104-03

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September 17, 2004

Mr. A. Joseph White
Division of Environmental Remediation
NYS Department of Environmental Conservation
625 Broadway, 11th Floor
Albany, NY 12233-7015

Ms. Charlotte Bethoney
New York State Department of Health (NYSDOH)
Bureau of Environmental Exposure Investigation
Flanigan Square, Room 300
547 River Street
Troy, NY 12180

SUBJECT: Seneca Army Depot Activity – Nuclear Regulatory Commission (NRC) License Termination Report

Dear Mr. White/Ms. Bethoney:

Enclosed are responses to comments from the New York State Department of Health (NYSDOH) sent to the Army by the New York State Department of Environmental Conservation (NYSDEC) on the NRC License Termination Report for Seneca Army Depot Activity located in Romulus, New York.

Should you have any questions concerning these responses to your comments, please do not hesitate to call me at (617) 457-7905 to discuss them.

Sincerely,

Kathleen J. Kadlubak for

Todd Heino, P.E.
Program Manager

cc: S. Absolom, SEDA
K. Hoddinott - USACHPPM
C. Boes, USAEC
K. Healy, USACOE
J. Vazquez, USEPA
T. Enroth, USACOE – NY District
Scott Bradley, USACOE
K. Picel, Argonne Nat'l Lab
J. Cleary, SEDA

Response to Comments from the New York State Department of Health

Subject: NRC License Termination Report
Seneca Army Depot
Romulus, New York

Comments Dated: August 17, 2004

Date of Comment Response: September 17, 2004

General Comments:

Comment 1: Staff of the Bureau of Environmental Radiation Protection has reviewed the June 2004 NRC License Termination Report for the Seneca Army Depot site. I have enclosed a copy of their comments and observations.

Response 1: Acknowledged; however, it should be noted that the NRC License Termination Report (LTR) jurisdictionally only requires the review and approval from the NRC but was distributed to all agencies as a courtesy. Nonetheless, your review and comments are appreciated and responses to your concerns follow.

Specific Comments:

Comment 1: The work described in this report was conducted to fulfill the provisions of the licensee's (Seneca Army Depot) plan for NRC license termination. The intent of this project was to demonstrate that the release criteria of 10 mrem/yr has been achieved, and to obtain unrestricted use release of this property from all licensed activities and future land-use restrictions. In a June 11, 2003 letter, the US NRC approved the work plan. The scope of work included surveying and evaluating five radionuclides of concern (ROC) in 120 storage igloos, six buildings, and two non-licensed areas (SEAD-12 and SEAD-48). The primary ROC was depleted uranium (DU); Pu-239, H-3, Pm-147 and Rn-220/Ra-226 were the others.

Response 1: Agreed.

Comment 2: Overall, the contractor's execution of the work plan appears to have been conducted in a thorough, consistent, and competent fashion.

The survey report was divided in three sections: the igloos, the buildings, and the non-licensed areas.

Response 2: Acknowledged.

Comment 3: For the igloos, how did the contractor measure Pu-239 gamma using a FIDLER? This is a concern because Pu-239 is a ROC in igloos A0201, A0316, A0317 and A0508 (special weapons storage). Igloo A0508 was identified for possible future investigation because based on gamma measurements, it exceeded the average background level (it was below the instrument equivalent $DCGL_W$). The annual dose contribution from this igloo was calculated to be about 6.5 mrem. Although wet smear samples were collected in this igloo, they were only analyzed for H-3. Since Pu-239 is a ROC in this igloo, additional analysis should be performed to determine in any Pu-239 is present.

Response 3: Weapons-grade plutonium (primarily Pu-239) contains Pu-241 contamination. The Pu-241 has a short (14 year) half-life and decays to Am-241, which emits low-energy gammas at 13.9, 26.4 and 59.5 keV. The FIDLER probe is designed to specifically look for the Am-241 associated with weapons-grade plutonium. Consequently, the survey using the FIDLER was sufficient in the detection of Pu-239 through the Am-241 detection. Although gamma measurements at A0508 were above background, they did not indicate that activity levels exceeded the release criterion of 10 mrem/yr above background. Alpha and beta measurements at A0508 were within background levels. It was concluded that no additional investigation at A0508 was necessary.

Comment 4: In general, the data and conclusions for the igloos seem to be acceptable.

Response 4: Agreed.

Comment 5: It appears that the contractor followed the approved Workplan, and performed a sufficiently thorough survey of the buildings and warehouse to demonstrate that all of these areas met the release criteria.

The remaining, radiologically-contaminated areas of the site, SEAD-12 and SEAD-48, are not covered by an NRC license. Because radiological activities have been performed in these areas, they were evaluated in this report to determine their contribution to a site dose. Note that SEAD-12 and SEAD-48 are being investigated under the CERCLA program.

Response 5: Acknowledged.

Comment 6: The DOH has previously reviewed and commented on the Final Status Survey for SEAD-48.

Response 6: Acknowledged.

Comment 7: The contractor has determined that several igloos (E0804, E0805, E0806, and E0811) do not meet the wide area release criterion of 10mrem/yr. Although SEAD-48 is under the CERCLA program and is not included under the NRC licenses, its dose contribution should be considered in the decision to terminate SEDA's NRC licenses and release of the property of unrestricted use. Until SEAD-48 is remediated and resurveyed for compliance with the 10 mrem/yr dose limit, it is suggested that notation be made in the license termination documents, describing the situation in SEAD-48.

Response 7: It is agreed that the Draft SEAD-48 Final Status Survey identified survey units that did not meet the release criterion. Additional information is being collected at the site within the FSS process outlined by MARSSIM to demonstrate the compliance of the site with the 10 mrem/yr release criterion. In addition, only two of the SEAD-48 igloos were certified to hold NRC licensed material, Igloos E0801 and E0802, and they both were found to be at background levels. With all of the above information covered in the NRC License Termination Report, it will be at the discretion of the NRC to determine if any special consideration of SEAD-48 needs to be highlighted in the license termination for SEDA. Being that the NRC has previously released SEAD-48 for unrestricted use (see Appendix 7.A of the LTP), it is not believed that further detail regarding SEAD-48 is required in this report for the termination of the NRC licenses at SEDA.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

August 9, 2004

Docket No. 04008526 License No. SUC-1275
Control No. 135163

Stephen M. Absolom
Installation Manager
Caretaker Office
Seneca Army Depot Activity
5786 State Route 96
P.O. Box 9
Romulus, NY 14541-0009

SUBJECT: DEPARTMENT OF THE ARMY, REQUEST FOR ADDITIONAL INFORMATION CONCERNING APPLICATION FOR AMENDMENT TO LICENSE, CONTROL NO. 135163

Dear Mr. Absolom:

This is in reference to your letter dated June 15, 2004 requesting to amend Nuclear Regulatory Commission License No. SUC-1275. In order to continue our review, we need the following additional information.

