0	1.31E+06	4.69E-08 MDA	0.00E+00	0		1.698243		
phwall	B		5					1	Bicron	0	1.31E+06	4.69E-08 MDA	0.00E+00	0		0.075855		
phwall	C		5					1	Bicron	0	1.31E+06	4.69E-08 MDA	0.00E+00	0		0.075855		
phwall	D		5					1	Bicron	0	1.31E+06	4.69E-08 MDA	0.00E+00	0		0.075855		
phwall	E		5					1	Bicron	0	1.31E+06	4.69E-08 MDA	0.00E+00	0		0.075855		
phwall	F		5					1	Bicron	0	1.31E+06	4.69E-08 MDA	0.00E+00	0		0.075855		
phwall	G		5					1	Bicron	0	1.31E+06	4.69E-08 MDA	0.00E+00	0		0.075855		
phwall	H		5					1	Bicron	0	1.31E+06	4.69E-08 MDA	0.00E+00	0		0.075855		
phwall	I		5					1	Bicron	0	1.31E+06	4.69E-08 MDA	0.00E+00	0		0.075855		
phwall	J	13	5	8	20	13	28	1	Bicron	7	3.96E+06	1.41E-07	2.50E+03	0.0003535		0.075855		
phwall	K	13	5	8	17	12	25	1	Bicron	13	7.36E+06	2.63E-07	2.50E+03	0.0008565		0.424561		
phwall	L	13	5	18	20	14	28	1	Bicron	6	3.40E+06	1.21E-07	2.50E+03	0.0003003		0.195951		
phwall	M	13	5	8	15	12	28	1	Bicron	18	1.02E+07	3.64E-07	2.50E+03	0.000969		0.587843		
phwall	N	13	5	13	20	13	45	1	Bicron	50	2.83E+07	1.01E-06	2.50E+03	0.002525		1.632926		
phwall	O	13	5	18	20	11	35	1	Bicron	24	1.36E+07	4.85E-07	2.50E+03	0.001212		0.783004		
phwall	P	13	5	8	13	7	15	1	Bicron	8	4.53E+06	1.62E-07	2.50E+03	0.000404		0.261288		
phwall	Q	13	5	8	40	7	58	1	Bicron	43	2.43E+07	8.69E-07	2.50E+03	0.0021715		1.404316		
phwall	R	13	5	5	20	18	58	1	Bicron	40	2.28E+07	8.08E-07	2.50E+03	0.00202		1.306341		
phwall	S	13	5	8	40	8	58	1	Bicron	42	2.38E+07	8.48E-07	2.50E+03	0.002121		1.371658		
phwall	A		5					1	Bicron	0	1.31E+06	4.69E-08 MDA	0.00E+00	0		0.075855		
phwall	B		5					1	Bicron	0	1.31E+06	4.69E-08 MDA	0.00E+00	0		0.075855		
phwall	C		5					1	Bicron	0	1.31E+06	4.69E-08 MDA	0.00E+00	0		0.075855		
phwall	D		5					1	Bicron	0	1.31E+06	4.69E-08 MDA	0.00E+00	0		0.075855		
phwall	E		5					1	Bicron	0	1.31E+06	4.69E-08 MDA	0.00E+00	0		0.075855		
phwall	F		5					1	Bicron	0	1.31E+06	4.69E-08 MDA	0.00E+00	0		0.075855		
phwall	G	14	5	27	27	27	27	1	Bicron	0	1.31E+06	4.69E-08 MDA	3.09E+04	0.001448784		0.075855		
phwall	H		5					1	Bicron	0	1.31E+06	4.69E-08 MDA	0.00E+00	0		0.075855		
phwall	I		5					1	Bicron	0	1.31E+06	4.69E-08 MDA	0.00E+00	0		0.075855		
phwall	J	14	5	7	14	18	18	1	Bicron	8	4.53E+06	1.62E-07	2.50E+03	0.000404		0.261288		
phwall	K	14	5	8	16	12	25	1	Bicron	3	1.70E+06	6.06E-08 MDA	2.50E+03	0.000404		0.097978		
phwall	L	14	5	18	20	12	25	1	Bicron	13	7.36E+06	2.63E-07	2.50E+03	0.0008565		0.424561		
phwall	M	14	5	18	20	13	25	1	Bicron	12	8.79E+06	2.42E-07	2.50E+03	0.000606		0.391962		

location	point	survey point	blg	contact shielded	contact unshielded	30cm shielded	30cm unshielded	metercde	intensity	Am241Dose	95m/100cm2	STRAJcm2	MDA Flag	STRAJm area	QTRJ surface	room	Stod area	Fluor
