8/25/95 total 10 cys

455-04

8/25/95 Done for Mike Lewis 5 cys + 2 for mail office Safety

Final Report

(Part 1 of 2)

(trips taken to Xerox and set up: approx 45 min Xerox + 30 min Binding)

BK

Radioactive Material Decommissioning Survey

Seneca Army Depot Activity

Prepared by
Radiological Assistance Team
Seneca Army Depot Activity
Romulus, New York

TABLE OF CONTENTS

SECTION 1

DEPARTMENT OF THE ARMY
SENECA ARMY DEPOT ACTIVITY
5786 STATE RTE 96
ROMULUS NEW YORK 14541-5001

REPLY TO
ATTENTION OF

SDSTO-SEM-P (385-11a)

MEMORANDUM THRU

Commander, Tobyhanna Army Depot, 11 Hap Arnold Blvd., Tobyhanna, PA 18466-5000

Commander, U.S. Army Depot System Command, ATTN: AMSDS-IN-S, Chambersburg, PA 17201

FOR Commander, U.S. Army Materiel Command, ATTN: AMCSF (J. Manfre), 5001 Eisenhower Ave., Alexandria, VA 22333

SUBJECT: Decommissioning Survey, SEDA, Romulus, NY

EXECUTIVE SUMMARY

1. The purpose and summary of the findings for subject survey are as follows:

a. PURPOSE: At the request of HQ, U.S. Army Materiel Command and U.S. Army Depot System Command, we performed a decommissioning survey of the remaining eight (8) munitions storage bunkers at SEDA for the purpose of releasing the sites for unrestricted use.

b. SUMMARY: No fixed or removable radiological contamination was found at the surveyed sites that exceeded regulatory guidelines and requirements. Based upon these findings, the munitions storage bunkers listed in Appendix A may be released for unrestricted use.

2. A detailed report of the survey is at enclosure.

3. POC's are Mr. Thomas Reynolds or Mr. John Cleary, Facsimile on DSN 489-5933; or Voice on DSN 489-5370 or COM (607) 869-1370.

Ray E. Johnson

Encl

ROY E. JOHNSON
LTC, OD
Commanding

DECOMMISSIONING SURVEY
SENECA ARMY DEPOT ACTIVITY
MUNITIONS STORAGE BUNKERS
ROMULUS, NY

1. REFERENCES:

a. Report, Radioactive Material Decommissioning Survey - Seneca Army Depot (SEAD), dated 14 July 1993.

b. AR 385-11, Ionizing Radiation Protection, 1 May 1990.

c. NUREG/CR-5849, Manual for Conducting Radiological Surveys in Support of License Termination, 1 June 1992.

d. U.S. Nuclear Regulatory Commission, Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material, 1 May 1987.

2. AUTHORITY: Reference 1a.

3. PURPOSE: Perform a decommissioning survey of munitions storage bunkers at SEDA for the purpose of releasing the sites for unrestricted use.

4. BACKGROUND:

a. The SEDA Radiological Assistance Team (RAT) was requested to finish the decommissioning surveys of the remaining eight munitions storage bunkers not surveyed by June 1993. The surveys were required for the purpose of ascertaining and quantifying the existence of any radiological contamination. The following bunkers were identified to be surveyed: A0202, A0204, A0206, A0208, A0212, A0213, A0218, and A0305. During the period from 26 August 1994 to 17 November 1994, the eight (8) bunkers have been surveyed. The ancillary maintenance buildings are, at this time, being utilized, and not available for survey.]

b. The decommissioning survey consisted of: (1) portable RADIAC meter readings for the detection of fixed contamination levels, (2) wipe test samples., for the quantification of removable gross alpha/beta and tritium contamination, (3) and the collection of sand samples from A0202 and A0204 for radioanalysis.

c. The portable RADIAC meter survey and wipe testing of the bunkers was performed by members of the SEDA RAT team in accordance with (IAW) procedures identified in Appendix B. The U.S. Army Ionizing Radiation Dosimetry Center (USATA) at Lexington, KY provided radioanalysis of the samples collected

and the interpretation of laboratory results.

5. SEDA RAT Team Survey:

a. Fixed Contamination Quality Control Procedures:

(1) In-house quality control measures were performed to verify the operation of the portable RADIAC meters prior to deployment. The instrument used to determine fixed alpha activity was a Ludlum Model 3 with a Model 43-5 scintillation probe. The instrument used to determine fixed beta-gamma activity was a Ludlum Model 3 with a Model 44-9 Geiger-Mueller (G-M pancake) probe.

(2) Prior to entering each bunker, a background count for each instrument was obtained by holding the detector at ground level for a sufficient time to allow meter to stabilize.

b. Fixed Contamination Survey Techniques:

(1) The surveys were performed to meet the requirements of references 1c and 1d. SEDA RAT utilized three person teams to perform each bunker survey, one for meter readings, one for taking swipes, and one for recording data.

(2) Prior to surveying each bunker, a grid pattern of 4'x5' rectangles was drawn on all the bunker surfaces. These dimensions were chosen for ease of drawing out the grid pattern in the bunker structure, yet remaining within the requirements of reference 1c. (enclosures 1 - 4)

(3) A fixed gross alpha and gross beta/gamma radiation reading was obtained in each grid location. (enclosure 5)

c. Removable Contamination Survey:

(1) Wipe Test Samples: For each grid location, two swipes, i.e., NuCon smears and S&S filter swipes, were obtained to detect for removable gross alpha/beta and tritium contamination, respectively, over a 100 square centimeter area on the bunker surfaces. The samples were sent to the Dosimetry Center laboratory for analysis.

(2) NuCon smears were used for the detection of removable gross alpha/beta contamination. The smears were arranged in packets corresponding to the specific location identification number assigned to each bunker. Upon completion of the structure, samples were sent for analysis.

(3) S&S 8A85 Membrane filters were used for the detection of tritium contamination. Each filter was dampened with distilled water prior to use. After swiping, the

dampened filter was placed in a 20 milliliter (ml) glass liquid scintillation vials with 2ml of distilled water in the vial. The vials were marked on the cap with the corresponding specific location identification numbers assigned to each bunker. Upon completion of the structure, samples were sent to the USATA at Lexington for analysis.

(4) Sand Samples: These samples were collected to determine the presence of tritium contamination from within the inner styrofoam dividers utilized in bunkers A0202 and A0204. The sand samples were placed in plastic bags and sent to the Radiation Research Office, U.S. Army Test, Measurement and Diagnostic Equipment Activity laboratory at Fort Belvior, Virginia for analysis. A detailed summary of the sand can be found in Appendix C.

6. USATA Laboratory Procedures:

a. The sample procedures used at the laboratory can be found in Appendix D.

b. The laboratory results can be found in enclosure 6.

7. Decommissioning Survey Results:

a. Fixed Contamination Instrument Survey: No fixed alpha/beta meter readings were detected above releasable limits for unrestricted use throughout the bunkers surveyed.

b. Removable Contamination Survey: The analysis of the wipe tests reveals no removable activity exceeding the contamination limits set forth by references 1b and 1d.

c. The instrument and laboratory results are provided at enclosure 6.

8. CONCLUSION:

Based upon the results of our decommissioning survey of the munitions storage bunkers listed in Appendix A, no fixed or removable radiological contamination was found at the surveyed sites that exceeded regulatory guidelines and requirements. The munitions storage bunkers identified may be released for unrestricted use.

APPENDIX A

APPENDIX A

The following is a list of the 9 bunkers surveyed:

A0202
A0204
A0206
A0208
A0212
A0213
A0218
A0305

APPENDIX B

Appendix B

SEAD Memo, 8 Apr 92
"Verification of Background Levels of Igloos", Basic Plan.

Basic Plan

Verification of Background Levels of 64 Area Igloos

Purpose

The purpose of this verification survey is to confirm that the igloos have no radioactive contamination and can be released for unrestricted use. U.S. Nuclear Regulatory Commission, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material," December 1975, and AR 385-11, Ionizing Radiation Protection, May 1980, will be used for contamination guides.

Equipment

The following calibrated equipment will be used by the Seneca Army Depot Alpha Team.

Ludlum Model 3	Pancake	Beta & Low Energy Gamma
Ludlum Model 3	Alpha	Alpha Particles

CECOM RADCOM team will use laboratory counters for analysis of wet and dry swipes.

Methodology for Survey

The igloos will be lined in grids as indicated in figures 1 thru 4. A consistent numbering system will be used for grid identification. A reading with a Ludlum Model 3 with beta/gamma probe (mR/hr), and a Model 3 with alpha probe (cpm) will be taken in each grid on the floor. The point at which the readings were taken will be marked. At the center of all grids two swipes will be taken, one for gross alpha/beta and the second for gross beta of 100 cm2 each. The location of the swipe will be marked. Additionally in the top grid due to its size, an extra swipe of 100 cm2 taken at random in the grid for gross beta will be taken and marked. CECOM will instruct Seneca personnel in the method to use for the swipes. Data sheets showing all readings, the results of proportional counting and liquid scintillation analysis will be prepared for each igloo. The data sheets for monitoring will show location, instrument cal due date, operator, operators signature and date. Laboratory sheets will show location, operator, operators signature, date, and lower limit of detection. CECOM will analyze the swipes. AEHA will be notified when a weeks work of bunkers are available for swiping for a close out survey. After CECOM declares an igloo clean and after AEHA swiping, the igloo may be used by Seneca.

Survey Results

The results of the survey are to be reviewed by CECOM, AEHA, DESCOM Safety, and AMC Safety with appropriate written responses to indicate that the igloos are releasable for unrestricted use, require further analysis or cleanup.

DEPARTMENT OF THE ARMY
SENECA ARMY DEPOT
ROMULUS, NEW YORK 14541-5001

REPLY TO ATTENTION OF

S: 10 Apr 92

SDSSE-N (385)

8 April 1992

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Verification of Background Levels of Igloos

1. Enclosed is the revised basic plan to verify the background levels of Seneca Army Depot's 64 limited area igloos.

2. Request approval of all concerned with plan as written. Further request that approval or disapproval be provided this office not later than 10 Apr 92.

3. POC this activity is Mr. Michael Lewis, SEAD RPO, DSN 489-1261, or the undersigned at DSN 489-8250. Datafax number at this activity is DSN 489-8592 or commercial (607) 869-1818.

FOR THE COMMANDER:

encl

LAURENCE M. ORNDROFF
Deputy Director of Special Weapons

DISTRIBUTION:

Cdr, U.S. Army Materiel Command, ATTN: AMCSF-P (J. Manfre)/AMCAM-CN (R. Miller), Alexandria, VA 22333-001
Cdr, U.S. Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-SF (J. Santasiero), Ft Monmouth, NJ 07703-5000
Cdr, U.S. Army Environmental Health Agency, ATTN: HSHB-MR-HI (S. Goodison), Aberdeen Proving Ground, MD 21010-5422
Cdr, U.S. Army Depot System Command, ATTN: AMSDS-SA-A (G. Teague)/AMSDS-IN-U (M. Brodbeck)/AMSDS-IN-S (K. Davis), AMSDS-IN-U/(T. Gallagher), Chambersburg, PA 17201-4170

APPENDIX C

DEPARTMENT OF THE ARMY
US ARMY TEST, MEASUREMENT AND DIAGNOSTIC EQUIPMENT ACTIVITY
RADIATION RESEARCH OFFICE
10115 DUPORTAIL ROAD, SUITE 136
FORT BELVOIR, VIRGINIA 22060-5847

REPLY TO
ATTENTION OF

AMXTM-SR-RR (385-11) 19 October 1994

SUBJECT: Analysis of Radioactive Tritium in Sand

Report Number: 94/1560

Requested by: Commander
Seneca Army Depot Activity
ATTN: SDSTO-SEM-G (Cleary)
Romulus, NY 14541-5001

SUMMARY OF THE REPORT

Fifty six sand samples were tested for tritium. Fourteen of the fifty six samples (twenty five percent) were slightly above background, the rest of the samples were below background.

1. Reference letter dated 31 Aug 94 from Mr. Thomas E. Reynolds, the Assistant Chief of the Radiation Assistance Team, Seneca Army Depot Activity (SEDA), see Encl. 1. The fifty six sand samples were received on 7 Sep 1994.

2. Reviewed CECOM's SOP Number 10-06, "Standard Operating Procedure for Determination of Tritium in Soil," see Encl. 2.

3. One of the fifty six sand samples was distilled as per Encl 2. Approximately two hours were needed to collect 1 - 2 ml of distillate from the sand. The Radiation Research Office (RRO) consulted with Dr. M. S. Chandrasekhararaia, an expert in high temperature chemistry, and the procedure for the distillation of the water from the sand samples was slightly modified. The procedure was in concurrence with 7.4.2, soil/sediment analysis, of the NRC document NUREG/CR-5849, published in 1994, "Manual for Conducting Radiological Surveys in Support of License Termination." Details of the procedure are included at Encl. 3.

4. The RRO used NIST traceable standards to spike a sample to determine the efficiency of recovery of tritium from the sand samples. Appendix A contains the calculations of the procedure.

5. Appendix B contains the calculation of the minimum detectable activity (MDA).

AMXTM-SR-RR (385-11) 19 October 1994
SUBJECT: Analysis of Radioactive Tritium in Sand

6. Appendix C contains the calculations for the amount of activity in the sand samples and Enclosure 4 contains the results of the tritium analysis in sand samples.

7. POC for this action is the undersigned, 654-1979.

RK Bhat

RAMACHANDRA K. BHAT
Chief, Radiation Research Office
USATA

CF:
AMXTM-SR (Kuykendall)
AMCSF-P (Manfre)
SLCIS-RK (M. Borisky)

U.S. ARMY TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT ACTIVITY
RADIATION RESEARCH OFFICE
ATTN: AMXTM-SR-RR
FORT BELVOIR, VIRGINIA 22060-5847

FILE: 385-11c, Radiation SOP File

SUBJECT: Standard Operating Procedure (SOP) for Determination of Tritium in Sand.

SOP #: PR-117; Tab P, Book 5, Disk 5

Date: 28 September 1994

Prepared by: Tim Mikulski & Tom Brown

Approved by: Dr. Ramachandra K. Bhat

1. Purpose: This document outlines procedures for the measurement of tritium concentration'THO (T20) in sand samples by liquid scintillation counting.

2. Discussion: The RRO reviewed CECOM's SOP Number 10-06, "Standard Operating Procedure for Determination of Tritium in Soil," see Attachment 1. The procedure to determine the amount of tritium in sand is a two part process. The first part is the distillation of water from the sand to determine the amount of tritium activity per gram of water. The second part is the determination of the amount of grams of water per grams of sand. The culmination of the two parts lead to the determination of tritium activity per gram of sand.

The distillation procedure was set up as per SOP Number 10-06. Approximately two hours were needed to collect 1 - 2 ml of distillate from the sand. The RRO consulted with Dr. M. S. Chandrasekhararaia, an expert in high temperature chemistry, and the procedure for the distillation of the water from the sand samples was slightly modified. The procedure is in concurrence with § 7.4.2, soil/sediment analysis, of the NRC document NUREG/CR-5849, "Manual for Conducting Radiological Surveys in Support of License Termination." Details of the procedure are presented in this SOP.

The RRO used the CECOM procedure to determine the amount of grams of water per grams of sand. Details of this procedure is included in the SOP for continuity.

3. Equipment:

a. LKB 1219 Rackbeta Liquid Scintillation Counter (LCS).

b. Atom Light Liquid Scintillation Cocktail.

c. 20 ml Glass Vials.

Encl 3 A

d. Mettler AE 163 Analytical Balance (0-30 g).

e. Mettler PJ Analytical Balance (0-10,000 g).

f. Distillation Apparatus (See Figure 1)

g. Oven.

h. Fume Hoods.

i. Pipette.

j. Gloves (Plastic and Thermal Resistant).

k. Desiccator.

l. Potomac River Sand used as Background Sample.

4. Procedure:

Preliminaries:

a. After receiving the sample, open an analysis file using the next available number from the Anl. folder in the isotope room (Room 107). Record all necessary information about the samples making sure to xerox all important memos.

b. Sort the samples on the lab bench using the customer sample serial numbers. Then taking a white label, label the samples sequentially using the RRO designation, Anl-XXXX-1, Anl XXXX-2, etc. (i.e., Anl 1560-1, ...) for our convenience.

c. Prepare the necessary number of liquid scintillation vials, including background and spiked samples. Place the Anl. number on the cap, making sure not to touch the sides of the vials.

d. Prepare the necessary number of petri dishes and lids, including background samples. Place the Anl. number on the lid and the dish.

Distillation:

e. Set up the distillation unit as per Fig. 1.
Precautions:

-Make sure that the joints are well lubricated.
-Regulate the air flow to agitate the water and sand, be careful not to apply too much pressure causing sand to be displaced all over the distillation flask.
-Make sure that the ice bath is almost all the way to the top of the graduated cylinder, so that all of the condensation of the distillate occurs in the cylinder.

-It is important that the cylinder and the condensing tube are not sealed air tight, so that there is an outlet for the compressed air flow.
-Wait for ten minutes after the heating unit is turned off, keeping the air on so that all of the distillate can condensed into the graduated cylinder.
-Once most of the distillate has been collected, separate the distillation flask from the distillation set up and place it under the fume hood. Make sure that the distillation flask is cooled to room temperature before reweighing.

Procedure:
f. Place an O ring onto the Mettler PJ analytical balance so that the round bottom distillation (RBD) flask can be placed on top of the balance. Weigh the O ring and then rezero the balance.

g. Place an empty RBD flask on top of the O ring and record the weight. Then add approximately 200 g of sand to the RBD flask and then reweigh and record.

h. Measure 50 ml of DI water into a graduated cylinder, then pour into the RBD flask. Mix the sand and water by gently agitating the RBD flask in a circular motion. Then place the sample back onto the balance and record the weight of the RBD flask, sand, and water. The sample is now prepared for the distillation process.

i. Place the RBD flask onto the heating mantel. Make sure the compressed air and the heating unit are turned off. Also check to see if water is flowing through the condenser. Once the beaker is connected, slowly turn the air flow on enough for the air to be agitating both the water and the sand. Make sure that it is not too high and sand is being displaced all over the beaker. Then turn the heating element on and wait until the distillate is collected. Make sure that all of the glassware is firmly sealed air tight and not leaking. Make sure that the graduated cylinder is not sealed air tight to the condenser and that the ice bath is not too high such that there is spill over into the graduated cylinder.

j. Once 15 - 20 ml of distillate is collected in the cylinder, turn off the heating unit. Let the compressed air blow for ten minutes until almost all of the distillate has condensed into the graduated cylinder. Put on heat resistant gloves and disconnect the condenser from the connecting tube, and then loosen the condenser and raise it up enough to allow the ice bath and the cylinder to be removed from underneath the condenser. Immediately place a

beaker directly under the condenser to catch any run off.

k. Remove the cylinder from ice bath and place it near the Mettler AE 163 analytic balance. Place a piece of plastic on top of the balance to prevent possible contamination. Put on plastic gloves and pick up the liquid scintillation vial and place it with its cap on into the balance, and record the weight, making sure that the doors have been closed. Once the weight has been recorded, rezero the balance. Remove the vial from the balance.

l. Pipette 10 ml of distillate into the vial. Place the vial with the distillate into the balance with the lid and record the weight.

m. Add 10 ml of Atom Light liquid scintillation cocktail to the vial, place lid back on and shake up the vial to evenly distribute the distillate and the cocktail.

n. Remove the RBD flask from the heat mantle and remove all stoppers, and place it on an O ring under the fume hood until cool. Reweigh the RBD flask and record the weight.

o. Place the used beaker with the sand in it next to the sink on an O ring. Get a plastic bag that is resealable (i.e., Glad baggy) and place on it a label:

Used Sample
Anl XXXX-XX.

Then take the baggy to the sink. Take a glass rod and loosen the sand with it. Then swirl the RBD flask gently in a circular motion to loosen the sand. Pour the sand into the plastic bag. Repeat the steps until most of the sand is transferred to the bag. If there is still sand remaining in the RBD flask, place either a fine mesh screen, or a piece of filter paper over the sink drain to keep sand loss down the drain to a minimum. Run water from the faucet into the beaker and swirl it until the sand is loosened and dump the residue onto the screen or filter paper, repeat until clean. Place the remaining sand from the screen or filter paper into the bag. Then place this bag with the original bag received so that keeping track of the bags is made more simple. Then spill out all excess water form the RBD flask and then add DI water to it and clean it out. To dry out the RBD flask to be quickly used again, first dry the outside with a paper towel and then add either Methanol or Acetone into the flask. This will absorb all of the water and then quickly evaporate leaving the RBD flask dry and ready to be reweighed.

p. To clean out the distillation unit, simply squirt DI water into the condenser and let it collect with the other precipitate and fall into the run off beaker. Then blow off as much water as possible with the compressed air and then pour some Methanol or Acetone down the condenser to dry it

out for the next distillation. Do the same to the fitting tube between the RBD flask and the condenser, and the graduated cylinder used to collect the distillate. Pour all of the excess distillate and run off into a large beaker and place it covered under the fume hood, this collection will be tested with the LSC counter and disposed of properly.

q. Repeat these steps as many times as necessary to complete all of the unknown soil samples. Spiked sand samples will be dealt with in another section.

r. Once all of the samples have been distilled, run the distillate samples on the calibrated LSC for 10 minutes to get a rough estimate of the level of activity in the samples. Then rerun each of the samples again, for 60 minutes to get a better approximation of the amount of activity in each of the samples.

Heating of the Samples:

s. Weight the empty, labeled petri dish, with lid on, on the Mettler PJ analytical balance and record the weight. Then add approximately 100 grams of the unused soil sample into the dish, replace the lid and record the weight. Take the samples to the oven that is located under the fume hood. Turn on the fume hood, place the petri dishes uncovered into the oven, close the door, set the timer for four hours at a temperature of 200° C and let the samples bake to dryness.

t. Once the samples have been heated for four hours, take them out and place them into the desiccant and let them cool to room temperature and then reweigh them and record the weight.

u. Repeat all of these steps until all of the samples have been completed.

Procedure for Tritium Spiked Samples:

v. Prepare the NIST traceable tritium standard, an acceptable level of activity is about 25 pCi/g.

w. Place approximately 200 g of background sand (Potomac river sand) into the RBD flask.

x. Place about 600 dpm of tritium activity into the RBD flask.

-Place a piece of plastic on top of the Mettler AE 162 analytical balance to prevent possible contamination.
-Put on plastic gloves and pick up a liquid scintillation vial and place it with its cap on into the balance, and record the weight, making sure that the doors have been closed. Once the weight has been recorded, rezero the

balance. Remove the vial from the balance.
-Pipette approximately 4 ml of the tritium standard into the vial. Place the vial with the standard into the balance with the lid and record the weight.
-To determine the amount of activity in the vial, the concentration in pCi/ml is multiplyed by the weight of the sample in grams, and by the conversion factor for water 1ml/g, and by the conversion factor of 2.22 dpm/pCi, to get the samples activity in dpm.

y. Transfer the tritium standard from the vial to the RBD flask.
-make sure that the tritium is poured directly into the flask and none touches the sides of the RBD flask.
-Then add the DI water. The amount of DI water is 50 ml minus the amount of standard in grams. Do not pour the DI water directly into the RBD flask, but pour it first into the vial and then into the flask. This will assure that all of the tritium standard has been transferred from the vial to the flask.

z. Set up the distillation unit as per Fig. 1.

aa. Collect 20 ml of the distillate, to keep the procedure the same, as for the unknown samples. Use 10 ml of the distillate for the LCS counting. Set up the distillation unit again and continue until the sand is completely dry. The collection of the total amount of the distillate should be slightly greater than the added 50 ml. Reweigh the RBD flask, the weight should be less than the initial weight of the sand and RBD flask. Collect the distillate separate from the unknown samples and dispose of properly.

bb. Add 50 ml of DI water to the sand and redistill. Run the distillate on the LSC. Repeat this step until the distillate is reading background levels on the LSC.

Calculations:

cc. Activity of sample (pCi of tritium per gram of soil) is calculated as follows:
Sample Calculation using a sand sample.

1. Calculate Moisture Content per gram of sand.
Initial Mass of sand sample m_o = 99.9g
Mass of sand after heating, 200°C, 4 hours mf_f = 99.5g
Moisture Content Mc = $(m_o - m_f)/m_o$
Mc = 0.004ml of water/gram of sand

2. Calculate Total Moisture Content
Mass of sand sample used in distillation m = 227.3g
Volume of Distilled Water added to sand sample
V_a = 49.3ml
Volume of Total Moisture Content in the sand
$V_t = V_a + (Mc * m)$ or $\underline{V_t = 50.2ml}$

3. Calculate Activity
Background counts per minute bkg = 28.72cpm
Activity Measured from distillate Ad = 28.98cpm
Efficiency of the count E = 0.2595
Net Activity net = (Ad - bkg)
Net Activity in dpm A = net/E $\underline{A = 1.00dpm}$

4. Calculate Total Activity per 100 grams of sand
Volume of Total Moisture Content in the sand V_t =50.2ml
Volume of Distillate V_d = 10.01ml
Mass of sand sample used in distillation m = 227.3g
Activity in dpm A = 1.00
Activity per 100g of sand in pCi/100g

$$pCi/100g = \frac{100 * V_t * A}{m * V_d * 2.22}$$

$\underline{\text{Activity = 1 pCi/100g}}$.

dd. The calculation of the minimum detectable activity (MDA), according to NUREG/CR5849, published in 1994, is:

$$MDA = \frac{2.71 + 4.65 (B_R * t)^{1/2}}{t * E * S * Y * 2.22}$$

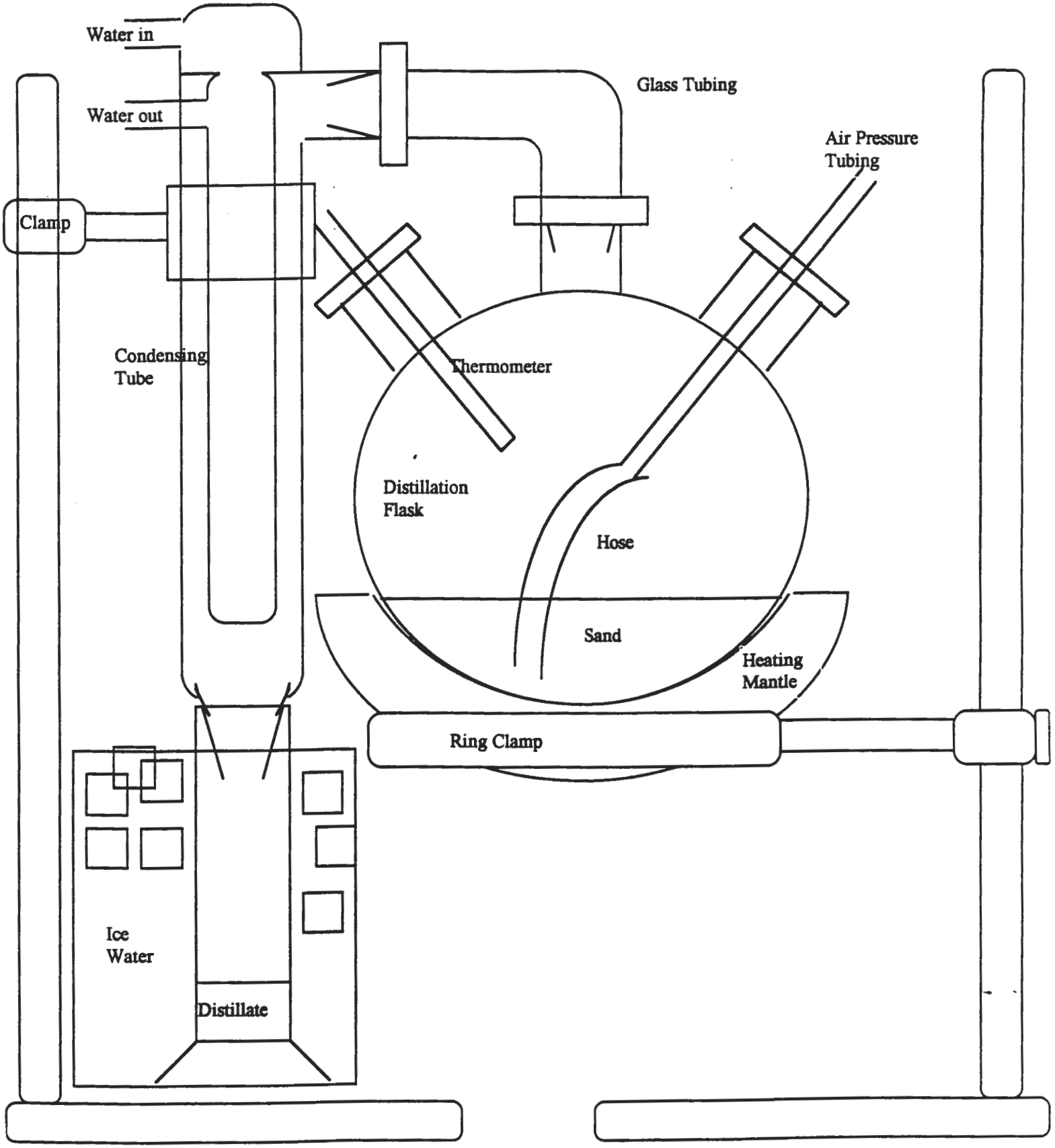
where
MDA = activity in pCi/g
B_R = background rate in counts/minute
t = counting time in minutes
E = detector efficiency in counts/disintegration
S = samples size in grams
Y = other factors such as percent chemical recovery and number of emissions of radiation being measured per disintegration of the radionuclide
2.22 = conversion from disintegrations/minute to pCi

Calibration:

ee. Ensure that the LKB 1219 Rack Beta Liquid Scintillation Counter has been calibrated within the last 90 days, if not refer to SOP PR-92 "SOP for liquid scintillation on the LKB 1219 Rackbeta" Book 4, Tab P.

ff. Ensure that the analytical balances have been calibrated by TMDE and that the calibration sticker has not expired. Record all necessary information.

DISTILLATION GLASSWARE SETUP
Figure 1



ENCL 3H

Sample	Tritium Activity in pCi/100g
A202B1	<MDA
A202B2	<MDA
A202B3	<MDA
A202B4	<MDA
A202L1A	0.7
A202L2A	<MDA
A202L3A	3
A202L4A	<MDA
A202L5A	<MDA
A202L6A	<MDA
A202L7A	<MDA
A202L8A	<MDA
A202L9A	<MDA
A202L10A	0.9
A202L11A	<MDA
A202L12A	<MDA
A202L1B	<MDA
A202L2B	<MDA
A202L3B	<MDA
A202L4B	<MDA
A202L5B	<MDA
A202L6B	<MDA
A202L7B	<MDA
A202L8B	<MDA
A202L9B	4
A202L10B	<MDA
A202L11B	<MDA
A202L12B	<MDA
A204B1	<MDA
A204B2	<MDA
A204B3	1
A204B4	0.2
A204L1A	4
A204L2A	<MDA
A204L3A	0.6
A204L4A	<MDA
A204L5A	<MDA
A204L6A	<MDA
A204L7A	<MDA
A204L8A	<MDA
A204L9A	2
A204L10A	3
A204L11A	<MDA
A204L12A	3
A204L1B	0.6
A204L2B	<MDA
A204L3B	3
A204L4B	<MDA
A204L5B	<MDA
A204L6B	<MDA
A204L7B	<MDA
A204L8B	<MDA
A204L9B	<MDA
A204L10B	<MDA
A204L11B	2

APPENDIX A

Spike Sample #1

Amount of sand 200.4g.

Total Activity of the Tritiated water 2708dpm.

Total Activity Recovered 2497dpm.

Recovery is equal to 92%.

APPENDIX B

MINIMUM DETECTABLE ACTIVITY (MDA) OF TRITIUM IN SAND

$$MDA = \frac{2.71 + 4.65\ (B_R * t)^{1/2}}{t * E * S * Y * 2.22}$$

where

MDA = activity in pCi/g
B_R = background rate in counts/minute
t = counting time in minutes
E = detector efficiency in counts/disintegration
S = samples size in grams
Y = other factors such as percent chemical recovery and number of emissions of radiation being measured per disintegration of the radionuclide
2.22 = conversion from disintegrations/minute to pCi

$$MDA = \frac{2.71 + 4.65\ (28.72 * 60)^{1/2}}{60 * 0.2635 * 200.4 * 0.92 * 2.22} = 0.03 \text{ pCi/g}$$

MDA = 0.03 pCi/g for 10ml of distillate

The conversion from 10ml of distillate to the 50ml add to the 200 grams of soil per sample is:

MDA = 0.03 pCi/g * 5 = 0.15 pCi/g

therefore

MDA = 0.15 pC of tritium/gram of sand

APPENDIX C

Sample Calculation using sand sample A204B3:

1. Calculate Moisture Content per gram of sand.

Initial Mass of sand sample (m_o) = 99.9g

Mass of sand after heating at 200°C for 4 hours (m_f) = 99.5g

Moisture Content (Mc) = (m_o - m_f) / m_o

Mc=.004ml of water/gram of sand

2. Calculate Total Moisture Content.

Mass of sand sample used in distillation (m) = 227.3g

Volume of Distilled Water added to sand sample (v_a) = 49.3ml

Volume of Total Moisture Content in the sand (v_t) = v_a + (Mc X m)

v_t=50.2ml

3. Calculate Activity.

Background counts per minute (bkg) = 28.72cpm

Activity measured from distillate (Ad) = 28.98cpm

Efficiency of the count (E) = .2595

Net Activity (net) = (Ad - bkg)

Net Activity in dpm (A) = net / E

A=1.00dpm

APPENDIX C

4. Calculate total activity per 100 grams of sand.

Volume of Total Moisture Content in the sand (v_t) = 50.2ml

Volume of Distillate (v_d) = 10.01ml

Mass of sand sample used in distillation (m) = 227.3g

Activity in dpm (A) = 1.00

Activity per 100g of sand in pCi/100g = $(100 \times v_t \times A) / (m \times v_d \times 2.22)$

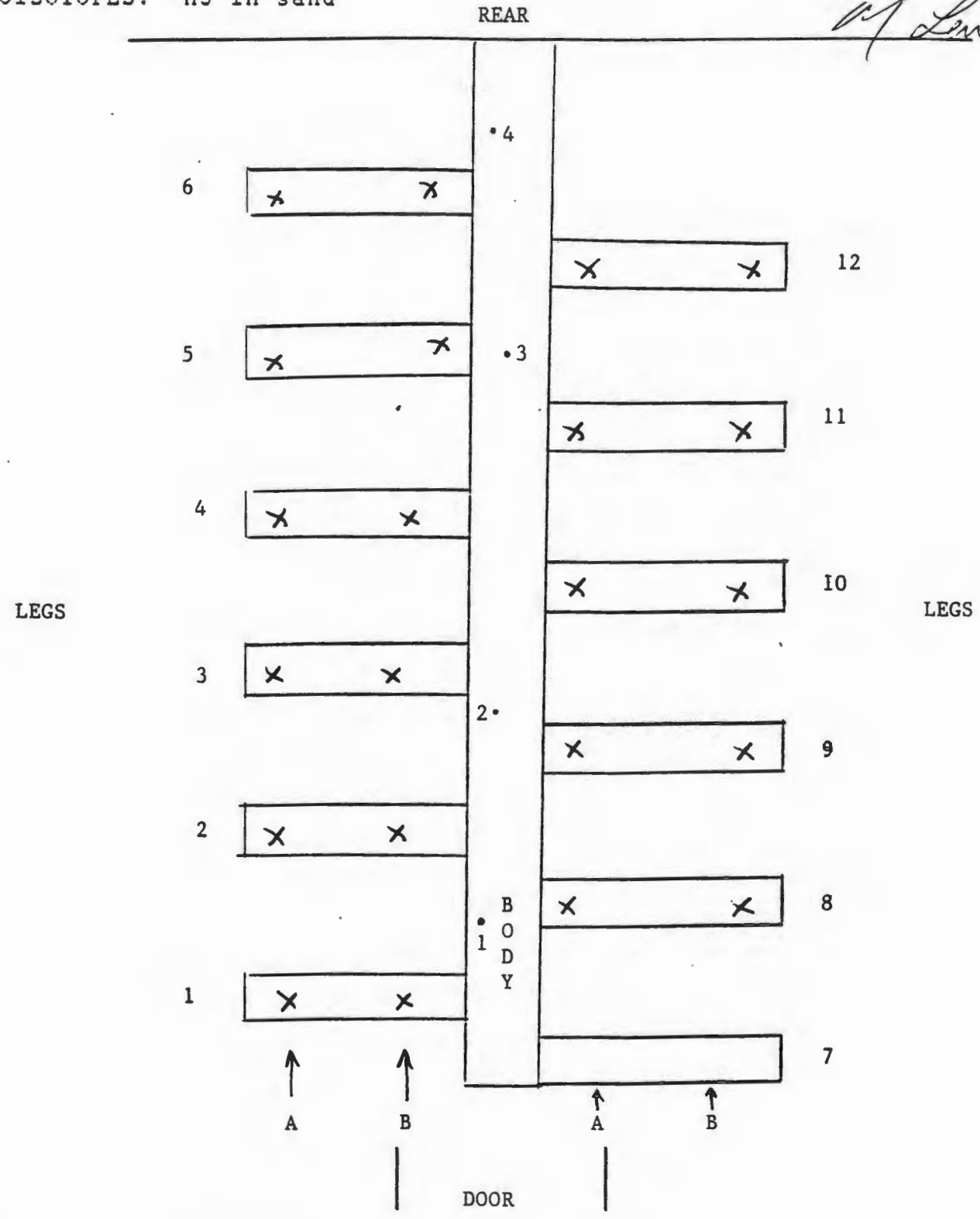
Activity = 1 pCi/100g

RADIADION SURVEY SHEET - EMPTY IGLOO

LOCATION A202 DATE 26 Aug 94 TIME 1500

Samples taken by M Lewis
M Lewis

RADIOISOTOPES: H3 in sand



REMARKS: 2 samples per leg as labeled and 4 taken in the main body.