1. Your compliance approach does not appear to follow that recommended in MARSSIM. The null hypothesis recommended for use in MARSSIM is: "the residual radioactivity in the survey unit exceeds the release criteria." This statement directly addresses the issue of compliance with the DCGL, and requires significant evidence that the residual radioactivity in the survey unit is less than the DCGL to reject the null hypothesis and pass the survey unit. Distinguishability from background is not addressed under this hypothesis. Additionally, Appendix 1A of your submittal, License Termination and License Release Plan (LTP), Table 5-4, footnote 6, states that the alpha value in Table 5-4 is the acceptable level of Type I decision error, when the null hypothesis is that survey unit exceeds the cleanup standard. This statement is consistent with the recommended null hypothesis in MARSSIM. Please discuss the statistical methods you used for determining compliance to the DCGLs relative to the null hypothesis recommended in MARSSIM and presented in Table 5-4 of your LTP. Also please provide the retrospective power curves.

2. MARSSIM recommends that when gross activity DCGLs are used, an appropriate weighted total efficiency should be used for the radiological surveys. Please provide the calculations for determining the weighted total efficiencies used for the radiological surveys. If weighted total efficiencies were not used, please provide the basis for not using weighted total efficiencies. In addition, MARSSIM states that the total efficiency for survey instruments may be considered to represent the product of two factors, the instrument efficiency and the source efficiency. Please provide the instrument efficiencies and source efficiencies used in the determination of the total efficiencies for the radiation survey instruments used to perform the radiological surveys. If

the total efficiencies, please provide the basis for not using these efficiencies for determining the total efficiency.

3. Please provide examples of the calculations for the MDAs presented in Tables 3-3, 4-3, 5-3, and 6-2.

4. Please provide the method used to determine the mean cpm in Tables 3-11 and 4-10. Also please provide the standard deviation for these mean values.

5. MARSSIM states that sample results should be reported along with their associated uncertainties. For smear sample results in Tables 3-13, 4-12, 5-9, and 6-5, please provide the uncertainties for the results and the standard deviation for the average results. Also, for the sample results in Tables 3-14 and 4-13, please define the reported uncertainties. For example, do they represent the counting uncertainty (at some confidence interval) or the total propagated uncertainty (at some confidence interval).

6. Section 5.3.3 of the report on page 5-3 states: "Per MARSSIM for Class 1 survey units, all direct and scanning measurements from each building were compared directly with the $DCGL_{EMC}$ for DU. A following sentence in Section 5.3.3 states: "Scanning measurements from Building 612 were not available to preform the $DCGL_{EMC}$ comparison. Table 5-3 indicates that the instrumentation used for the survey of Building 612 included a floor monitor. However, no scanning measurements are included in the data tables for section 5 of the report. Were scanning measurements made during the survey of Building 612? If so, please provide these measurements. Table 5-3 also reports an efficiency of 0.75% for the FIDDLER, resulting in a scanning MDA of 167,867 dpm/100cm^2 which is above $DCGL_W$ for DU. The FIDDLER efficiencies presented in Tables 3-3 and 4-3 are 15%. Please explain the difference in the FIDDLER efficiencies.

In accordance with 10 CFR 2.390, a copy of this letter will be placed in the NRC Public Document Room and will be accessible from the NRC Web site at http://www.nrc.gov/reading-rm.html.

We will continue our review upon receipt of this information. Please reply to my attention at the Region I Office and refer to Mail Control No. 135163. If you have any technical questions regarding this deficiency letter, please call me at (610) 337-5214.

If we do not receive a reply from you within 30 calendar days from the date of this letter, we shall assume that you do not wish to pursue your application.

Sincerely,

Original signed by James Kottan

James Kottan
Senior Health Physicist
Nuclear Materials Safety Branch 2
Division of Nuclear Materials Safety

Enclosure:
10 CFR Parts 19, 20, and 30

cc:
John Cleary, Radiation Safety Officer

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

REPLY TO
ATTENTION OF

Caretaker Office

February 11, 2003

Ms. Elizabeth Ullrich
United States Nuclear Regulatory Commission
Region 1
Division of Nuclear Materials Safety
Nuclear Materials Safety Branch 2
475 Allendale Road
King of Prussia, PA 19406-1415

Dear Ms. Ullirich,

This letter is a request from the license holder of NRC license SUC-1275 for approval of the enclosed License Termination and License Release Plan, dated January 2003. Enclosed also is a CD containing the document on Microsoft Word format, as well as the relevant back-up material for the RESRAD modeling that was performed in developing this plan.

We appreciate your efforts and those of others on the NRC staff in assisting us in getting this document to this point. We look forward to gaining your approval of this plan and the timely termination of this license.

Feel free to contact Mr. John F. Cleary, Installation Radiation Safety Officer, with any questions concerning this submission, at (607)869-1235/1309.

ORIGINAL SIGNED

Stephen M. Absolom
Commander's Representative

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

September 17, 2003

Docket No. 04008526 License No. SUC-1275
Control No. 132746

Stephen M. Absolom
Commander's Representative
Department of the Army
Seneca Army Depot Activity
5786 State Route 96
P. O. Box 9
Romulus, NY 14541-009

SUBJECT: DEPARTMENT OF THE ARMY, ISSUANCE OF CORRECTED COPY OF LICENSE, CONTROL NO. 132746

Dear Mr. Absolom:

Enclosed is the Corrected Copy of Amendment No. 13 for License No. SUC-1275. In accordance with the information provided by telephone on August 18 and September 15, 2003, and the facsimile dated September 15, 2003, Condition No. 9 has been changed to show that the authorized use is decommissioning. This change in authorized use should have been made with Amendment 12 of the license, issued February 7, 2000, based on your October 19, 1999, letter that requested approval of a termination survey plan and stated that all licensed materials had been shipped from your facilities. Since that time, several amendment requests were submitted and subsequently voided, because of technical issues related to the release criteria; therefore, no changes were made to the license. At this time, we are issuing the Corrected Copy only of the most recent amendment issued.

We apologize for any inconvenience this error may have caused.