																	MCU	>70 nCUd
phnwall	H	4	5	10	15	18	31	1	Bicron	0	131E+06	4.69E+08	MDA	2.50E+03	0.000117295		0.075855	
phnwall	A	4	5	40	100	60	350	1	Bicron	25	142E+07	5.05E+07		2.50E+03	0.0012625		0.816463	
phnwall	B	5	5	100	1200	200	200	1	Bicron	290	1.64E+08	9.65E+06		2.50E+03	0.014645		9.47097	
phnwall	C	5	5	130	540	140	4000	1	Bicron	500	2.83E+08	1.01E+05		2.50E+03	0.02525		16.32926	
phnwall	J	5	5	20	90	30	130	1	Bicron	3450	2.18E+09	7.78E+05		2.50E+03	0.184425		125.7353	above limit
phnwall	K	5	5	25	100	25	160	1	Bicron	100	5.66E+07	2.02E+06		2.50E+03	0.00505		3.265852	
phnwall	F	5	5					1	Bicron	155	7.64E+07	2.73E+06		2.50E+03	0.0068175		4.4089	
phnwall	G	5	5					1	Bicron	0	1.31E+06	4.69E+08	MDA	2.50E+03	0.000117295		0.075855	
phnwall	H	5	5					1	Bicron	0	1.31E+06	4.69E+08	MDA	2.50E+03	0.000117295		0.075855	
phnwall	I	5	5	10	25	10	45	1	Bicron	0	1.31E+06	4.69E+08	MDA	2.50E+03	0.000117295		0.075855	
phnwall	A	6	5	38	800	15	140	1	Bicron	1435	8.12E+08	7.07E+07		2.50E+03	0.0724675		46.86497	
phnwall	B	6	5	11	63	21	40	1	Bicron	429	2.43E+08	8.67E+06		2.50E+03	0.0216645		14.0105	
phnwall	C	6	5	12	1100	12	90	1	Bicron	938	5.31E+08	1.69E+05		2.50E+03	0.0417360		30.63360	
phnwall	D	6	5	24	2000	82	800	1	Bicron	712	4.03E+08	1.44E+05		2.50E+03	0.035956		23.25286	
phnwall	E	6	5	8	170	8	800	1	Bicron	792	4.48E+08	1.60E+05		2.50E+03	0.035956		25.86554	
phnwall	F	6	5	10	540	8	700	1	Bicron	892	3.92E+08	1.40E+05		2.50E+03	0.034946		22.59969	
phnwall	G	6	5	4	75	5	200	1	Bicron	195	1.10E+08	3.94E+06		2.50E+03	0.0098475		6.368411	
phnwall	H	6	5	4	75	5	210	1	Bicron	215	1.22E+08	4.34E+06		2.50E+03	0.0108575		7.021581	
phnwall	I	6	5	4	65	4	170	1	Bicron	166	9.40E+07	3.35E+06		2.50E+03	0.008303		5.421314	
phnwall	A	7	5	8	140	14	3000	1	Bicron	2984	1.69E+09	6.03E+05		2.50E+03	0.150692		87.45301	above limit
phnwall	B	7	5	10	70	17	310	1	Bicron	313	1.77E+08	6.32E+06		2.50E+03	0.0150685		10.22212	
phnwall	C	7	5	14	175	12	600	1	Bicron	588	3.33E+08	1.19E+05		2.50E+03	0.023694		19.20321	
phnwall	D	7	5	15	215	18	500	1	Bicron	283	1.60E+08	5.78E+06		2.50E+03	0.0142915		9.24236	
phnwall	E	7	5	15	215	18	500	1	Bicron	490	2.77E+08	9.90E+06		2.50E+03	0.024745		16.00267	
phnwall	F	7	5	35	2400	6	500	1	Bicron	494	2.80E+08	9.90E+06		2.50E+03	0.024947		16.13331	
phnwall	G	7	5	4	80	4	170	1	Bicron	166	9.40E+07	3.35E+06		2.50E+03	0.008303		5.421314	
phnwall	H	7	5	4	65	4	115	1	Bicron	111	6.26E+07	2.24E+06		2.50E+03	0.0056025		3.625095	
phnwall	I	7	5	3	65	3	120	1	Bicron	117	6.57E+07	2.36E+06		2.50E+03	0.0059085		3.821048	