Leg A202L(1-12)A,B Body A201B1....4

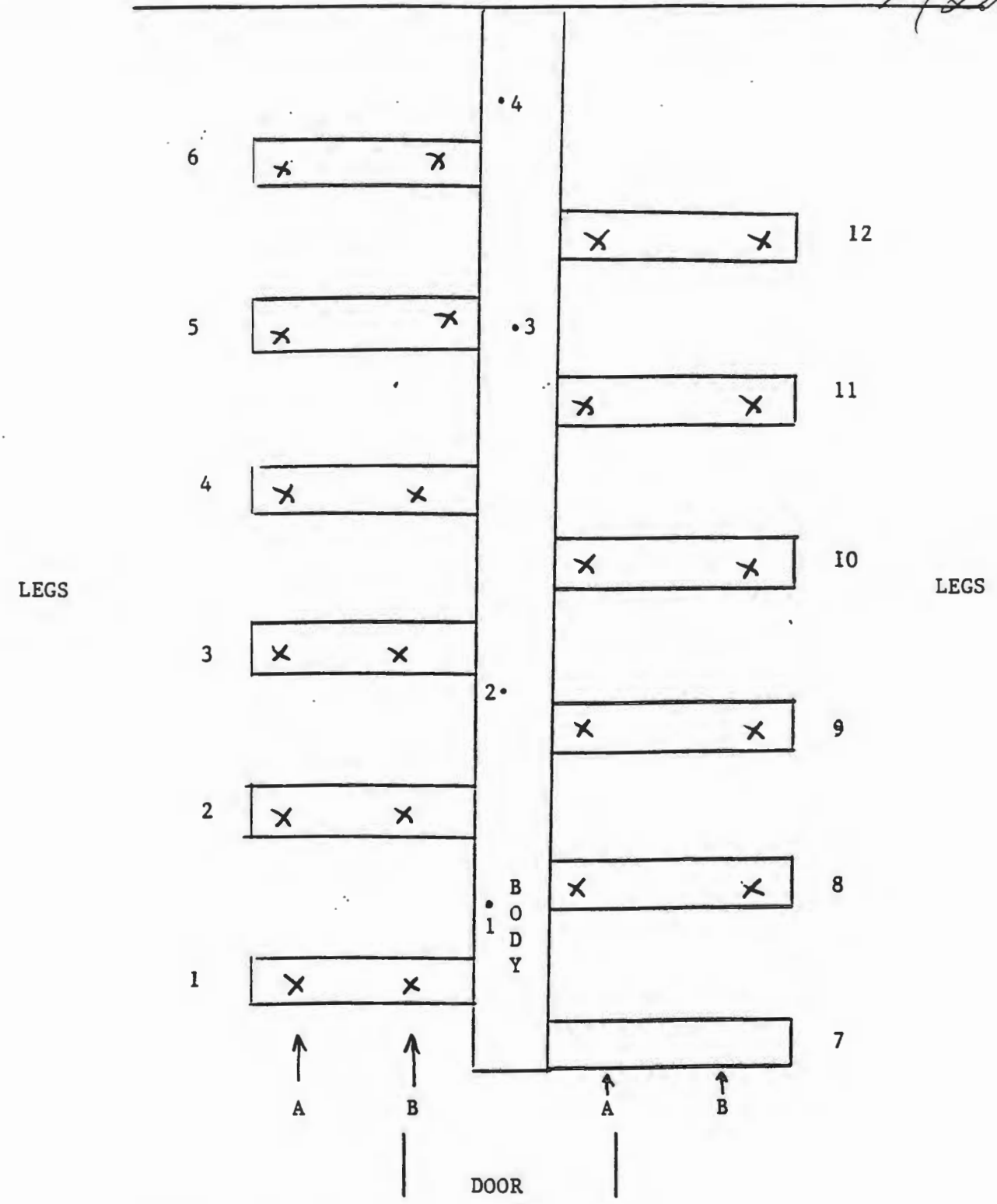
SURVEYMO-igloo H3

RADIADION SURVEY SHEET - EMPTY IGLOO

LOCATION A204 DATE 26 Aug 94 TIME 1100

RADIOISOTOPES: H3 in sand

Samples taken by M Lewis
M Lewis



REMARKS: 2 samples per leg as labeled and 4 taken in the main body.

Leg A204L(1-12)A,B Body A204B1....4

SURVEYMQ-igloo3

APPENDIX D

US ARMY IONIZING RADIATION DOSIMETRY CENTER
LEXINGTON-BLUEGRASS ARMY DEPOT
LEXINGTON, KY 40511-5102

USAIRDC
SOP NUMBER 301

16 December 1993

LEAK/WIPE TEST ANALYSIS OPERATIONS

1. **PURPOSE.** This SOP prescribes the policies and procedures for preparation of leak/wipe test analysis samples within Special Nuclear Services. Samples analyzed at USAIRDC will be leak/wipe tests performed on sources used at USAIRDC, and leak/wipe tests submitted by other facilities requesting analysis services.

2. **SCOPE.** This SOP applies to all personnel in Special Nuclear Services and to anyone using its instrumentation or facilities.

3. **RESPONSIBILITIES.**

a. The Chief, Special Nuclear Services (SNS) will:

(1) Assure that leak/wipe tests are processed in accordance with this SOP and other pertinent directives.

(2) Be the approval authority for result letters.

(3) Be the approval authority for sample preparation procedures and policies.

(4) Have approval authority for all exceptions to this SOP.

b. The staff Health Physicist (HP) will assure that all counters are properly calibrated and standardized. Calibrations will be performed using only National Institute of Standards and Technology (NIST) traceable standards. The HP will also be responsible for assuring that good health physics practices are implemented. The HP will be responsible for the Nuclear Counting Quality Assurance program.

c. Technician(s) will be responsible for processing all leak/wipe tests in accordance with this SOP. The technician(s) will annotate the quality control charts after each batch of samples processed and ensure that contaminated samples are properly disposed.

d. The Radiation Support Clerk will be responsible for tracking all leak/wipe tests currently in the laboratory as well as maintaining file copies of the analysis results. The clerk is also responsible for preparing data submissions (RATTS) to AMCCOM for the M43A1 and CAM leak tests and report the results to the organization which submitted the leak/wipe test.

4. **EQUIPMENT.**

a. The following equipment will be used to analyze leak/wipe tests.

Supersedes USAIRDC SOP 301, 29 April 1985 and changes

TYPE	Quantity	Sensitivity	Use
(1) Gas flow proportional Counting System	3	10^{-6} microcuries	Analytical Measurement
(2) Liquid Scintillation Counting System	2	10^{-6} microcuries	Analytical Measurement
(3) Well Scintillation Counter	1	10^{-6} microcuries	Analytical Measurement

b. Calibration of the counters will be maintained in accordance with USAIRDC SOP 306, Leak/Wipe Test Analysis Quality Assurance Program. Instrument calibration will be performed using NIST traceable sources, i.e. sources fabricated in-house from NIST standard solutions or point sources traceable to NIST. The accuracy of the calibrations will be maintained within ± 5% of the stated value and traceable to standards maintained by the NIST.

5. DEFINITIONS.

a. Leak test - Testing a sealed source for leakage of radioactive material. Test results will be reported in microcuries (uCi). The sealed source must be appropriately identified by serial number or some equivalent method of identification.

b. Wipe test - Testing an area, a package, or other item for removable contamination. The area tested is generally 100 square centimeters, but this value can increase to 300 square centimeters for package wipes. Test results will be reported in Disintegrations Per Minute (DPM) if the isotope is one of those listed in Appendix B. The wipe test results will be reported in emissions per minute (i.e. alphas per minute apparent) if the isotope is not listed in Appendix B.

6. GENERAL.

a. Personnel working in the laboratory are required to be provided training commensurate with the level of hazard found in the workplace. This requirement is met when the employee is provided with initial radiation safety training. Radiation workers are required to attend a yearly radiation safety class after the initial training. Radiation workers will be familiarized with specific laboratory safety procedures prior to working in the laboratory. It is suggested that technicians complete the "Radiological Safety - Fundamentals" course which is offered through the US Army correspondence course program.

b. Survey instruments will be calibrated in accordance with standard Army policies and procedures as described in U.S. Army Technical Bulletin (TB) 43-180 and TB 9-6665-285-15.

7. SAFETY.

a. ALARA. All procedures will be conducted so that all exposure to ionizing radiation is kept As Low As Reasonably Achievable (ALARA).

b. Basic safety guidelines to observe while working in the lab or areas where radioactive materials are used or stored are as follows:

(1) Smoking, eating, and use of cosmetics are strictly prohibited.

(2) Avoid touching facial areas.

(3) Wash hands immediately after handling samples or working in the testing area. Rubber gloves will be worn when working with unsealed radioactive sources, i.e. liquid or powdered sources.

(4) A dosimeter will be worn whenever working in the laboratory or working with radioactive materials.

c. Procedures for exchanging P-10 gas cylinders are provided in Appendix A.

8. **Analysis Methodology.**

a. All alpha, high-energy beta (> 250 keV), and gamma emitters will be analyzed for broad spectrum alpha, beta, or gamma results on the Gamma Products G-5000 Gas Proportional Counters. The following isotopes are routinely analyzed on the gas proportional counters.

ALPHA	BETA	GAMMA
Am-241	Sr-90	Cs-137
Depleted Uranium		Co-60

b. All low energy beta (< 250 keV) will be analyzed by liquid scintillation analysis. The following isotopes will be analyzed by liquid scintillation analysis.

H-3 (tritium) Ni-63 Pm 147 C-14

c. Counting times. A list of leak and wipe test counting times is provided in Appendix B. The counting times listed in Appendix B will be used unless otherwise notified by a health physicist.

d. Procedures for preparing samples for submission to this laboratory are provided in Appendix D. Procedures for performing leak tests of sources used within USAIRDC are provided in USAIRDC SOP 305, Performing Wipe Tests on Radioactive Sources at USAIRDC.

e. This laboratory routinely performs the analysis on leak tests of the Campbell-Pacific Soil Moisture Density Tester (MDT) (10 mCi, Cs-137 and 50 mCi, AmBe); M43A1, Chemical Agent Detector (250 μCi, Am-241); the Chemical Agent Monitor (CAM) (10 mCi, Ni-63); and other specifically licensed sources containing the sources listed in Appendix B. It also performs area/package wipe test analysis for the isotopes listed in Appendix B.

9. **Leak Test Submissions.**

a. Leak test kits are provided for the Campbell-Pacific Soil Moisture Density Tester (MDT) managed by the U.S. Army Tank-Automotive Command (TACOM). TACOM semiannually provides this laboratory with a list of the MDT's to be leak tested. The list contains the MDT serial numbers, addresses, points of contact, and telephone numbers. The leak test kits are distributed within 10 days of receipt of the list. The leak test kit consists of:

(1) Request letter. This letter includes a return endorsement certification indicating the MDT serial number, date the wipe was performed, telephone number, and a certification statement that the MDT has only been used by trained personnel. The return endorsement is signed by the Radiological Protection Officer. The original copy of the endorsement letter is forwarded with the leak test results to TACOM. An example of the endorsement letter is provided in Appendix C.

(2) A copy of the leak test procedure.

(3) A self addressed envelope to facilitate returning the leak test after it is performed.

(4) A swab is placed in a plastic bag with a label on the outside. The label contains the serial number of the MDT, a line to enter the date the leak test is performed, and the name of the owning unit. An example of the label is provided below:

TACOM C-P MOISTURE DENSITY TESTER
SERIAL NUMBER: M00000000
DATE:_____
139TH COMBAT ENGINEERS

b. Leak tests for the M43A1 and the CAM are submitted in accordance with the procedures listed in NRC license Nos. 12-00722-13, 12-00722-14, and Army Regulation 710-3. These leak tests are submitted on a nucon smear with a transaction card containing the information necessary to process the leak tests. Leak test results are sent to the unit performing the leak test. A copy of the result letter, the original copies of the transaction cards, and an electronic copy of the transaction cards (floppy disk) are submitted to the US Army Armament, Munitions, and Chemical Command for inclusion in the Department of Defense Radiation Testing and Tracking System.

c. Other leak tests are submitted in accordance with specific licenses owned or operated by the US Army. This laboratory requires a source serial number in order to identify a wipe as a leak test.

d. This laboratory accepts small numbers of wipes from US Army activities in the interest of promoting health and safety. The purpose of this service is to ensure that all Army personnel have access to adequate laboratory analysis for radioactive contamination.

10. **Sample Preparation.**

a. General.

(1) All leak/wipe tests will be received in the Radiation Support Clerk's office (room 1G) where they will be logged into the Wipelog database, date-stamped, and counted (quantity of wipes), prior to being taken to the laboratory for analysis. In-house generated wipes will be logged into the Wipelog database and tracked the same as wipes received from other facilities.

(2) All samples exceeding 150 picocuries activity will be recounted to verify results.

b. Gas Proportional Wipes.

(1) All wipes to be analyzed with gas proportional counters will be placed in planchets and thoroughly dried prior to analysis.

(2) All wipes processed in a sample run will be listed on the sample run sheet by serial number or other identification.

(3) Sample counting times will be determined in accordance with Appendix B of this SOP.

(4) Pure P-10 gas (10% Methane/90% Argon) will be used for the G5000 Gas Proportional Counters. Consistent quality of P-10 Gas is a key to consistent counting results. The gas cylinder should be changed when the tank pressure reads zero prior to complete loss of flow pressure. Positive pressure is required to prevent impurities from contaminating the inside of the cylinder. Follow the procedures listed in Appendix A for changing Gas Cylinders. The gas flow meter on the counter should be set at approximately 0.20 Standard Cubic Feet per Hour (SCFM). Notify the supervisor

when the last full cylinder is removed from the storage area.

(5) After completing the sample run, the QC computer program will be initiated to calculate control chart plot points. The plot points will be plotted on the control charts. If the control chart plot point falls outside the $\pm 2\sigma$ range, a staff health physicist will be consulted before proceeding.

(6) If the plot point is within $\pm 2\sigma$, select the option for the QC computer program to print the results. The QC computer program will calculate the limit of detection and the limit of decision. All results below the limit of decision will automatically be changed to "0.000" and the limit of detection will be listed in each report. If any results exceed 100 picocuries, notify a health physicist or supervisor.

c. Liquid Scintillation Wipes.

(1) Liquid scintillation wipes will be analyzed in borosilicate vials. Liquid samples or samples immersed in liquids, which arrive in scintillation vials other than those used by this laboratory will be transferred into borosilicate vials. The contents of the original vials will be rinsed with 15 milliliters of Optifluor which will then be poured into the borosilicate vial for analysis with the original sample. Tests have shown that this process will transfer approximately 99 percent of the radionuclide.

(2) After the wipes are transferred to borosilicate vials, they will be allowed to dark adapt inside the liquid scintillation counter for two hours prior to counting.

(3) After the initial two hour dark adaptation period, the samples will be counted using the appropriate protocol. The first count of the samples will provide preliminary results which can indicate no contamination present. If the count-rate suggests that there is contamination present, the samples must be allowed to dark adapt over night to ensure that there is no photoluminescence present causing false counts.

(4) After dark adapting overnight, the samples will be recounted for the official results.

(5) The technician will then calculate the limits of decision and detection for that sample run using the initial background count. The final laboratory report will be prepared using the official results.

d. Radioactive wastes accumulated from contaminated leak/wipe tests will be disposed of in accordance with USAIRDC SOP 303, Disposal of Radioactive Waste Materials.

11. **Reporting Requirements.**

a. Leak test analyses will be limited to the isotopes for which there is a valid calibration document on file. Only isotopes with documented calibration reports will be reported in microcuries. All other samples will be reported in emissions per minute, i.e. alphas per minute apparent, betas per minute apparent, or gammas per minute apparent. Radionuclides authorized for analysis are provided in Appendix B.

b. Leak tests will be reported in microcuries. If a leak test is received for a radionuclide not routinely analyzed by this laboratory, consult a health physicist.

c. Area wipes and package wipes will be reported in disintegrations per minute (DPM). If the activity on the wipe is less than 300 DPM, it will be reported as listed. Activities exceeding 300 DPM will be reported in scientific notation with 3 significant digits. Area wipes are routinely taken on areas of 100 square centimeters. Since this Center has no control over the area wiped, wipe test results will be reported in DPM and the customer can convert the results to DPM per unit of area.

d. Leak/wipe tests exhibiting contamination levels exceeding 1,100 DPM (0.0005 μCi) will be reported immediately to the Chief, Special Nuclear Services. The Chief, Special Nuclear Services will be responsible for telephonically notifying the customer of the contamination level.

e. Examples of routine report formats are provided in Appendix E. All result letters shall contain a statement of the limit of detection.

(1) The format of a sample analysis report containing five or less samples will be similar to the example in Appendix E-3. The format consists of a single page letter.

(2) If more than five samples are received from a single location, the result letter will consist of a cover letter with an addendum (see Appendix E-1).

f. All result letters will be provided to the Radiation Support Clerk for initial review. The Chief, Special Nuclear Services, will perform the final review and approve result letters prior to being logged out. A copy of counter result sheet, initialed by the individual running the samples will be attached to the file copy of the result letters.

g. All result letters will be logged out of the Wipelog database and mailed within two working days of signature. Copies of leak test results going to the licensees for standard US Army radioactive commodities will be mailed once a week to reduce mailing costs.

12. The proponent for this SOP is the Chief, Special Nuclear Services.

PREPARED BY:
STEPHEN V. HOWARD
Chief, Special Nuclear Services

APPROVED BY:

A. EDWARD ABNEY
Chief, US Army Ionizing Radiation
Dosimetry Center

Appendix A

PROCEDURE FOR CHANGING GAS CYLINDERS

1. CAUTION: Accidents with gas cylinders can be deadly. Secure gas cylinders at all times.

2. Close the flow pressure valve on the regulator. Completely close valve at the top of the cylinder.

3. Increase flow at valve on the G5000 to 0.20 Standard Cubic Feet per Hour (SCFH) and shut off flow valve on the regulator.

4. Allow gas in lines to bleed off until flow rate reaches 0.

5. When the flow reaches 0, remove regulator by turning connector clockwise (Remember: These Gas cylinder connectors are threaded opposite to normal connectors). After removing regulator, replace cover nut and cap on cylinder.

6. Return empty cylinder to storage area and obtain full cylinder. Insure stored cylinder is secured in place with chain. Obtain full cylinder from storage area.

7. Remove cap and cover nut from full cylinder and store in cabinet for safe keeping.

8. Carefully blow out cylinder valve opening. This is done to ensure that the opening is free from contaminants which may clog or damage the regulator.

9. Reinstall regulator on cylinder.

10. Turn valve on top of cylinder to the completely open position (until the valve stops turning).

11. Slowly adjust (increase) the flow pressure valve on the regulator until the flow pressure meter reads 15 lbs (20 lbs for G5000, SN: 8503).

12. Adjust flow valve on counter to read between 0.15 - 0.20 SCFH.

13. Check for gas leaks at cylinder connection by spraying spray soap on connectors and watching for bubbles. If bubbles are seen around the regulator connector, tighten the connector. If the bubbles continue notify one of the staff health physicists.

APPENDIX B

RADIONUCLIDES AUTHORIZED FOR ANALYSIS AND COUNTING TIMES

1. The following isotopes are approved for analysis at USAIRDC.

α-emitters	ß-emitters	Γ-emitters
Am-241	Sr-90	Cs-137
dU	H-3	Co-60
Pu-239	Ni-63	
	C-14	

2. The following count times will be used to evaluate leak/wipe tests unless notified otherwise by a supervisor.

Isotope	Leak Test	Area/Pkg Wipe	Counter
Am-241	2 min	20 min	G5000 Gas Proportional Counter
C-14	1 min	20 min	Packard Liquid Scintillation Counter
Co-60	2 min	20 min	G5000 Gas Proportional Counter
Cs-137	2 min	20 min	G5000 Gas Proportional Counter
dU	2 min	20 min	G5000 Gas Proportional Counter
H-3	5 min	20 min	Packard Liquid Scintillation Counter
Ni-63	2 min	20 min	Packard Liquid Scintillation Counter
Pu-239	2 min	20 min	G5000 Gas Proportional Counter
Sr-90	2 min	20 min	G5000 Gas Proportional Counter

Samples containing unidentified isotopes will be counted on the G5000 on both alpha/beta and Gamma channels for 20 minutes each. If there is reason to believe that the sample may be a low energy beta, the sample will be counted for 20 minutes on the Packard liquid scintillation counter using the protocol for Carbon-14.

APPENDIX C

LEAK TEST REQUEST LETTER
CAMPBELL-PACIFIC MOISTURE DENSITY TESTER

S: 26 Jul 93

AMXTM-SR-DN 24 June 1993

MEMORANDUM FOR: &SUPERVISOR&, &UNIT&, &ATTN&, &STRTADDR&, &CITY&, &STATE& &ZIPCODE&

SUBJECT: Leak Test for Tester, Density and Moisture, Nuclear Method, NSN 6635-01-030-6896, Serial No. &SERIAL_NO&

1. This office has been tasked with providing wipe test kits for the subject testers. Enclosed are kits for the testers which have been issued to you. Please perform a leak test on the equipment following the procedure given in Sec. IV of TM 5-6635-386-12&P, dated AUG, 1991 by 26 July 1993 to insure Nuclear Regulatory Commission requirements are met. Since the tester is an individually controlled radioactive item of supply (AR 385-11, Chapter 3), leak tests must be performed every six months whether the tester was in use or in storage during that period. The RPO must sign the 1st endorsement on the space provided at the bottom of this page and return this form, with the endorsement and leak test sample, to the address listed in the 1st endorsement.

2. Records indicate that &RPO& is the Radiological Protection Officer responsible for the subject sets. Please indicate below any address or RPO changes.

3 Encl
1. Procedure cited
2. Swab w/plastic bag
3. Return Envelope

A. EDWARD ABNEY
C, US Army Ionizing Radiation
Dosimetry Center

1st End

SUBJECT: Leak Test for Tester, Density and Moisture, Nuclear Method, NSN 6635-01-030-6896, Serial No. &SERIAL_NO&

FOR: Chief, US Army Ionizing Radiation Dosimetry Center, ATTN: AMXTM-SR-DN, Lexington, KY 40511-5102

1. I certify that the serial number listed above agrees with the serial number of the set on hand. Leak tests were performed this date and are forwarded to your depot on _____. Our AV number is _____ and our commercial number is _____.

2. I also certify that the tester has been used only by trained personnel.

1 Encl
Cotton Swab

_____
Radiological Protection Officer
(please type signature block below)

APPENDIX D-1

AREA WIPE TEST PROCEDURES

Nucon smears (NSN 6665-01-198-7573) should be used to perform area monitoring wipe tests. No special type of wipe media is required for performing tritium wipes.

1. First the wipe test must be identified by location and the date the wipe is performed. The wipe can be identified by placing the date and a description of the location on the wipe wrapper. If the description is lengthy or the individual prefers the date and a letter or number can be placed on the wipe wrapper. If the wipe test is for tritium, place a letter or number on the top of the vial. A list of the location descriptions with corresponding identification letters or numbers should accompany the wipes to USAIRDC.

NOTE: Do NOT write or place tape on the side of a liquid scintillation vial.

2. Don a pair of rubber or plastic gloves. Remove the cloth wipe from the wax paper backing.

3. Dampen the wipe with distilled water. Studies have shown that dampened wipes pick-up a significantly greater amount of radioactive material than dry wipes. Distilled water should be used to dampen the wipes to prevent impurities in tap water from affecting the counting process.

4. Wipe the area of concern. An area of 100 cm^2 (4 inches x 4 inches) should be covered with the wipe. Monitor the wipe test with a survey instrument (AN/PDR-27 or AN/VDR-2). If the level of exposure exceeds 0.5 mR/hr contact USAIRDC (DSN 745-3942/3666 or COM (606) 293-3942/3666) for instructions.

5. If the wipe is for tritium follow the procedure in paragraph a, for all other isotopes follow paragraph b.

a. Place the wipe in the liquid scintillation vial. Add approximately two milliliters of distilled water. Place cap on vial and seal tightly to prevent leakage.

b. Replace the wipe on the waxed paper backing and place each individual wipe into an individual envelope. DO NOT LICK ENVELOPE. Seal the envelope with tape.

6. Place the wipes in a package for shipment to USAIRDC. The wipes should be sent to:

Chief
US Army Ionizing Radiation Dosimetry Center
US Army TMDE Activity
ATTN: AMXTM-SR-DN
BLDG 139
Lexington, KY 40511-5102

7. Results can be expected within fifteen days. If more urgent results are required, place a request with the wipes and the results will be faxed or telephonically provided to you.

8. If you have any questions about these procedures contact USAIRDC at DSN 745-3942, COM (606) 293-3942, FAX (606) 293-3677.

APPENDIX D-2

M43A1 LEAK TEST

1. Perform wipe test in response to notification indicating wipe test is required or prior to performing maintenance.

2. Check out operation of AN/PDR-56F, AN/PDR-60 or equivalent radiac set. Monitoring procedures are given in TM 11-6665-245-12 for AN/PDR-56F; TM 11-6665-221-15 for AN/PDR-60.

3. Use Nucon smears (NSN 6665-01-198-7573).

4. Record SN of M43A1 detector on envelope which will be used to hold wipe paper. Open M43A1 detector and position so modules are visible. Record SN of cell module. Record name and location of user on envelope. Put address listed in paragraph 15 on envelope. Fill out computer transaction card(s) or equivalent as required.

5. Put on disposable gloves.

6. Moisten wipe paper with water.

7. Wipe exterior surface of cell module and exit port of M43A1 detector with moistened wipe paper.

8. Allow wipe paper to dry on a paper towel

9. Bring wipe paper towel to radiac meter. Monitor wipe paper.

10. If instrument meter indicates 200 cpm or more above background, the M43A1 detector is considered unserviceable. Immediately, place unit in plastic bag and seal bag. Hold unit in a secure radioactive materials storage area until wipe test results are received from Lexington. NOTE: If the wipe test results from Lexington indicate the amount of Americium-241 on the wipe paper is in excess of 0.005 microcuries, the detector is unserviceable and must be shipped to Anniston Army Depot for further evaluation.

11. If the instrument meter indicated less than 200 cpm above background, the M43A1 detector can be used or maintenance performed pending receipt of wipe test results from Lexington.

12. Place wipe test in marked envelope.

13. Remove and dispose of gloves and paper towel on which wipe test paper was dried as transuranic radioactive waste.

14. Seal envelope which contains wipe test paper with tape. Mark on the envelope MAILROOM-DO NOT OPEN. DO NOT LICK ENVELOPE TO SEAL.

15. Place sealed, marked envelope, and computer transaction card(s) in a second envelope and address to:

Chief
US Army Ionizing Radiation Dosimetry Center
US Army TMDE Activity
ATTN: AMXTM-SR-DN
Lexington, KY 40511-5102

16. Replace wipe test label with new one. Date of wipe test and date next wipe test due and signature of person performing wipe test must be completed.

17. Results of wipe test evaluation by Lexington will forwarded to AMCCOM within a 15 Day period.

APPENDIX D-3

LEAK TEST PROCEDURES

Nucon smears (NSN 6665-01-198-7573) should be used to perform leak tests. No special type of wipe media is required for performing tritium wipes.

1. First the leak test must be identified by serial number and the date the leak test is performed. The wipe can be identified by placing the date and the serial number of the item leak tested on the wipe wrapper. If preferred the date and a letter or number can be placed on the wipe wrapper. If the wipe test is for tritium, place a letter or number on the top of the vial. A list of the source serial numbers with corresponding identification letters or numbers should accompany the wipes to USAIRDC.

NOTE: Do NOT write or place tape on the side of a liquid scintillation vial.

2. Don a pair of rubber or plastic gloves. Remove the cloth wipe from the wax paper backing.

3. Dampen the wipe with distilled water. Studies have shown that dampened wipes pick-up a significantly greater amount of radioactive material than dry wipes. Distilled water should be used to dampen the wipes to prevent impurities in tap water from affecting the counting process.

4. Wipe the area of concern. Follow the manufacturers instructions or appropriate Technical Manual procedures for performing leak test. Monitor the wipe test with a survey instrument (AN/PDR-27 or AN/VDR-2). If the level of exposure exceeds 0.5 mR/hr contact USAIRDC (DSN 745-3942/3666 or COM (606) 293-3942/3666) for instructions.

5. If the wipe is for tritium follow the procedure in paragraph a, for all other isotopes follow paragraph b.

a. Place the wipe in the liquid scintillation vial. Add approximately two milliliters of distilled water. Place cap on vial and seal tightly to prevent leakage.

b. Replace the wipe on the waxed paper backing and place each individual wipe into an individual envelope. DO NOT LICK ENVELOPE. Seal the envelope with tape.

6. Place the wipes in a package for shipment to USAIRDC. The wipes should be sent to:

Chief
US Army Ionizing Radiation Dosimetry Center
US Army TMDE Activity
ATTN: AMXTM-SR-DN
BLDG 139
Lexington, KY 40511-5102

7. Results can be expected within fifteen days. If more urgent results are required, place a request with the wipes and the results will be faxed or telephonically provided to you.

8. If you have any questions about these procedures contact USAIRDC at DSN 745-3942, COM (606) 293-3942, FAX (606) 293-3677.

APPENDIX D-4

WIPE TEST PROCEDURE

TRITIUM (H-3)

Tritium (H-3) is a low energy (E_{MAX} = 18 keV) beta emitter which is a gas in it's natural state. This makes it imperative to follow proper sampling procedures to ensure accurate results. Remember, any item that has been in contact with a device containing tritium for a long period of time is potentially contaminated.

PROCEDURE

1. Put on disposable gloves prior to wipe testing a potentially contaminated item.

2. Remove a NUCON smear from its backing and moisten it with a small amount of distilled water.

3. If this is an area wipe, wipe approximately 100 cm^2. If it is a leak test, wipe the appropriate area.

4. Place the wipe into the liquid scintillation vial containing 2 milliliters of distilled water. Replace the cap and tighten to prevent leakage. DO NOT WRITE OR PLACE TAPE ON THE GLASS VIAL. Label the plastic lid with a number to identify the vial.

5. On the request for analysis, place the following information for each on the identified vials.

   type of wipe - area wipe or leak test
   date wipe is performed
   nuclide of interest if known, i.e. H-3 (Tritium)

   If it is a leak test add the following.

   item nomenclature
   serial number

6. Ship the request for analysis along with the samples to:

   Chief
   US Army Ionizing Radiation Dosimetry Center
   US Army TMDE Activity
   ATTN: AMXTM-SR-DN
   Bldg 139
   Lexington, KY 40511-5102

7. The results should arrive in 2 weeks. If you have any questions contact USAIRDC at DSN 745-3666, Com (606) 293-3666, or FAX (606) 293-3942.

APPENDIX D-5

LEAK TEST PROCEDURE FOR CAMPBELL-PACIFIC MOISTURE DENSITY TESTER

1. Verify that the serial number on the Qtip matches the set serial number.

2. Moisten Qtip in distilled water or clean tap water.

3. Wipe set in accordance with instructions in TM 5663538612&P.

4. Check the Qtip with the open probe of an ANIPDR27 survey meter set to the 0.5 mr/hr range.

5. Any detectable reading on the AN/PDR27 above twice the background or 0.1 mr/hr indicates contamination of the set and its use should be discontinued.

6. Place Qtip in the plastic bag provided.

7. Complete endorsement on the back of the cover letter and return with the swab in the self addressed envelope.

NOTE: If a reading is observed on the AN/PDR27 in excess of 0.1 mr/hr or twice the background, the plastic bag and swab should be placed in a small cardboard box and mailed to the US Army Ionizing Radiation Dosimetry Center ATTN: AMXTM-SR-DN, Bldg 139, Lexington, KY 405115102. The radiation on the surface of the box must not exceed 0.4 mr/hr. If the measured radiation is more than 0.4 mr/hr, wrap a thin sheet of lead, aluminum, or other metal around the plastic bag and then place in a small cardboard box and recheck the surface radiation.