Sincerely,

Original signed by Judith A. Joustra

John D. Kinneman, Chief
Nuclear Materials Safety Branch 2
Division of Nuclear Materials Safety

Enclosure:
Corrected Copy of Amendment No. 13

cc:
John Cleary, Radiation Safety Officer

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL # of pages ► 3

To Gary Buckrop	From John Cleary
Dept./Agency	Phone # 607-869-1235
Fax # 309-782-2289	Fax #

NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

Amendment No. 13

CORRECTED COPY

MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 36, 39, 40, and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	In accordance with the letter dated February 11, 2003,
1. Department of the Army Commander, Seneca Army Depot Activity ATTN: SDSSE-CO	3. License number SUC-1275 is amended in its entirety to read as follows:
2. Romulus, New York 14541-5001	4. Expiration date February 28, 2005
	5. Docket No. 040-08526 Reference No.

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Uranium (depleted in the isotope uranium 235)	A. Solid metal alloy	A. 10,000,000 kilograms

9. Authorized use:

A. For receipt, possession, storage, transportation, inspection and disposal incident to the decommissioning of the facilities.

CONDITIONS

10. Licensed material may be used only at the licensee's facilities located at the Seneca Army Depot, Romulus, New York.

11. A. Licensed material shall be used by, or under the supervision of John F. Cleary, Michael R. Lewis, or Thomas E. Reynolds.

    B. The Radiation Safety Officer for this license is John Cleary.

12. The licensee is authorized to transport licensed material in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."

13. Radioactive waste generated shall be stored in accordance with the statements, representations, and procedures included with the waste storage plan described in the licensee's letter dated January 27, 1995.

14. The licensee may use the Derived Concentration Guideline Level (DCGL) values described in the Seneca

MATERIALS LICENSE SUPPLEMENTARY SHEET

License Number SUC-1275

Docket or Reference Number 040-08526

Amendment No. 13

CORRECTED COPY

Army Depot Activity License Termination and License Release Plan for decommissioning of the facilities at the Seneca Army Depot Activity, Romulus, New York, with the intention of release of the facilities for unrestricted use.

15. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents, including any enclosures, listed below, except for minor changes in the medical use radiation safety procedures as provided in 10 CFR 35.31. The U.S. Nuclear Regulatory Commission's regulations shall govern unless the statements, representations, and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Letter dated January 17, 1992
B. Letter dated March 31, 1992
C. Application dated October 30, 1992
D. Letter dated November 2, 1992
E. Letter dated December 21, 1992
F. Letter dated September 2, 1993
G. Letter dated September 27, 1993
H. Letter dated December 15, 1993
I. Letter dated January 27, 1995
J. Letter dated December 5, 1996
K. Letter dated August 13, 1997
L. Letter dated February 11, 2003 with the Seneca Army Depot Activity License Termination and License Release Plan
M. Letter dated April 3, 2003

For the U.S. Nuclear Regulatory Commission

Date September 17, 2003

By *__Original signed by Judith A. Joustra__*

Judith A. Joustra
Nuclear Materials Safety Branch 2
Division of Nuclear Materials Safety
Region I
King of Prussia, Pennsylvania 19406

DEPARTMENT OF THE ARMY
UNITED STATES ARMY AVIATION AND MISSILE COMMAND
REDSTONE ARSENAL, ALABAMA 35898-5000

REPLY TO
ATTENTION OF

AMSAM-TMD-SR(C) 11 April 2002

MEMORANDUM FOR Radiological Assistance Team-Seneca (Mr. Cleary), 5786 State Route 96, Romulus, NY 14541-5001

SUBJECT: Quote for Services

1. Reference email from Mr. John Cleary, Installation Radiation Protection Office, 26 March 2002, subject: Request for Services.

2. This laboratory can provide the services requested for a cost of $0.41 per wipe. The total cost of processing the 120 liquid scintillation wipes and 4050 alpha/beta wipes samples is $1,700.00.

3. Sample analyses will be performed on gas proportional and liquid scintillation counters. We have four Gamma Products Model: G5000E gas proportional counters. A NIST traceable Americium-241 source will be used to standardize the gas proportional counters. The limit of detection will be approximately 10 disintegrations per minute (dpm). We also have two Packard 2250CA Liquid Scintillation Counters for analysis of low energy beta emitters. A NIST traceable Tritium quench set will be used to standardize the liquid scintillation counters. The limit of detection will be approximately 22 dpm.

4. This laboratory will report all results in accordance with NCRP 58. Results exceeding the limit of decision will be reported and the limit of detection will be indicated with the results. Results that are less than the limit of decision will be reported as 0.0 dpm. Since the limit of decision is less than the limit of detection, some reported results will be less than the limit of detection. Since the results between the limit of decision and limit of detection are statistically unsure, this laboratory reports them, as they are determined.

5. A copy of our license to analyze samples is provided at enclosure 1. Analytical samples are approved in paragraphs 6M and 9M.

6. Based upon the quantity of wipes involved, the following supplies will be provided:

a. We will provide the wipe media for the alpha/beta wipes. The wipes should be submitted folded within plastic bags.

b. We will provide the vials for the low energy beta emitters. The low energy beta wipes should be deposited in the vials with 2 milliliters of de-ionized water and shipped to our laboratory. We will insert the liquid scintillation cocktail upon arrival.

7. In order to start this mission to include shipping supplies; we will need official notification including a MIPR for the amount indicated above.

8. Point of contact for this action is Mr. Stephen Howard, phone DSN 746-0472/3340 or commercial 256-876-0472/3340, email: stephen.howard@redstone.army.mil.

Encl

PATRICK J. KUYKENDALL
Chief, Radiation Standards and
Dosimetry Laboratory

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET SW SUITE 23T85
ATLANTA, GEORGIA 30303-8931

January 29, 2002

Department of the Army
ATTN: Robert K. DuBois
Director
US Army TMDE Activity
Redstone Arsenal, AL 35898-5400

SUBJECT: LICENSE RENEWAL APPLICATION

Dear Mr. DuBois:

This is to acknowledge receipt of your application for renewal of the materials license identified below. Your application is deemed timely filed and, accordingly, the license will not expire until final action has been taken by this office.

Renewal actions are normally processed within 180 days. However, under timely filing (before expiration), your license will not expire until final action has been taken by this office.

In accordance with 10 CFR 2.790 of NRC's "Rules of Practice," a copy of this letter will be available electronically for public inspection in NRC's Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Any correspondence regarding your renewal application should reference the control number and license number specified below.