phnwall	A	8	5	7	1400	15	2000	1	Bicron	1985	1.12E+09	4.01E+05		2.50E+03	0.1002425		64.82713	
phnwall	B	8	5	7	60	12	240	1	Bicron	238	1.35E+08	4.81E+06		2.50E+03	0.012019		7.77277	
phnwall	C	8	5	12	72	12	211	1	Bicron	210	1.19E+08	4.24E+06		2.50E+03	0.010605		6.858288	
phnwall	D	8	5	48	200	8	1600	1	Bicron	1592	9.01E+08	3.22E+05		2.50E+03	0.080396		51.99236	
phnwall	E	8	5	25	200	5	1200	1	Bicron	1195	6.76E+08	2.41E+05		2.50E+03	0.0603475		39.02693	
phnwall	F	8	5	7	740	7	500	1	Bicron	483	2.79E+08	9.96E+06		2.50E+03	0.0248965		16.10065	
phnwall	G	8	5	7	110	6	165	1	Bicron	159	9.00E+07	3.21E+06		2.50E+03	0.0080295		5.192704	
phnwall	H	8	5	4	400	4	200	1	Bicron	196	1.11E+08	3.96E+06		2.50E+03	0.009898		6.401069	
phnwall	I	8	5	4	120	4	130	1	Bicron	126	7.13E+07	2.55E+06		2.50E+03	0.006303		4.114973	
phnwall	A	9	5	28	515	22	2070	1	Bicron	2048	1.16E+09	4.14E+05		2.50E+03	0.103424		66.83464	
phnwall	B	9	5	11	62	9	240	1	Bicron	241	1.36E+08	4.87E+06		2.50E+03	0.0121705		7.870702	
phnwall	C	9	5	10	60	8	310	1	Bicron	302	1.71E+08	6.10E+06		2.50E+03	0.015251		9.862872	
phnwall	D	9	5	13	1200	11	1100	1	Bicron	1089	6.16E+08	2.20E+05		2.50E+03	0.0549945		35.56512	
phnwall	E	9	5	19	140	15	160	1	Bicron	145	8.21E+07	2.93E+06		2.50E+03	0.0073225		4.735465	
phnwall	F	9	5	21	95	12	150	1	Bicron	138	7.81E+07	2.79E+06		2.50E+03	0.005969		4.508375	
phnwall	G	9	5	14	165	16	105	1	Bicron	95	5.30E+07	1.92E+06		2.50E+03	0.0047975		3.102559	
phnwall	H	9	5	15	100	18	110	1	Bicron	102	5.77E+07	2.06E+06		2.50E+03	0.005151		3.331169	
phnwall	I	9	5	4	150	4	110	1	Bicron	116	6.57E+07	2.34E+06		2.50E+03	0.005858		3.780380	
phnwall	A	10	5	25	1000	25	2000	1	Bicron	2565	1.45E+09	5.19E+05		2.50E+03	0.1295325		83.76909	above limit
phnwall	B	10	5	7	200	16	800	1	Bicron	790	4.47E+08	1.60E+05		2.50E+03	0.038695		25.80023	
phnwall	C	10	5	7	90	8	740	1	Bicron	742	4.20E+08	1.50E+05		2.50E+03	0.037471		24.23262	
phnwall	D	10	5	25	1000	13	1200	1	Bicron	1187	6.72E+08	2.40E+05		2.50E+03	0.0596435		38.76566	
phnwall	E	10	5	6	85	6	140	1	Bicron	134	7.58E+07	2.71E+06		2.50E+03	0.006767		4.376241	
phnwall	F	10	5	5	300	7	200	1	Bicron	193	1.08E+08	3.80E+06		2.50E+03	0.0097465		6.303094	
phnwall	G	10	5	4	450	4	250	1	Bicron	246	1.39E+08	4.97E+06		2.50E+03	0.012423		8.033995	
phnwall	H	10	5	7	100	5	180	1	Bicron	175	9.91E+07	3.54E+06		2.50E+03	0.0083375		5.71524	
phnwall	I	10	5	4	145	7	180	1	Bicron	173	9.79E+07	3.49E+06		2.50E+03	0.0087365		5.649223	
phnwall	A	11	5	26	1000	28	2100	1	Bicron	2080	1.18E+09	4.20E+05		1.57E+04	0.6596512		67.92971	
phnwall	B	11	5	28	1200	28	1000	1	Bicron	950	5.38E+08	1.92E+05		2.50E+03	0.047975		31.02559	