APPENDIX E-1

M43A1 Leak Test Result Letter

–SAMPLE–

DEPARTMENT OF THE ARMY
U.S. ARMY IONIZING RADIATION DOSIMETRY CENTER
LEXINGTON—BLUE GRASS ARMY DEPOT
LEXINGTON, KY 40511-5102

AMXTM-SR-DN (385-11d) 16 November 1993

MEMORANDUM FOR Commander, 95th Maintenance Company, ATST-1C, ATTN: AMXTM-A1C, PO Box 5780, Fort Hood, TX 76544-5780

SUBJECT: Leak Test of Radioactive Sources

1. The results of the leak test(s) made on the radioactive source(s) at your facility (DODAAC: WGEH09) on 03 November 1993 are indicated on the attached sheet. We received the leak test samples on 15 November 1993.

2. The results are within acceptable limits as specified by the US Nuclear Regulatory Commission.

3. POC is Jennifer Harris, DSN 745-3666.

A. EDWARD ABNEY
Chief, US Army Ionizing
Radiation Dosimetry Center

ENCL

CF:
AMCCOM, (AMSMC-MMD-LW)

–SAMPLE–

APPENDIX E-1
(continued)

–SAMPLE–

US Army Ionizing Radiation Dosimetry Center
Leak Test Analysis Results

Nomenclature: M43A1
Batch: AB-2319M.--3

Date of Analysis 17 NOV 93
Checked By _____

SAMPLE ID	<--- EQUIVALENT ACTIVITY --->			
C26688D25610	0.0	ALPHA/min	0.000	uCi ALPHA
	0.0	BETA/min	0.000	uCi BETA
C25782D24551	0.0	ALPHA/min	0.000	uCi ALPHA
	0.0	BETA/min	0.000	uCi BETA
C25851D24482	0.0	ALPHA/min	0.000	uCi ALPHA
	0.0	BETA/min	0.000	uCi BETA
C21658D21688	0.0	ALPHA/min	0.000	uCi ALPHA
	0.0	BETA/min	0.000	uCi BETA
C30003D29590	0.0	ALPHA/min	0.000	uCi ALPHA
	0.0	BETA/min	0.000	uCi BETA
C26426D25679	0.0	ALPHA/min	0.000	uCi ALPHA
	0.0	BETA/min	0.000	uCi BETA
C25183D25736	0.0	ALPHA/min	0.000	uCi ALPHA
	0.0	BETA/min	0.000	uCi BETA
C36441D35834	0.0	ALPHA/min	0.000	uCi ALPHA
	0.0	BETA/min	0.000	uCi BETA
C26177D25052	0.0	ALPHA/min	0.000	uCi ALPHA
	0.0	BETA/min	0.000	uCi BETA
C13742D12543	0.0	ALPHA/min	0.000	uCi ALPHA
	0.0	BETA/min	0.000	uCi BETA
C15743D16810	0.0	ALPHA/min	0.000	uCi ALPHA
	0.0	BETA/min	0.000	uCi BETA
C25874D25214	0.0	ALPHA/min	0.000	uCi ALPHA
	0.0	BETA/min	0.000	uCi BETA
C25903D24621	0.0	ALPHA/min	0.000	uCi ALPHA
	0.0	BETA/min	0.000	uCi BETA
Detection limit (LD)				
LD FOR ALPHA =	18	ALPHA/min	.000008	uCi ALPHA
LD FOR BETA =	36	BETA/min	.000016	uCi BETA

APPENDIX E-2

Moisture Density Tester
Leak Test Result Letter

–SAMPLE–

DEPARTMENT OF THE ARMY
U.S. ARMY IONIZING RADIATION DOSIMETRY CENTER
LEXINGTON—BLUE GRASS ARMY DEPOT
LEXINGTON, KY 40511-5102

AMXTM-SR-DN 10 November 1993

MEMORANDUM FOR: Commander, HHC, 20th Eng. Bde., ATTN: S-3 Construction, Fort Bragg, NC 28307-5000

Subject: Leak Test of Radioactive Sources

1. The leak test(s) made on the radioactive source(s) at your installation which this center received on 09 November indicates the following amounts of removable contamination:

NOMENCLATURE	SERIAL	MICROCURIES		
		Alpha	Beta	Gamma
Moisture Density	M17071975	0.000	0.000	0.000

Note: Detection Limit (LD) is .000002 uCi for Alpha, .000005 uCi for Beta, and .00004 uCi for Gamma.

2. The results are within acceptable limits specified by the Nuclear Regulatory Commission.

3. POC is Jennifer Harris, AV 745-3942.

A. EDWARD ABNEY
Chief, US Army Ionizing
Radiation Dosimetry Center

CF:
1. CDR, FORSCOM, (AFPR-HRS)
2. CDR, TACOM, (AMSTA-CZ)

–SAMPLE–

APPENDIX E-3

Tritium Result Letter

–SAMPLE–

DEPARTMENT OF THE ARMY
U.S. ARMY IONIZING RADIATION DOSIMETRY CENTER
LEXINGTON—BLUE GRASS ARMY DEPOT
LEXINGTON, KY 40511-5102

AMXTM-SR-DN 6 December 1992

MEMORANDUM FOR Commander, 810th Infantry Battalion, Camp Swampy, GA 73503

SUBJECT: Wipe Test(s)

1. The results of the wipe test(s) made at your installation which this center received on 22 November 1992 for analysis of tritium are indicated below.

ISOTOPE	SERIAL	DPM (Beta)
H-3	#1	0.0
	#2	1.7×10^3
	#3	279
	#4	264
	#5	54

Note: Limit of Detection (LD) is 26 dpm for Tritium Beta.

2. P.O.C. is Stephen Howard, DSN 745-3942.

A. EDWARD ABNEY
Chief, US Army Ionizing Radiation Dosimetry Center

–SAMPLE–

US ARMY IONIZING RADIATION DOSIMETRY CENTER
BLUE GRASS ARMY DEPOT
LEXINGTON, KY 40511-5102

USAIRDC **16 November 1994**
SOP Number 306, Ch 1

LEAK/WIPE TEST ANALYSIS
QUALITY ASSURANCE PROGRAM

The USAIRDC SOP No. 306, 3 August 1994, is changed as follows:

Replace paragraph 4 (h) with:

h. Gas. The gas used in the proportional counters must be ultra high purity P-10 gas (90% Argon, 10% Methane). All proportional counters have graduated gas regulators for accurate and reproducible pressure settings. The flow pressure on each of the regulators should be set at 15 pounds per square inch. Each of the proportional counters has a flow meter on the front of the counter which should be set at approximately 0.20 cubic feet per minute.

Prepared By: _____
STEPHEN V. HOWARD
Chief, Special Nuclear Svcs.

Reviewed/Approved By: _____
A. EDWARD ABNEY
Chief, US Army Ionizing
Radiation Dosimetry Center

U.S. ARMY IONIZING RADIATION DOSIMETRY CENTER
LEXINGTON-BLUEGRASS ARMY DEPOT
LEXINGTON, KY 40511-5102

USAIRDC
SOP NUMBER 306

3 August 1994

LEAK/WIPE TEST ANALYSIS
QUALITY ASSURANCE PROGRAM

1. PURPOSE.

This SOP prescribes the policies and procedures for implementation of a laboratory quality assurance program to assure the continued accuracy of leak/wipe test analysis results.

2. SCOPE.

This SOP is applicable to all personnel in Special Nuclear Services and to anyone using its instruments or facilities.

3. RESPONSIBILITIES.

a. The Chief, Special Nuclear Services will be the approval authority for all radiological counter calibration reports.

b. The staff health physicist will be responsible for performing calibrations of radiological counters, preparing all QA reports, and maintaining continued accuracy of the counting results.

c. Technicians will be responsible for assuring that adequate background counts and check-source counts are performed with each sample process to assure continued result reproducibility. They will also be responsible for assuring that the quality control plot points are within acceptable parameters prior to preparation of final laboratory reports.

4. GENERAL.

a. **ALARA.** All analyses and procedures shall be performed in such a manner as to keep the dose to individuals **A**s **L**ow **A**s **R**easonably Achievable (ALARA).

b. **Storage of Radioactive Standards.** All standards that are not in use shall be stored in the Isotope storage room. Check sources and quench standards that are used intermittently may be stored in either the appropriately marked drawer in the counting laboratory, room 3, or on the shelves under the liquid scintillation counters respectively.

c. **Dosimetry.** A whole body dosimeter will be worn whenever working with radioisotopes or when working with wipe/leak tests. When individual dosimeters are not being worn, they will be stored in box located on the wall across the hall from the front door to building 139.

Supersedes USAIRDC SOP 306, 18 November 1993 and changes

d. **Sample Collection.** Sample collection procedures are listed in the laboratory SOP for Sample Collection and Preparation Procedures.

e. **Half-Lives.** When half-lives are listed by the National Institute of Standards and Technology (NIST, formerly National Bureau of Standards, NBS) on calibration certificates, they are to be used. If not listed by NIST, the half-lives on US Environmental Protection Agency (USEPA) certificates will be used. Any half-lives not listed in the above certificates will be obtained from the Radiological Health Handbook, January 1970 edition, published by US Department of Health, Education, and Welfare.

f. **Standard Reference Materials.** Standard reference materials are to be procured from NIST or USEPA. See the policy letter dated 3 Oct 90, subject: Requisitioning of NRC Licensable Radioactive Material.

g. **Gamma-Ray Abundances and Energies.** Absolute gamma-ray abundances are taken from the Radiological Health Handbook.

h. **Gas.** The gas used in the proportional counters must be ultra high purity P-10 gas (90% Argon, 10% Methane). Special Nuclear Services special orders P-10 gas from Matheson Gas Products. All proportional counters have graduated gas regulators for accurate and reproducible pressure settings. The flow pressure on each of the regulators should be set at 15 pounds per square inch. Each of the proportional counters has a flow meter on the front of the counter which should be set at approximately 0.20 cubic feet per minute.

5. INSTRUMENT QUALITY CONTROL.

a. **Counting Efficiency.** The counting efficiency for a particular isotope will be calculated in accordance with the formula provided in Appendix A.

b. **Detection Limits.** The Limit of Detection (L_D) and the Limit of Decision (L_C) will be calculated in accordance with the formulas provided in Appendix B. The policy of this laboratory is to report all contamination levels exceeding the L_C and list the applicable L_D in the report.

c. **Reliability Factor.** The reliability factor test is a statistical method of determining the reliability of the counter results and is similar to the Chi-Square test. The reliability factor will be determined during isotopic calibrations, monthly as a part of routine quality assurance testing, and after each instrument service call. The data from the reliability factor computation will be used to develop instrument control charts. See Appendix C for the procedures to perform a reliability factor test and prepare a Quality Control Chart.

d. **Constancy Check.** A constancy check will be performed with each sample run by counting a known standard (with same emission as sample) and plotting the normalized data on a quality control chart. On the gas proportional counters, the initial sample will be the standard. If the initial standard count is not within $\pm 2\ \sigma$ of the average observed count, the sample run will be stopped, restarted, and the original point will be plotted on the control chart. If the initial standard count is still not within $\pm 2\ \sigma$, and a health physicist will be notified. When the counting sequence is complete, the average of the standard counts will be used to determine a plot point on the QA control chart. On the liquid scintillation counters the standard will be the second sample (the first is a background). The same procedure will apply if the standard count is not within $\pm 2\ \sigma$ average observed count. A plot point for the quality control chart will be calculated in accordance with Appendix C.

e. **Geometry Factor.** The source to detector geometry must be kept constant. Therefore, all proportional

counter sources and wipes will be taped to the planchet to insure the geometry is kept constant during repetitive counts.

f. **Routine QC Checks.** Each time samples are counted, sufficient background and check source counts must be performed to develop a control chart plot point. See Appendix D for the methodology used to determine the number of background and checksource counts per sample run. The quality control chart must be updated prior to releasing the results to verify that the counter is operating properly. If the quality control chart plot point falls outside the 2 sigma range, notify one of the staff health physicists immediately.

g. **Log Books.** All adjustments and repairs shall be recorded in the instrument log book (e.g., change of gas cylinder, adjustment by repairman, change of HV, change of gain, change of discriminator). Each sample run shall also be recorded in the log book.

h. **Maintenance Records.** Maintenance records are kept in the Section office. The following counters are on maintenance contracts.

Gamma Products Proportional Counters (3 each)
Packard Liquid Scintillation Counters (2 each)

i. **Data Reduction.** After each sample run is complete, data reduction will be performed by the Quality Control (QC) computer program for wipes analyzed with proportional counters. The liquid scintillation counters provide reportable results; however, the limit of detection and the limit of decision must be calculated for each sample run. All calculations requiring a decay correction shall use the natural log of 0.5 and not its approximate value of -0.693.

j. **Statistical Review.**

(1) The technician will review the results of the samples and standard counts for each sample run. Samples exceeding the 150 picoCuries will be recounted to verify results. Other samples need not be recounted unless the control chart plot points fall outside the tolerance limits. If a sample is recounted, the count rate will be determined by dividing the sum total of counts by the sum total of time counted. Revised limits of detection and decision will be calculated for recounted sample(s).

(2) The technician will then review the control chart plot points as provided by the counter for that specific sample run. If the plot point exceeds +/- 1 (normalized for 2 sigma), a staff health physicist must be notified to determine the cause. If the plot point falls between -1 and +1, plot the point on the control chart and prepare letters to be returned to the customer(s).

6. CALIBRATION.

a. **Calibration Samples.** Isotopic calibration samples shall be prepared on an annual basis. These samples will then be used to perform isotopic calibrations and monthly efficiency verifications. All calibration samples will be prepared from NIST traceable sources. A calibration document must be provided to verify traceability. USEPA sources are considered to be NIST traceable.

b. **Calibration Frequencies.** Isotopic calibrations will be performed on an annual basis and after each

instrument service call. Monthly verifications will be performed to insure continued accuracy. The monthly verification will include a reliability factor check and an isotopic efficiency determination.

c. **Calibration Reports.** An official calibration report will consist of the following information:

(1) Voltage Plateau
(2) Reliability Factor
(3) Resolution time
(4) Counter efficiency for the isotope
(5) Quality Assurance Chart Update
(6) Error Analysis

Upon publishing the calibration report, the efficiency must be corrected within the QA programs for calibrations performed on the gas proportional counters. A calibration report is considered published when approved by the Chief, Special Nuclear Services.

7. **QUALITY ASSURANCE DOCUMENTATION.** Quality assurance within this laboratory will be documented through monthly QA reports, special QA reports, and calibration reports. The previous paragraph discussed the requirements of calibration reports.

a. The monthly QA report will document the continued consistency and reliability of each of the counters used by Special Nuclear Services to evaluate leak/wipe tests. The QA report will cover the span of one month and will be archived by the tenth calendar day of the following month. An example of the QC report form is provided as Appendix E. The monthly QA report will consist of:

(1) The monthly QA Report will include the original or a legible copy of the control charts for each of the counters. These control charts comprise the daily constancy checks for each sample run.

(2) A copy of the monthly reliability factor check for each counter. This includes separate reliability factor tests for alpha, beta, and gamma on the Gamma Products G5000 counters. It also includes a reliability test for each of the radionuclides analyzed by liquid scintillation. These values should be indicated on the monthly QA report and copies of the reliability factor test form should be appended to the report.

(3) The counter efficiencies of each of the radionuclides routinely counted. These efficiencies shall be checked on monthly basis to ensure stability of the efficiency with the efficiency determined during calibration. These values should be indicated on the monthly QA report.

(4) The voltage settings of each protocol used to evaluate leak/wipe tests. These values shall be indicated on the monthly QA report.

b. A special QA report will verify the result quality for a counter after being serviced. A special QA report is specific to the counter serviced. After servicing, a counter will not be used for production workload until the special QA report has been approved by the Chief, Special Nuclear Services. A special QA report will consist of:

(1) A voltage plateau to verify the proper operating voltage.

(2) A reliability factor check to verify the consistency of the results. This includes a development of new quality control charts.

(3) Counter efficiency determinations for each of the radionuclides counted on that counter.

c. Quench standard curves will be updated on a quarterly basis for each isotope analyzed by liquid scintillation counting.

8. The proponent of this SOP is Special Nuclear Services Section, USAIRDC.

Prepared By: _____
STEPHEN V. HOWARD
Chief, Special Nuclear Services
USAIRDC

Approved By: _____
A. EDWARD ABNEY
Chief, US Army Ionizing Radiation
Dosimetry Center

APPENDIX A

Counter Efficiency Calculation

Efficiency is defined as the probability that a count will be recorded when radiation is incident on a detector.

The equation used to calculate % Efficiency of a counting system is as follows:

$$\% \text{ Efficiency} = \frac{\text{Observed Count Rate X 100}}{\text{Disintegration Rate}}$$

Example: The net count rate of a counting system is 52703 cpm for a 75.1 nCi Am-241 source. Calculate the efficiency of the counting system.

$$\text{Disintegration Rate} = 75.1 \text{ nCi} \times 2.22 \times 10^3 \text{ dpm/nCi}$$

$$= 166{,}772 \text{ dpm}$$

$$\% \text{ Efficiency} = \frac{52703 \text{ cpm} \times 100}{166722 \text{ dpm}}$$

$$= 31.6\ \%$$

The counter efficiency is used to convert recorded counts into activity.

Example: An Am-241 wipe of unknown activity is analyzed with a counting system possessing an Am-241 efficiency of 31.6 %. Calculate the activity if a count rate of 5212 cpm is observed.

$$\text{Activity} = \frac{\text{Count Rate X 100}}{\% \text{ Efficiency}}$$

$$\text{Activity} = \frac{5212 \text{ cpm X 100}}{31.6\ \%}$$

$$= 161494 \text{ dpm}$$

To convert this activity into microcuries (μCi), you divide by 2.22E+6 dpm/μCi.

$$\text{Activity}_{\mu Ci} = \frac{\text{Activity}_{dpm}}{2.22E6 \text{dpm}/\mu Ci}$$

$$= \frac{161494}{2.22E6 \text{dpm}/\mu Ci} = 0.072745 \mu Ci$$

APPENDIX B

Limit Of Detection (L_D) Calculation and Limit of Decision (L_C) Calculation

The LLD is defined as the smallest activity that has a p (.95) probability of being detected with only 1-p (.05) probability of a false non-detection. This sensitivity has been defined (EPA 1980) as the level above which there is less than a 5% probability that radioactivity will be reported when it is really absent (Type I error) or not reported when actually is present (Type II error).

The equation used to calculate L_D is as follows:

$$L_D = \frac{2.71 + 4.65\sqrt{Bkg_{raw}} * Time}{Time * (Efficiency)}$$

where:

Bkg_{raw} = Background count rate

Time = Sample count time

Eff = Radionuclide counting efficiency

Example: A 10 minute background count yields a count rate 0.12 cpm for a counting system with an efficiency of 31.6%. Calculate the L_D for the counting system in dpm.

$$L_D = \frac{2.71+4.65\sqrt{0.12}*10}{10*0.316}$$

$$= 2.47 \text{ dpm}$$

To convert L_D in dpm to µCi divide the L_D in dpm by 2.22×10^6 dpm/µCi:

$$\frac{2.5 \text{ dpm}}{2.22 \times 10^6 \text{ dpm/µCi}} = 0.0000011 \text{ µCi}.$$

To convert L_D in dpm to Bq divide the L_D in dpm by 60 dpm/Bq:

$$\frac{2.5 \text{ dpm}}{60 \text{ dpm/Bq}} = 0.04 \text{ Bq}$$

The limit of decision (L_C) is defined as the largest activity that has a p (.95) probability of not being detected with only a 1-p (.05) probability of a false detection. This sensitivity has been defined (NCRP, 1985) as the upper limit above which there is less than a 5% probability that radioactivity will be reported when it is really absent (Type I error) or not be reported when actually is present (Type II error).

The equation used to calculate the L_C is as follows:

$$L_C = \frac{2.32 \sqrt{Bkg_{rate} * Time}}{Time * (Efficiency)}$$

Example: A 10 minute background count yields a count rate 0.1 cpm for a counting system with an efficiency of 31.6%. Calculate the L_D for the counting system in dpm.

$$L_C = \frac{2.32 \sqrt{0.1 * 10}}{10 * 0.316}$$

$$= 0.73 \text{ dpm}$$

To convert L_C in dpm to µCi divide the L_C in dpm by 2.22×10^6 dpm/µCi:

$$\frac{0.73 \text{ dpm}}{2.22 \times 10^6 \text{ dpm/µCi}} = 0.0000003 \text{µCi}.$$

To convert L_D in dpm to Bq divide the L_D in dpm by 60 dpm/Bq:

$$\frac{0.73 \text{ dpm}}{60.0 \text{ dpm/Bq}} = 0.012 \text{ Bq}$$

APPENDIX C

Reliability Factor Calculation and Quality Control Chart Preparation

The reliability factor is defined as the observed mean standard deviation (S_n) divided by the theoretical standard deviation (σ_n).

The observed mean standard deviation is defined by the equation:

$$S_n = \left[\sum_{i=1}^{m} (\bar{n} - n_i)^2/(m - 1)\right]^{1/2}$$

Where:

S_n = observed mean standard deviation
$\bar{n}$ = mean number of counts, series of observations
m = number of observations
n_i = individual count value

The theoretical standard deviation is defined by the equation:

$$\sigma_n = [\bar{n} / m]^{1/2}$$

Where:

σ_n = theoretical standard deviation

The reliability factor is defined by the equation:

$$R.F. = S_n/\sigma_n$$

PROCEDURE:

The initial data to perform a reliability factor test is obtained by counting a source (check source or standard) 25 times. The total number of counts during the counting period, not the count rate, is used to perform the reliability factor test. The time that each standard is counted should be adjusted so that a total of 10,000 to 40,000 total counts is obtained. The average of the source counts is assumed to be the "true" value which is used to calculate the theoretical standard deviation.

See Table 1 for an example. Calculate the observed and theoretical standard deviations. Divide the observed standard deviation by the theoretical standard deviation to obtain the reliability factor. Compare the calculated reliability factor to the chart on page 120 of the Radiological Health Handbook to determine if the instrument is operating properly.

Information to be recorded on the Reliability Test document

1. Identification of instrument tested.
2. Check source Isotope
3. Operating Voltage
4. Date of Reliability Factor Test

Table 1

10/28/93

RELIABILITY FACTOR
H-3, SN: 1
Liquid Scintillation Counter B

	NO OF COUNTS	$(\bar{n} - n_i)$	$(n - ni)^2$
1	120948	-397.52	158022.15
2	121238	-107.52	11560.55
3	121584	238.48	56872.71
4	120964	-381.52	145557.51
5	121565	219.48	48171.47
6	120870	-475.52	226119.27
7	121513	167.48	28049.55
8	121449	103.48	10708.11
9	121519	173.48	30095.31
10	121478	132.48	17550.95
11	120833	-512.52	262676.75
12	121298	-47.52	2258.15
13	121322	-23.52	553.19
14	121178	-167.52	28062.95
15	121412	66.48	4419.59
16	121086	-259.52	67350.63
17	121424	78.48	6159.11
18	121765	419.48	175963.47
19	121193	-152.52	23262.35
20	122078	732.48	536526.95
21	121604	258.48	66811.91
22	121501	155.48	24174.03
23	120833	-512.52	262676.75
24	121997	651.48	424426.19
25	120986	-359.52	129254.63
	Σ = 3033638.00		Σ = 2747284.23

$\bar{n}$ = sum of counts/# of counts = 3033638.00/25.00 = 121345.52

THEORETICAL STD DEV = $(\bar{n})^{1/2}$ = 348.35

OBSERVED STD DEV = [sum of $(\bar{n} - n_i)^2$ / (# of counts - 1)]$^{1/2}$

= $(2747284.23/ 24.00)^{1/2}$

= 338.33

RELIABILITY FACTOR = 338.33 / 348.35 = 0.97

Control Charts

Once a nuclear counting system is operational and running, it is important to periodically check the system to ensure that it continues to function properly. The reliability factor test and chi-square test are good methods for verifying proper operation of the system; however, it does not enable the operator to spot trends leading to system failure. The control chart is a graphical representation of past and present performance of the counting system. Figure two is an example of a standard control chart. Provided below is an example of control chart preparation. In the example the chart is prepared by obtaining 25 counts of a radiation standard and by calculating the average and ±2 σ of the independent readings.

Example: A 1.4 nCi Cs-137 standard was counted 25 times using identical source/detector geometry configuration. The following counts were obtained: 120948, 121238, 121584, 120964, 121565, 120870, 121513, 121449, 121519, 121478, 120833, 121298, 121322, 121178, 121412, 121086, 121424, 121765, 121193, 122078, 121604, 121501, 120833, 121997, and 120986.

The average is calculated as follows:

$$\bar{x} = (1/n)\ \Sigma x_i$$

$$\bar{x} = 121345.5 \text{ cpm}$$

The standard deviation is calculated as follows:

$$\sigma = \{ [\Sigma (x^{-} - x_i)^2] / (n-1) \}^{1/2}$$
$$= 338.3 \text{ cpm}$$

$$2\sigma = 676.6 \text{ cpm}$$

The chart is developed by plotting ±2 standard deviations around the mean for standard count. For this purpose we use a standard chart as seen in table 1. Instead of changing the chart values each time

the standard count deviates, the data is normalized to ± 1. Normalizing the data is performed using the following algorithm.

$$\text{Normalized plot point} = (\bar{n} - R_o)/2\sigma$$

where: $\bar{n}$ = average standard count for sample run
R_o = average standard count determined during reliability factor test ($\bar{x}$)
2σ = Two standard deviations as calculated above

You will notice that when $\bar{n} = R_o$, the normalized plot point is equal to zero, and when $(\bar{n} - R_o) = 2\sigma$, the plot point will be ± 1. The QA program used with the Gamma Products counters produces the plot points by taking an average of the standard counts during a sample run and normalizing the plot point.

APPENDIX D

Quality Control Check Methodology

Gas Proportional Counters.

Routine quality control checks are performed during the counting process by counting background and standards and comparing the results to predetermined averages.

The count sequence shall start with the check source count, a short background count. The purpose of counting the check source first is to determine if the check source count rate falls within a given range associated with $\pm 2\sigma$ of the standard count rate. This provides an early indicator that the counter is operating properly. After the initial check source and background counts are completed, samples should be counted in groups up to fifty samples with a standard and short background between each group. Dispersing standard and background counts throughout the counting sequence provides an indication of the fluctuations of background and continued proper operation of the counter.

Count Sequence = 2,3,4-10,2-3,11-20,2-3,20-28,2-3,99(1-3)

NOTE: The first three samples are:

1. Three hour background
2. Counting Standard (α, ß, or τ)
3. Short background (time = sample count time)

If the sample run is put on to run over night, the last item on the count sequence shall be {99(1-3)}. This will cause the counter to continue counting backgrounds and standards until the sample run is discontinued the next morning.

Liquid Scintillation Counters.

The protocols of the liquid scintillation counters shall be set to count a background and standard before each set of samples. The protocol will then automatically count a minimum ten minute background. The background count time will automatically be equal to the sample count time if the the sample count time is greater than 10 minutes. The background and standard counts will be normalized and plotted on a control chart for each sample run processed. A fluctuation of less than 2σ from the observed standard count rate will provide an indication that the counter is continuing to operate correctly.

APPENDIX E

QUALITY CONTROL REPORT

COMMENTS:

APPROVED:

APPENDIX E

DEPARTMENT OF THE ARMY
U.S. ARMY IONIZING RADIATION DOSIMETRY CENTER
U.S. ARMY TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE) ACTIVITY
LEXINGTON, KY 40512-4063

AMXTM-SR-DN 13 December 1994

MEMORANDUM FOR Commander, Seneca Army Depot, Building 323, Romulus, NY 14541

SUBJECT: Decommissioning Wipes

1. The results of the decommissioning wipes done at your facility, which this Center received 28 November 1994, are indicated on the enclosed tables.

2. A review of the results revealed that none of the wipes exceeded the removable contamination limits set forth in AR 385-11 or the Nuclear Regulatory Commission's "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material", dated April 1993.

3. POC is Stephen Howard, DSN 745-3942.

for Stephen V. Howard

A. EDWARD ABNEY
Chief, US Army Ionizing
Radiation Dosimetry Center

Encl

70202+
A0204

SURFACE ACTIVITY MEASUREMENTS
SMEAR AND SWAB ANALYSIS
BUILDING 202

	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
SWIPE	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
01	10	2.64	13	0	0.15	4	0	0.76
02	13	2.67	13	0	0.18	4	0	0.74
03	10	2.64	13	0	0.18	4	0	0.72
04	12	2.66	13	1.49	0.25	4	0	0.70
05	8	2.62	13	0	0.15	4	0	0.65
06	0	2.58	13	0	0.11	4	0	0.71
07	7	2.60	13	0	0.11	4	0	0.76
08	7	2.61	13	0	0.11	4	0	0.66
09	10	2.65	13	0	0.15	4	0	0.68
10	8	2.62	13	0	0.15	4	0	0.78
11	11	2.66	13	0	0.11	4	0	0.65
12	11	2.64	13	0	0.18	4	0	0.66
13	7	2.61	13	0	0.18	4	0	0.76
14	0	2.58	13	0	0.11	4	0	0.74
15	7	2.61	13	0	0.11	4	0	0.74
01	12	2.67	13	0	0.11	4	0	0.74
02	12	2.66	13	0	0.11	4	0	0.66
03	7	2.61	13	0	0.18	4	0	0.68
04	0	2.56	13	0	0.11	4	0	0.72
05	0	2.53	13	2.32	0.28	4	0	0.76
06	7	2.61	13	0	0.11	4	0	0.72
07	14	2.68	13	0	0.15	4	0	0.70
08	0	2.57	13	0	0.23	4	0	0.68
09	11	2.65	13	0	0.11	4	0	0.73
10	9	2.64	13	1.49	0.25	4	0	0.76
11	0	2.58	13	0	0.15	4	0	0.62
12	13	2.68	13	0	0.20	4	0	0.78
13	16	2.71	13	0	0.11	4	0	0.74
14	6	2.59	13	0	0.18	4	0	0.68
15	11	2.65	13	0	0.18	4	0	0.62
01	10	2.64	13	0	0.15	4	0	0.63
02	7	2.61	13	0	0.11	4	0	0.69
03	8	2.61	13	0	0.18	4	0	0.76

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
04	11	2.65	13	0	0.11	4	0	0.70
05	6	2.59	13	0	0.11	4	0	0.70
06	8	2.62	13	0	0.15	4	0	0.80
07	11	2.64	13	0	0.20	4	0	0.78
08	11	2.65	13	0	0.05	4	0	0.68
09	12	2.67	13	0	0.11	4	0	0.70
10	6	2.59	13	0	0.23	4	0	0.69
11	8	2.62	13	0	0.18	4	0	0.61
12	11	2.53	13	0	0.18	4	0	0.78
13	6	2.62	13	0	0.11	4	0	0.74
14	9	2.61	13	0	0.11	4	0	0.69
15	7	2.61	13	0	0.15	4	0	0.64
01	6	2.60	13	0	0.15	4	0	0.77
02	14	2.67	13	0	0.11	4	0	0.70
03	0	2.58	13	0	0.11	4	0	0.72
04	11	2.65	13	0	0.11	4	0	0.76
05	10	2.64	13	0	0.11	4	0	0.63
06	14	2.67	13	0	0.18	4	0	0.59
07	10	2.63	13	0	0.11	4	0	0.72
08	6	2.60	13	0	0.18	4	0	0.68
09	12	2.66	13	0	0.11	4	0	0.81
10	12	2.65	13	0	0.05	4	0	0.68
11	0	2.58	13	0	0.15	4	0	0.68
12	9	2.63	13	0	0.15	4	0	0.64
13	7	2.61	13	0	0.18	4	0	0.70
14	6	2.59	13	0	0.11	4	0	0.73
15	9	2.63	13	0	0.11	4	0	0.78
01	7	2.60	13	0	0.18	4	0	0.65
02	0	2.57	13	0	0.20	4	0	0.70
03	0	2.56	13	0	0.11	4	0	0.72
04	0	2.55	13	0	0.05	4	0	0.70
05	0	2.56	13	0	0.18	4	0	0.74
06	14	2.65	13	0	0.11	4	0	0.73
07	10	2.63	13	0	0.15	4	0	0.70
08	0	2.56	13	0	0.11	4	0	0.69
09	8	2.61	13	0	0.15	4	0	0.68

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
10	11	2.63	13	0	0.15	4	0	0.62
11	7	2.60	13	0	0.11	4	0	0.72
12	7	2.61	13	0	0.05	4	0	0.63
13	0	2.59	13	0	0.20	4	0	0.81
14	11	2.63	13	1.49	0.25	4	0	0.73
15	13	2.66	13	0	0.15	4	0	0.79
01	12	2.67	13	0	0.23	4	0	0.69
02	13	2.69	13	0	0.11	4	0	0.74
03	11	2.67	13	0	0.23	4	0	0.76
04	8	2.63	13	0	0.11	4	0	0.77
05	12	2.67	13	0	0.05	4	0	0.65
06	8	2.63	13	0	0.20	4	0	0.69
07	6	2.60	13	0	0.11	4	0	0.75
08	13	2.69	13	0	0.15	4	0	0.70
09	9	2.64	13	0	0.15	4	0	0.70
10	12	2.67	13	0	0.20	4	0	0.72
11	10	2.65	13	0	0.11	4	0	0.73
12	8	2.62	13	0	0.15	4	0	0.73
13	0	2.58	13	0	0.15	4	0	0.74
14	9	2.64	13	0	0.18	4	0	0.74
15	9	2.64	13	0	0.18	4	0	0.66
01	8	2.62	13	0	0.35	4	0	1.20
02	16	2.71	13	0	0.29	4	0	1.09
03	10	2.65	13	1.94	0.25	4	0	0.80
04	0	2.57	13	0	0.29	4	0	1.20
05	10	2.65	13	0	0.08	4	0	0.92
06	0	2.58	13	0	0.21	4	0	1.09
07	6	2.61	13	0	0.29	4	0	0.90
08	12	2.67	13	0	0.08	4	0	1.04
09	6	2.61	13	0	0.21	4	0	1.13
10	8	2.62	13	0	0.35	4	0	1.06
11	10	2.65	13	0	0.29	4	0	0.86
12	12	2.66	13	0	0.29	4	0	1.02
13	10	2.64	13	0	0.08	4	0	1.24
14	8	2.63	13	0	0.21	4	0	1.02
15	13	2.68	13	0	0.08	4	0	1.13