Sincerely,

David J. Collins

David J. Collins
Health Physicist
Division of Nuclear Materials Safety

License No. 01-00126-16
Docket No. 030-12630
Control No. 259868

U.S. NUCLEAR REGULATORY COMMISSION

Amendment No. 22

MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 36, 39, 40, and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Department of the Army Director, U. S. Army Test, Measurement and Diagnostic Equipment Activity	**In accordance with the letter dated October 3, 2000** 3. License No. 01-00126-16 **is amended in its entirety to read as follows:**
2. ATTN: AMSAM-TMD-SR Redstone Arsenal, Alabama 35898-5400	4. Expiration date February 28, 2002 5. Docket No. 030-12630

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Any byproduct material with Atomic numbers 1 through 83, inclusive, except iodine 129	A. Any form	A. Not to exceed the quantities specified in 10 CFR 33.100, Schedule A, Column II
B. Hydrogen 3	B. Sealed light sources	B. Not to exceed 1.85 terabecquerels (TBq) (50 curies (Ci)) per source nor 5.55 Tbq (150 Ci) total
C. Carbon 14	C. Sealed light sources	C. 18.5 gigabecquerels (Gbq) (500 millicuries)
D. Cesium 137	D. Sealed sources registered pursuant to 10 CFR 32.210	D. One source not to exceed 74 gigabecquerels (GBq) (2 Ci) and one source not to exceed 7.4 TBq (200 Ci)
E. Cobalt 60	E. Sealed sources registered pursuant to 10 CFR 32.210	E. One source not to exceed 18.5 GBq (0.5 Ci) and one source not to exceed 1.85 TBq (50 Ci)
F. Cesium 137	F. Sealed sources registered pursuant to 10 CFR 32.210	F. Three sources not to exceed 14.8 TBq (400 Ci) per source and three sources not to exceed 4.81 GBq (130 millicuries) per source

License Number
01-00126-16

Docket or Reference Number
030-12630

Amendment No. 22

MATERIALS LICENSE
SUPPLEMENTARY SHEET

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
G. Americium 241	G. Any form	G. Not to exceed 370 kilobecquerels (kBq) (10 microcuries) per source nor 925 kBq (25 microcuries) total
H. Nickel 63	H. Any form	H. Not to exceed 370 megabecquerels (MBq) (10 millicuries) per source nor 740 MBq (20 millicuries) total
I. Thorium 230	I. Any	I. 1.85 MBq (50 microcuries)
J. Thorium 228	J. Any	J. No single source to exceed 370 kBq (10 microcuries), nor 1.85 MBq (50 microcuries) total
K. Thorium 232	K. Any	K. No single source to exceed 370 kBq (10 microcuries), nor 1.85 MBq (50 microcuries) total
L. Depleted Uranium	L. Any	L. No single source to exceed 370 kBq (10 microcuries), nor 1.85 MBq (50 microcuries) total
M. Any licensed material	M. Analytical samples	M. Not applicable
N. Strontium 90	N. Any sealed source registered pursuant to 10 CFR 32.210 and contained in a compatible device specified in Item 9 of this license.	N. No single source to exceed 74 MBq (2.0 millicuries)

License Number
01-00126-16

MATERIALS LICENSE
SUPPLEMENTARY SHEET

Docket or Reference Number
030-12630

Amendment No. 22

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
O. Strontium 90	O. Any sealed source registered pursuant to 10 CFR 32.210 and contained in a compatible device specified in Item 9 of this license.	O. No single source to exceed 1.85 Gbq (50.0 millicuries)
P. Thallium 204	P. Any sealed source registered pursuant to 10 CFR 32.210 and contained in a compatible device specified in Item 9 of this license.	P. No single source to exceed 18.5 MBq (0.5 millicuries)
Q. Promethium 147	Q. Any sealed source registered pursuant to 10 CFR 32.210 and contained in a compatible device specified in Item 9 of this license.	Q. No single source to exceed 518 MBq (14.0 millicuries)
R. Curium 244	R. Sealed sources	R. No single source to exceed 37 kBq (1 microcurie), nor 370 kBq (10 microcuries) total
S. Strontium 90	S. Sealed sources (U.S. Nuclear Corporation Type 320)	S. No single source to exceed 1.3 GBq (35 millicuries), nor 13 GBq (350 millicuries) total
T. Strontium 90	T. Sealed sources (Nuclear Chicago Model RG-31)	T. No single source to exceed 37 MBq (1 millicurie), nor 444 MBq (12 millicuries) total
U. Uranium	U. Natural uranium metal	U. 4 kilograms
V. Californium 252	V. Sealed sources (Amersham Model CVN series)	V. No single source to exceed 40 micrograms, nor 80 micrograms total

License Number
01-00126-16

MATERIALS LICENSE
SUPPLEMENTARY SHEET

Docket or Reference Number
030-12630

Amendment No. 22

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
W. Cobalt 60	W. Any sealed source registered pursuant to 10 CFR 32.210 and contained in a compatible device specified in Item 9 of this license.	W. 37 TBq (1000 Ci)
X. Cesium 137	X. Any sealed source registered pursuant to 10 CFR 32.210 and contained in a compatible device specified in Item 9 of this license.	X. 148 TBq (4000 Ci)
Y. Cesium 137	Y. Sealed source (Amersham R6040)	Y. No source to exceed 16.65 TBq (450 curies)
Z. Cobalt 60	Z. Sealed source	Z. No source to exceed 74 GBq (2 curies)
AA. Cesium 137	AA. Sealed source (Amersham CDC 800)	AA. No source to exceed 4.81 GBq (130 millicuries)
AB. Cesium 137	AB. Sealed source (Amersham R6010; CDC.PE4)	AB. No source to exceed 1.85 TBq (50 curies)
AC. Cesium 137	AC. Sealed source (Amersham CDC.93)	AC. No source to exceed 74 GBq (2 curies)
AD. Promethium 147	AD. Sealed source (Nycomed Amersham, Inc. PHC.C1)	AD. No source to exceed 3.7 GBq (100 millicuries)
AE. Krypton 85	AE. Sealed source (Nycomed Amersham, Inc. KAC.D3)	AE. No source to exceed 3.7 GBq (100 millicuries)

9. Authorized Use:

A. For possession and use in the calibration and testing of radiation detection systems, as counting standards, as check sources, and research and development purposes.