location	room	survey point	blg	contact shielded	contact unshielded	30cm shielded	30cm unshielded	meteroids	metcoms	Am241Dose	Sfpm/100cm2	MDA Fltg	g/cm2	QTR(m) in air	CXTR(L) surface	room	Shot Area nCi/g	Flg # >70 nCi/g
phwall	I	3	5	5	12	16	15	1	Bicron	5	2.83E+06	1.01E-07	2.35E+04	0.0023735	0	0	163293	
phwall	A		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	B		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	C	2	5	4	19	4	12	8	Bicron	8	4.53E+06	1.62E-07	2.35E+04	0.0037976	0	0	075855	
phwall	D		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	E		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	F		5	1	4	5	7	2	Bicron	2	1.31E+06	4.69E-08 MDA	2.35E+04	0.001102575	0	0	075855	
phwall	G	2	5	3	6	3	6	0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	H		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	I		5	1	3	3	2	-1	Bicron	-1	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	A		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	B		5	3	6	3	6	3	Bicron	3	1.70E+06	6.06E-08 MDA	2.35E+04	0.0014241	0	0	075855	
phwall	C		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	D		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	E		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	F		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	G		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	H		5	3	18	4	8	4	Bicron	4	2.26E+06	8.04E-08	2.35E+04	0.0016986	0	0	130634	
phwall	I		5	7	14	5	18	5	Bicron	5	2.83E+06	1.01E-07	6.97E+04	0.007037377	0.828005	0	163293	
phwall	A		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	B		5	7	9	6	14	8	Bicron	8	4.53E+06	1.62E-07	6.97E+04	0.011259803	0	0	075855	
phwall	C		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	D		5	9	9	6	6	0	Bicron	0	1.31E+06	4.69E-08 MDA	6.97E+04	0.003269113	0	0	075855	
phwall	E		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	A		2	9	7	36	5	45	Bicron	45	2.55E+07	9.09E-07	8.97E+04	0.063338393	0	0	075855	
phwall	B		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	C		2	9	7	7	6	-2	Bicron	-2	1.31E+06	4.69E-08 MDA	6.97E+04	0.003269113	0	0	075855	
phwall	D		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	E		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	A		3	5	4	15	4	349	Bicron	349	1.96E+08	7.05E-06	6.97E+04	0.491208815	0	0	1139782	
phwall	B		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	C		3	5	3	12	3	11	Bicron	11	6.23E+06	2.22E-07	6.97E+04	0.015482229	0	0	075855	
phwall	D		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	E		3	5	22	44	4	8	Bicron	8	4.53E+06	1.62E-07	6.97E+04	0.011259803	0	0	075855	
phwall	A		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	B		4	5	6	28	7	15	Bicron	15	8.49E+06	3.03E-07	6.97E+04	0.021112131	0	0	075855	