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
01	12	2.67	13	0	0.21	4	0	1.15
02	10	2.64	13	0	0.29	4	0	1.09
03	12	2.67	13	0	0.29	4	0	1.06
04	15	2.70	13	0	0.29	4	0	1.02
05	10	2.65	13	1.15	0.40	4	0	1.09
06	12	2.66	13	0	0.08	4	0	1.04
07	7	2.62	13	0	0.08	4	0	1.35
08	10	2.65	13	0	0.21	4	0	1.06
09	8	2.63	13	0	0.21	4	0	0.90
10	7	2.61	13	0	0.08	4	0	0.92
11	7	2.61	13	0	0.08	4	0	1.11
12	10	2.64	13	0	0.29	4	0	1.29
13	0	2.59	13	0	0.21	4	0	1.11
14	8	2.62	13	0	0.21	4	0	1.08
15	9	2.63	13	0	0.29	4	0	1.15
01	0	2.59	13	0	0.08	4	0	1.11
02	13	2.67	13	0	0.21	4	0	1.02
03	18	2.73	13	0	0.29	4	0	1.11
04	10	2.65	13	0	0.21	4	0	1.13
05	7	2.61	13	0	0.21	4	0	1.16
06	0	2.59	13	0	0.08	4	0	1.21
07	12	2.67	13	0	0.21	4	0	1.09
08	15	2.70	13	0	0.21	4	0	1.23
09	14	2.70	13	0	0.21	4	0	1.20
10	12	2.67	13	0	0.08	4	0	1.33
11	12	2.67	13	0	0.08	4	0	1.06
12	10	2.65	13	0	0.08	4	0	1.27
13	13	2.68	13	0	0.21	4	0	1.20
14	10	2.65	13	0	0.21	4	0	1.21
15	15	2.70	13	0	0.08	4	0	0.92
01	16	2.72	13	0	0.08	4	0	1.13
02	20	2.75	13	0	0.21	4	0	1.06
03	13	2.69	13	0	0.21	4	0	1.08
04	14	2.69	13	0	0.21	4	0	1.02
05	9	2.63	13	0	0.21	4	0	1.21
06	11	2.66	13	0	0.21	4	0	1.08

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
07	12	2.68	13	0	0.21	4	0	1.00
08	14	2.68	13	0	0.08	4	0	0.92
09	8	2.60	13	0	0.21	4	0	1.23
10	10	2.65	13	0	0.08	4	0	1.21
11	10	2.65	13	0	0.08	4	0	1.11
12	10	2.64	13	0	0.35	4	0	1.23
13	23	2.79	13	0	0.21	4	0	1.15
14	11	2.66	13	0	0.21	4	0	1.06
15	8	2.64	13	0	0.08	4	0	0.98
01	0	2.59	13	0	0.08	4	0	0.98
02	8	2.62	13	0	0.21	4	0	1.23
03	14	2.69	13	0	0.08	4	0	1.13
04	7	2.61	13	0	0.08	4	0	1.09
05	14	2.69	13	0	0.08	4	0	1.04
06	10	2.65	13	0	0.08	4	0	1.11
07	15	2.70	13	0	0.08	4	0	1.18
08	11	2.66	13	0	0.08	4	0	1.02
09	14	2.69	13	0	0.08	4	0	1.09
10	11	2.66	13	0	0.08	4	0	0.90
11	8	2.63	13	0	0.29	4	0	1.13
12	16	2.71	13	0	0.21	4	0	1.23
13	8	2.63	13	0	0.08	4	0	1.00
14	13	2.67	13	0	0.08	4	0	1.21
15	0	2.58	13	0	0.21	4	0	1.02
01	12	2.67	13	0	0.21	4	0	1.04
02	8	2.62	13	0	0.08	4	0	1.06
03	13	2.68	13	0	0.08	4	0	1.00
04	10	2.65	13	0	0.21	4	0	1.00
05	13	2.68	13	0	0.08	4	0	1.09
06	14	2.69	13	0	0.08	4	0	1.09
07	10	2.65	13	0	0.21	4	0	1.06
08	11	2.66	13	0	0.29	4	0	1.11
09	9	2.63	13	0	0.08	4	0	1.00
10	0	2.58	13	0	0.08	4	0	1.18
11	12	2.67	13	0	0.08	4	0	1.08

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
12	17	2.72	13	0	0.21	4	0	1.04
13	10	2.64	13	0	0.21	4	0	0.94
14	10	2.64	13	0	0.21	4	4.42	1.36
15	12	2.66	13	0	0.20	4	0	1.27
01	11	2.66	13	1.15	0.40	4	0	1.35
02	9	2.63	13	0	0.29	4	0	1.33
01	9	2.64	13	1.15	0.40	4	0	1.27
02	14	2.69	13	0	0.29	4	0	1.08
03	11	2.65	13	0	0.29	4	0	1.04
01	12	2.67	13	0	0.22	4	0	1.18
02	9	2.64	13	0	0.22	4	0	1.20
03	8	2.59	13	0	0.22	4	0	1.18
01	9	2.63	13	0	0.22	4	0	1.08
02	11	2.66	13	0	0.29	4	0	1.10
03	17	2.73	13	0	0.35	4	0	1.35
01	10	2.65	13	0	0.22	4	0	1.08
02	7	2.61	13	0	0.10	4	0	1.33
01	8	2.62	13	0	0.22	4	0	1.20
02	7	2.61	13	0	0.10	4	0	1.21
01	0	2.59	13	0	0.22	4	0	1.24
02	16	2.71	13	0	0.22	4	0	1.04
03	6	2.60	13	1.15	0.40	4	4.74	1.40
01	9	2.64	13	0	0.10	4	0	1.21
02	10	2.64	13	0	0.10	4	0	1.06
03	14	9.47	13	0	0.10	4	0	1.16
01	10	2.65	13	0	0.22	4	0	1.26
02	11	2.65	13	0	0.10	4	0	0.94
03	11	2.65	13	0	0.22	4	0	1.15
01	11	2.65	13	0	0.10	4	0	1.18
02	12	2.66	13	0	0.22	4	0	1.15
01	0	2.78	13	0	0.10	4	0	1.11
01	11	2.65	13	0	0.22	4	0	1.27

IGLOO CERTIFICATION

IGLOO NO. A02ØZ INSTRUMENT LUDLUM #3 BETA/GAM

DATE 17 NOV 1994 INSTRUMENT S/N 4137 PROBE 26655

ALPHA READINGS OR BETA/GAMMA READINGS INSTRUMENT CAL DATE 8 SEPT 94

	A	B	C	D	E	F	G	H	I
1	.2	.2	.2	.2	.3	.3	.3	.3	.3
2	.3	.3	.3	.2	.3	.3	.3	.3	.3
3	.2	.3	.3	.3	.3	.3	.2	.2	.3
4	.2	.2	.3	.2	.4	.4	.2	.2	.2
5	.3	.2	.4	.2	.3	.3	.2	.3	.2
6	.3	.3	.3	.3	.3	.3	.3	.3	.2
7	.2	.3	.3	.3	.3	.2	.3	.2	.3
8	.2	.3	.2	.3	.4	.3	.3	.3	.2
9	.3	.3	.2	.2	.4	.3	.3	.2	.2
10	.2	.3	.2	.2	.3	.4	.4	.2	.2
11	.2	.2	.3	.3	.3	.4	.4	.2	.3
12	.2	.3	.3	.3	.3	.4	.4	.3	.2
13	.2	.3	.4	.2	.3	.3	.3	.3	.2
14	.2	.3	.4	.2	.2	.3	.3	.2	.3
15	.3	.3	.3	.3	.2	.2	.2	.3	.2
16									
17									
18									
19									
20									

BACKGROUND .1

DUE CAL 6 JAN 95

SDSSE-N Form 880 (One-Time) 1 Jun 92

IGLOO CERTIFICATION

IGLOO NO. A0202 INSTRUMENT LUDLUM #3 (ALPHA)

DATE 17 NOV 1994 INSTRUMENT S/N 41118 PROBE 51714

ALPHA READINGS OR BETA/GAMMA READINGS INSTRUMENT CAL DATE 7 AUG 94

	A	B	C	D	E	F	G	H	I
1	40	40	20	60	40	30	40	20	40
2	40	40	60	80	60	30	40	60	60
3	40	60	50	40	40	40	40	40	60
4	40	70	30	40	60	60	40	40	50
5	70	100	40	600	40	60	40	60	60
6	40	60	40	100	30	40	30	60	40
7	40	40	20	60	20	30	30	50	40
8	40	40	40	40	40	20	30	60	50
9	40	40	60	40	40	30	40	60	60
10	40	40	60	40	40	40	50	40	40
11	40	40	60	60	40	30	80	70	40
12	40	40	40	50	40	20	40	60	60
13	40	60	40	60	50	60	40	40	100
14	40	40	20	40	50	40	40	40	60
15	60	40	40	30	60	60	40	40	50
16									
17									
18									
19									
20									

BACKGROUND 40
DUE CAL 6 JAN 95

SURFACE ACTIVITY MEASUREMENTS
SMEAR AND SWAB ANALYSIS
BUILDING 204

	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
SWIPE	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
01	0	2.57	13	0	0.23	2	0	1.23
02	11	2.65	13	0	0.36	2	0	1.20
03	8	2.59	13	0	0.30	2	0	1.08
04	3	2.62	13	0	0.13	2	0	1.14
05	6	2.59	13	0	0.23	2	0	1.12
06	11	2.65	13	0	0.23	2	0	1.10
07	9	2.62	13	0	0.13	2	0	1.15
08	0	2.56	13	0	0.36	2	0	1.07
09	11	2.66	13	0	0.13	2	0	1.25
10	10	2.64	13	0	0.36	2	0	1.20
11	8	2.61	13	0	0.30	2	0	1.26
12	14	2.67	13	0	0.30	2	0	1.28
13	9	2.62	13	0	0.13	2	0	0.95
14	11	2.65	13	0	0.30	2	0	1.07
15	0	2.59	13	0	0.36	2	0	1.10
01	13	2.67	13	0	0.13	2	0	0.99
02	7	2.61	13	0	0.36	2	0	1.19
03	9	2.62	13	0	0.23	2	0	1.22
04	12	2.66	13	0	0.13	2	0	1.10
05	0	2.58	13	0	0.36	2	0	0.99
06	10	2.64	13	0	0.23	2	0	1.01
07	0	2.58	13	0	0.30	2	0	1.12
08	8	2.62	13	0	0.30	2	0	1.14
09	14	2.68	13	0	0.30	2	0	1.07
10	10	2.64	13	0	0.23	2	0	0.97
11	6	2.59	13	0	0.13	2	0	1.14
12	11	2.65	13	0	0.23	2	0	1.25
13	0	2.56	13	0	0.23	2	0	1.10
14	11	2.65	13	0	0.30	2	0	1.14
15	11	2.65	13	0	0.13	2	0	1.05
01	17	2.71	13	0	0.30	2	5.28	1.37
02	10	2.64	13	0	0.30	2	0	0.99
03	12	2.66	13	0	0.13	2	0	1.08

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
04	7	2.61	13	0	0.23	2	0	1.20
05	9	2.63	13	0	0.13	2	0	0.99
06	13	2.67	13	0	0.13	2	0	0.97
07	10	2.64	13	0	0.30	2	0	1.05
08	8	2.62	13	1.69	0.50	2	0	1.12
09	12	2.64	13	0	0.36	2	0	1.05
10	0	2.58	13	1.34	0.46	2	0	1.17
11	8	2.62	13	0	0.13	2	0	1.01
12	12	2.67	13	0	0.30	2	0	1.12
13	8	2.62	13	0	0.13	2	0	0.93
14	0	2.56	13	0	0.23	2	0	0.97
15	15	2.72	13	0	0.13	2	0	1.01
01	11	2.66	13	0	0.36	2	0	1.01
02	0	2.58	13	0	0.36	2	0	1.08
03	12	2.68	13	0	0.23	2	0	1.08
04	6	2.61	13	0	0.13	2	0	1.12
05	11	2.67	13	0	0.23	2	0	1.03
06	7	2.61	13	0	0.36	2	0	1.08
07	0	2.59	13	0	0.13	2	0	1.08
08	11	2.67	13	0	0.30	2	0	1.14
09	0	2.59	13	0	0.36	2	0	1.23
10	11	2.65	13	0	0.23	2	0	1.22
11	8	2.62	13	0	0.23	2	0	1.23
12	0	2.56	13	0	0.23	2	0	1.15
13	8	2.62	13	0	0.36	2	0	1.19
14	10	2.65	13	0	0.30	2	0	1.31
15	6	2.60	13	0	0.23	2	0	1.03
01	0	2.56	13	1.34	0.46	2	0	1.25
02	0	2.53	13	2.40	0.57	2	0	1.17
03	6	2.60	13	0	0.30	2	0	1.03
04	0	2.59	13	0	0.41	2	0	1.01
05	0	2.59	13	0	0.30	2	4.29	1.32
06	8	2.63	13	0	0.23	2	0	1.26
07	0	2.57	13	0	0.36	2	0	1.05
08	9	2.64	13	0	0.13	2	0	1.28
09	10	2.66	13	0	0.23	2	0	1.26

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
10	8	2.63	13	0	0.13	2	0	1.29
11	8	2.63	13	0	0.41	2	0	1.20
12	9	2.64	13	0	0.23	2	4.29	1.32
13	7	2.61	13	0	0.30	2	0	1.29
14	7	2.61	13	0	0.30	2	0	1.22
15	8	2.63	13	0	0.36	2	0	1.15
01	12	2.68	13	0	0.30	2	0	0.89
02	0	2.59	13	0	0.13	2	0	1.08
03	8	2.64	13	0	0.30	2	0	1.26
04	10	2.66	13	0	0.30	2	0	0.89
05	15	2.72	13	0	0.23	2	0	0.99
06	8	2.63	13	0	0.13	2	0	1.25
07	6	2.61	13	0	0.30	2	0	0.99
08	12	2.68	13	0	0.23	2	0	1.19
09	8	2.64	13	0	0.23	2	0	0.91
10	10	2.66	13	0	0.30	2	0	1.08
11	10	2.66	13	0	0.13	2	0	0.95
12	6	2.61	13	0	0.36	2	0	1.05
13	10	2.66	13	0	0.30	2	0	1.12
14	12	2.68	13	0	0.41	2	0	1.19
15	10	2.67	13	0	0.36	2	0	1.12
01	0	2.59	13	0	0.11	4	0	0.50
02	13	2.70	13	0	0.20	4	0	0.61
03	8	2.63	13	0	0.28	4	0	0.61
04	9	2.65	13	0	0.04	4	0	0.56
05	14	2.70	13	0	0.20	4	0	0.52
06	10	2.66	13	0	0.28	4	0	0.55
07	13	2.70	13	0	0.04	4	0	0.61
08	15	2.72	13	0	0.04	4	0	0.53
09	0	2.61	13	0	0.04	4	0	0.58
10	0	2.58	13	0	0.04	4	0	0.55
11	10	2.66	13	0	0.20	4	0	0.63
12	0	2.59	13	0	0.20	4	0	0.59
13	14	2.58	12	0	0.28	4	0	0.58
14	15	2.59	12	0	0.20	4	0	0.57
15	13	2.58	12	0	0.04	4	0	0.57

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
01	15	2.60	12	1.15	0.39	4	0	0.58
02	15	2.60	12	0	0.20	4	0	0.61
03	19	2.65	12	0	0.18	4	0	0.65
04	20	2.66	12	0	0.20	4	0	0.64
05	12	2.56	12	0	0.04	4	0	0.57
06	15	2.60	12	0	0.20	4	0	0.64
07	15	2.61	12	0	0.04	4	0	0.63
08	18	2.64	12	0	0.20	4	5.71	0.71
09	21	2.67	12	1.15	0.39	4	0	0.60
10	18	2.63	12	0	0.28	4	0	0.62
11	12	2.56	12	1.15	0.39	4	0	0.61
12	14	2.59	12	0	0.20	4	4.44	0.69
13	14	2.59	12	0	0.28	4	0	0.64
14	17	2.62	12	0	0.28	4	0	0.61
15	22	2.69	12	0	0.04	4	0	0.58
01	15	2.60	12	0	0.04	4	0	0.54
02	11	2.55	12	0	0.28	4	0	0.67
03	16	2.61	12	0	0.20	4	0	0.67
04	18	2.64	12	0	0.20	4	0	0.63
05	13	2.57	12	0	0.20	4	0	0.50
06	15	2.60	12	0	0.04	4	0	0.61
07	16	2.61	12	0	0.04	4	0	0.61
08	21	2.67	12	0	0.34	4	0	0.56
09	12	2.56	12	0	0.20	4	0	0.59
10	21	2.68	12	0	0.28	4	0	0.62
11	15	2.61	12	0	0.20	4	0	0.62
12	13	2.57	12	0	0.20	4	0	0.58
13	19	2.65	12	0	0.04	4	0	0.60
14	16	2.61	12	0	0.20	4	0	0.60
15	19	2.65	12	0	0.20	4	0	0.54
01	14	2.58	12	0	0.28	4	0	0.65
02	10	2.54	12	0	0.28	4	0	0.60
03	17	2.63	12	0	0.28	4	0	0.68
04	13	2.58	12	0	0.20	4	4.12	0.69
05	11	2.55	12	0	0.28	4	4.44	0.59
06	14	2.59	12	0	0.04	4	0	0.65

	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
SWIPE	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
07	15	2.60	12	0	0.04	4	0	0.61
08	16	2.61	12	0	0.20	4	0	0.63
09	11	2.55	12	1.55	0.44	4	0	0.60
10	13	2.57	12	0	0.34	4	0	0.50
11	14	2.59	12	0	0.20	4	0	0.64
12	11	2.54	12	0	0.04	4	0	0.64
13	11	2.54	12	0	0.20	4	0	0.61
14	20	2.65	12	0	0.20	4	0	0.55
15	14	2.59	12	0	0.20	4	0	0.63
01	18	2.61	12	0	0.28	4	0	0.63
02	12	2.56	12	0	0.06	4	0	0.53
03	8	2.71	12	0	0.06	4	0	0.66
04	10	2.73	12	0	0.28	4	0	0.54
05	12	2.76	12	0	0.06	4	0	0.64
06	10	2.74	12	0	0.06	4	0	0.56
07	8	2.70	12	0	0.28	4	0	0.68
08	11	2.75	12	0	0.06	4	4.44	0.50
09	16	2.81	12	0	0.06	4	0	0.63
10	0	2.66	12	0	0.20	4	0	0.62
11	13	2.75	12	0	0.34	4	0	0.61
12	16	2.81	12	0	0.20	4	0	0.75
13	8	2.71	12	0	0.28	4	0	0.63
14	8	2.71	12	0	0.20	4	0	0.73
15	14	2.78	12	0	0.20	4	0	0.65
01	0	2.62	12	0	0.34	4	0	0.71
02	8	2.70	12	0	0.34	4	0	0.72
03	12	2.73	12	0	0.06	4	0	0.66
04	5	2.67	12	0	0.06	4	0	0.64
05	10	2.73	12	0	0.34	4	0	0.60
06	12	2.75	12	0	0.20	4	0	0.66
07	10	2.73	12	0	0.20	4	0	0.66
08	8	2.71	12	0	0.06	4	0	0.62
09	8	2.71	12	0	0.06	4	0	0.63
10	13	2.77	12	0	0.20	4	0	0.69
11	0	2.67	12	0	0.06	4	0	0.66

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
12	14	2.77	12	0	0.20	4	0	0.58
13	7	2.68	12	0	0.20	4	0	0.63
14	14	2.78	12	0	0.06	4	0	0.73
15	8	2.69	12	0	0.20	4	0	0.63
01	9	2.63	12	0	0.10	4	0	1.21
02	10	2.65	12	0	0.29	4	0	1.24
01	12	2.68	12	0	0.22	4	0	1.33
02	8	2.59	12	0	0.22	4	0	1.24
03	16	2.72	12	0	0.29	4	0	1.30
01	11	2.66	12	0	0.10	4	0	1.11
02	12	2.67	12	0	0.29	4	0	1.16
03	9	2.63	12	0	0.29	4	0	1.29
01	12	2.67	12	0	0.29	4	0	1.32
02	8	2.62	12	2.34	0.53	4	0	1.23
03	14	2.69	12	0	0.29	4	0	1.02
01	11	2.65	12	0	0.22	4	0	1.18
02	10	2.65	12	0	0.10	4	0	1.24
01	12	2.67	12	0	0.10	4	0	1.04
02	17	2.72	12	0	0.10	4	0	1.36
01	12	2.67	12	0	0.10	4	0	1.08
02	7	2.61	12	0	0.22	4	0	1.18
03	12	2.67	12	0	0.10	4	0	1.15
01	13	2.67	12	0	0.10	4	0	1.08
02	11	2.65	12	0	0.35	4	0	1.11
03	12	2.67	12	0	0.35	4	0	1.35
01	9	2.64	12	0	0.10	4	0	1.24
02	14	2.69	12	0	0.29	4	0	1.15
03	16	2.70	12	0	0.10	4	0	1.30
01	14	2.69	12	0	0.10	4	0	1.15
02	14	2.69	12	0	0.10	4	0	1.13
01	0	2.55	12	0	0.29	4	0	0.49
01	6	2.58	12	0	0.22	4	0	1.20

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IGLOO CERTIFICATION

IGLOO NO. A0204 INSTRUMENT LUDLUM #3 BETA/GAM.

DATE 15 NOV. 94 INSTRUMENT S/N 41137 w/PROBE 26655

~~ALPHA READINGS~~ OR BETA/GAMMA READINGS in mR/HR INSTRUMENT CAL DATE 8 SEPT 94

	A	B	C	D	E	F	G	H	I
1	0.3	0.3	0.3	0.3	0.2	0.1	0.3	0.2	0.2
2	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.2	0.2
3	0.25	0.3	0.2	0.3	0.2	0.2	0.3	0.2	0.2
4	0.3	0.3	0.2	0.2	0.3	0.2	0.3	0.3	0.2
5	0.3	0.3	0.2	0.2	0.3	0.2	0.3	0.3	0.2
6	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.3	0.2
7	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2
8	0.3	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.3
9	0.2	0.3	0.2	0.2	0.3	0.3	0.2	0.2	0.3
10	0.2	0.3	0.2	0.2	0.2	0.3	0.2	0.2	0.3
11	0.3	0.3	0.3	0.2	0.2	0.3	0.2	0.2	0.3
12	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.3
13	0.3	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.3
14	0.2	0.3	0.2	0.2	0.3	0.3	0.2	0.2	0.2
15	0.2	0.2	0.3	0.2	0.3	0.2	0.2	0.3	0.3
16									
17									
18									
19									
20									

SDSSE-N Form 880 (One-Time) 1 Jun 92

IGLOO CERTIFICATION

IGLOO NO. A0204 INSTRUMENT LUDLUM #3 (ALPHA)

DATE 15 NOV. 94 INSTRUMENT S/N [redacted]4/1118 Probe 517.

~~ALPHA READINGS~~ OR ~~BETA/GAMMA READINGS~~ in CPM INSTRUMENT CAL DATE 8 SEPT 94

	A	B	C	D	E	F	G	H	I
1	20	50	30	40	50	30	20	40	50
2	60	50	40	60	50	50	20	20	60
3	60	50	20	50	50	20	20	30	40
4	40	40	20	90	50	20	30	40	80
5	20	20	20	60	30	20	40	40	50
6	40	40	70	50	40	60	60	20	50
7	40	50	80	50	40	80	60	30	40
8	60	40	50	40	50	100	40	50	50
9	40	50	40	50	70	70	50	50	50
10	60	40	30	50	80	80	60	50	60
11	60	30	20	40	80	60	50	50	40
12	60	40	30	50	70	40	30	40	60
13	40	50	60	50	50	40	50	20	60
14	40	20	60	30	60	60	60	30	40
15	80	30	50	50	60	50	60	60	50
16									
17									
18									
19									
20									

SDSSE-N Form 880 (One-Time), 1 Jun 92

DEPARTMENT OF THE ARMY

U.S. ARMY IONIZING RADIATION DOSIMETRY CENTER

U.S. ARMY TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE) ACTIVITY

LEXINGTON, KY 40511-5102

AMXTM-SR-DN

3 October 1994

MEMORANDUM FOR Commander, Seneca Army Depot, Building 323, Romulus, NY 14541

SUBJECT: Decommissioning Wipes

1. The results of the decommissioning wipes done at your facility, which this Center received 01 September 1994, are indicated on the enclosed tables.

2. A review of the results revealed that none of the wipes exceeded the removable contamination limits set forth in AR 385-11 or the Nuclear Regulatory Commission's "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material", dated April 1993.

3. POC is Stephen Howard, DSN 745-3942.

A. EDWARD ABNEY
Chief, US Army Ionizing
Radiation Dosimetry Center

Encl

Iglco # 212
208
305

SURFACE ACTIVITY MEASUREMENTS
SMEAR AND SWAB ANALYSIS
BUILDING 212

		ACTIVITY (DPM/100 cm²)								
		TRITIUM BETA			ALPHA			BETA		
RID	SWIPE	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM
A	01	0	3.46	17	0	0.17	4	0	0.71	1
A	02	0	3.43	17	0	0.14	4	0	0.65	1
A	03	0	3.46	17	0	0.17	4	0	0.60	1
A	04	8	3.51	17	0	0.10	4	0	0.64	1
A	05	0	3.47	17	0	0.03	4	0	0.62	1
A	06	15	3.57	17	0	0.03	4	0	0.65	1
A	07	0	3.48	17	0	0.10	4	0	0.56	1
A	08	8	3.49	17	0	0.17	4	0	0.70	1
A	09	0	3.49	17	0	0.03	4	0	0.58	1
A	10	10	3.51	17	0	0.20	4	0	0.62	1
A	11	8	3.49	17	0	0.10	4	0	0.62	1
A	12	0	3.49	17	0	0.20	4	0	0.56	1
A	13	12	3.53	17	0	0.10	4	0	0.70	1
A	14	0	3.45	17	0	0.10	4	0	0.62	1
A	15	9	3.50	17	0	0.10	4	0	0.65	1
B	01	10	3.52	17	0	0.10	4	0	0.62	1
B	02	10	3.51	17	0	0.17	4	0	0.63	1
B	03	16	3.55	17	0	0.20	4	0	0.71	1
B	04	0	3.43	17	0	0.14	4	0	0.68	1
B	05	0	3.43	17	0	0.10	4	0	0.64	1
B	06	0	3.47	17	0	0.10	4	0	0.68	1
B	07	0	3.43	17	0	0.14	4	0	0.69	1
B	08	0	3.46	17	0	0.10	4	0	0.54	1
B	09	10	3.52	17	0	0.20	4	0	0.68	1
B	10	10	3.52	17	0	0.10	4	0	0.70	1
B	11	0	3.47	17	0	0.14	4	0	0.62	1
B	12	8	3.50	17	0	0.17	4	0	0.66	1
B	13	9	3.51	17	0	0.14	4	0	0.62	1
B	14	0	3.44	17	0	0.10	4	0	0.74	1
B	15	8	3.51	17	0	0.10	4	0	0.57	1
C	01	8	3.49	17	0	0.10	4	0	0.62	1
C	02	0	3.44	17	0	0.03	4	0	0.69	1
C	03	0	3.43	17	0	0.03	4	0	0.65	1

		ACTIVITY (DPM/100 cm²)								
		TRITIUM BETA			ALPHA			BETA		
RID	SWIPE	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM
C	04	0	3.46	17	0	0.14	4	0	0.65	1
C	05	0	3.46	17	0	0.14	4	0	0.65	1
C	06	0	3.44	17	0	0.10	4	0	0.62	1
C	07	0	3.43	17	0	0.14	4	0	0.63	1
C	08	12	3.54	17	1.99	0.26	4	0	0.62	1
C	09	0	3.47	17	0	0.14	4	0	0.58	1
C	10	12	3.55	17	0	0.10	4	0	0.70	1
C	11	17	3.56	17	0	0.14	4	0	0.62	1
C	12	0	3.46	17	0	0.20	4	0	0.71	1
C	13	14	3.55	17	0	0.10	4	0	0.65	1
C	14	9	3.51	17	0	0.20	4	0	0.70	1
C	15	8	3.50	17	0	0.03	4	0	0.72	1
D	01	0	3.43	17	0	0.20	4	0	0.65	1
D	02	0	3.47	17	0	0.10	4	0	0.64	1
D	03	0	3.48	17	0	0.17	4	0	0.62	1
D	04	10	3.53	17	0	0.10	4	0	0.62	1
D	05	12	3.54	17	0	0.14	4	0	0.62	1
D	06	0	3.49	17	0	0.10	4	0	0.61	1
D	07	14	3.55	17	0	0.17	4	0	0.70	1
D	08	18	3.59	17	0	0.10	4	0	0.69	1
D	09	14	3.55	17	0	0.03	4	0	0.68	1
D	10	8	3.50	17	0	0.10	4	0	0.65	1
D	11	15	3.58	17	0	0.10	4	0	0.67	1
D	12	22	3.62	17	0	0.14	4	0	0.65	1
D	13	0	3.45	17	0	0.17	4	0	0.67	1
D	14	13	3.54	17	0	0.20	4	0	0.78	1
D	15	12	3.53	17	0	0.20	4	0	0.68	1
E	01	14	3.54	17	0	0.10	4	0	0.72	1
E	02	0	3.46	17	0	0.14	4	0	0.61	1
E	03	13	3.54	17	0	0.17	4	0	0.70	1
E	04	9	3.51	17	0	0.22	4	0	0.74	1
E	05	0	3.49	17	0	0.10	4	0	0.64	1
E	06	0	3.44	17	0	0.14	4	0	0.71	1
E	07	8	3.50	17	0	0.10	4	0	0.60	1
E	08	15	3.57	17	0	0.03	4	0	0.70	1
E	09	8	3.50	17	0	0.14	4	0	0.58	1

		ACTIVITY (DPM/100 cm²)								
		TRITIUM BETA			ALPHA			BETA		
RID	SWIPE	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM
E	10	11	3.52	17	0	0.03	4	0	0.58	1
E	11	17	3.58	17	0	0.20	4	0	0.65	1
E	12	18	3.60	17	0	0.03	4	0	0.70	1
E	13	12	3.54	17	0	0.22	4	0	0.62	1
E	14	21	3.64	17	0	0.03	4	0	0.61	1
E	15	13	3.56	17	0	0.10	4	0	0.52	1
F	01	9	3.52	17	0	0.10	4	0	0.58	1
F	02	12	3.56	17	0	0.17	4	0	0.69	1
F	03	8	3.52	17	0	0.10	4	0	0.62	1
F	04	13	3.57	17	0	0.10	4	0	0.61	1
F	05	17	3.60	17	0	0.20	4	0	0.67	1
F	06	10	3.53	17	0	0.14	4	0	0.62	1
F	07	10	3.53	17	0	0.17	4	0	0.64	1
F	08	10	3.53	17	0	0.14	4	0	0.71	1
F	09	12	3.56	17	0	0.03	4	0	0.60	1
F	10	14	3.57	17	0	0.10	4	0	0.61	1
F	11	9	3.53	17	0	0.10	4	0	0.56	1
F	12	11	3.55	17	0	0.17	4	0	0.65	1
F	13	9	3.52	17	0	0.10	4	0	0.71	1
F	14	8	3.51	17	0	0.03	4	0	0.68	1
F	15	11	3.54	17	0	0.10	4	0	0.62	1
G	01	10	3.53	17	0	0.22	4	0	2.40	1
G	02	10	3.53	17	0	0.20	4	0	2.43	1
G	03	8	3.51	17	0	0.15	4	0	2.41	1
G	04	9	3.52	17	0	0.11	4	0	2.38	1
G	05	0	3.49	17	0	0.20	4	0	2.41	1
G	06	16	3.59	17	0	0.05	4	0	2.40	1
G	07	0	3.48	17	0	0.11	4	0	2.43	1
G	08	16	3.59	17	0	0.11	4	0	2.40	1
G	09	15	3.58	17	0	0.11	4	0	2.36	1
G	10	14	3.57	17	0	0.18	4	0	2.38	1
G	11	12	3.56	17	0	0.15	4	0	2.40	1
G	12	16	3.59	17	0	0.20	4	0	2.40	1
G	13	11	3.54	17	0	0.11	4	0	2.38	1
G	14	16	3.59	17	0	0.15	4	0	2.40	1
G	15	16	3.59	17	0	0.11	4	0	2.39	1

RID	SWIPE	ACTIVITY (DPM/100 cm²)								
		TRITIUM BETA			ALPHA			BETA		
		ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM
H	01	15	3.58	17	0	0.11	4	0	2.39	10
H	02	12	3.55	17	0	0.11	4	0	2.38	10
H	03	14	3.57	17	0	0.20	4	0	2.39	10
H	04	15	3.57	17	0	0.05	4	0	2.40	10
H	05	17	3.60	17	0	0.11	4	0	2.38	10
H	06	15	3.57	17	0	0.11	4	0	2.39	10
H	07	10	3.53	17	0	0.11	4	0	2.37	10
H	08	14	3.57	17	0	0.11	4	0	2.39	10
H	09	12	3.54	17	0	0.11	4	0	2.39	10
H	10	18	3.60	17	0	0.15	4	0	2.40	10
H	11	14	3.56	17	0	0.11	4	0	2.40	10
H	12	8	3.50	17	0	0.11	4	0	2.39	10
H	13	15	3.57	17	0	0.11	4	0	2.43	10
H	14	9	3.52	17	0	0.11	4	0	2.41	10
H	15	12	3.55	17	0	0.15	4	0	2.38	10
I	01	10	3.53	17	0	0.15	4	0	2.40	10
I	02	13	3.56	17	0	0.11	4	0	2.39	10
I	03	12	3.55	17	0	0.05	4	0	2.41	10
I	04	20	3.63	17	0	0.11	4	0	2.39	10
I	05	8	3.51	17	0	0.11	4	0	2.40	10
I	06	18	3.61	17	0	0.15	4	0	2.39	10
I	07	13	3.56	17	0	0.05	4	0	2.40	10
I	08	13	3.56	17	0	0.11	4	0	2.39	10
I	09	12	3.54	17	0	0.15	4	0	2.40	10
I	10	14	3.58	17	0	0.11	4	0	2.37	10
I	11	8	3.51	17	0	0.18	4	0	2.39	10
I	12	14	3.57	17	0	0.11	4	0	2.39	10
I	13	12	3.55	17	0	0.15	4	0	2.40	10
I	14	12	3.55	17	0	0.05	4	0	2.41	10
I	15	15	3.57	17	0	0.15	4	0	2.40	10
J	01	8	3.50	17	0	0.20	4	0	2.39	10
J	02	13	3.56	17	0	0.11	4	0	2.39	10
J	03	10	3.53	17	0	0.05	4	0	2.40	10
J	04	10	3.53	17	0	0.18	4	0	2.37	10
J	05	0	3.48	17	0	0.05	4	0	2.40	10
J	06	0	3.58	18	0	0.05	4	0	2.39	10