B. and C For possession and use in the evaluation and testing of self-luminous sources

License Number
01-00126-16

MATERIALS LICENSE
SUPPLEMENTARY SHEET

Docket or Reference Number
030-12630

Amendment No. 22

9. Authorized Use - Continued

D. and E. For possession and use in J. L. Shepherd Model 81-16Q quadruple source device to perform instrument calibration and research and development.

F. For possession and use in three (3) J. L. Shepherd Model 89-400 shielded calibration ranges for instrument evaluation, calibration and research and development.

G. through L. For possession and use as calibration or reference sources.

M. For collection and analysis of leak test samples from Army radioactive commodities.

N. through Q. For possession and use of sealed sources contained in a beta calibration range which has been registered pursuant 10 CFR 32.210 and distributed in accordance with an NRC or Agreement State License for use by persons named in Condition 12 for the calibration of radiation instrumentation and the irradiation of dosimeters.

R. For possession and use in a Far West Technology, Inc. tissue equivalent proportional counter.

S. For use in Model TS-784 A/PD Radiac Calibrators used for calibration of instruments and dosimeters.

T. For use in Model AN/FJW-1 Radiation Detection and Alarm System and in Victoreen Model 712 Remote Area Monitoring Systems.

U. For use as beta standards in the calibration of personnel dosimeters.

V. For use in J. L. Shepherd Model 149 series neutron calibrator for calibration of dosimeters and radiation detection instruments.

W. and X. For possession and use in J. L. Shepherd Model 81-22T irradiator/calibrator.

Y., Z., and AA. For possession and use in an Atlan-Tech GC60 instrument calibrator.

AB. For storage only in Eberline Model FHP 200/2 self-contained instrument calibrator.

AC. For possession and use in Panasonic Model UD 794 TLD badge irradiator.

AD. and AE. For possession and use in AEA Technology Beta Calibrator Model BSS-2 (SS&D IL-136-D-352-S)

MATERIALS LICENSE SUPPLEMENTARY SHEET	License Number 01-00126-16
	Docket or Reference Number 030-12630
	Amendment No. 22

CONDITIONS

10\. A. Licensed material may be used and stored only at Buildings 5435, and 5417, Redstone Arsenal, Alabama.

B. Notwithstanding Item 10. A., the sources specified in Item 7. T. may also be used and stored at temporary job sites of the licensee anywhere in the United States.

C. The sources specified in Items 7. W. and X. may only be used and stored in the J. L. Shepherd Model 81-22T irradiator/calibrator at Building 5417, Redstone Arsenal, Alabama.

D. The Atlan-Tech instrument calibrator (item 9 Y, Z and AA, above) may only be used at the Aberdeen Proving Ground, MD - Edgewood Test Measurement, and Diagnostic Equipment Support Laboratory until April 30, 2001.

E. The Eberline Model FHP 200/2 self-contained instrument calibrator may be stored only at Redstone Arsenal, AL

F. The Panasonic Model UD 794 may be used only at Redstone Arsenal, AL.

11\. The Radiation Protection Officer for the activities authorized by this license is Jerry D. Gray, or in his absence, Patrick J. Kuykendall, Stephen C. Rogers, William S. Harris, Jr., Gregory R. Komp, Paul O. Pittman, A. Edward Abney, or Steven V. Howard.

12\. Licensed material shall be used by, or under the supervision of, William S. Harris, Jr., Patrick J. Kuykendall, Stephen C. Rogers, Jerry D. Gray, Gregory R. Komp and Paul O. Pittman, A. Edward Abney, Steven V. Howard, or individuals trained according to the application dated July 8, 1991 and the letter dated January 29, 1992. The licensee shall maintain records of individuals designated as authorized users and their qualifications.

13\. A. Sealed sources and detector cells shall be tested for leakage and/or contamination at intervals not to exceed 6 months or at such other intervals as specified by the certificate of registration referred to in 10 CFR 32.210.

B. Notwithstanding Paragraph A of this Condition, sealed sources designed to emit alpha particles shall be tested for leakage and/or contamination at intervals not to exceed 3 months

C. In the absence of a certificate from a transferor indicating that a leak test has been made within 6 months prior to the transfer, a sealed source or detector cell received from another person shall not be put into use until tested

MATERIALS LICENSE SUPPLEMENTARY SHEET	License Number 01-00126-16
	Docket or Reference Number 030-12630
	Amendment No. 22

13. D. Each sealed source fabricated by the licensee shall be inspected and tested for construction defects, leakage, and contamination prior to any use or transfer as a sealed source.

E. Sealed sources need not be leak tested if:

(I) they contain only hydrogen-3; or
(ii) they contain only a radioactive gas; or
(iii) the half-life of the isotope is 30 days or less; or
(iv) they contain not more than 3.7 megabecquerels (MBq) (100 microcuries) of beta and/or gamma emitting material or not more than 0.370 MBq (10 microcuries) of alpha emitting material; or
(v) they are not designed to emit alpha particles, are in storage, and are not being used. However, when they are removed from storage for use or transferred to another person, and have not been tested within the required leak test interval, they shall be tested before use or transfer. No sealed source or detector cell shall be stored for a period of more than 10 years without being tested for leakage and/or contamination.

F. The leak test shall be capable of detecting the presence of 185 becquerels (Bq) (0.005 microcurie) of radioactive material on the test sample. If the test reveals the presence of 185 Bq (0.005 microcurie) or more of removable contamination, a report shall be filed with the U.S. Nuclear Regulatory Commission in accordance with 10 CFR 30.50(b)(2), and the source shall be removed immediately from service and decontaminated, repaired, or disposed of in accordance with Commission regulations. The report shall be filed within 5 days of the date the leak test result is known with the U.S. Nuclear Regulatory Commission, Region II, ATTN: Chief, Materials Licensing/Inspection Branch, Division of Nuclear Materials Safety, 61 Forsyth Street, SW, Suite 23T85, Atlanta Georgia 30303-8931. The report shall specify the source involved, the test results, and corrective action taken.

G. Tests for leakage and/or contamination shall be performed by the licensee or by other persons specifically licensed by the Commission or an Agreement State to Perform such services.

14. Sealed sources containing licensed material shall not be opened by the licensee.

15. The licensee is authorized to hold radioactive material with a physical half-life of less than 65 days for decay-in-storage before disposal in ordinary trash provided:

A. Radioactive waste to be disposed of in this manner shall be held for decay a minimum of 10 half-lives.

B. Before disposal as normal waste, radioactive waste shall be surveyed to determine that its radioactivity cannot be distinguished from background. All radiation labels shall be removed or obliterated.