phwall	C		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	D		4	5	3	3	3	2	Bicron	2	1.31E+06	4.69E-08 MDA	6.97E+04	0.003269113	0	0	075855	
phwall	E		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	A		5	4	5	4	6	135	Bicron	135	7.64E+07	2.73E-06	6.97E+04	0.190009179	0	0	44089	
phwall	B		5	5	5	5	5	0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	C		5	3	6	3	6	3	Bicron	3	1.70E+06	6.06E-08 MDA	6.97E+04	0.004222426	0	0	075855	
phwall	D		1	5	16	11	11	1	Bicron	1	1.31E+06	4.69E-08 MDA	2.89E+04	0.001355933	0.037325	0	075855	
phwall	E		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	A		1	5	4	6	4	6	Bicron	6	3.40E+06	1.21E-07	2.89E+04	0.003502268	0	0	075855	
phwall	B		5	5	9	6	14	8	Bicron	8	4.53E+06	1.62E-07	2.89E+04	0.00467024	0	0	075855	
phwall	C		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	D		2	5	3	3	3	0	Bicron	0	1.31E+06	4.69E-08 MDA	2.89E+04	0.001355933	0	0	075855	
phwall	E		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	A		2	5	6	6	14	8	Bicron	8	4.53E+06	1.62E-07	2.89E+04	0.00467024	0	0	075855	
phwall	B		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	C		2	5	6	6	14	0	Bicron	0	1.31E+06	4.69E-08 MDA	2.89E+04	0.001355933	0	0	075855	
phwall	D		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	E		3	5	18	10	10	0	Bicron	0	1.31E+06	4.69E-08 MDA	2.89E+04	0.001355933	0	0	075855	
phwall	A		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	B		5	3	7	4	18	6	Bicron	6	3.40E+06	1.21E-07	2.89E+04	0.003502268	0	0	075855	
phwall	C		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	
phwall	D		5					0	Bicron	0	1.31E+06	4.69E-08 MDA		0	0	0	075855	

location	portion	survey point	big	contact shielded	contact unshielded	30cm shielded	30cm unshielded	meteoCode	meteoFlg	Am²@10cm	9cm@100cm²	CFRUL Flg #ref(cm²)	MDA Flg #ref(cm²)	CFRUL in area	CFRUL surface	room	Shed Area, Fig 4
starfloor1	D1		5	2	5	2	15	1	Boron	13	7.36E+06	2.63E-07	1.30E+04	0.0034138		5.918423	
starfloor1	E1		5	2	5	2	2	1	Boron	3	1.31E+06	4.69E-08	1.30E+04	0.000609835		1.03743	
starfloor1	E4		5	2	10	2	15	1	Boron	13	7.36E+06	2.63E-07	1.30E+04	0.0034138		5.918423	
starfloor2	A1		5	2	5	2	10	1	Boron	8	4.53E+06	1.62E-07	9.00E+03	0.0014544	0.648772	3.642106	
starfloor2	A3		5	2	2	2	10	1	Boron	8	4.53E+06	1.62E-07	9.00E+03	0.0014544		3.642106	
starfloor2	A5		5	2	5	2	10	1	Boron	8	4.53E+06	1.62E-07	9.00E+03	0.0014544		3.642106	
starfloor2	B2		5	2	15	2	10	1	Boron	8	4.53E+06	1.62E-07	9.00E+03	0.0014544		3.642106	
starfloor2	B4		5	2	15	2	15	1	Boron	13	7.36E+06	2.63E-07	9.00E+03	0.0023634		5.918423	