RID	SWIPE	ACTIVITY (DPM/100 cm²)								
		TRITIUM BETA			ALPHA			BETA		
		ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPI
J	07	0	3.57	18	1.88	0.26	4	0	2.39	10
J	08	0	3.57	18	0	0.11	4	0	2.40	10
J	09	0	3.50	18	0	0.15	4	0	2.41	10
J	10	0	3.56	18	0	0.20	4	0	2.39	10
J	11	0	3.55	18	0	0.11	4	0	2.42	10
J	12	0	3.58	18	0	0.20	4	0	2.41	10
J	13	0	3.50	18	0	0.15	4	0	2.37	10
J	14	0	3.50	18	0	0.05	4	0	2.40	10
J	15	0	3.56	18	0	0.11	4	0	2.38	10
K	01	14	3.64	18	0	0.18	4	0	2.38	10
K	02	0	3.51	18	0	0.18	4	0	2.40	10
K	03	0	3.57	18	0	0.20	4	0	2.39	10
K	04	0	3.58	18	0	0.15	4	0	2.38	10
K	05	9	3.52	18	0	0.22	4	0	2.42	10
K	06	0	3.53	18	0	0.15	4	0	2.41	10
K	07	0	3.55	18	0	0.11	4	0	2.41	10
K	08	0	3.51	18	0	0.22	4	0	2.41	10
K	09	0	3.58	18	0	0.15	4	0	2.40	10
K	10	0	3.53	18	0	0.11	4	0	2.40	10
K	11	14	3.65	18	0	0.18	4	0	2.39	10
K	12	0	3.55	18	0	0.18	4	0	2.37	10
K	13	0	3.58	18	0	0.05	4	0	2.39	10
K	14	0	3.55	18	0	0.05	4	0	2.41	10
K	15	0	3.56	18	0	0.15	4	0	2.40	10
L	01	0	3.50	18	0	0.20	4	0	2.40	10
L	02	0	3.50	18	0	0.11	4	0	2.40	10
L	03	0	3.54	18	0	0.20	4	0	2.40	10
L	04	0	3.57	18	0	0.11	4	0	2.40	10
L	05	0	3.55	18	0	0.05	4	0	2.40	10
L	06	13	3.63	18	0	0.15	4	0	2.41	10
L	07	18	3.67	18	0	0.15	4	0	2.39	10
L	08	0	3.57	18	0	0.18	4	0	2.40	10
L	09	0	3.62	18	0	0.11	4	0	2.41	10
L	10	11	3.66	18	0	0.15	4	0	2.40	10
L	11	16	3.59	18	0	0.22	4	0	2.36	10
L	12	9	3.51	18	0	0.20	4	0	2.41	10

		ACTIVITY (DPM/100 cm²)								
		TRITIUM BETA			ALPHA			BETA		
RID	SWIPE	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DP
L	13	0	3.65	18	0	0.18	4	0	2.39	1
L	14	14	3.71	18	0	0.11	4	0	2.39	1
L	15	20	3.62	18	0	0.05	4	0	2.39	1
AF	01	12	3.62	18	0	0.01	4	0	0.65	1
AF	02	12	3.63	18	0	0.14	4	0	0.69	1
BF	01	14	3.60	18	0	0.14	4	0	0.59	1
BF	02	11	3.57	18	0	0.10	4	0	0.60	1
BF	03	0	3.56	18	0	0.20	4	0	0.64	1
CF	01	0	3.57	18	0	0.20	4	0	0.64	1
CF	02	11	3.61	18	0	0.14	4	0	0.64	1
CF	03	0	3.59	18	0	0.20	4	0	0.66	1
DF	01	9	3.62	18	0	0.10	4	0	0.58	1
DF	02	12	3.54	18	0	0.17	4	0	0.63	1
DF	03	0	3.55	18	0	0.10	4	0	0.60	1
EF	01	0	3.56	18	0	0.14	4	0	0.69	1
EF	02	0	3.61	18	0	0.14	4	0	0.61	1
AR	01	0	3.57	18	0	0.14	4	0	0.68	1
AR	02	12	3.56	18	0	0.14	4	0	0.69	1
BR	01	0	3.50	18	0	0.17	4	0	0.67	1
BR	02	0	3.53	18	0	0.10	4	0	0.64	1
BR	03	0	3.51	18	0	0.10	4	0	0.66	1
CR	01	0	3.52	18	0	0.10	4	0	0.62	1
CR	02	0	3.56	18	0	0.14	4	0	0.56	1
CR	03	0	3.50	18	0	0.17	4	0	0.69	1
DR	01	0	3.50	18	0	0.01	4	0	0.71	1
DR	02	0	3.52	18	0	0.14	4	0	0.67	1
DR	03	0	3.50	18	0	0.14	4	0	0.69	1
ER	01	0	3.50	18	0	0.10	4	0	0.61	1
ER	02	0	3.50	18	0	0.24	4	0	0.68	1
RV	01	0	3.51	18	0	0.01	4	0	0.49	1
RV	02	0	3.50	18	0	0.14	4	0	0.69	1

SURFACE ACTIVITY MEASUREMENTS
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SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
01	0	2.78	15	0	0.06	4	0	0.79
02	0	2.79	15	0	0.10	4	0	0.76
03	0	2.78	15	0	0.10	4	0	0.75
04	0	2.78	15	0	0.13	4	0	0.75
05	0	2.78	15	0	0.13	4	0	0.71
06	0	2.78	15	0	0.10	4	0	0.69
07	0	2.78	15	0	0.13	4	0	0.78
08	0	2.79	15	0	0.10	4	0	0.72
09	0	2.84	15	0	0.13	4	0	0.69
10	0	2.78	15	0	0.10	4	0	0.75
11	0	2.78	15	0	0.15	4	0	0.78
12	0	2.79	15	0	0.13	4	0	0.86
13	0	2.78	15	0	0.20	4	0	0.70
14	0	2.78	15	0	0.15	4	0	0.70
15	0	2.78	15	0	0.15	4	0	0.73
01	0	2.78	15	0	0.13	4	0	0.76
02	0	2.78	15	0	0.15	4	0	0.82
03	0	2.82	15	0	0.13	4	0	0.78
04	0	2.81	15	0	0.15	4	0	0.76
05	0	2.78	15	0	0.15	4	0	0.75
06	0	2.78	15	0	0.19	4	0	0.78
07	0	2.84	15	0	0.17	4	0	0.69
08	0	2.78	15	0	0.10	4	0	0.71
09	0	2.78	15	0	0.06	4	0	0.77
10	0	2.78	15	0	0.17	4	0	0.71
11	0	2.78	15	0	0.19	4	0	0.71
12	0	2.78	15	0	0.13	4	0	0.78
13	0	2.78	15	0	0.20	4	0	0.74
14	0	2.82	15	0	0.10	4	0	0.70
15	0	2.78	15	0	0.17	4	0	0.71
01	0	2.78	15	0	0.13	4	0	0.78
02	0	2.78	15	0	0.15	4	0	0.73
03	0	2.78	15	0	0.20	4	0	0.78

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
04	0	2.78	15	0	0.17	4	0	0.78
05	0	2.78	15	0	0.06	4	0	0.72
06	0	2.78	15	0	0.19	4	0	0.78
07	0	2.78	15	0	0.19	4	0	0.73
08	0	2.78	15	0	0.06	4	0	0.77
09	0	2.78	15	0	0.13	4	0	0.78
10	0	2.78	15	0	0.10	4	0	0.74
11	0	2.78	15	0	0.13	4	0	0.81
12	0	2.80	15	0	0.15	4	0	0.72
13	0	2.78	15	0	0.13	4	0	0.78
14	0	2.78	15	0	0.13	4	0	0.70
15	0	2.78	15	1.83	0.15	4	0	0.73
01	0	2.74	13	0	0.20	4	0	0.86
02	0	2.69	13	0	0.14	4	0	0.85
03	0	2.69	13	0	0.10	4	0	0.80
04	0	2.70	13	0	0.17	4	0	0.77
05	0	2.72	13	0	0.14	4	0	0.80
06	0	2.72	13	0	0.14	4	0	0.68
07	0	2.69	13	0	0.10	4	0	0.79
08	0	2.69	13	0	0.20	4	0	0.83
09	0	2.74	13	0	0.17	4	0	0.77
10	0	2.69	13	0	0.22	4	0	0.60
11	0	2.69	13	0	0.17	4	0	0.54
12	0	2.69	13	0	0.10	4	0	0.65
13	0	2.69	13	1.57	0.24	4	0	0.64
14	0	2.69	13	0	0.01	4	0	0.71
15	0	2.71	13	0	0.01	4	0	0.63
01	0	2.69	13	0	0.10	4	0	0.69
02	0	2.71	13	0	0.14	4	0	0.71
03	0	2.71	13	0	0.10	4	0	0.70
04	0	2.69	13	0	0.17	4	0	0.66
05	0	2.69	13	0	0.15	4	0	0.72
06	0	2.72	13	0	0.18	4	0	0.65
07	0	2.75	13	0	0.21	4	0	0.74
08	0	2.74	13	0	0.15	4	0	0.72
09	0	2.72	13	0	0.12	4	0	0.69

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
10	7	2.78	13	0	0.18	4	0	0.66
11	6	2.76	13	0	0.07	4	0	0.71
12	0	2.74	13	0	0.18	4	0	0.70
13	0	2.76	13	0	0.12	4	0	0.76
14	7	2.78	13	0	0.12	4	0	0.78
15	7	2.78	13	0	0.12	4	0	0.76
01	0	2.75	13	0	0.12	4	0	0.79
02	0	2.74	13	0	0.12	4	0	0.68
03	0	2.77	13	0	0.18	4	0	0.74
04	0	2.74	13	0	0.12	4	0	0.77
05	9	2.82	13	0	0.12	4	0	0.71
06	7	2.79	13	0	0.12	4	0	0.70
07	0	2.75	13	0	0.18	4	0	0.65
08	6	2.77	13	0	0.22	4	0	0.82
09	7	2.79	13	1.58	0.26	4	0	0.79
10	0	2.69	13	0	0.24	4	0	0.66
11	9	2.81	13	0	0.19	4	0	0.78
12	6	2.77	13	0	0.19	4	0	0.71
13	8	2.81	13	0	0.09	4	0	0.72
14	0	2.71	13	0	0.13	4	0	0.64
15	0	2.71	13	0	0.09	4	0	0.78
01	0	2.74	13	0	0.19	4	0	0.89
02	0	2.75	13	1.47	0.26	4	0	0.74
03	6	2.78	13	0	0.16	4	0	0.73
04	7	2.79	13	0	0.16	4	0	0.73
05	0	2.74	13	0	0.09	4	0	0.70
06	6	2.77	13	0	0.19	4	0	0.73
07	0	2.73	13	0	0.21	4	0	0.80
08	0	2.71	13	0	0.09	4	0	0.69
09	0	2.74	13	0	0.19	4	0	0.83
10	6	2.77	13	0	0.16	4	0	0.85
11	7	2.78	13	0	0.13	4	0	0.78
12	0	2.75	13	0	0.19	4	0	0.77
13	0	2.69	13	0	0.13	4	0	0.65
14	0	2.74	13	0	0.16	4	0	0.75
15	0	2.73	13	0	0.13	4	0	0.78

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
01	8	2.79	13	1.47	0.26	4	0	0.71
02	0	2.69	13	0	0.13	4	0	0.74
03	7	2.78	13	0	0.13	4	0	0.75
04	7	2.78	13	0	0.09	4	0	0.69
05	8	2.79	13	0	0.21	4	0	0.71
06	0	2.72	13	0	0.13	4	0	0.69
07	0	2.70	13	0	0.19	4	0	0.74
08	6	2.77	13	0	0.16	4	0	0.77
09	0	2.72	13	0	0.09	4	0	0.75
10	0	2.73	13	0	0.16	4	0	0.69
11	7	2.78	13	0	0.16	4	0	0.71
12	0	2.73	13	0	0.16	4	0	0.75
13	0	2.69	13	0	0.16	4	0	0.69
14	0	2.73	13	0	0.16	4	0	0.67
15	0	2.69	13	0	0.19	4	0	0.75
01	0	2.75	13	0	0.24	4	0	0.76
02	0	2.70	13	0	0.21	4	0	0.69
03	6	2.76	13	0	0.24	4	0	0.78
04	0	2.74	13	0	0.21	4	0	0.79
05	0	2.74	13	0	0.16	4	0	0.78
06	8	2.79	13	0	0.16	4	0	0.73
07	0	2.70	13	0	0.21	4	0	0.75
08	0	2.72	13	0	0.13	4	0	0.74
09	0	2.75	13	0	0.19	4	0	0.79
10	0	2.69	13	0	0.21	4	0	0.73
11	0	2.70	13	1.47	0.26	4	0	0.81
12	0	2.73	13	0	0.19	4	0	0.66
13	0	2.70	13	1.47	0.26	4	0	0.73
14	6	2.76	13	0	0.13	4	0	0.78
15	0	2.75	13	0	0.19	4	0	0.71
01	0	2.76	13	0	0.19	4	0	0.68
02	0	2.76	13	0	0.21	4	0	0.80
03	7	2.78	13	0	0.16	4	0	0.78
04	0	2.74	13	0	0.16	4	0	0.75
05	6	2.77	13	0	0.16	4	0	0.82
06	8	2.80	13	1.47	0.26	4	0	0.75

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
07	0	2.72	13	0	0.21	4	0	0.73
08	6	2.77	13	2.7	0.31	4	0	0.81
09	0	2.74	13	2.7	0.31	4	0	0.74
10	9	2.80	13	3.11	0.32	4	0	0.83
11	0	2.76	13	1.88	0.27	4	0	0.75
12	0	2.74	13	1.47	0.26	4	0	0.74
13	7	2.77	13	0	0.24	4	0	0.73
14	0	2.75	13	0	0.19	4	0	0.68
15	0	2.72	13	0	0.19	4	0	0.69
01	0	2.75	13	1.47	0.26	4	0	0.68
02	0	2.69	13	0	0.19	4	0	0.69
03	0	2.76	13	0	0.21	4	0	0.74
04	6	2.78	13	0	0.16	4	0	0.77
05	10	2.82	13	0	0.21	4	0	0.80
06	0	2.72	13	0	0.19	4	0	0.66
07	6	2.77	13	0	0.13	4	0	0.71
08	0	2.73	13	0	0.16	4	0	0.80
09	0	2.77	13	0	0.13	4	0	0.75
10	8	2.79	13	0	0.19	4	0	0.77
11	0	2.69	13	0	0.13	4	0	0.77
12	0	2.72	13	0	0.16	4	0	0.65
13	0	2.75	13	0	0.09	4	0	0.71
14	9	2.81	13	0	0.13	4	0	0.68
15	0	2.72	13	0	0.13	4	0	0.70
01	0	2.76	13	0	0.21	4	0	0.71
02	0	2.77	13	0	0.09	4	0	0.64
03	0	2.69	13	0	0.09	4	0	0.77
04	0	2.76	13	0	0.13	4	0	0.64
05	0	2.71	13	0	0.13	4	0	0.73
06	0	2.73	13	0	0.19	4	0	0.71
07	0	2.75	13	0	0.16	4	0	0.73
08	7	2.78	13	0	0.09	4	0	0.73
09	0	2.79	14	0	0.19	4	0	0.77
10	0	2.72	14	0	0.21	4	0	0.86
11	0	2.73	14	0	0.09	4	0	0.69
12	0	2.77	14	0	0.13	4	0	0.73

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
13	0	2.72	14	0	0.16	4	0	0.78
14	0	2.74	14	0	0.27	4	0	0.74
15	0	2.72	14	0	0.13	4	0	0.77
01	0	2.74	14	0	0.14	4	0	0.70
02	0	2.75	14	0	0.22	4	0	0.66
01	0	2.75	14	0	0.17	4	0	0.69
02	0	2.75	14	0	0.10	4	0	0.68
03	0	2.77	14	2	0.17	4	0	0.69
01	0	2.72	14	0	0.14	4	0	0.77
02	0	2.76	14	1.6	0.01	4	0	0.58
03	0	2.76	14	1.6	0.10	4	0	0.73
01	0	2.77	14	0	0.10	4	0	0.68
02	0	2.76	14	0	0.14	4	0	0.64
03	0	2.78	14	0	0.10	4	0	0.64
01	0	2.72	14	0	0.14	4	0	0.63
02	0	2.72	14	0	0.20	4	0	0.71
01	0	2.72	14	0	0.14	4	0	0.64
02	0	2.73	14	0	0.24	4	0	0.71
01	0	2.72	14	0	0.14	4	0	0.64
02	0	2.75	14	0	0.01	4	0	0.67
03	0	2.72	14	0	0.17	4	0	0.67
01	0	2.76	14	0	0.14	4	0	0.69
02	0	2.77	14	0	0.20	4	0	0.68
03	0	2.72	14	0	0.14	4	0	0.64
01	10	2.84	14	2.4	0.10	4	0	0.63
02	0	2.72	14	0	0.24	4	0	0.62
03	0	2.78	14	0	0.14	4	0	0.69
01	0	2.77	14	0	0.20	4	0	0.60
02	9	2.83	14	0	0.14	4	0	0.71
00	0	2.78	14	0	0.14	4	0	0.59
01	0	2.75	14	0	0.10	4	0	0.69

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		ACTIVITY (DPM/100 cm²)							
		TRITIUM BETA			ALPHA			BETA	
D	SWIPE	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
	01	0	2.76	14	0	0.15	4	0	0.70
	02	0	2.74	14	0	0.13	4	0	0.75
	03	0	2.72	14	0	0.13	4	0	0.81
	04	0	2.72	14	0	0.11	4	0	0.79
	05	0	2.72	14	0	0.17	4	0	0.79
	06	0	2.78	14	0	0.13	4	0	0.75
	07	0	2.78	14	0	0.21	4	0	0.82
	08	0	2.74	14	0	0.13	4	0	0.77
	09	0	2.75	14	0	0.15	4	0	0.72
	10	0	2.72	14	0	0.17	4	0	0.79
	11	0	2.72	14	0	0.11	4	0	0.78
	12	0	2.74	14	0	0.11	4	0	0.75
	13	0	2.72	14	0	0.17	4	0	0.82
	14	0	2.72	14	0	0.11	4	0	0.74
	15	0	2.75	14	0	0.13	4	0	0.77
	01	0	2.72	14	0	0.11	4	0	0.78
	02	0	2.72	14	0	0.11	4	0	0.87
	03	0	2.73	14	0	0.11	4	0	0.78
	04	0	2.72	14	0	0.11	4	0	0.75
	05	0	2.72	14	0	0.13	4	0	0.79
	06	0	2.72	14	0	0.13	4	0	0.74
	07	0	2.76	14	0	0.07	4	0	0.72
	08	0	2.72	14	0	0.11	4	0	0.81
	09	8	2.82	14	0	0.07	4	0	0.75
	10	0	2.72	14	0	0.17	4	0	0.81
	11	0	2.72	14	0	0.13	4	0	0.80
	12	0	2.73	14	0	0.11	4	0	0.77
	13	0	2.78	14	0	0.07	4	0	0.75
	14	0	2.73	14	0	0.17	4	0	0.75
	15	0	2.72	14	0	0.13	4	0	0.81
	01	0	2.72	14	0	0.15	4	0	0.74
	02	0	2.72	14	0	0.15	4	0	0.75
	03	0	2.78	14	0	0.13	4	0	0.82

		ACTIVITY (DPM/100 cm²)							
		TRITIUM BETA			ALPHA			BETA	
D	SWIPE	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
	04	0	2.74	14	0	0.13	4	0	0.82
	05	0	2.78	14	0	0.19	4	0	0.73
	06	0	2.72	14	0	0.07	4	0	0.75
	07	0	2.74	14	0	0.15	4	0	0.81
	08	0	2.74	14	0	0.07	4	0	0.80
	09	0	2.76	14	0	0.13	4	0	0.77
	10	0	2.72	14	0	0.17	4	0	0.79
	11	0	2.72	14	0	0.11	4	0	0.75
	12	0	2.73	14	0	0.21	4	0	0.82
	13	0	2.72	14	0	0.07	4	0	0.81
	14	0	2.72	14	0	0.13	4	0	0.79
	15	0	2.75	14	0	0.13	4	0	0.75
	01	0	2.72	14	0	0.13	4	0	0.75
	02	0	2.74	14	0	0.11	4	0	0.80
	03	0	2.72	14	0	0.11	4	0	0.78
	04	0	2.75	14	0	0.15	4	0	0.76
	05	0	2.76	14	0	0.11	4	0	0.74
	06	0	2.72	14	0	0.15	4	0	0.77
	07	0	2.76	14	0	0.15	4	0	0.81
	08	0	2.72	14	0	0.11	4	0	0.75
	09	0	2.74	14	0	0.19	4	0	0.81
	10	0	2.72	14	0	0.11	4	0	0.89
	11	0	2.74	14	0	0.13	4	0	0.78
	12	0	2.72	14	0	0.07	4	0	0.80
	13	0	2.72	14	0	0.07	4	0	0.79
	14	0	2.73	14	0	0.07	4	0	0.89
	15	0	2.72	14	0	0.11	4	0	0.81
	01	0	2.72	14	0	0.15	4	0	0.81
	02	0	2.77	14	0	0.13	4	0	0.84
	03	0	2.72	14	0	0.11	4	0	0.80
	04	0	2.76	14	0	0.07	4	0	0.77
	05	0	2.72	14	0	0.11	4	0	0.85
	06	0	2.72	14	0	0.11	4	0	0.78
	07	0	2.72	14	0	0.11	4	0	0.81
	08	0	2.72	14	0	0.11	4	0	0.78
	09	0	2.73	14	0	0.14	4	0	0.78

		ACTIVITY (DPM/100 cm²)							
		TRITIUM BETA			ALPHA			BETA	
	SWIPE	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
	10	0	2.76	14	0	0.08	4	0	0.79
	11	0	2.72	14	0	0.08	4	0	0.78
	12	7	2.80	14	0	0.11	4	0	0.75
	13	0	2.78	14	0	0.14	4	0	0.73
	14	0	2.73	14	0	0.11	4	0	0.74
	15	0	2.75	14	0	0.08	4	0	0.80
	01	0	2.73	14	0	0.19	4	0	0.80
	02	0	2.80	14	0	0.16	4	0	0.71
	03	0	2.78	14	0	0.14	4	0	0.71
	04	0	2.77	14	0	0.08	4	0	0.83
	05	0	2.72	14	0	0.08	4	0	0.82
	06	0	3.53	18	0	0.14	4	0	0.78
	07	0	3.50	18	0	0.11	4	0	0.78
	08	0	3.51	18	0	0.14	4	0	0.71
	09	0	3.50	18	0	0.18	4	0	0.75
	10	0	3.55	18	1.9	0.25	4	0	0.80
	11	0	3.52	18	0	0.18	4	0	0.79
	12	0	3.57	18	0	0.11	4	0	0.72
	13	0	3.52	18	0	0.14	4	0	0.80
	14	0	3.56	18	0	0.08	4	0	0.80
	15	0	3.58	18	0	0.11	4	0	0.73
	01	0	3.52	18	0	0.24	4	0	0.86
	02	0	3.55	18	1.49	0.26	4	0	0.79
	03	10	3.60	18	0	0.14	4	0	0.81
	04	12	3.62	18	0	0.24	4	0	0.76
	05	0	3.50	18	0	0.20	4	0	0.75
	06	0	3.56	18	0	0.17	4	0	0.69
	07	0	3.57	18	0	0.20	4	0	0.76
	08	0	3.51	18	0	0.10	4	0	0.78
	09	9	3.59	18	0	0.14	4	0	0.61
	10	0	3.52	18	0	0.10	4	0	0.84
	11	0	3.55	18	0	0.17	4	0	0.67
	12	0	3.54	18	0	0.14	4	0	0.75
	13	0	3.53	18	0	0.20	4	0	0.75
	14	0	3.54	18	0	0.17	4	0	0.68
	15	0	3.54	18	0	0.20	4	0	0.74

D	SWIPE	ACTIVITY (DPM/100 cm²)							
		TRITIUM BETA			ALPHA			BETA	
		ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
	01	0	3.58	18	0	0.14	4	0	0.69
	02	0	3.58	18	0	0.10	4	0	0.77
	03	0	3.57	18	0	0.22	4	0	0.81
	04	0	3.53	18	0	0.14	4	0	0.66
	05	0	3.55	18	0	0.14	4	0	0.75
	06	0	3.54	18	0	0.17	4	0	0.79
	07	0	3.55	18	0	0.20	4	0	0.72
	08	0	3.50	18	0	0.14	4	0	0.76
	09	0	3.50	18	0	0.10	4	0	0.78
	10	0	3.53	18	0	0.22	4	0	0.78
	11	0	3.58	18	0	0.10	4	0	0.72
	12	0	3.55	18	0	0.14	4	0	0.68
	13	0	3.58	18	0	0.20	4	0	0.87
	14	0	3.55	18	0	0.17	4	0	0.73
	15	0	3.54	18	0	0.17	4	0	0.73
	01	0	3.52	18	0	0.14	4	0	0.75
	02	0	3.55	18	0	0.17	4	0	0.85
	03	12	3.62	18	0	0.17	4	0	0.73
	04	0	3.56	18	0	0.10	4	0	0.69
	05	9	3.59	18	0	0.14	4	0	0.72
	06	0	3.52	18	0	0.10	4	0	0.74
	07	0	3.50	18	0	0.10	4	0	0.71
	08	0	3.56	18	0	0.14	4	0	0.75
	09	0	3.50	18	0	0.20	4	0	0.80
	10	0	3.50	18	0	0.14	4	0	0.76
	11	0	3.53	18	0	0.14	4	0	0.67
	12	0	3.55	18	0	0.20	4	0	0.75
	13	0	3.57	18	0	0.22	4	0	0.76
	14	0	3.50	18	0	0.17	4	0	0.76
	15	0	3.54	18	0	0.17	4	0	0.76
	01	0	3.53	18	0	0.24	4	0	0.76
	02	0	3.57	18	0	0.22	4	0	0.75
	03	0	3.51	18	0	0.17	4	0	0.75
	04	0	3.56	18	0	0.22	4	0	0.76
	05	0	3.50	18	0	0.20	4	0	0.74
	06	0	3.55	18	0	0.17	4	0	0.73

D	SWIPE	ACTIVITY (DPM/100 cm²)							
		TRITIUM BETA			ALPHA			BETA	
		ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
	07	0	3.50	18	3.97	0.35	4	0	0.82
	08	0	3.53	18	1.9	0.28	4	0	0.77
	09	0	3.57	18	0	0.14	4	0	0.77
	10	0	3.50	18	0	0.10	4	0	0.75
	11	0	3.50	18	0	0.14	4	0	0.65
	12	0	3.50	18	0	0.14	4	0	0.71
	13	0	3.50	18	0	0.14	4	0	0.69
	14	0	3.50	18	0	0.14	4	0	0.74
	15	0	3.50	18	0	0.14	4	0	0.73
	01	10	3.55	18	0	0.20	4	0	0.76
	02	0	3.58	18	0	0.17	4	0	0.79
	03	0	3.53	18	0	0.10	4	0	0.69
	04	0	3.50	18	0	0.22	4	0	0.72
	05	0	3.50	18	0	0.24	4	0	0.75
	06	0	3.50	18	0	0.20	4	0	0.66
	07	0	3.51	18	0	0.17	4	0	0.75
	08	0	3.50	18	0	0.22	4	0	0.75
	09	0	3.50	18	0	0.22	4	0	0.78
	10	0	3.53	18	2.32	0.29	4	0	0.84
	11	0	3.52	18	0	0.17	4	0	0.69
	12	0	3.51	18	0	0.10	4	0	0.67
	13	0	3.51	18	0	0.10	4	0	0.71
	14	0	3.50	18	0	0.14	4	0	0.73
	15	0	3.53	18	0	0.20	4	0	0.75
	01	0	3.50	18	0	0.14	4	0	0.63
	02	0	3.50	18	0	0.14	4	0	0.77
	03	0	3.54	18	0	0.20	4	0	0.66
	04	0	3.54	18	0	0.14	4	0	0.69
	05	0	3.54	18	0	0.10	4	0	0.76
	06	0	3.51	18	0	0.14	4	0	0.75
	07	0	3.57	18	0	0.10	4	0	0.74
	08	10	3.60	18	0	0.10	4	0	0.64
	09	0	3.56	18	0	0.10	4	0	0.63
	10	0	3.56	18	0	0.14	4	0	0.70
	11	10	3.60	18	0	0.22	4	0	0.72
	12	0	3.54	18	0	0.17	4	0	0.69

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
13	10	3.60	18	0	0.14	4	0	0.74
14	0	3.53	18	0	0.10	4	0	0.75
15	0	3.56	18	0	0.10	4	0	0.78
01	11	3.60	18	0	0.10	4	0	0.78
02	0	3.54	18	0	0.17	4	0	0.73
01	0	3.58	18	0	0.14	4	0	0.75
02	0	3.56	18	0	0.10	4	0	0.83
03	10	3.59	18	0	0.17	4	0	0.71
01	0	3.53	18	0	0.04	4	0	0.72
02	0	2.78	13	0	0.10	4	0	0.70
03	0	2.79	13	0	0.14	4	0	0.85
01	0	2.73	13	0	0.10	4	0	0.73
02	0	2.79	13	0	0.17	4	0	0.80
03	0	2.78	13	0	0.10	4	0	0.80
01	0	2.73	13	0	0.10	4	0	0.79
02	8	2.80	13	0	0.20	4	0	0.77
01	8	2.81	13	0	0.04	4	0	0.77
02	0	2.73	13	0	0.04	4	0	0.77
01	0	2.73	13	0	0.17	4	0	0.80
02	0	2.73	13	0	0.10	4	0	0.77
03	0	2.76	13	0	0.17	4	0	0.82
01	0	2.73	13	1.8	0.14	4	0	0.72
02	0	2.73	13	0	0.14	4	0	0.82
03	0	2.75	13	0	0.10	4	0	0.81
01	0	2.73	13	0	0.22	4	0	0.80
02	0	2.74	13	0	0.14	4	0	0.71
03	0	2.73	13	0	0.17	4	0	0.77
01	0	2.78	13	0	0.14	4	0	0.85
02	0	2.73	13	0	0.14	4	0	0.77
01	0	2.73	13	0	0.10	4	0	0.83
02	0	2.77	13	0	0.14	4	0	0.76

IGLOO CERTIFICATION

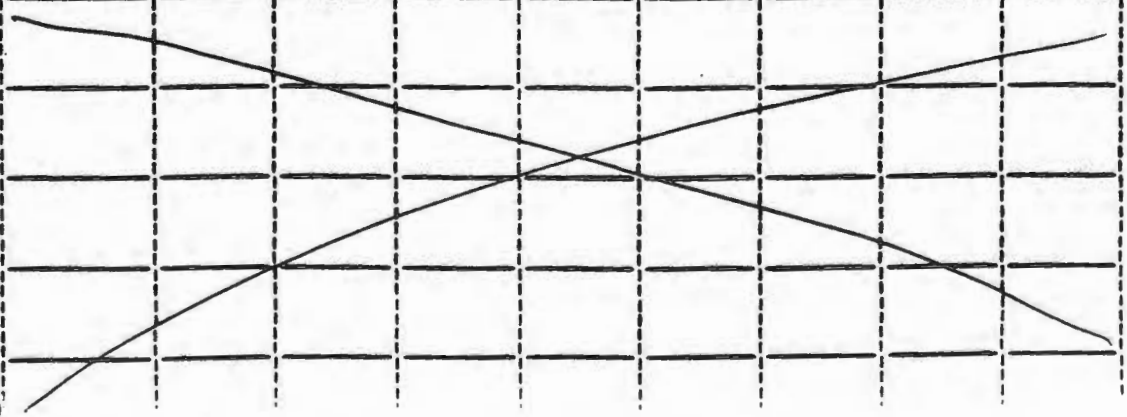
IGLOO NO. AC208 INSTRUMENT LUDLUM3

DATE 23 AUG 94 INSTRUMENT S/N 33573

ALPHA READINGS ~~OR BETA/GAMMA READINGS~~ (CPM) INSTRUMENT CAL DATE 11 JUL 94

BACKGROUND 0 CPM

	A	B	C	D	E	F	G	H	I
1	10	10	10	10	10	10	10	40	20
2	10	10	10	10	10	10	10	40	20
3	8	8	10	10	10	15	10	20	45
4	10	10	10	10	8	5	5	20	20
5	10	10	8	8	8	10	10	20	45
6	10	10	10	8	10	10	8	15	15
7	10	8	10	8	10	10	10	40	40
8	5	10	5	10	10	12	10	35	25
9	10	10	10	5	10	20	10	20	55
10	10	5	8	10	10	10	8	40	45
11	10	10	8	8	10	10	10	40	25
12	8	10	5	8	5	10	10	55	45
13	10	10	10	10	10	10	5	45	20
14	10	5	10	5	8	5	10	40	40
15	8	5	10	10	10	10	5	50	40
16									
17									
18									
19									
20									



ALPHA BG Φ

	J	K	L	AF	BF	CF	DF	EF	
1	35	15	10	8	15	10	20	10	1
2	20	10	15	15	15	20	15	10	2
3	10	20	20	X	10	5	4	X	3
				AR	BR	CR	DR	ER	
4	25	20	10						
5	35	10	10	10	10	10	12	8	1
6	30	20	20	20	20	50	50	50	2
7	20	10	8	X	5	40	8	X	3
8	20	5	8	REAR VENTI-LATOR INSIDE				REAR VENTI-LATOR OUTSIDE	
9	42	10	5						
10	38	5	10	15				10	
11	30	10	10						
12	35	10	10						
13	20	10	10						
14	20	8	10						
15	30	10	15						
16									
17									
18									
19									
20									