MATERIALS LICENSE SUPPLEMENTARY SHEET	License Number 01-00126-16
	Docket or Reference Number 030-12630
	Amendment No. 22

16. In addition to the possession limits in item 8, the licensee shall further restrict the possession of licensed material as follows:

A. For unsealed sources to quantities less than 10^4 times the applicable limits in Appendix C, 10 CFR 20 as specified in 10 CFR 30.35(d) and

B. For sealed sources, to quantities less than 10^{10} times the applicable limits in Appendix C, 10 CFR 20 as specified in 10 CFR 30.35(d).

17. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents including any enclosures, listed below. The Nuclear Regulatory Commission's regulations shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Applications dated (or received, as noted):

(1) July 8, 1991
(2) April 13, 1994 [Additional sources]
(3) December 15, 1994 [Additional sources and device]

B. Letter (or facsimile, as noted) dated (or received, as noted):

(1) January 29, 1992
(2) February 8, 1993 [Modification of possession limits, new beta calibration range]
(3) June 4, 1993 [Supplemental information for 2/8/93]
(4) February 23, 1995 [Delete panoramic irradiator from amendment]
(5) September 12, 1995 [Add sources and panoramic irradiator for storage only]
(6) September 19, 1995 Facsimile [Request to add Californium 252 source]
(7) April 20, 1995 [Additional information on irradiator/ calibrator installation]
(8) February 2, 1996 [Retraction of exemption request and commitment to test control circuits and interlocks for irradiator]
(9) April 2, 1996 [Change RSO]
(10) April 2, 1996 [Commitment to install required irradiator controls]
(11) September 24, 1996 [Notification of installation of irradiators]
(12) September 2, 1997 Received [Close-out survey results for Module A Laboratory (except Radiochemistry), Building 5437 for unrestricted release per Draft NUREG 5849]
(13) April 13, 1998 [Close-out survey results for Room 10 (Radiochemistry Laboratory) Building 5437 for unrestricted release per NUREG 5849]
(14) September 1, 1999 [Request addition of Atlan-Tech GC60 instrument calibrator; Panasonic UD 794 TLD irradiator and Eberline FHP 200/2 instrument calibrators]

MATERIALS LICENSE **SUPPLEMENTARY SHEET**	License Number 01-00126-16
	Docket or Reference Number 030-12630
	Amendment No. 22

17\. B. (15) December 10, 2000 [Corrected copy of final survey of Building 5437, Nucleonics Laboratory, request unrestricted release]

(16) February 28, 2000 [Add AEA Technology Beta Secondary Standard]

(17) March 24, 2000 [extend authorization for Atlan-Tech Model GC-60 at Aberdeen Proving Ground, MD]

(18) October 3, 2000 [Request extension of use for Atlan-Tech calibrator, replacement device not yet approved for SS&D]

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

DAVID J. COLLINS

DATE OCT 18 2000

BY

Region II, Division of Nuclear Materials Safety
61 Forsyth Street SW, Suite 23T85
Atlanta, GA 30303-8931

DEFENSE LOGISTICS AGENCY
DEFENSE NATIONAL STOCKPILE ZONE
26 FEDERAL PLAZA
NEW YORK, NY 10278-0043

IN REPLY
REFER TO

DNSZ-NYQ (M.Pecullan/212-264-2653/jk)

JAN 10 1995

SUBJECT: NRC Close-out Safety Inspection & License Amendment
Seneca Army Depot

TO: T. Stincic
(SDSTO-SES)

1. We are enclosing, for your information, a copy of the subject survey relating to Storage of Defense National Stockpile materials at your facility.

2. We are also forwarding a copy of Amendment No. 16 to our NRC license (STC-133). The amendment deletes your facility from our license.

2 Encls

T.J. De GRAZIA
Zone Administrator

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

DEC 22 1994

License No. STC-133
Docket No. 040-00341
Control No. 119798

Defense Logistics Agency
Defense National Stockpile
ATTN: Kermit Frze, Director
Crystal Square 4
Arlington, Virginia 22202

Dear Mr. Frze:

This refers to your license amendment request to remove Seneca Army Depot from your license. Enclosed with this letter is the amended license.

Please review the enclosed document carefully and be sure that you understand and fully implement all the Conditions incorporated into the amended license. If there are any errors or questions, please notify the U.S. Nuclear Regulatory Commission, Region I office, the Licensing Assistance Section, (610) 337-5093 or 5239, so that we can provide appropriate corrections and answers.

The DLA/DNSC storage area at Seneca Army Depot, Romulus, New York, is hereby released for unrestricted use.

Thank you for your cooperation.

Sincerely,

Elizabeth Ullrich
for Mohamed Shanbaky, Chief
Research and Development Section
Nuclear Materials Safety Branch
Division of Radiation Safety
and Safeguards

Enclosures:
1. Amendment No. 16
2. 10 CFR Parts 2, 19, 20, 30, and 170
3. NRC Form 3 and 313

NRC FORM 374
(10-89)

U.S. NUCLEAR REGULATORY COMMISSION

Amendment No. 16

MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 39, 40 and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Defense Logistics Agency Defense National Stockpile Center	3. License number — In accordance with the letter dated February 2, 1994, STC-133 is amended in its entirety to read as follows:
2. 1745 Jefferson Davis Highway Crystal Square 4 Arlington, Virginia 22202	4. Expiration date — October 31, 1999
	5. Docket or Reference No. — 040-00341

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Uranium and Thorium	A. Natural uranium and thorium mixtures as ores, concentrates and solids	A. 2,000,000 kilograms

9. Authorized use

A. Storage, repackaging and transfer as necessary for the activities of the National Defense Stockpile.

CONDITIONS

10. Licensed material shall be used only at the licensee's facilities located at DLA/DNSC Scotia Depot, Scotia, New York; DLA/DNSC Binghamton Depot, Hoyt Avenue, Binghamtom, New York; DLA/DNSC Somerville Depot, State Highway #206, Somerville, New Jersey; DLA/DNSC Warren Depot, Warren, Ohio; DLA/DNSC Hammond Depot, 3200 Sheffield Avenue, Hammond, Indiana; DLA/DNSC Casad Depot, New Haven, Indiana; and DLA/DNSC Curtis Bay Depot, Baltimore, Maryland.

11. A. Licensed material shall be used by, or under the supervision of, F. Kevin Reilly or individuals who have completed the training specified in application dated February 1, 1994 and letter dated September 29, 1994.