starfloor2	C1		5	2	15	2	25	1	Boron	15	8.49E+06	3.03E-07	9.00E+03	0.003636		9.105285	
starfloor2	C3		5	2	30	5	20	1	Boron	15	8.49E+06	3.03E-07	9.00E+03	0.002727		6.828949	
starfloor2	C5		5	2	10	5	15	1	Boron	10	5.66E+06	2.02E-07	9.00E+03	0.001818		4.552833	
starfloor2	D2		5	2	10	5	25	1	Boron	10	5.66E+06	2.02E-07	9.00E+03	0.001818		4.552833	
starfloor2	D4		5	2	15	5	20	1	Boron	15	8.49E+06	3.03E-07	9.00E+03	0.003636		9.105285	
starfloor2	E1		5	2	15	2	45	1	Boron	43	2.43E+07	8.69E-07	9.00E+03	0.002727		6.828949	
starfloor2	E3		5	2	10	5	85	1	Boron	80	4.53E+07	1.62E-06	9.00E+03	0.0078174		19.576312	
starfloor2	E5		5	2	30	5	25	1	Boron	20	1.13E+07	4.04E-07	9.00E+03	0.014544		36.42106	
starfloor3	A1		5	2	5	10	20	1	Boron	10	5.66E+06	2.02E-07	9.00E+03	0.003636	0.037205	9.105285	
starfloor3	A3		5	2	5	5	20	1	Boron	15	8.49E+06	3.03E-07	9.00E+03	0.002727		6.828949	
starfloor3	A5		5	2	10	5	20	1	Boron	15	8.49E+06	3.03E-07	9.00E+03	0.002727		6.828949	
starfloor3	B2		5	2	10	5	15	1	Boron	10	5.66E+06	2.02E-07	9.00E+03	0.001818		4.552833	
starfloor3	B4		5	2	15	5	15	1	Boron	10	5.66E+06	2.02E-07	9.00E+03	0.001818		4.552833	
starfloor3	C1		5	2	10	5	10	1	Boron	10	5.66E+06	2.02E-07	9.00E+03	0.001818		4.552833	
starfloor3	C3		5	2	30	5	15	1	Boron	5	2.83E+06	1.01E-07	9.00E+03	0.000909		2.276316	
starfloor3	C5		5	2	10	5	15	1	Boron	5	2.83E+06	1.01E-07	9.00E+03	0.000909		2.276316	
starfloor3	D2		5	2	10	5	5	1	Boron	5	2.83E+06	1.01E-07	9.00E+03	0.000909		2.276316	
starfloor3	D4		5	2	10	5	15	1	Boron	10	5.66E+06	2.02E-07	9.00E+03	0.001818		4.552833	
starfloor3	E1		5	2	10	5	25	1	Boron	10	5.66E+06	2.02E-07	9.00E+03	0.001818		4.552833	
starfloor3	E3		5	2	30	5	15	1	Boron	5	2.83E+06	1.01E-07	9.00E+03	0.000909		2.276316	
starfloor3	E5		5	2	50	20	60	1	Boron	60	3.40E+07	1.21E-06	9.00E+03	0.002727		6.828949	
starfloor4	A2		5	2	50	10	20	1	Boron	60	3.40E+07	1.21E-06	9.00E+03	0.002727		6.828949	
starfloor4	A4		5	2	50	5	15	1	Boron	40	2.79E+07	8.08E-07	9.00E+03	0.007272		18.21053	
starfloor4	B3		5	2	10	5	15	1	Boron	10	5.66E+06	2.02E-07	9.00E+03	0.001818		4.552833	
starfloor4	C1		5	2	10	5	10	1	Boron	5	2.83E+06	1.01E-07	9.00E+03	0.000909		2.276316	
starfloor4	C2		5	2	10	5	10	1	Boron	5	2.83E+06	1.01E-07	9.00E+03	0.000909		2.276316	
starfloor4	C4		5	2	10	5	10	1	Boron	5	2.83E+06	1.01E-07	9.00E+03	0.000909		2.276316	
starfloor4	D2		5	2	10	5	10	1	Boron	5	2.83E+06	1.01E-07	9.00E+03	0.000909		2.276316	
starfloor4	E1		5	2	15	5	15	1	Boron	10	5.66E+06	2.02E-07	9.00E+03	0.001818		4.552833	
starfloor4	E3		5	2	15	5	10	1	Boron	10	5.66E+06	2.02E-07	9.00E+03	0.001818		4.552833	
starfloor4	E5		5	2	20	5	10	1	Boron	5	2.83E+06	1.01E-07	9.00E+03	0.000909		2.276316	