NAME OF RESPONSIBLE INDIVIDUAL (PLEASE PRINT) KIRK F. GRIM

SIGNATURE OF RESPONSIBLE INDIVIDUAL Kirk F. Grim

IGLOO CERTIFICATION

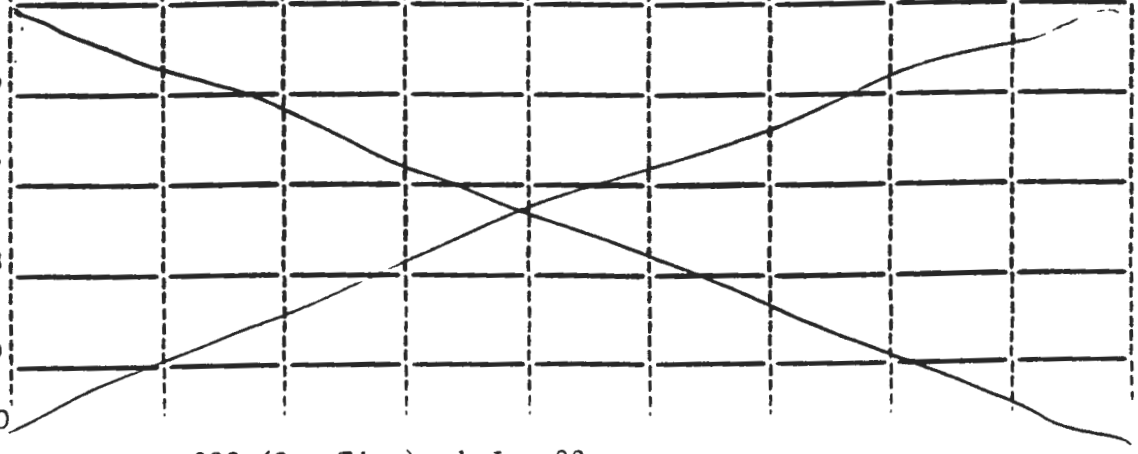
BACK ROUND .03 mR/Hr

IGLOO NO. AD212 INSTRUMENT LUDLUM MODEL 3

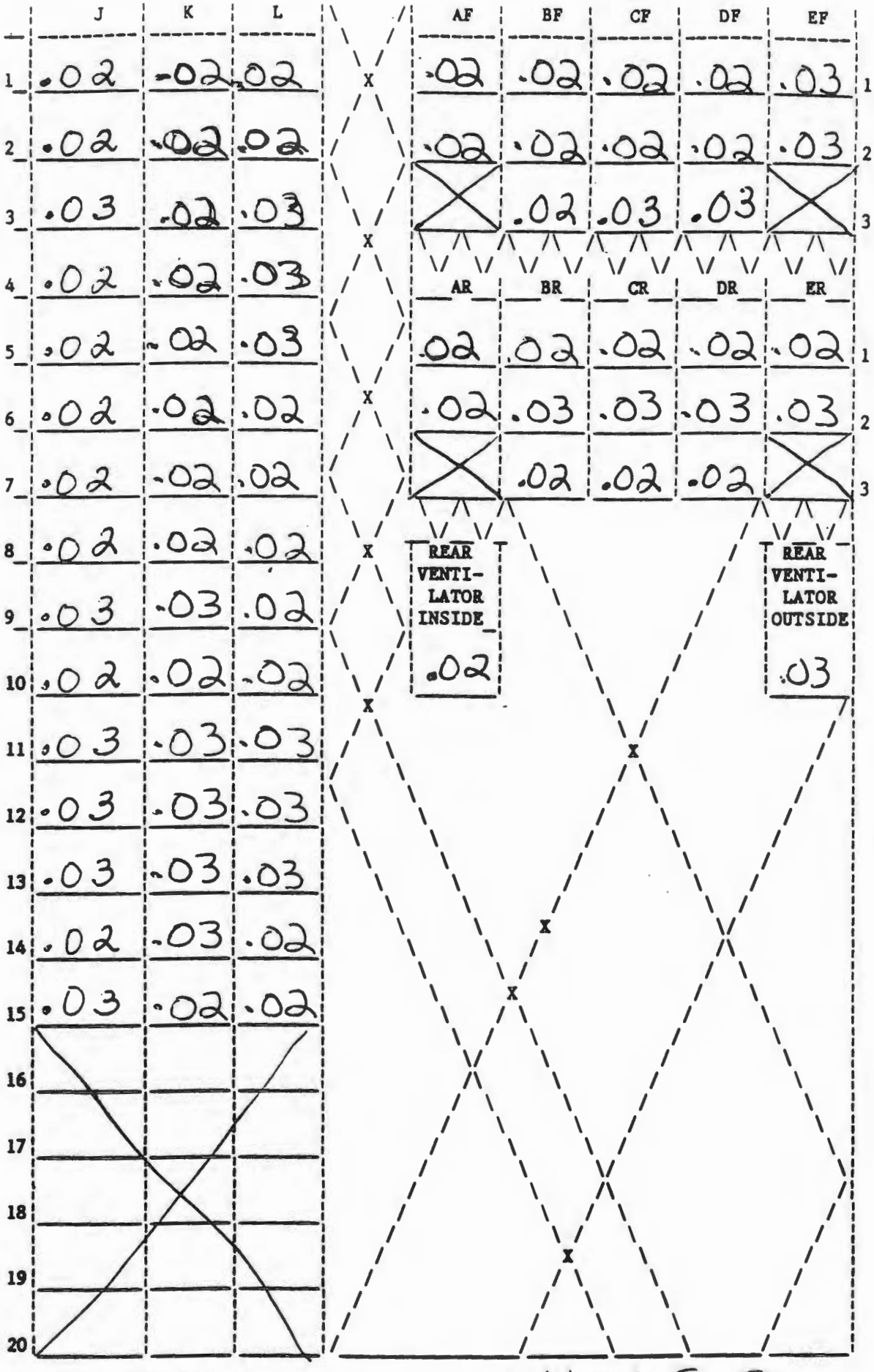
DATE 8/29/94 INSTRUMENT S/N 60733

~~ALPHA READINGS OR~~ BETA/GAMMA READINGS in mR/hr. INSTRUMENT CAL DATE 3 AUG 94

	A	B	C	D	E	F	G	H	I
1	.03	.03	.02	.02	.02	.02	.02	.03	.02
2	.02	.02	.02	.03	.02	.02	.03	.03	.02
3	.02	.02	.02	.02	.02	.02	.03	.03	.02
4	.02	.03	.03	.03	.03	.02	.02	.02	.02
5	.02	.03	.03	.03	.03	.03	.03	.02	.02
6	.02	.03	.04	.02	.04	.03	.03	.02	.03
7	.03	.03	.03	.02	.02	.04	.03	.02	.02
8	.02	.02	.04	.02	.03	.02	.02	.02	.03
9	.03	.03	.02	.02	.03	.02	.03	.03	.02
10	.02	.03	.03	.02	.02	.02	.02	.02	.02
11	.04	.03	.02	.02	.02	.02	.02	.02	.02
12	.02	.02	.03	.02	.03	.02	.02	.03	.03
13	.02	.03	.03	.02	.03	.03	.02	.03	.03
14	.02	.02	.03	.03	.03	.02	.02	.04	.02
15	.02	.02	.02	.02	.02	.02	.03	.03	.02
16									
17									
18									
19									
20									



SDSSE-N Form 880 (One-Time), 1 Jun 92



NAME OF RESPONSIBLE INDIVIDUAL (PLEASE PRINT) KIRK E. GRAY

SIGNATURE OF RESPONSIBLE INDIVIDUAL Kirk E. Gray

SDSSE-N Form 880 (One-Time)(Reverse), 1 Jun 92

IGLOO CERTIFICATION

IGLOO NO. A0305 INSTRUMENT LUDLUM 3

DATE 25 AUG 94 INSTRUMENT S/N 33573

ALPHA READINGS ~~OR BETA/GAMMA READINGS~~ (CPM) INSTRUMENT CAL DATE 11 JUL 94

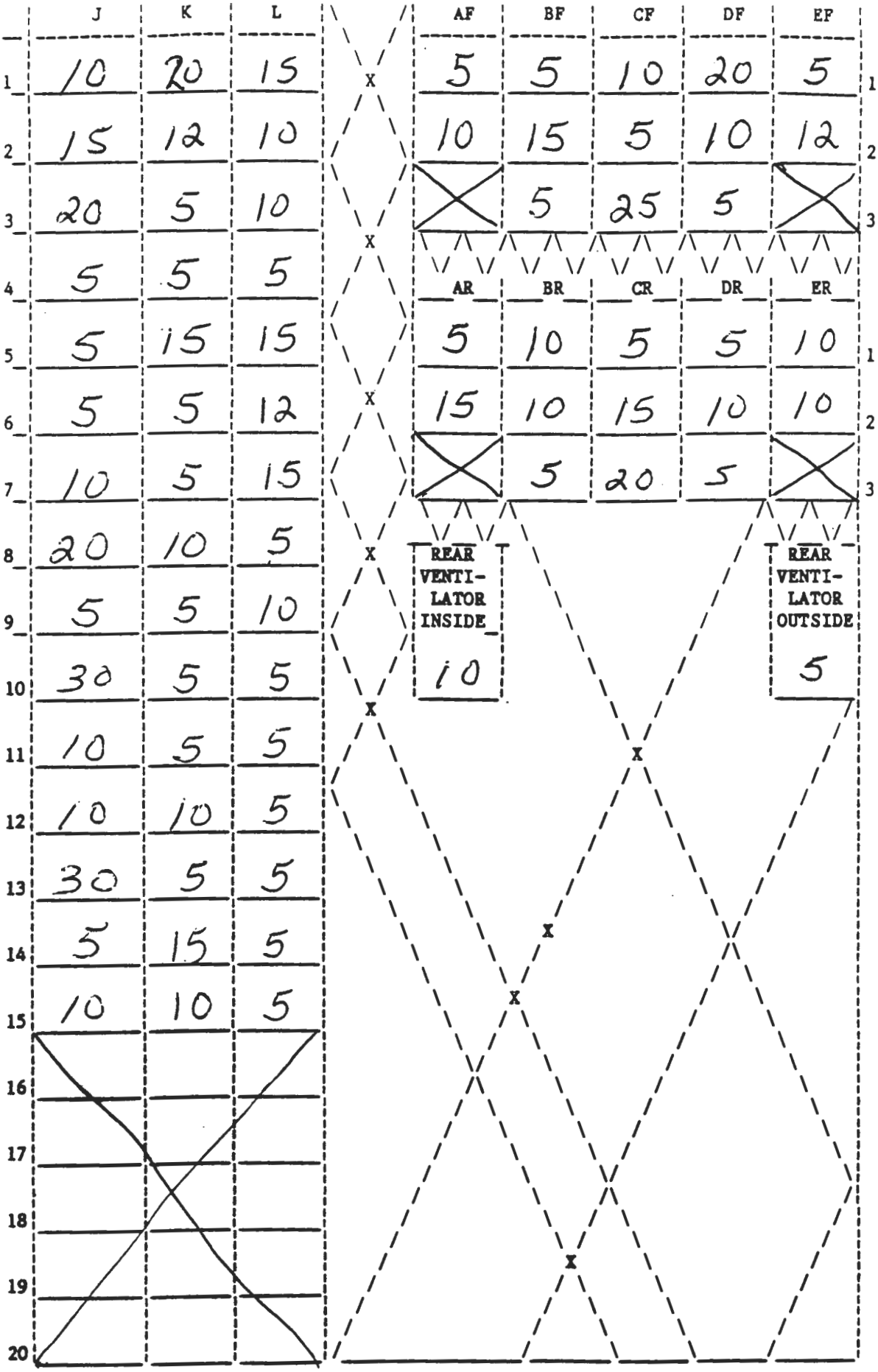
BACKGROUND 5 CPM

	A	B	C	D	E	F	G	H	I
1	10	5	5	5	10	10	8	5	15
2	10	5	5	5	5	5	10	5	10
3	10	5	5	5	5	10	5	10	10
4	10	5	5	10	9	20	5	10	15
5	5	18	5	5	10	10	5	15	15
6	10	15	8	5	10	5	5	5	10
7	5	5	5	5	5	15	5	10	10
8	5	5	5	10	5	10	5	5	15
9	20	5	5	5	5	5	12	15	5
10	5	12	5	5	5	5	20	5	10
11	5	5	5	5	5	8	10	10	15
12	5	5	15	5	5	5	5	5	10
13	15	10	5	5	5	5	5	5	10
14	5	15	5	5	10	5	10	10	5
15	5	5	5	5	10	5	5	5	5
16									
17									
18									
19									
20									

ALPHA

2 BACKGROUND

5



	J	K	L	AF	BF	CF	DF	EF	
1	10	20	15	5	5	10	20	5	1
2	15	12	10	10	15	5	10	12	2
3	20	5	10	X	5	25	5	X	3
4	5	5	5	AR	BR	CR	DR	ER	
5	5	15	15	5	10	5	5	10	1
6	5	5	12	15	10	15	10	10	2
7	10	5	15	X	5	20	5	X	3
8	20	10	5	REAR VENTI-LATOR INSIDE				REAR VENTI-LATOR OUTSIDE	
9	5	5	10						
10	30	5	5	10				5	
11	10	5	5						
12	10	10	5						
13	30	5	5						
14	5	15	5						
15	10	10	5						
16									
17									
18									
19									
20									

NAME OF RESPONSIBLE INDIVIDUAL (PLEASE PRINT) KIRK E. GRAY

SIGNATURE OF RESPONSIBLE INDIVIDUAL Kirk E. Gray

SDSSE-N Form 880 (One-Time)(Reverse), 1 Jun 92

DEPARTMENT OF THE ARMY

U.S. ARMY IONIZING RADIATION DOSIMETRY CENTER

U.S. ARMY TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE) ACTIVITY

LEXINGTON, KY 40511-5102

AMXTM-SR-DN

11 October 1994

MEMORANDUM FOR Commander, Seneca Army Depot, Building 323, Romulus, NY 14541

SUBJECT: Decommissioning Wipes

1. The results of the decommissioning wipes done at your facility, which this Center received 08 September 1994, are indicated on the enclosed tables.

2. A review of the results revealed that none of the wipes exceeded the removable contamination limits set forth in AR 385-11 or the Nuclear Regulatory Commission's "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material", dated April 1993.

3. POC is Stephen Howard, DSN 745-3942.

for Stephen W. Howard

A. EDWARD ABNEY
Chief, US Army Ionizing
Radiation Dosimetry Center

Encl

Iglco # 213
206

SURFACE ACTIVITY MEASUREMENTS
SMEAR AND SWAB ANALYSIS
BUILDING 213

	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
SWIPE	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
01	15	3.80	17	1.97	0.26	4	0	0.70
02	4	3.73	17	0	0.17	4	0	0.63
03	1	3.74	17	0	0.11	4	0	0.65
04	25	3.86	17	0	0.14	4	0	0.67
05	20	3.81	17	0	0.14	4	0	0.68
06	13	3.78	17	0	0.17	4	0	0.66
07	10	3.74	17	0	0.11	4	0	0.72
08	14	3.78	17	0	0.14	4	0	0.63
09	0	3.66	17	0	0.04	4	0	0.57
10	0	3.69	17	0	0.11	4	0	0.72
11	0	3.69	17	0	0.14	4	0	0.72
12	0	3.71	17	0	0.14	4	0	0.64
13	9	3.73	17	0	0.20	4	0	0.68
14	15	3.79	17	0	0.04	4	0	0.75
15	8	3.72	17	0	0.14	4	0	0.67
16	0	3.72	17	0	0.17	4	0	0.70
17	10	3.74	17	0	0.04	4	0	0.74
18	13	3.78	17	0	0.17	4	0	0.67
19	13	3.78	17	0	0.17	4	0	0.72
20	11	3.77	17	0	0.14	4	0	0.66
01	0	3.70	17	0	0.04	4	0	0.70
02	0	3.69	17	0	0.04	4	0	0.63
03	12	3.77	17	0	0.11	4	0	0.75
04	10	3.74	17	0	0.11	4	0	0.70
05	0	2.67	15	1.57	0.20	4	0	0.77
06	0	2.73	15	0	0.11	4	0	0.64
07	0	2.68	15	0	0.04	4	0	0.78
08	8	2.76	15	0	0.04	4	0	0.65
09	0	2.68	15	0	0.14	4	0	0.63
10	8	2.77	15	0	0.04	4	0	0.78
11	7	2.75	15	0	0.04	4	0	0.64
12	0	2.69	15	0	0.11	4	0	0.64
13	0	2.74	15	0	0.14	4	0	0.77

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
14	11	2.80	15	0	0.11	4	0	0.65
15	0	2.74	15	0	0.14	4	0	0.61
16	0	2.68	15	0	0.14	4	0	0.78
17	0	2.74	15	0	0.11	4	0	0.65
18	0	2.68	15	0	0.20	4	0	0.72
19	0	2.70	15	0	0.17	4	0	0.60
20	0	2.67	15	0	0.04	4	0	0.56
01	11	2.78	15	0	0.11	4	0	0.64
02	0	2.71	15	0	0.17	4	0	0.66
03	0	2.67	15	0	0.14	4	0	0.73
04	0	2.70	15	0	0.04	4	0	0.65
05	0	2.75	15	0	0.11	4	0	0.72
06	0	2.70	15	0	0.11	4	0	0.68
07	0	2.73	15	0	0.11	4	0	0.67
08	10	2.79	15	0	0.14	4	0	0.70
09	0	2.70	15	0	0.20	4	0	0.72
10	0	2.72	15	0	0.11	4	0	0.56
11	8	2.75	15	0	0.14	4	0	0.76
12	8	2.76	15	0	0.17	4	0	0.67
13	0	2.67	15	0	0.14	4	0	0.70
14	0	2.67	15	0	0.11	4	0	0.71
15	11	2.79	15	0	0.11	4	0	0.70
16	0	2.74	15	0	0.04	4	0	0.73
17	8	2.76	15	0	0.14	4	0	0.63
18	7	2.75	15	0	0.11	4	0	0.61
19	0	2.67	15	0	0.11	4	0	0.72
20	0	2.67	15	0	0.20	4	0	0.73
01	0	2.70	15	0	0.17	4	0	0.68
02	7	2.75	15	0	0.20	4	0	0.59
03	8	2.77	15	0	0.04	4	0	0.61
04	0	2.67	15	0	0.14	4	0	0.61
05	13	2.81	15	0	0.04	4	0	0.64
06	9	2.78	15	0	0.11	4	0	0.72
07	13	2.82	15	0	0.14	4	0	0.77
08	0	2.70	15	0	0.04	4	0	0.58
09	10	2.78	15	1.97	0.22	4	0	0.69

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
10	12	2.80	15	0	0.17	4	0	0.70
11	12	2.80	15	0	0.11	4	0	0.67
12	0	2.71	15	0	0.22	4	0	0.64
13	0	2.67	15	0	0.14	4	0	0.61
14	0	2.76	15	0	0.11	4	0	0.75
15	0	2.67	15	0	0.14	4	0	0.64
16	0	2.74	15	0	0.11	4	0	0.62
17	0	2.77	15	0	0.17	4	0	0.73
18	0	2.72	15	0	0.11	4	0	0.59
19	0	2.69	15	0	0.11	4	0	0.66
20	0	2.75	15	0	0.04	4	0	0.63
01	0	3.82	18	0	0.14	4	0	0.70
02	0	3.84	18	0	0.22	4	0	0.64
03	0	3.77	18	0	0.14	4	0	0.71
04	0	3.82	18	0	0.20	4	0	0.62
05	0	3.83	18	0	0.11	4	0	0.65
06	0	3.83	18	0	0.22	4	0	0.68
07	0	3.76	18	0	0.11	4	0	0.67
08	0	3.78	18	0	0.17	4	0	0.69
09	0	3.78	18	0	0.22	4	0	0.81
10	0	3.82	18	0	0.14	4	0	0.67
11	0	3.76	18	0	0.17	4	0	0.70
12	0	3.76	18	0	0.24	4	0	0.70
13	0	3.76	18	0	0.14	4	0	0.62
14	0	3.79	18	0	0.11	4	0	0.67
15	0	3.82	18	0	0.14	4	0	0.68
16	0	3.79	18	0	0.16	4	0	0.76
17	0	3.82	18	0	0.16	4	0	0.71
18	0	3.76	18	0	0.12	4	0	0.76
19	12	3.87	18	0	0.23	4	0	0.65
20	14	3.85	18	0	0.16	4	0	0.59
01	0	3.90	18	1.99	0.42	4	0	0.83
02	0	3.84	18	0	0.12	4	0	0.61
03	0	3.83	18	0	0.07	4	0	0.63
04	0	3.84	18	0	0.21	4	0	0.65
05	0	3.80	18	0	0.16	4	0	0.70

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
06	13	3.87	18	0	0.07	4	0	0.68
07	10	3.85	18	0	0.07	4	0	0.65
08	13	3.87	18	0	0.07	4	0	0.62
09	0	3.78	18	0	0.12	4	0	0.66
10	12	3.87	18	0	0.12	4	0	0.61
11	0	3.84	18	0	0.12	4	0	0.74
12	11	3.86	18	0	0.16	4	0	0.62
13	10	3.85	18	0	0.12	4	0	0.70
14	0	3.83	18	0	0.07	4	0	0.64
15	0	3.82	18	0	0.12	4	0	0.61
16	12	3.87	18	0	0.12	4	0	0.66
17	0	3.81	18	0	0.16	4	0	0.66
18	9	3.85	18	0	0.12	4	0	0.74
19	10	3.85	18	0	0.12	4	0	0.70
20	15	3.89	18	0	0.23	4	0	0.68
01	9	3.84	18	0	0.07	4	0	0.57
02	14	3.87	18	0	0.21	4	0	0.68
03	0	3.83	18	0	0.16	4	0	0.70
04	22	3.94	18	0	0.16	4	0	0.70
05	12	3.87	18	0	0.19	4	0	0.67
06	11	3.86	18	0	0.12	4	0	0.65
07	12	3.87	18	0	0.16	4	0	0.58
08	14	3.89	18	0	0.12	4	0	0.64
09	11	3.85	18	0	0.07	4	0	0.69
10	10	3.85	18	0	0.12	4	0	0.80
11	15	3.89	18	0	0.12	4	0	0.76
12	16	3.90	18	0	0.16	4	0	0.66
13	0	3.81	18	0	0.12	4	0	0.71
14	18	3.92	18	0	0.21	4	0	0.62
15	15	3.89	18	0	0.19	4	0	0.55
16	15	3.88	18	0	0.12	4	0	0.69
17	10	3.84	18	0	0.16	4	0	0.60
18	0	3.79	18	0	0.19	4	0	0.74
19	0	3.83	18	0	0.12	4	0	0.65
20	0	3.84	18	0	0.21	4	0	0.66
01	26	4.00	18	0	0.19	4	0	0.61

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
02	18	3.92	18	0	0.21	4	0	0.73
03	0	3.84	18	0	0.23	4	0	0.74
04	14	3.89	18	0	0.21	4	0	0.70
05	13	3.88	18	0	0.21	4	0	0.59
06	10	3.86	18	0	0.12	4	0	0.69
07	14	3.89	18	0	0.19	4	0	0.70
08	0	3.81	18	0	0.23	4	0	0.76
09	22	3.95	18	0	0.16	4	0	0.63
10	16	2.70	12	0	0.07	4	0	0.76
11	13	2.65	12	0	0.16	4	0	0.67
12	16	2.68	12	0	0.19	4	0	0.66
13	15	2.69	12	0	0.07	4	0	0.65
14	14	2.66	12	0	0.16	4	0	0.69
15	12	2.73	13	0	0.12	4	0	0.63
16	7	2.66	13	0	0.12	4	0	0.68
17	9	2.69	13	0	0.12	4	0	0.64
18	16	2.78	13	0	0.16	4	0	0.62
19	13	2.75	13	0	0.16	4	0	0.70
20	14	2.75	13	0	0.07	4	0	0.64
01	8	2.69	13	0	0.12	4	0	0.74
02	17	2.80	13	0	0.16	4	0	0.72
03	11	2.71	13	0	0.07	4	0	0.67
04	10	2.71	13	0	0.07	4	0	0.74
05	10	2.71	13	0	0.16	4	0	0.63
06	10	2.70	13	0	0.07	4	0	0.71
07	11	2.71	13	0	0.19	4	0	0.72
08	8	2.69	13	0	0.12	4	0	0.76
09	12	2.72	13	0	0.16	4	0	0.71
10	19	2.81	13	0	0.12	4	0	0.65
11	12	2.71	13	0	0.16	4	0	0.62
12	10	2.68	13	0	0.07	4	0	0.68
13	11	2.69	13	0	0.23	4	0	0.66
14	15	2.73	13	0	0.16	4	0	0.70
15	8	2.66	13	0	0.12	4	0	0.61
16	10	2.70	13	0	0.19	4	0	0.68
17	6	2.66	13	0	0.07	4	0	0.58

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
18	15	2.76	13	0	0.23	4	0	0.70
19	19	2.78	13	0	0.12	4	0	0.66
20	8	2.68	13	0	0.19	4	0	0.66
01	14	2.73	13	0	0.12	4	0	0.67
02	11	2.71	13	0	0.16	4	0	0.63
03	11	2.71	13	0	0.12	4	0	0.65
04	8	2.67	13	0	0.16	4	0	0.69
05	8	2.67	13	0	0.16	4	0	0.74
06	13	2.75	13	0	0.16	4	0	0.67
07	18	2.78	13	0	0.12	4	0	0.68
08	15	2.76	13	1.99	0.27	4	0	0.70
09	17	2.78	13	0	0.07	4	0	0.65
10	11	2.72	13	2	0.16	4	0	0.64
11	14	2.76	13	1.46	0.24	4	0	0.74
12	9	2.67	13	0	0.10	4	0	0.67
13	17	2.78	13	0	0.01	4	0	0.68
14	16	2.75	13	0	0.20	4	0	0.65
15	20	2.81	13	0	0.14	4	0	0.74
16	21	2.81	13	0	0.17	4	0	0.67
17	17	2.76	13	0	0.17	4	0	0.69
18	20	2.79	13	0	0.14	4	0	0.65
19	6	2.64	13	0	0.14	4	0	0.66
20	12	2.71	13	0	0.17	4	0	0.59
01	15	2.74	13	0	0.10	4	0	0.66
02	11	2.73	13	0	0.01	4	0	0.76
03	10	2.71	13	0	0.17	4	0	0.70
04	16	2.75	13	0	0.17	4	0	0.66
05	13	2.74	13	0	0.10	4	0	0.68
06	12	2.71	13	0	0.10	4	0	0.67
07	9	2.69	13	0	0.14	4	0	0.71
08	9	2.69	13	0	0.14	4	0	0.74
09	14	2.76	13	0	0.01	4	0	0.67
10	8	2.68	13	0	0.10	4	0	0.66
11	12	2.74	13	0	0.20	4	0	0.63
12	12	2.72	13	0	0.14	4	0	0.64
13	14	2.76	13	0	0.01	4	0	0.65

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
14	17	2.79	13	0	0.14	4	0	0.67
15	23	2.83	13	0	0.10	4	0	0.69
16	15	2.77	13	0	0.14	4	0	0.75
17	17	2.78	13	0	0.17	4	0	0.66
18	0	2.65	13	0	0.10	4	0	0.69
19	29	2.91	13	0	0.10	4	0	0.66
20	15	2.75	13	0	0.20	4	0	0.70
01	11	2.70	13	0	0.10	4	0	0.73
02	9	2.68	13	0	0.17	4	0	0.72
03	17	2.77	13	0	0.20	4	0	0.72
04	17	2.70	13	0	0.01	4	0	0.65
05	18	2.72	13	0	0.10	4	0	0.70
06	13	2.67	13	0	0.14	4	0	0.62
07	15	2.66	13	0	0.10	4	0	0.56
08	11	2.64	13	0	0.01	4	0	0.68
09	18	2.71	13	0	0.10	4	0	0.65
10	15	2.69	13	0	0.10	4	0	0.70
11	16	2.69	13	0	0.10	4	0	0.67
12	13	2.64	13	0	0.01	4	0	0.64
13	19	2.72	13	0	0.01	4	0	0.58
14	12	2.64	13	0	0.20	4	0	0.72
15	18	2.71	13	0	0.14	4	0	0.67
16	14	2.65	13	0	0.20	4	0	0.76
17	18	2.71	13	0	0.14	4	0	0.70
18	12	2.66	13	0	0.14	4	0	0.67
19	12	2.64	13	0	0.20	4	0	0.74
20	9	2.60	13	0	0.17	4	0	0.70
01	20	2.75	13	0	0.20	4	0	0.70
02	18	2.71	13	0	0.10	4	0	0.71
01	20	2.74	13	0	0.17	4	0	0.68
02	17	2.73	13	0	0.14	4	0	0.71
03	20	2.74	13	0	0.10	4	0	0.72
01	20	2.74	13	0	0.10	4	0	0.66
02	18	2.71	13	0	0.10	4	0	0.65
03	18	2.73	13	0	0.01	4	0	0.76
01	16	2.69	13	0	0.01	4	0	0.69

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
02	25	2.79	13	0	0.14	4	0	0.70
03	21	2.78	13	0	0.10	4	0	0.58
01	22	2.74	13	0	0.10	4	0	0.68
02	20	2.75	13	0	0.01	4	0	0.75
01	11	2.63	13	0	0.10	4	0	0.73
02	20	2.74	13	0	0.10	4	0	0.70
01	16	2.69	13	0	0.10	4	0	0.79
02	19	2.71	13	0	0.01	4	0	0.72
03	9	2.60	13	0	0.10	4	0	0.59
01	14	2.66	13	0	0.10	4	0	0.64
02	21	2.76	13	0	0.01	4	0	0.75
03	17	2.73	13	0	0.14	4	0	0.67
01	10	2.63	13	0	0.10	4	0	0.67
02	12	2.63	13	0	0.14	4	0	0.78
03	17	2.71	13	0	0.22	4	0	0.67
01	20	2.76	13	0	0.14	4	0	0.58
02	20	2.77	13	0	0.10	4	0	0.70
01	26	2.73	13	0	0.10	4	0	0.62
01	20	2.74	13	0	0.01	4	0	0.65

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	ACTIVITY (DPM/100 cm²)								
	TRITIUM BETA			ALPHA			BETA		
SWIPE	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	
01	6	2.80	13	0	0.11	4	0	0.72	
02	0	2.78	13	0	0.11	4	0	0.63	
03	0	2.78	13	0	0.18	4	0	0.66	
04	10	2.85	13	0	0.11	4	0	0.74	
05	0	2.79	13	0	0.14	4	0	0.68	
06	0	2.80	13	0	0.11	4	0	0.65	
07	0	2.75	13	0	0.11	4	0	0.75	
08	0	2.80	13	0	0.16	4	0	0.72	
09	7	2.81	13	0	0.11	4	0	0.63	
10	8	2.83	13	0	0.08	4	0	0.69	
11	0	2.73	13	0	0.19	4	0	0.66	
12	0	2.80	13	0	0.08	4	0	0.64	
13	7	2.81	13	0	0.19	4	0	0.63	
14	0	2.80	13	0	0.14	4	0	0.73	
15	0	2.77	13	0	0.08	4	0	0.70	
01	0	2.76	13	0	0.16	4	0	0.69	
02	6	2.81	13	0	0.14	4	0	0.75	
03	0	2.75	13	0	0.19	4	0	0.73	
04	0	2.79	13	0	0.18	4	0	0.65	
05	8	2.81	13	0	0.16	4	0	0.66	
06	7	2.81	13	0	0.18	4	0	0.71	
07	0	2.77	13	0	0.16	4	0	0.59	
08	7	2.82	13	0	0.18	4	0	0.75	
09	0	2.79	13	0	0.16	4	0	0.69	
10	0	2.75	13	0	0.14	4	0	0.71	
11	10	2.85	13	0	0.11	4	0	0.68	
12	8	2.82	13	0	0.01	4	0	0.69	
13	0	2.76	13	0	0.14	4	0	0.72	
14	7	2.81	13	1.3	0.21	4	0	0.64	
15	0	2.79	13	0	0.14	4	0	0.69	
01	0	2.78	13	0	0.19	4	0	0.70	
02	0	2.75	13	0	0.11	4	0	0.67	
03	9	2.84	13	0	0.18	4	0	0.71	

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
04	6	2.81	13	0	0.14	4	0	0.73
05	7	2.81	13	0	0.08	4	0	0.70
06	0	2.77	13	0	0.08	4	0	0.68
07	0	2.79	13	0	0.08	4	0	0.67
08	8	2.83	13	0	0.18	4	0	0.69
09	11	2.86	13	0	0.01	4	0	0.65
10	7	2.81	13	0	0.18	4	0	0.67
11	0	2.78	13	0	0.14	4	0	0.63
12	0	2.76	13	0	0.18	4	0	0.64
13	0	2.74	13	0	0.14	4	0	0.63
14	0	2.76	13	0	0.16	4	0	0.71
15	7	2.81	13	0	0.11	4	0	0.69
01	0	2.76	13	0	0.08	4	0	0.67
02	7	2.82	13	0	0.19	4	0	0.71
03	6	2.81	13	0	0.08	4	0	0.63
04	6	2.80	13	0	0.11	4	0	0.72
05	0	2.79	13	0	0.01	4	0	0.61
06	0	2.75	13	0	0.16	4	0	0.68
07	0	2.74	13	0	0.14	4	0	0.70
08	0	2.84	13	0	0.14	4	0	0.64
09	0	2.79	13	0	0.01	4	0	0.62
10	0	2.79	13	0	0.08	4	0	0.67
11	0	2.84	13	0	0.01	4	0	0.73
12	0	2.80	13	0	0.08	4	0	0.64
13	0	2.78	13	0	0.08	4	0	0.75
14	16	3.64	16	0	0.16	4	0	0.69
15	11	3.60	16	0	0.08	4	0	0.71
01	8	3.56	16	0	0.16	4	0	0.63
02	0	3.56	16	1.3	0.11	4	0	0.68
03	0	3.51	16	0	0.08	4	0	0.75
04	15	3.63	16	0	0.16	4	0	0.69
05	10	3.59	16	0	0.16	4	0	0.63
06	10	3.59	16	0	0.16	4	0	0.70
07	0	3.53	16	0	0.16	4	0	0.67
08	10	3.58	16	0	0.01	4	0	0.69
09	11	3.60	16	0	0.08	4	0	0.64

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
10	0	3.55	16	0	0.08	4	0	0.63
11	12	3.60	16	0	0.14	4	0	0.72
12	0	3.55	16	0	0.11	4	0	0.63
13	1	3.60	16	0	0.11	4	0	0.71
14	8	3.57	16	0	0.08	4	0	0.68
15	11	3.60	16	0	0.11	4	0	0.62
01	11	3.60	16	0	0.11	4	0	0.64
02	8	3.57	16	0	0.11	4	0	0.67
03	0	3.56	16	0	0.11	4	0	0.69
04	0	3.54	16	0	0.01	4	0	0.67
05	10	3.60	16	0	0.08	4	0	0.65
06	8	3.57	16	0	0.08	4	0	0.71
07	12	3.61	16	0	0.11	4	0	0.69
08	10	3.60	16	0	0.11	4	0	0.71
09	9	3.58	16	0	0.08	4	0	0.68
10	0	3.54	16	0	0.01	4	0	0.69
11	0	3.56	16	0	0.11	4	0	0.62
12	9	3.58	16	0	0.08	4	0	0.69
13	0	3.55	16	0	0.14	4	0	0.66
14	15	3.64	16	0	0.08	4	0	0.69
15	8	3.57	16	0	0.16	4	0	0.74
01	11	3.60	16	0	0.15	4	0	0.82
02	8	3.57	16	0	0.20	4	0	0.63
03	13	3.62	16	0	0.20	4	0	0.69
04	10	3.59	16	0	0.11	4	0	0.77
05	13	3.62	16	0	0.04	4	0	0.70
06	17	3.67	16	0	0.04	4	0	0.72
07	18	3.56	16	0	0.18	4	0	0.83
08	18	3.66	16	0	0.22	4	0	0.67
09	13	3.62	16	0	0.18	4	0	0.73
10	10	3.59	16	0	0.15	4	0	0.68
11	0	3.53	16	0	0.15	4	0	0.74
12	0	3.56	16	0	0.04	4	0	0.70
13	0	3.49	16	0	0.11	4	0	0.65
14	0	3.50	16	0	0.11	4	0	0.74
15	0	3.56	16	0	0.11	4	0	0.56

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
01	13	3.62	16	0	0.18	4	0	0.68
02	0	3.53	16	0	0.15	4	0	0.67
03	9	3.58	16	0	0.15	4	0	0.70
04	0	3.56	16	0	0.22	4	0	0.73
05	8	3.57	16	0	0.11	4	0	0.67
06	9	3.57	16	0	0.11	4	0	0.72
07	10	3.59	16	0	0.11	4	0	0.67
08	9	3.58	16	0	0.04	4	0	0.66
09	15	3.63	16	0	0.04	4	0	0.72
10	0	3.52	16	0	0.15	4	0	0.70
11	0	3.49	16	0	0.18	4	0	0.73
12	9	3.57	16	0	0.15	4	0	0.65
13	10	3.59	16	0	0.11	4	0	0.66
14	0	3.56	16	0	0.15	4	0	0.74
15	11	3.59	16	0	0.20	4	0	0.63
01	8	3.57	16	0	0.15	4	0	0.74
02	0	3.54	16	0	0.15	4	0	0.72
03	8	3.57	16	0	0.20	4	0	0.74
04	11	3.60	16	0	0.18	4	0	0.77
05	10	3.75	17	0	0.22	4	0	0.68
06	0	3.72	17	0	0.15	4	0	0.62
07	14	3.79	17	0	0.20	4	0	0.70
08	14	3.79	17	0	0.11	4	0	0.62
09	27	3.92	17	0	0.22	4	0	0.72
10	16	3.81	17	0	0.20	4	0	0.75
11	18	3.83	17	0	0.20	4	0	0.72
12	19	3.84	17	0	0.15	4	0	0.72
13	13	3.79	17	1.59	0.24	4	0	0.74
14	21	3.86	17	0	0.11	4	0	0.75
15	11	3.76	17	0	0.15	4	0	0.72
01	17	3.83	17	0	0.20	4	0	0.63
02	15	3.81	17	0	0.15	4	0	0.65
03	19	3.84	17	0	0.04	4	0	0.68
04	15	3.80	17	0	0.22	4	0	0.76
05	16	3.82	17	0	0.15	4	0	0.60
06	0	3.73	17	0	0.20	4	0	0.82