    B. The Radiation Safety Officer for this license is F. Kevin Reilly.

12. The licensee is authorized to transport licensed material in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."

NRC Form 374A
(5-84)

U.S. NUCLEAR REGULATORY COMMISSION

License number
STC-133

Docket or Reference number
040-00341

Amendment No. 16

MATERIALS LICENSE
SUPPLEMENTARY SHEET

(Continued)

CONDITIONS

13. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents, including any enclosures, listed below. The Nuclear Regulatory Commission's regulations shall govern unless the statements, representations, and procedures in the licensee's application and correspondence are more restrictive than the regulations.

    A. Application dated February 1, 1994
    B. Letter dated September 20, 1994
    C. Letter dated September 29, 1994

For the U.S. Nuclear Regulatory Commission

Date DEC 22 1994

By [signature]
Nuclear Materials Safety Branch
Region I
King of Prussia, Pennsylvania 19406

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

DEC 19 1994

License No. STC-133
Docket No. 040-00341

Defense Logistics Agency
ATTN: Kermit L. Frye, Director
1745 Jefferson Davis Highway
Arlington, Virginia 22202

Dear Mr. Frye:

Subject: Inspection No. 040-00341/94-002

This refers to the closeout safety inspection conducted by Penny Lanzisera and David Everhart of this office on November 16, 1994 at the Seneca Army Depot. The inspection was limited to a confirmatory closeout survey of the Defense Logistics Agency's thorium storage facility on the Seneca Army Depot, Warehouse 356, prior to release of the warehouse for unrestricted use. The initial findings of the inspection were discussed with Mr. Bruce Johnson, Mr. Michael Lewis, and Mr. Tom Stincic at the conclusion of the inspection. A copy of the NRC inspection report is enclosed.

An evaluation of the radiological significance of the survey results indicates that Warehouse 356 meets NRC guidelines for release of facilities for unrestricted use.

A copy of the enclosed report will be forwarded to the reviewer responsible for amending your license. Within the scope of this inspection, no violations were identified.

In accordance with Section 2.790 of the NRC's "Rules of Practice", Part 2, Title 10, Code of Federal Regulations, a copy of this letter will be placed in the Public Document Room. No reply to this letter is required.

Your cooperation with us is appreciated.

Sincerely,

M. S. Shanbaky

Mohamed M. Shanbaky, Chief
Research and Development Section
Division of Radiation Safety
and Safeguards

Enclosure:
Inspection Report No. 040-00341/94-002

cc:
Public Document Room (PDR)
Nuclear Safety Information Center (NSIC)
Kevin Reilly, Radiation Safety Officer
State of New York

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 040-00341/94-002

Docket No. 040-00341

License No. STC-133

Licensee: Defense Logistics Agency
Defense National Stockpile
Crystal Square 4
Arlington, Virginia 22202

Facility Name: Seneca Army Depot

Inspection At: Warehouse 356
Seneca Army Depot
Romulus, New York

Inspection Conducted: November 16, 1994

Inspectors: Penny Lanzisera, Health Physicist — 12-8-94 date

David Everhart, Health Physicist — 12-8-94 date

Approved by: Mohamed M. Shanbaky, Chief
Research and Development Section — 12/16/94 date

Inspection Summary: Closeout safety inspection of Warehouse 356 at the Seneca Army Depot. (Inspection No. 040-00341/94-002)

Areas Inspected: Announced, closeout inspection limited to a confirmatory survey of the Defense Logistics Agency's (DLA) thorium storage facility on the Seneca Army Depot (Depot) for residual thorium contamination prior to release of the warehouse for unrestricted use. Section D of Warehouse 356, used for thorium storage, and the surrounding land was surveyed for surface contamination and exposure rate. The building material was surveyed for removable contamination.

Results: No violations were identified. The warehouse building material met NRC guidelines for release of facilities and equipment for unrestricted use.

DETAILS

1. Persons Contacted

Defense Logistics Agency

Mary L. Davidson, Quality Assurance Specialist

Seneca Army Depot

*Bruce Johnson, Civilian Executive Assistant
*Michael Lewis, Radiation Protection Officer
*Tom Stincic, Safety Manager

*Indicates those present at exit interview

2. Background

Warehouse 356 of the Seneca Army Depot was, in part, a DLA National Defense Stockpile Storage Facility. DLA formerly maintained 1,327 standard tons of columbium/tantalum minerals containing natural thorium in Warehouse 356, Section D, at the Depot in Romulus, New York. The columbium/tantalum minerals were removed from the warehouse and transferred to Cabot Performance Materials Company and to the DLA facility in Binghamton, New York as of May 1993.

The licensee decontaminated the warehouse and conducted a final survey. The design of the final survey was based on Table 1 of the NRC'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" (Guidelines) dated May 1987. The licensee submitted a final survey report to Region I as an enclosure to a letter dated February 2, 1994 and requested that the site be removed from their license and that the warehouse be released for unrestricted use.

3. Instruments Used in Survey

Fixed floor and wall contamination was measured with an Eberline Model SPA-3 sodium iodide (NaI) detector (NRC Serial No. 021936) coupled to an Eberline Model ESP-2 scaler/ratemeter (NRC Serial No. 021940). The size of the NaI detector is 5 centimeters by 5 centimeters. The readout for this instrument is in counts per minute (cpm). The background radiation level measured with this instrument in the vicinity of the site was 10000 cpm.

Exposure rates in the building were measured with a Ludlum Model 19 micro-R meter (uR meter) with an internal geiger mueller detector. The readout for this instrument is in micro-Roentgen per hour (uR/hr). The background radiation level measured with this instrument in the vicinity of the site was 18 uR/hr.

Wipes were counted for 10 minutes on a Tennelec Model LB5100 Series II low background alpha/beta counter at the Region I office for gross alpha activity. The approximate efficiency was 23%. Results were reported in disintegrations per minute (dpm) per wipe at an uncertainty of one sigma.

4. Survey Design

Prior to the survey, the inspectors reviewed the licensee's final survey enclosed with their letter dated February 2, 1994 and past inspection reports in order to identify areas within the warehouse to be surveyed. The inspectors elected to survey approximately 50% of the floor and 10% of the walls.