SWIPE	ACTIVITY (DPM/100 cm²)								
	TRITIUM BETA			ALPHA			BETA		
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	
07	12	3.77	17	1.99	0.26	4	0	0.71	
08	17	3.82	17	0	0.20	4	0	0.83	
09	10	3.76	17	0	0.15	4	0	0.65	
10	13	3.79	17	0	0.15	4	0	0.66	
11	15	3.78	17	0	0.11	4	0	0.68	
12	16	3.82	17	0	0.15	4	0	0.70	
13	9	3.75	17	0	0.18	4	0	0.70	
14	11	3.78	17	0	0.18	4	0	0.70	
15	24	3.88	17	0	0.18	4	0	0.67	
01	15	3.81	17	0	0.11	4	0	0.67	
02	12	3.77	17	0	0.18	4	0	0.59	
03	12	3.78	17	0	0.11	4	0	0.68	
04	0	3.73	17	0	0.18	4	0	0.66	
05	0	3.73	17	0	0.20	4	0	0.77	
06	17	3.82	17	0	0.15	4	0	0.73	
07	11	3.77	17	0	0.15	4	0	0.63	
08	13	3.79	17	0	0.15	4	0	0.64	
09	14	3.80	17	0	0.18	4	0	0.69	
10	15	3.81	17	0	0.11	4	0	0.70	
11	13	3.79	17	0	0.15	4	0	0.60	
12	10	3.76	17	1.6	0.25	4	0	0.76	
13	9	3.75	17	0	0.18	4	0	0.64	
14	23	3.88	17	0	0.11	4	0	0.74	
15	11	3.77	17	0	0.15	4	0	0.66	
01	9	3.75	17	0	0.18	4	0	0.72	
02	15	3.81	17	0	0.22	4	0	0.73	
03	14	3.79	17	0	0.20	4	0	0.67	
04	0	3.70	17	0	0.15	4	0	0.65	
05	13	3.78	17	0	0.18	4	0	0.61	
06	9	3.74	17	0	0.11	4	0	0.67	
07	12	3.77	17	0	0.15	4	0	0.67	
08	13	3.79	17	0	0.11	4	0	0.63	
09	13	3.79	17	0	0.05	4	0	0.64	
10	18	3.84	17	0	0.20	4	0	0.70	
11	12	3.77	17	0	0.18	4	0	0.67	
12	12	3.78	17	0	0.15	4	0	0.59	

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
13	18	3.83	17	0	0.11	4	0	0.64
14	16	3.81	17	0	0.11	4	0	0.74
15	16	3.81	17	0	0.11	4	0	0.64
01	12	3.77	17	0	0.22	4	0	0.77
02	14	3.79	17	2.8	0.30	4	6.81	0.88
01	17	3.82	17	0	0.22	4	0	0.74
02	12	3.78	17	0	0.18	4	0	0.65
03	15	3.83	17	0	0.05	4	0	0.63
01	18	3.83	17	0	0.05	4	0	0.63
02	13	3.78	17	0	0.20	4	0	0.61
03	0	3.74	17	0	0.18	4	0	0.72
01	15	3.80	17	0	0.11	4	0	0.69
02	14	3.80	17	0	0.20	4	0	0.60
03	19	3.84	17	0	0.11	4	0	0.61
01	11	3.76	17	0	0.15	4	0	0.67
02	14	3.79	17	0	0.22	4	0	0.67
01	12	3.78	17	0	0.22	4	0	0.70
02	8	3.70	17	0	0.20	4	0	0.79
01	13	3.79	17	0	0.18	4	0	0.70
02	16	3.81	17	0	0.18	4	0	0.64
03	17	3.81	17	0	0.11	4	0	0.70
01	17	3.82	17	0	0.15	4	0	0.64
02	23	3.88	17	0	0.05	4	0	0.63
03	16	3.82	17	0	0.15	4	0	0.72
01	14	3.80	17	0	0.11	4	0	0.67
02	14	3.80	17	0	0.15	4	0	0.64
03	12	3.79	17	0	0.15	4	0	0.70
01	8	3.74	17	0	0.11	4	0	0.69
02	0	3.73	17	0	0.15	4	0	0.61
01	10	3.76	17	0	0.18	4	0	0.60
01	0	3.67	17	0	0.20	4	0	0.75

IGLOO CERTIFICATION

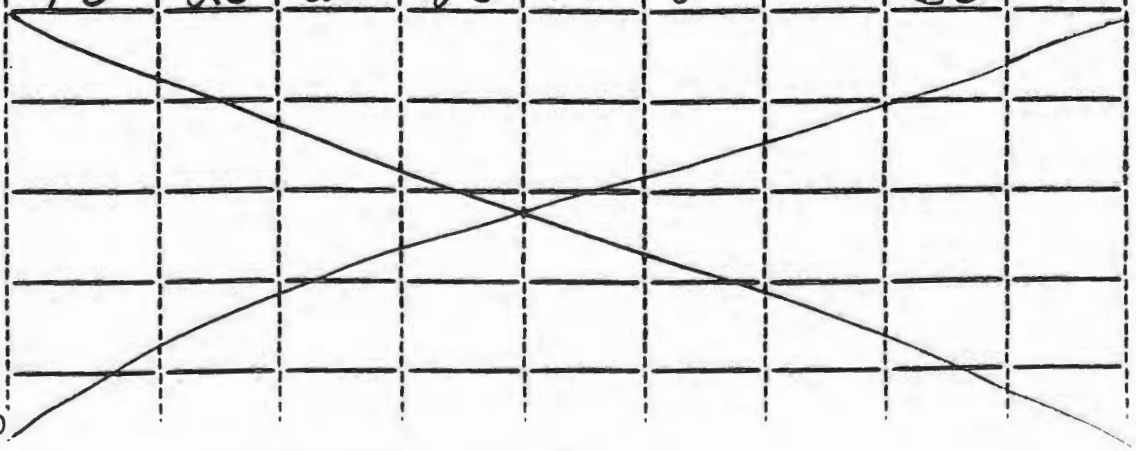
IGLOO NO. A0206 INSTRUMENT LUDLUM3

DATE 6 SEP 94 INSTRUMENT S/N 33573

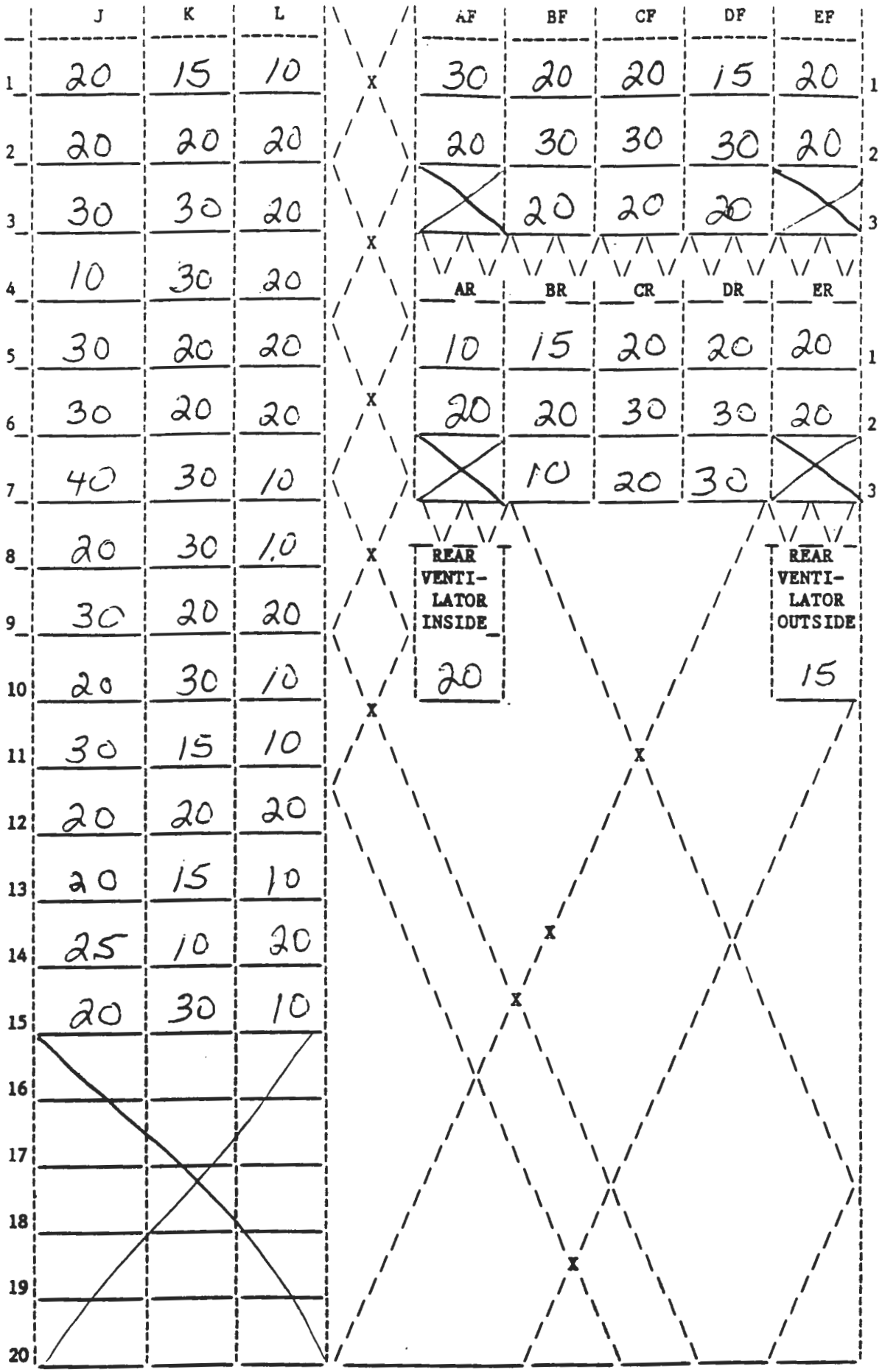
ALPHA READINGS ~~OR BETA/GAMMA READINGS~~ (in CPM) INSTRUMENT CAL DATE 11 JUL 94

BACKGROUND 30 CPM

	A	B	C	D	E	F	G	H	I
1	20	20	10	10	10	20	20	20	35
2	20	10	10	10	15	10	30	25	20
3	20	10	10	10	15	15	20	20	20
4	30	10	20	10	15	15	20	40	30
5	30	10	15	20	15	20	20	20	20
6	20	20	20	10	10	20	20	20	30
7	20	10	20	10	10	30	20	20	30
8	10	10	10	15	10	30	20	25	20
9	20	20	15	20	10	20	10	25	20
10	20	20	10	20	10	20	10	30	20
11	20	10	10	20	10	15	15	20	20
12	10	15	20	15	10	10	20	25	30
13	15	10	10	20	20	15	20	15	30
14	10	10	10	20	15	20	15	30	20
15	10	20	20	20	10	20	15	30	25
16									
17									
18									
19									
20									



SDSSE-N Form 880 (One-Time), 1 Jun 92



NAME OF RESPONSIBLE INDIVIDUAL (PLEASE PRINT) KIRK E. GRAY

SIGNATURE OF RESPONSIBLE INDIVIDUAL Kirk E. Gray

IGLOO CERTIFICATION

IGLOO NO. AO213 INSTRUMENT LUDLUM 3

DATE 31 AUG 94 INSTRUMENT S/N 34082

BACKGROUND 25 CPM

ALPHA READINGS ~~OR BETA/GAMMA READINGS~~ in CPM INSTRUMENT CAL DATE 11 JUL 94

	A	B	C	D	E	F	G	H	I
1	20	25	25	40	20	40	60	40	50
2	20	40	20	40	30	40	60	40	20
3	20	20	40	25	20	40	30	30	30
4	20	30	40	40	20	20	40	40	60
5	25	20	25	30	20	30	60	20	50
6	20	20	25	20	40	45	70	20	40
7	40	25	25	20	20	25	40	30	70
8	20	40	25	30	20	20	60	20	20
9	20	40	20	30	20	40	70	20	60
10	40	20	30	20	25	30	50	30	50
11	40	20	20	40	20	30	60	20	50
12	20	40	30	20	20	40	50	40	60
13	20	20	20	20	20	20	50	40	40
14	20	20	40	20	30	30	40	30	40
15	20	25	20	40	20	40	40	40	40
16	20	25	20	40	20	40	40	40	60
17	20	25	30	20	20	20	30	40	40
18	20	20	30	40	30	20	40	20	40
19	40	20	20	30	40	20	50	40	40
20	20	20	25	45	40	20	40	60	50

	J	K	L	AF	BF	CF	DF	EF	
1	50	30	40	20	20	30	20	30	1
2	40	20	40	20	30	50	50	40	2
3	40	20	40	X	40	40	40	X	3
4	30	30	40	AR	BR	CR	DR	ER	
5	50	30	40	40	50	50	40	60	1
6	45	30	60	70	80	60	60	40	2
7	45	40	50	X	30	20	20	X	3
8	40	40	40	REAR VENTI-LATOR INSIDE				REAR VENTI-LATOR OUTSIDE	
9	40	40	40						
10	50	40	40	30				40	
11	20	40	30						
12	60	40	50						
13	40	30	50						
14	40	40	30						
15	30	20	20						
16	40	20	30						
17	30	30	25						
18	50	20	60						
19	40	20	40						
20	20	30	50						

NAME OF RESPONSIBLE INDIVIDUAL (PLEASE PRINT) KIRK E. GRAY

SIGNATURE OF RESPONSIBLE INDIVIDUAL Kirk E. Gray

SDSSE-N Form 880 (One-Time)(Reverse), 1 Jun 92

DEPARTMENT OF THE ARMY

U.S. ARMY IONIZING RADIATION DOSIMETRY CENTER

U.S. ARMY TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE) ACTIVITY

LEXINGTON, KY 40511-5102

AMXTM-SR-DN

17 October 1994

MEMORANDUM FOR Commander, Seneca Army Depot, Building 323, Romulus, NY 14541

SUBJECT: Decommissioning Wipes

1. The results of the decommissioning wipes done at your facility, which this Center received 13 September 1994, are indicated on the enclosed tables.

2. A review of the results revealed that none of the wipes exceeded the removable contamination limits set forth in AR 385-11 or the Nuclear Regulatory Commission's "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material", dated April 1993.

3. POC is Stephen Howard, DSN 745-3942.

for Stephen V. Howard

A. EDWARD ABNEY
Chief, US Army Ionizing
Radiation Dosimetry Center

Encl

#218

SURFACE ACTIVITY MEASUREMENTS
SMEAR AND SWAB ANALYSIS
BUILDING 218

	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
SWIPE	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
01	0	3.71	18	0	0.09	2	0	0.41
02	13	3.81	18	0	0.07	2	0	0.40
03	0	3.70	18	0	0.06	2	0	0.37
04	12	3.82	18	0	0.11	2	0	0.40
05	0	3.73	18	0	0.07	2	0	0.39
06	13	3.81	18	0	0.09	2	2.57	0.44
07	11	3.80	18	0	0.07	2	0	0.41
08	16	3.85	18	0	0.07	2	0	0.41
09	9	3.78	18	0	0.08	2	0	0.37
10	20	3.88	18	0	0.08	2	0	0.38
11	12	3.80	18	0	0.07	2	0	0.37
12	0	3.72	18	0	0.07	2	0	0.36
13	0	3.76	18	0	0.08	2	0	0.35
14	0	3.76	18	0	0.10	2	2.74	0.44
15	13	3.79	18	0	0.09	2	0	0.40
01	16	3.84	18	0	0.09	2	0	0.38
02	10	3.79	18	0	0.07	2	0	0.41
03	10	3.79	18	0	0.05	2	0	0.41
04	0	3.73	18	0	0.08	2	0	0.42
05	0	3.72	18	0	0.07	2	0	0.38
06	0	3.76	18	0	0.07	2	0	0.38
07	0	3.77	18	0	0.07	2	0	0.40
08	9	3.78	18	0	0.07	2	0	0.42
09	0	3.76	18	0	0.09	2	0	0.39
10	10	3.79	18	0	0.08	2	0	0.39
11	0	3.75	18	0	0.09	2	0	0.37
12	0	3.75	18	0	0.06	2	0	0.39
13	10	3.78	18	0	0.07	2	0	0.38
14	10	3.79	18	0	0.09	2	0	0.39
15	0	3.75	18	0	0.09	2	0	0.38
01	10	3.79	18	0	0.09	2	0	0.37
02	11	3.80	18	0	0.09	2	0	0.38
03	0	3.76	18	0	0.09	2	0	0.40

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
04	0	3.73	18	0	0.11	2	0	0.38
05	8	3.78	18	0.8	0.11	2	0	0.37
06	0	3.70	18	0	0.07	2	0	0.41
07	12	3.80	18	0	0.08	2	0	0.41
08	[illegible]	3.77	18	0	0.09	2	0	0.39
09	11	3.80	18	0	0.06	2	0	0.39
10	0	3.73	18	0	0.06	2	0	0.38
11	0	3.75	18	0	0.08	2	0	0.39
12	0	3.71	18	0	0.08	2	0	0.36
13	0	3.76	18	0	0.07	2	0	0.39
14	11	3.79	18	0	0.10	2	0	0.40
15	0	3.75	18	0	0.08	2	0	0.38
01	0	3.77	18	0	0.07	2	0	0.41
02	0	3.77	18	0	0.06	2	0	0.39
03	12	3.81	18	0	0.07	2	0	0.39
04	0	3.74	18	0	0.04	2	0	0.39
05	10	3.78	18	0	0.04	2	0	0.36
06	0	3.78	18	0	0.08	2	0	0.36
07	0	3.77	18	0	0.07	2	0	0.36
08	14	3.83	18	0	0.09	2	0	0.39
09	10	3.79	18	0	0.06	2	0	0.36
10	0	3.72	18	0	0.05	2	0	0.39
11	0	3.78	18	0	0.06	2	0	0.40
12	0	3.75	18	0	0.09	2	0	0.37
13	0	3.75	18	0	0.20	4	0	0.60
14	0	3.73	18	0	0.11	4	0	0.76
15	10	3.80	18	0	0.15	4	0	0.65
01	14	3.83	18	0	0.11	4	0	0.77
02	15	3.81	18	0	0.15	4	0	0.78
03	0	3.72	18	0	0.05	4	0	0.72
04	0	3.70	18	0	0.15	4	0	0.76
05	10	3.79	18	0	0.11	4	0	0.61
06	15	3.84	18	0	0.05	4	0	0.74
07	16	3.84	18	0	0.05	4	0	0.65
08	13	3.82	18	0	0.15	4	0	0.69
09	10	3.79	18	0	0.20	4	0	0.61

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
10	11	3.80	18	0	0.18	4	0	0.68
11	0	3.79	18	0	0.15	4	0	0.69
12	[illegible]	3.85	18	0	0.15	4	0	0.74
13	[illegible]	3.80	18	0	0.18	4	0	0.70
14	0	3.76	18	0	0.05	4	0	0.67
15	[illegible]	3.80	18	0	0.11	4	0	0.73
01	12	3.81	18	0	0.20	4	0	0.74
02	0	3.78	18	0	0.11	4	0	0.72
03	0	3.80	18	0	0.15	4	0	0.67
04	2	3.82	18	0	0.15	4	0	0.72
05	11	3.81	18	0	0.20	4	0	0.77
06	15	3.85	18	0	0.20	4	0	0.65
07	0	3.73	18	0	0.11	4	0	0.70
08	10	3.79	18	0	0.11	4	0	0.71
09	9	3.78	18	0	0.11	4	0	0.68
10	0	3.78	18	0	0.11	4	0	0.74
11	0	3.78	18	0	0.11	4	0	0.77
12	12	3.82	18	0	0.15	4	0	0.71
13	10	3.80	18	0	0.05	4	0	0.63
14	14	3.83	18	0	0.05	4	0	0.68
15	11	3.81	18	0	0.18	4	0	0.72
01	0	3.74	18	0	0.16	4	0	0.73
02	0	3.76	18	0	0.14	4	0	0.78
03	9	3.78	18	0	0.08	4	0	0.64
04	0	3.74	18	0	0.02	4	0	0.71
05	21	3.90	18	0	0.11	4	0	0.74
06	11	3.81	18	0	0.02	4	0	0.72
07	14	3.83	18	0	0.11	4	0	0.69
08	0	3.78	18	0	0.11	4	0	0.72
09	10	3.80	18	0	0.16	4	0	0.72
10	9	3.79	18	0	0.11	4	0	0.70
11	9	3.79	18	0	0.11	4	0	0.70
12	0	3.76	18	0	0.02	4	0	0.73
13	12	3.81	18	0	0.02	4	0	0.76
14	10	3.80	18	0	0.18	4	0	0.67
15	11	3.80	18	0	0.08	4	0	0.68

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
01	14	3.83	18	0	0.02	4	0	0.65
02	3	3.81	18	0	0.02	4	0	0.73
03	11	3.80	18	0	0.16	4	0	0.77
04	8	3.79	18	0	0.11	4	0	0.69
05	0	3.77	18	0	0.02	4	0	0.69
06	0	3.77	18	0	0.02	4	0	0.65
07	11	3.81	18	0	0.11	4	0	0.67
08	3	3.83	18	0	0.08	4	0	0.67
09	2	3.81	18	0	0.08	4	0	0.71
10	14	3.83	18	0	0.14	4	0	0.68
11	15	3.85	18	0	0.02	4	0	0.72
12	14	3.83	18	0	0.16	4	0	0.68
13	14	3.84	18	0	0.11	4	0	0.77
14	14	3.84	18	0	0.16	4	0	0.75
15	0	3.71	18	0	0.14	4	0	0.64
01	9	3.79	18	0	0.08	4	0	0.64
02	12	3.82	18	0	0.08	4	0	0.72
03	17	3.86	18	0	0.14	4	0	0.71
04	0	3.76	18	0	0.11	4	0	0.69
05	13	3.82	18	0	0.14	4	0	0.70
06	14	3.83	18	0	0.18	4	0	0.73
07	21	3.90	18	0	0.08	4	0	0.75
08	11	3.81	18	0	0.08	4	0	0.69
09	6	3.86	18	0	0.08	4	0	0.74
10	12	3.81	18	0	0.18	4	0	0.78
11	16	3.83	18	0	0.02	4	0	0.73
12	17	3.87	18	0	0.11	4	0	0.65
13	0	3.75	18	0	0.11	4	0	0.66
14	9	3.79	18	0	0.11	4	0	0.70
15	11	3.80	18	0	0.11	4	0	0.73
01	12	3.82	18	0	0.08	4	0	0.75
02	13	3.83	18	0	0.11	4	0	0.69
03	14	3.84	18	0	0.08	4	0	0.71
04	23	3.92	18	0	0.02	4	0	0.72
05	10	3.79	18	0	0.11	4	0	0.64
06	13	3.82	18	0	0.18	4	0	0.74

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
07	13	3.82	18	0	0.11	4	0	0.75
08	10	3.78	18	0	0.11	4	0	0.73
09	11	3.80	18	0	0.14	4	0	0.69
10	10	3.80	18	0	0.02	4	0	0.68
11	13	3.82	18	0	0.11	4	0	0.67
12	15	3.85	18	0	0.08	4	0	0.64
13	0	3.77	18	0	0.02	4	0	0.80
14	13	3.82	18	0	0.08	4	0	0.68
15	0	3.75	18	0	0.14	4	0	0.72
01	13	3.83	18	0	0.02	4	0	0.68
02	12	3.82	18	0	0.02	4	0	0.68
03	9	3.78	18	0	0.11	4	0	0.68
04	9	3.79	18	0	0.11	4	0	0.70
05	10	3.80	18	0	0.02	4	0	0.69
06	11	3.80	18	0	0.14	4	0	0.78
07	0	3.75	18	0	0.11	4	0	0.67
08	16	3.85	18	0	0.14	4	0	0.68
09	0	3.77	18	0	0.14	4	0	0.64
10	16	3.85	18	0	0.16	4	0	0.73
11	9	3.79	18	0	0.14	4	0	0.65
12	20	3.89	18	0	0.14	4	0	0.71
13	12	3.81	18	0	0.14	4	0	0.69
14	0	3.78	18	0	0.08	4	0	0.70
15	12	3.81	18	0	0.02	4	0	0.65
01	0	3.78	18	0	0.14	4	0	0.75
02	11	3.81	18	0	0.11	4	0	0.68
03	12	3.82	18	0	0.08	4	0	0.69
04	16	3.85	18	0	0.08	4	0	0.73
05	0	3.75	18	0	0.08	4	0	0.68
06	12	3.82	18	0	0.14	4	0	0.70
07	20	3.89	18	0	0.08	4	0	0.67
08	10	3.80	18	0	0.02	4	0	0.73
09	12	3.82	18	0	0.11	4	0	0.74
10	12	3.82	18	0	0.16	4	0	0.67
11	12	3.89	17	0	0.11	4	0	0.69

SWIPE	ACTIVITY (DPM/100 cm²)							
	TRITIUM BETA			ALPHA			BETA	
	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)	LD DPM	ACTIVITY DPM	UNCERTAINTY (95% C.L.)
12	0	3.84	17	0	0.14	4	0	0.64
13	0	3.85	17	0	0.14	4	0	0.79
14	0	3.87	17	0	0.14	4	0	0.70
15	0	3.87	17	0	0.08	4	0	0.71
01	0	3.88	17	0	0.15	4	0	0.76
02	0	3.88	17	0	0.18	4	0	0.80
01	0	3.89	17	0	0.18	4	0	0.69
02	0	3.83	17	0	0.21	4	0	0.69
03	0	3.84	17	0	0.21	4	0	0.70
01	0	3.86	17	0	0.15	4	0	0.73
02	0	3.83	17	0	0.21	4	0	0.64
03	0	3.82	17	0	0.18	4	0	0.81
01	9	3.85	17	0	0.12	4	0	0.74
02	9	3.86	17	0	0.21	4	0	0.74
03	10	3.87	17	0	0.15	4	0	0.77
01	18	3.95	17	0	0.12	4	0	0.78
02	10	3.87	17	0	0.12	4	0	0.68
01	0	3.80	17	0	0.06	4	0	0.76
02	9	3.86	17	0	0.12	4	0	0.72
01	9	3.85	17	0	0.12	4	0	0.78
02	0	3.77	17	0	0.15	4	0	0.68
03	0	3.83	17	0	0.18	4	0	0.73
01	0	3.84	17	0	0.21	4	0	0.79
02	1	3.90	17	0	0.15	4	0	0.73
03	0	3.77	17	0	0.15	4	0	0.74
01	0	3.78	17	0	0.18	4	0	0.76
02	8	3.85	17	0	0.06	4	0	0.65
03	0	3.82	17	0	0.23	4	0	0.63
01	0	3.78	17	0	0.15	4	0	0.73
02	0	3.82	17	0	0.15	4	0	0.81
01	0	3.77	17	0	0.18	4	0	0.66
01	0	3.77	17	0	0.23	4	0	0.76

IGLOO CERTIFICATION

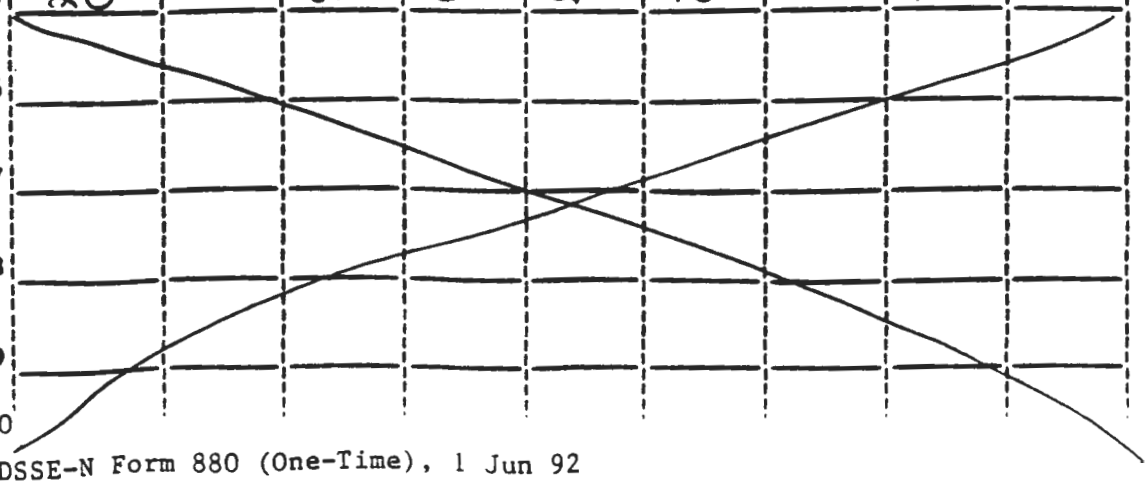
IGLOO NO. A0218 INSTRUMENT LUDLUM 3

DATE 7Sep94 INSTRUMENT S/N 34082

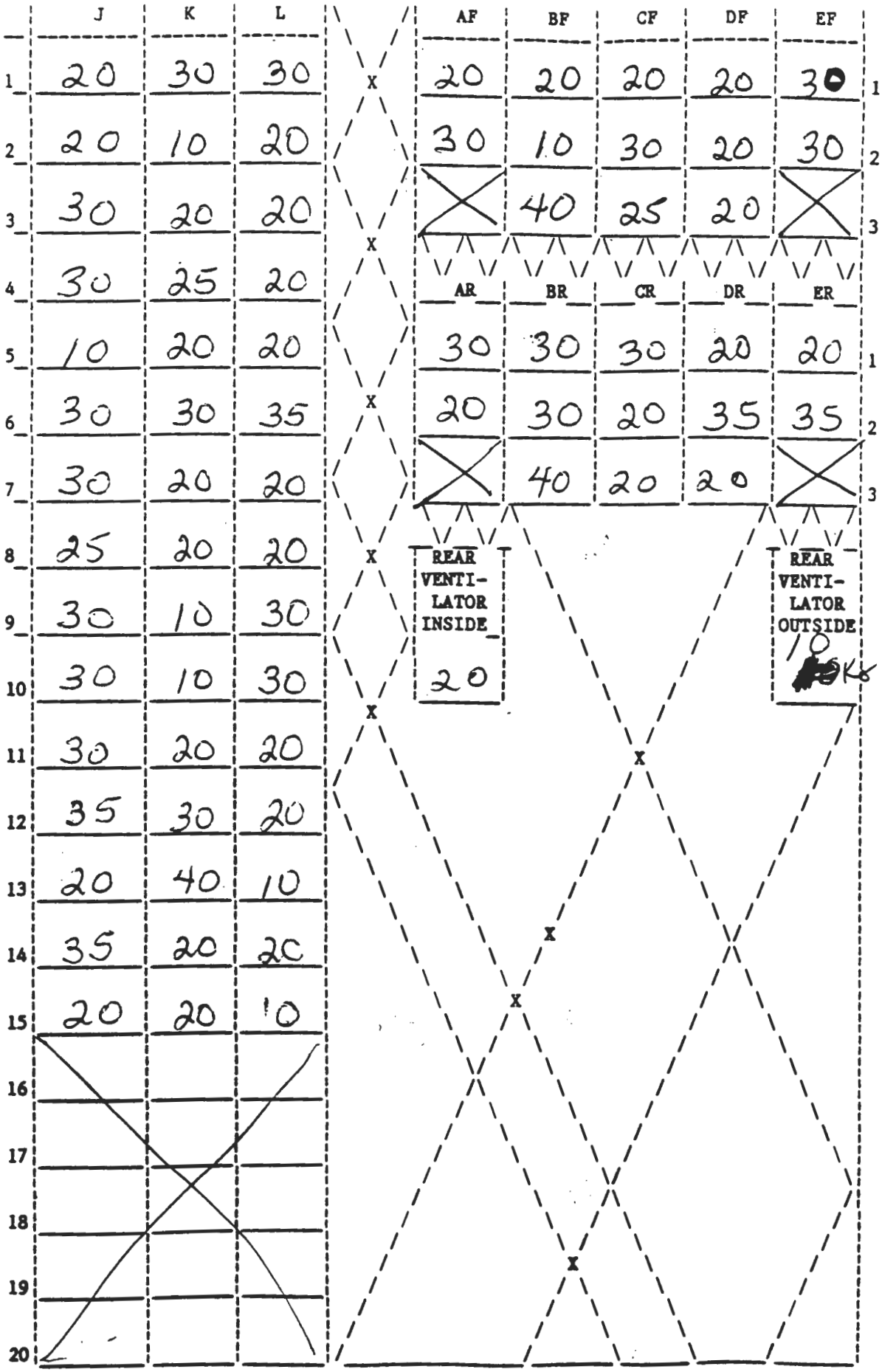
ALPHA READINGS OR BETA/GAMMA READINGS INSTRUMENT CAL DATE 11JUL94

GROUND
40

	A	B	C	D	E	F	G	H	I
1	20	20	10	30	20	10	30	10	10
2	20	10	10	30	20	20	30	20	35
3	10	20	20	10	10	20	20	35	10
4	20	20	20	10	20	10	20	20	30
5	20	30	20	20	30	20	20	20	35
6	20	10	20	20	20	10	20	20	25
7	20	30	20	10	20	20	30	20	20
8	30	20	20	20	10	20	30	10	20
9	10	15	10	20	20	35	30	20	30
10	20	10	25	20	10	30	20	20	15
11	30	10	20	10	10	20	10	30	30
12	20	20	10	20	30	10	20	10	20
13	30	10	10	10	10	20	30	30	30
14	30	10	10	10	10	10	30	30	10
15	20	20	20	30	20	10	30	10	20
16									
17									
18									
19									
20									



SDSSE-N Form 880 (One-Time), 1 Jun 92



	J	K	L	AF	BF	CF	DF	EF		AR	BR	CR	DR	ER	
1	20	30	30	20	20	20	20	30	1	30	30	30	20	20	1
2	20	10	20	30	10	30	20	30	2	20	30	20	35	35	2
3	30	20	20	X	40	25	20	X	3	X	40	20	20	X	3
4	30	25	20												
5	10	20	20												
6	30	30	35												
7	30	20	20												
8	25	20	20												
9	30	10	30												
10	30	10	30												
11	30	20	20												
12	35	30	20												
13	20	40	10												
14	35	20	20												
15	20	20	10												
16															
17															
18															
19															
20															

REAR VENTI-LATOR INSIDE: 20

REAR VENTI-LATOR OUTSIDE: 10

NAME OF RESPONSIBLE INDIVIDUAL (PLEASE PRINT) KIRK E. GRAY

SIGNATURE OF RESPONSIBLE INDIVIDUAL Kirk E. Gray

APPENDIX F

OWNER H.O.B.

DUIC WØMG4G

PUIC W45916

anufaturer LUDLUM

Meter Model 3

SN 41118

Probe Model 43-5

Probe SN PRØ51714

tope 239
PU

Source SN A-1156

METER RANGE

METER RANGE	APPLIED UNITS CP/Ms	INITIAL METER READING	ADJUST (Y/N)	FINAL METER READING	CORR FACTOR	AVG CORR FACTOR
X1ØØ	137K	1.4K	N	1.4K	Ø.98	
X1Ø	13.2K	1.3K	N	1.3K	1.Ø1	
X1	1211	1.2K	N	1.2K	1.Ø1	
XØ.1	**********					

REMARKS: ******** XØ.1 RANGE ELECTRONICALLY CALIBRATED.

IN CHARGE OF CALIBRATION

for SUPERVISOR

CALIBRATION REPORT NO: WØMG4GØ146

DATE CALIBRATED: 8 SEP 94

DATE DUE CALIBRATION: 6 JAN 95

CHIEF
US ARMY TMDE SUPPORT CENTER
ATTN: AMXTM-GA-TSE (RPO)
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NY 14541-5015

DSN 489-5268
COMM 6Ø7-869-1268

OWNER H.O.B.

OUIC WØMG4G

PUIC W45916

Manufaturer LUDLUM

Meter Model 3

SN 34082

Probe Model 43-5

Probe SN PRØ19251

Isotope 239 PU

Source SN A-1156

METER RANGE

METER RANGE	APPLIED UNITS CP/Ms	INITIAL METER READING	ADJUST (Y/N)	FINAL METER READING	CORR FACTOR	AVG CORR FACTOR
X100	137K	1.35K	N	1.35K	1.01	
X10	13.2K	1.3K	N	1.3K	1.01	
X1	1211	1.2K	N	1.2K	1.01	
X0.1	**********					

REMARKS: ******** X0.1 RANGE ELECTRONICALLY CALIBRATED.

IN CHARGE OF CALIBRATION

SUPERVISOR

CALIBRATION REPORT NO: WØMG4GØØ16

DATE CALIBRATED: 11 JUL 94

DATE DUE CALIBRATION: 9 OCT 94

CHIEF
US ARMY TMDE SUPPORT CENTER
ATTN: AMXTM-GA-TSE (RPO)
SENECA ARMY DEPOT
ROMULUS, NY 14541-5015

DSN 489-5268
COMM 607-869-1268

OWNER H.O.B.

OUIC WØMG4G

PUIC W45916

anufaturer LUDLUM

Meter Model 3

SN 33573

Probe Model 43-5

Probe SN PRØ19255

tope 239 PU

Source SN A-1156

METER RANGE

METER RANGE	APPLIED UNITS CP/Ms	INITIAL METER READING	ADJUST (Y/N)	FINAL METER READING	CORR FACTOR	AVG CORR FACTOR
X1ØØ	137K	1.35K	N	1.35K	1.Ø1	
X1Ø	13.2K	1.3K	N	1.3K	1.Ø1	
X1	1211	1.2K	N	1.2K	1.Ø1	
XØ.1	*********					

EMARKS: ******** XØ.1 RANGE ELECTRONICALLY CALIBRATED.

IN CHARGE OF CALIBRATION

SUPERVISOR

CALIBRATION REPORT NO: WØMG4GØØ26

DATE CALIBRATED: 11 JUL 94

DATE DUE CALIBRATION: 9 OCT 94

CHIEF
US ARMY TMDE SUPPORT CENTER
ATTN: AMXTM-GA-TSE (RPO)
SENECA ARMY DEPOT
ROMULUS, NY 14541-5Ø15

DSN 489-5268
COMM 6Ø7-869-1268

OWNER H.O.B. | OUIC WØMG4G | PUIC W45916

anufaturer LUDLUM | Meter Model 3 | SN 41137

Probe Model | Probe SN | ISOTOPE

ser Model MP-1 | Pulser SN 22Ø | SOURCE

SOURCE SN.=

METER RANGE

METER RANGE	APPLIED UNITS CP/M	INITIAL METER READING	ADJUST (Y/N)	FINAL METER READING		
X1ØØ	4ØØK	3.8K	N	3.8K		
	2ØØK	2.ØK		2.ØK		
	1ØØK	1.ØK		1.ØK		
X1Ø	4ØK	4.ØK	N	4.ØK		
	2ØK	2.ØK		2.ØK		
	1ØK	1.ØK		1.ØK		
X1	4K	3.9K	N	3.9K		
	2K	1.9K		1.9K		
	1K	1.ØK		1.ØK		
X Ø.1	4ØØ	4.ØK	N	4.ØK		
	2ØØ	2.Ø5K		2.Ø5K		
	1ØØ	1.ØK		1.ØK		

REMARKS: ALL RANGES ELECTRONICALLY CALIBRATED. ADJUSTED AT TOP END OF SCALE TO PREVENT OVERRUN.

IN CHARGE OF CALIBRATION

for SUPERVISOR

LIBRATION REPORT NO: WØMG4GØ676

ATE CALIBRATED: 8 SEP 94

DATE DUE CALIBRATION: 6 JAN 95

CHIEF
US ARMY TMDE SUPPORT CENTER
ATTN: AMXTM-GA-TSE (RPO)
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NY 14541-5Ø15

DSN 489-5772/5268
COMM 6Ø7-869-1772/1268

OWNER H.O.B. W0MG4G [illegible]

Manufaturer LUDLUM Meter Model 3 SN 34649

Probe Model 44-9 Probe SN PR051753 ISOTOPE Tc-99

Pulser Model MP-1 Pulser SN 220 SOURCE 12,000 DPM,s

SOURCE SN.= 1843-94

METER RANGE

METER RANGE	APPLIED UNITS CP/M	INITIAL METER READING	ADJUST (Y/N)	FINAL METER READING
	400K	4.0K		4.0K
X100	200K	2.05K	N	2.05K
	100K	1.05K		1.05K
	40K	4.0K		4.0K
X10	20K	2.0K	N	2.0K
	10K	1.0K		1.0K
	4K	4.05K		4.05K
X1	2K	2.0K	N	2.0K
	1K	1.05K		1.05K
	400	4.0K		4.0K
X0.1	200	2.0K	N	2.0K
	100	1.05K		1.05K

REMARKS: ALL RANGES ELECTRONICALLY CALIBRATED. ADJUSTED AT TOP END OF SCALE TO PREVENT OVERRUN.
Tc-99 EFFICIENCY IS 17.5% . POINT SOURCE READS 2.10K ON THE X1 RANGE.
EFFICIENCY DERIVED BY THE FOLLOWING. OBSERVED READING IN CPM DIVIDED BY SOURCE STRENGTH IN DPM X 100. 2,100 CPM,s / 12,000 DPM,s * 100 = 17.50%

IN CHARGE OF CALIBRATION

for SUPERVISOR

CALIBRATION REPORT NO: W0MG4G0636

DATE CALIBRATED: 3 AUG 94

DATE DUE CALIBRATION: 1 NOV 94

CHIEF
US ARMY TMDE SUPPORT CENTER
ATTN: AMXTM-GA-TSE (RPO)
SENECA ARMY DEPOT
ROMULUS, NY 14541-5015

DSN 489-5772/5268
COMM 607-869-1772/1268

OWNER H.U.S.

anufaturer LUDLUM

robe Model 44-9

.ser Model MP-1

Meter Model 3

Probe SN PR051749

Pulser SN 220

SN 60733

ISOTOPE Tc-99

SOURCE 12,000 DPM,s

SOURCE SN.= 1843-94

METER RANGE

METER RANGE	APPLIED UNITS CP/M	INITIAL METER READING	ADJUST (Y/N)	FINAL METER READING		
	400K	4.0K		4.0K		
X100	200K	2.0K	N	2.0K		
	100K	1.0K		1.0K		
	40K	4.0K		4.0K		
X10	20K	2.0K	N	2.0K		
	10K	1.0K		1.0K		
	4K	4.0K		4.0K		
X1	2K	2.0K	N	2.0K		
	1K	1.0K		1.0K		
	400	4.0K		4.0K		
X0.1	200	2.0K	N	2.0K		
	100	1.0K		1.0K		

REMARKS: ALL RANGES ELECTRONICALLY CALIBRATED. ADJUSTED AT TOP END OF SCALE TO PREVENT OVERRUN.
Tc-99 EFFICIENCY IS 16.7% . POINT SOURCE READS 2.00K ON THE x1 RANGE.
EFFICIENCY DERIVED BY THE FOLLOWING. OBSERVED READING IN CPM DIVIDED BY SOURCE STRENGTH IN DPM X 100. 2,000 CPM,s / 12,000 DPM,s x 100 = 16.66%

IN CHARGE OF CALIBRATION

for SUPERVISOR

`LIBRATION REPORT NO: W0M94G0606

ATE CALIBRATED: 3 AUG 94

DATE DUE CALIBRATION: 1 NOV 94

CHIEF
US ARMY TMDE SUPPORT CENTER
ATTN: AMXTM-GA-TSE (RPO)
SENECA ARMY DEPOT
ROMULUS, NY 14541-5015

DSN 489-5772/52e8
COMM 607-869-1772/12e8

ENCLOSURE 1

Enclosures 1 through 4

Grid pattern maps for "typical igloos"

and Igloo
Extra AEC
bunkers

AGREEMENT FOR INITIAL START-UP SURVEY OF STANDARD IGLOOS

SENECA ARMY DEPOT - DSW

45 - 60 FOOT X 26.5 FOOT 159 +32

17 - 80 FOOT X 26.5 FOOT 221 +32

2 - 40 FOOT X 26.5 FOOT 106 +32

64 TOTAL

SENECA ARMY DEPOT WILL:

GRID EACH IGLOO 4' X 5' APPROX FLOOR AND CEILING

SWIPE EACH GRID IN APPROXIMATE CENTER 100 CM/SQ

SWIPES WILL BE FOR GROSS ALPHA/BETA DRY AND GROSS BETA (WET)

NOTIFY CECOM WHEN SWIPES AND MONITORING WILL BEGIN. CECOM WILL SEND A REPRESENTATIVE TO MONITOR DEPOT.

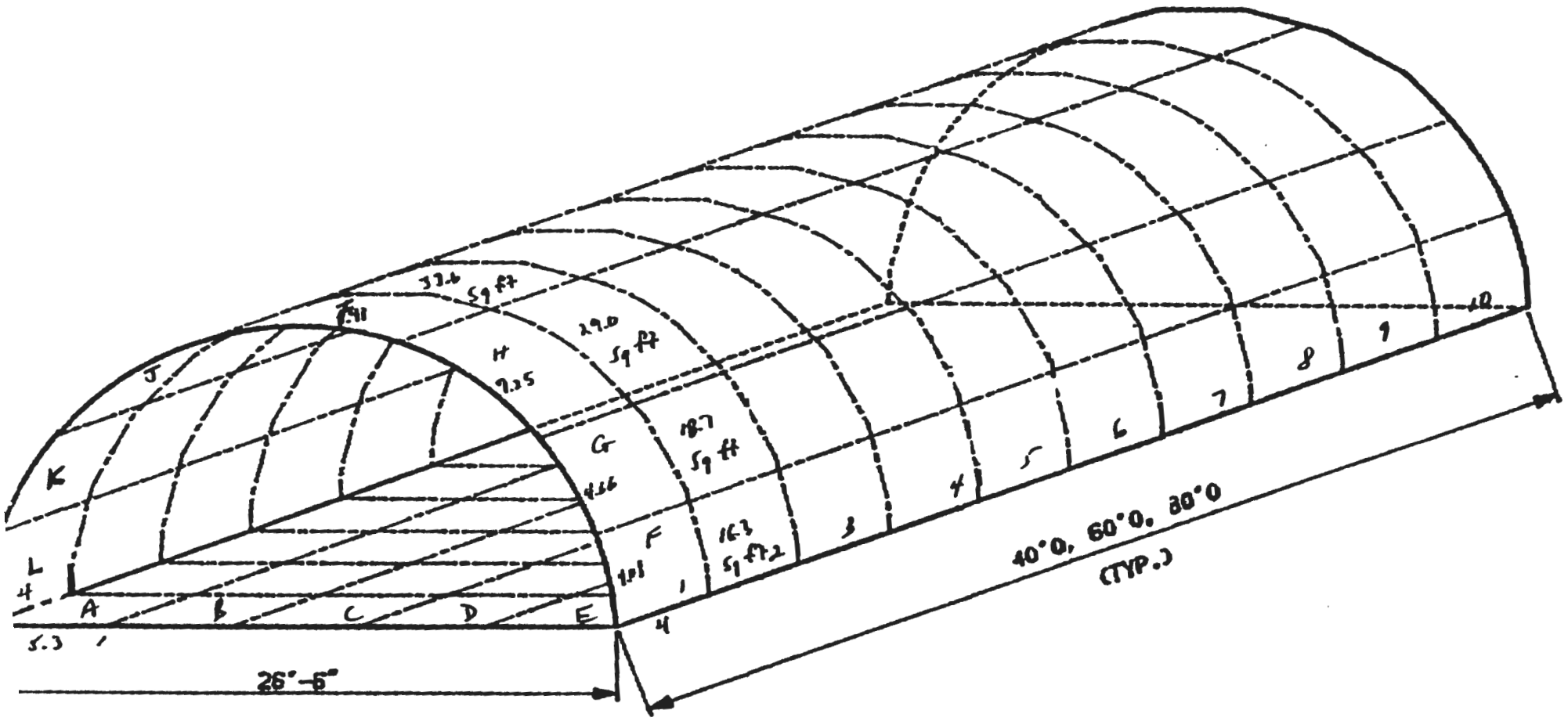
NOTE: MONITORING ON FLOOR ONLY.

MONITOR EACH GRID USING A ALPHA AND A BETA/GAMMA INSTRUMENT. CIRCLE AREAS WITH PAINT WHERE SWIPE AND INSTRUMENTS WERE TAKEN OR USED.

CECOM WILL RECEIVE SWIPES AND PROVIDE INITIAL READINGS.

AEHA WILL BE NOTIFIED WHEN A WEEKS WORTH OF BUNKERS ARE AVAILABLE TO SEND A TEAM FOR OFFICIAL SWIPING.

AFTER CECOM DECLARES AN IGLOO CLEAN AND AFTER AEHA SWIPING, THE IGLOO MAY BE UTILIZED.



SCALE 1/2 = 1'-0"

enclosure #1

ENCLOSURE 2

Enclosures 1 through 4

Grid pattern maps for "typical igloos"

and Igloo
Extra AEC bunkers

AGREEMENT FOR INITIAL START-UP SURVEY OF STANDARD IGLOOS

SENECA ARMY DEPOT - DSW

45 - 60 FOOT X 26.5 FOOT 159 +32

17 - 80 FOOT X 26.5 FOOT 221 +32

2 - 40 FOOT X 26.5 FOOT 100 +32

64 TOTAL

SENECA ARMY DEPOT WILL:

GRID EACH IGLOO 4' X 5' APPROX FLOOR AND CEILING

SWIPE EACH GRID IN APPROXIMATE CENTER 100 CM/SQ

SWIPES WILL BE FOR GROSS ALPHA/BETA DRY AND GROSS BETA (WET)

NOTIFY CECOM WHEN SWIPES AND MONITORING WILL BEGIN. CECOM WILL SEND A REPRESENTATIVE TO MONITOR DEPOT.

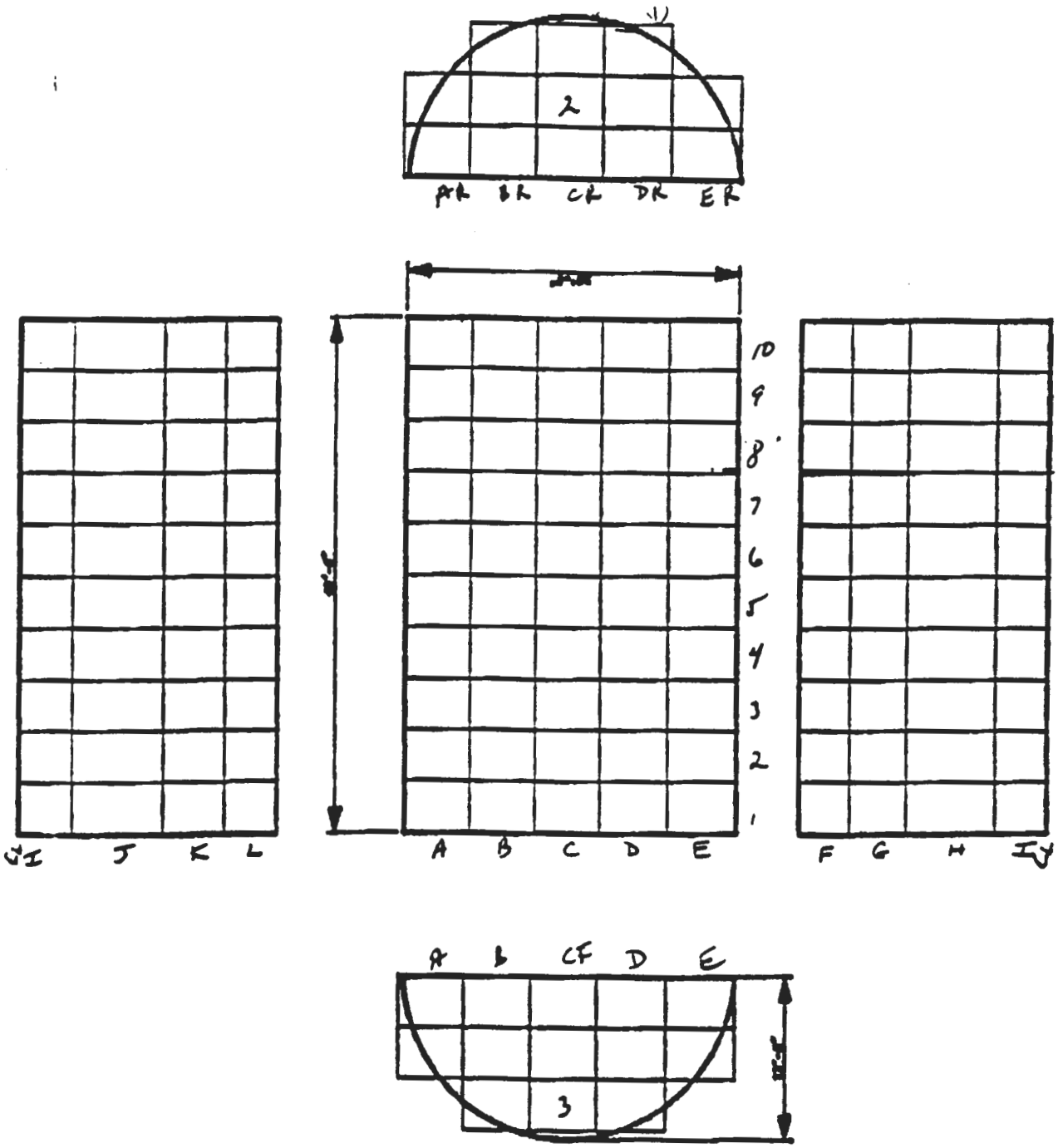
NOTE: MONITORING ON FLOOR ONLY.

MONITOR EACH GRID USING A ALPHA AND A BETA/GAMMA INSTRUMENT. CIRCLE AREAS WITH PAINT WHERE SWIPE AND INSTRUMENTS WERE TAKEN OR USED.

CECOM WILL RECEIVE SWIPES AND PROVIDE INITIAL READINGS.

AEHA WILL BE NOTIFIED WHEN A WEEKS WORTH OF BUNKERS ARE AVAILABLE TO SEND A TEAM FOR OFFICIAL SWIPING.

AFTER CECOM DECLARES AN IGLOO CLEAN AND AFTER AEHA SWIPING, THE IGLOO MAY BE UTILIZED.



Enclosure #2

ENCLOSURE 3

Enclosures 1 through 4

Grid pattern maps for "typical igloos"

and Igloo
Extra AEC
bunkers

AGREEMENT FOR INITTIAL START-UP SURVEY OF STANDARD IGLOOS

SENECA ARMY DEPOT - DSW

45 - 60 FOOT X 26.5 FOOT 159 +32

17 - 80 FOOT X 26.5 FOOT 221 +32

2 - 40 FOOT X 26.5 FOOT 106 +32

64 TOTAL

SENECA ARMY DEPOT WILL:

GRID EACH IGLOO 4' X 5' APPROX FLOOR AND CEILING

SWIPE EACH GRID IN APPROXIMATE CENTER 100 CM/SQ

SWIPES WILL BE FOR GROSS ALPHA/BETA DRY AND GROSS BETA (WET)

NOTIFY CECOM WHEN SWIPES AND MONITORING WILL BEGIN. CECOM WILL SEND A REPRESENTATIVE TO MONITOR DEPOT.

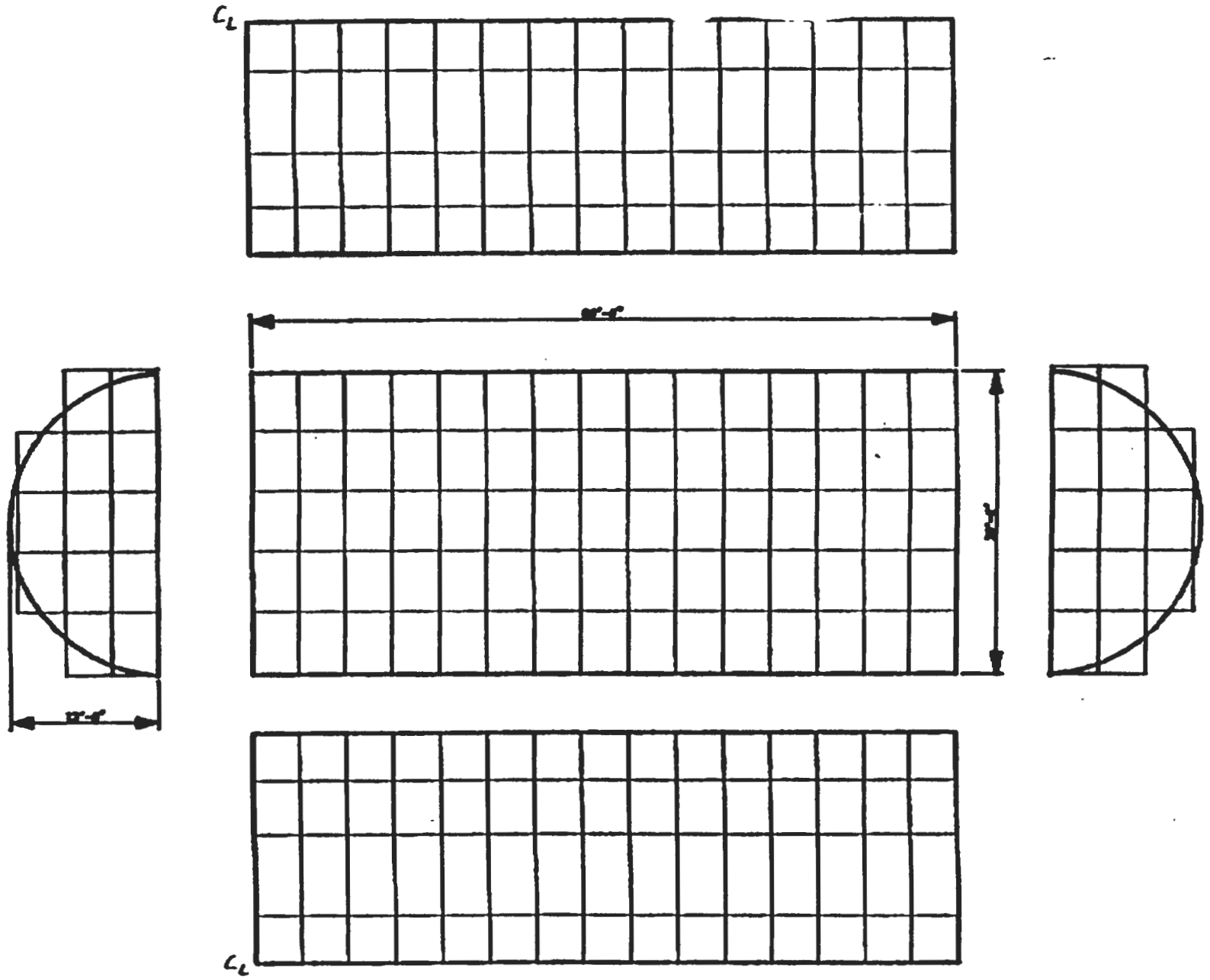
NOTE: MONITORING ON FLOOR ONLY.

MONITOR EACH GRID USING A ALPHA AND A BETA/GAMMA INSTRUMENT. CIRCLE AREAS WITH PAINT WHERE SWIPE AND INSTRUMENTS WERE TAKEN OR USED.

CECOM WILL RECEIVE SWIPES AND PROVIDE INITIAL READINGS.

AEHA WILL BE NOTIFIED WHEN A WEEKS WORTH OF BUNKERS ARE AVAILABLE TO SEND A TEAM FOR OFFICIAL SWIPING.

AFTER CECOM DECLARES AN IGLOO CLEAN AND AFTER AEHA SWIPING, THE IGLOO MAY BE UTILIZED.



IGLOO 26'6 x 60'0

Enclosure #3

ENCLOSURE 4

Enclosures 1 through 4

Grid pattern maps for "typical igloos"

and Igloo
Extra AEC bunkers

AGREEMENT FOR INITIAL START-UP SURVEY OF STANDARD IGLOOS

SENECA ARMY DEPOT - DSW

45 - 60 FOOT X 26.5 FOOT 159 +32

17 - 80 FOOT X 26.5 FOOT 221 +32

2 - 40 FOOT X 26.5 FOOT 106 +32

64 TOTAL

SENECA ARMY DEPOT WILL:

GRID EACH IGLOO 4' X 5' APPROX FLOOR AND CEILING

SWIPE EACH GRID IN APPROXIMATE CENTER 100 CM/SQ

SWIPES WILL BE FOR GROSS ALPHA/BETA DRY AND GROSS BETA (WET)

NOTIFY CECOM WHEN SWIPES AND MONITORING WILL BEGIN. CECOM WILL SEND A REPRESENTATIVE TO MONITOR DEPOT.

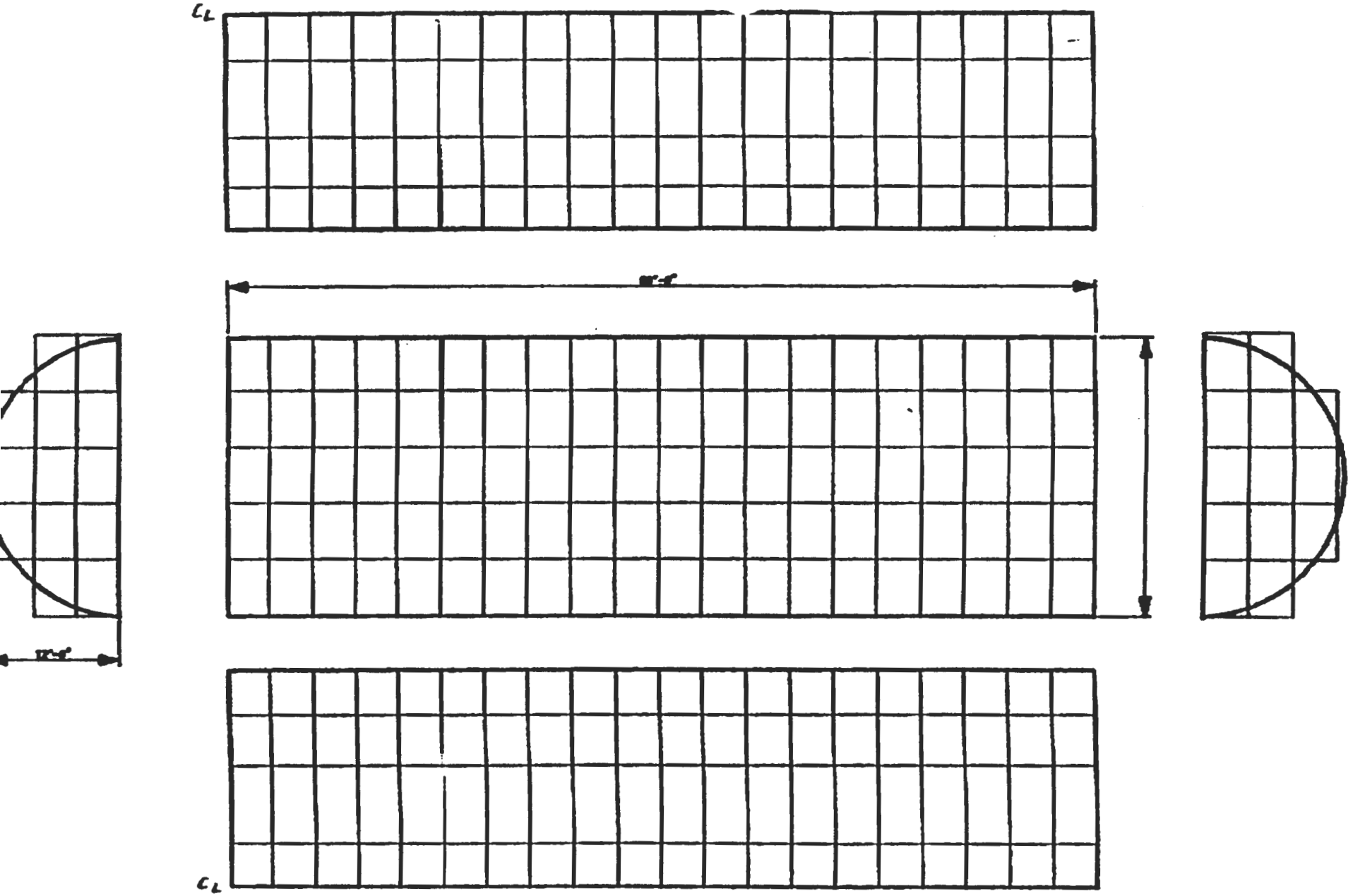
NOTE: MONITORING ON FLOOR ONLY.

MONITOR EACH GRID USING A ALPHA AND A BETA/GAMMA INSTRUMENT. CIRCLE AREAS WITH PAINT WHERE SWIPE AND INSTRUMENTS WERE TAKEN OR USED.

CECOM WILL RECEIVE SWIPES AND PROVIDE INITIAL READINGS.

AEHA WILL BE NOTIFIED WHEN A WEEKS WORTH OF BUNKERS ARE AVAILABLE TO SEND A TEAM FOR OFFICIAL SWIPING.

AFTER CECOM DECLARES AN IGLOO CLEAN AND AFTER AEHA SWIPING, THE IGLOO MAY BE UTILIZED.



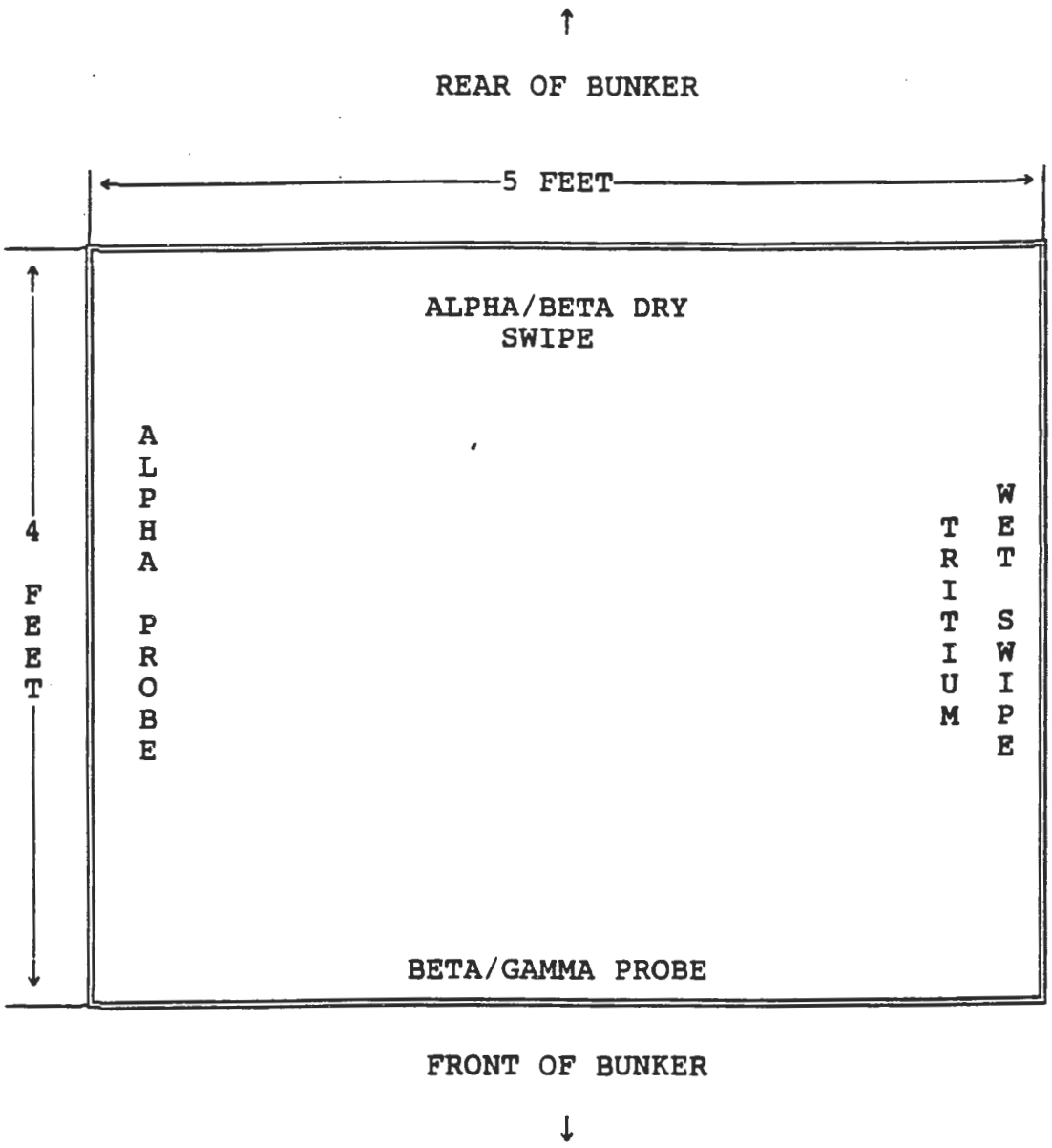
IGLOO 26'6 x 80'0

Enclosure #4

ENCLOSURE 5

Enclosure 5

Single grid pattern example survey map.


REAR OF BUNKER
5 FEET
4 FEET
ALPHA/BETA DRY SWIPE
ALPHA PROBE
TRITIUM
WET SWIPE
BETA/GAMMA PROBE
FRONT OF BUNKER

Enclosure #5