5. Survey for Surface Contamination

Surface contamination by thorium was monitored with the NaI detector coupled to a scaler/ratemeter and a uR meter. In each area surveyed, accessible floor surfaces were scanned and the readings were recorded. Particular attention was given to areas where contamination was suspected, such as cracks. Areas exhibiting radiation levels above background were noted during the survey and wipes were taken in those areas. Direct radiation measurements were performed at approximately 1 meter above the building pad surface and at contact with the pad surface. Radiation levels ranged from 0 dpm/100 cm^2 to 500 dpm/100 cm^2 above background for the building walls and building floor. The limit for surface contamination in the Guidelines for natural thorium is 1,000 dpm/100 cm^2 averaged over an area not to exceed one square meter. A maximum contamination level of 3,000 dpm/100 cm^2 is allowed over an area not to exceed 100 cm^2.

Based on the results of the surface contamination survey, all areas met the NRC guidelines for unrestricted release for surface contamination.

6. Survey for Removable Contamination

The inspectors took 42 wipes in various areas. Wipes were taken at locations where radioactive material was stored, in areas suspected of having elevated contamination levels, and in areas where the portable survey instruments detected elevated readings. Removable contamination samples were taken with dry filter paper over an area of approximately 100 cm^2. Removable contamination results are provided for each area surveyed in the table at the end of this report.

The removable contamination criteria in the Guidelines for natural thorium is 200 dpm/100 cm^2. Based on the results of the removable contamination surveys, all areas surveyed met the NRC guidelines for unrestricted release.

7. Transfer of Licensed Material

Records of shipping papers are maintained by the licensee. These records were reviewed by the inspector. Licensed material originally stored in Warehouse 356, Section D, were properly transferred to another authorized licensee.

8. Exit Interview

The preliminary results of the inspector's direct survey were discussed with the individuals indicated in Section 1 of this report at the conclusion of the inspection.

TABLE: Wipe Tests

Wipe Number	Location	Gross Alpha (dpm/100 cm^2)
1	Floor	1.3 ± 0.8
2	Floor	0.8 ± 0.6
3	Floor	0.4 ± 0.4
4	Floor	2.1 ± 0.8
5	Floor	0.4 ± 0.4
6	Floor	1.7 ± 0.8
7	Floor	0.4 ± 0.4
8	Floor	0 ± 0
9	Floor	0.8 ± 0.6
10	Floor	2.6 ± 0.8
11	Floor	0.4 ± 0.4
12	Floor	0.8 ± 0.6
13	Floor	0.8 ± 0.6
14	Floor	0.4 ± 0.4
15	Floor	0.4 ± 0.4
16	Floor	0.4 ± 0.4
17	Floor	0.4 ± 0.4
18	Floor	0.4 ± 0.4
19	Floor	0.4 ± 0.4
20	Floor	1.3 ± 0.8
21	Floor	1.7 ± 0.8
22	Floor	0.8 ± 0.6
23	Floor	0.4 ± 0.4
24	Floor	0.4 ± 0.4
25	Floor	3.9 ± 1.3
26	Floor	0.8 ± 0.6
A	West Wall	1.3 ± 0.8
B	West Wall	0.8 ± 0.6
C	West Wall	1.3 ± 0.8
D	West Wall	0.4 ± 0.4
E	North Wall	0.8 ± 0.6
F	North Wall	0.8 ± 0.6
G	North Wall	1.3 ± 0.8
H	North Wall	2.1 ± 0.8
I	North Wall	0.4 ± 0.4
J	North Wall	0.4 ± 0.4
K	North Wall	1.7 ± 0.8
L	North Wall	0 ± 0
M	East Wall	0.8 ± 0.6
N	East Wall	0.8 ± 0.6
O	East Wall	0.8 ± 0.6
P	East Wall	0.4 ± 0.4

Amendment No. 13

MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 36, 39, 40, and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Department of the Army Commander, Seneca Army Depot Activity ATTN: SDSSE-CO	In accordance with the letter dated February 11, 2003, 3. License number SUC-1275 is amended in its entirety to read as follows:
2. Romulus, New York 14541-5001	4. Expiration date February 28, 2005
	5. Docket No. 040-08526 Reference No.

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Uranium (depleted in the isotope uranium 235)	A. Solid metal alloy	A. 5,000,000 kilograms
B. Uranium (depleted in the isotope uranium 235)	B. Solid metal alloy	B. 5,000,000 kilograms

9. Authorized use:

A. For receipt, possession, storage, transportation, inspection and disposal incident to the demilitarization of munitions.

B. For receipt, possession, storage, transportation, inspection, and disposal incident to demilitarization of munitions from other licensed U.S. Army and U.S. Navy installations.

CONDITIONS

10. Licensed material may be used only at the licensee's facilities located at the Seneca Army Depot, Romulus, New York.

11. A. Licensed material shall be used by, or under the supervision of John F. Cleary, Michael R. Lewis, or Thomas E. Reynolds.

B. The Radiation Safety Officer for this license is John Cleary.

License Number
SUC-1275

Docket or Reference Number
040-08526

Amendment No. 13

MATERIALS LICENSE
SUPPLEMENTARY SHEET

12. The licensee is authorized to transport licensed material in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."

13. Radioactive waste generated shall be stored in accordance with the statements, representations, and procedures included with the waste storage plan described in the licensee's letter dated January 27, 1995.

14. The licensee may use the Derived Concentration Guideline Level (DCGL) values described in the Seneca Army Depot Activity License Termination and License Release Plan for decommissioning of the facilities at the Seneca Army Depot Activity, Romulus, New York, with the intention of release of the facilities for unrestricted use.

License Number
SUC-1275

MATERIALS LICENSE
SUPPLEMENTARY SHEET

Docket or Reference Number
040-08526

Amendment No. 13

15. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents, including any enclosures, listed below, except for minor changes in the medical use radiation safety procedures as provided in 10 CFR 35.31. The U.S. Nuclear Regulatory Commission's regulations shall govern unless the statements, representations, and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Letter dated January 17, 1992
B. Letter dated March 31, 1992
C. Application dated October 30, 1992
D. Letter dated November 2, 1992
E. Letter dated December 21, 1992
F. Letter dated September 2, 1993
G. Letter dated September 27, 1993
H. Letter dated December 15, 1993
I. Letter dated January 27, 1995
J. Letter dated December 5, 1996
K. Letter dated August 13, 1997
L. Letter dated February 11, 2003 with the Seneca Army Depot Activity License Termination and License Release Plan
M. Letter dated April 3, 2003

For the U.S. Nuclear Regulatory Commission

Date June 11, 2003

By ***Original signed by Elizabeth Ullrich***

Elizabeth Ullrich
Nuclear Materials Safety Branch 2
Division of Nuclear Materials Safety
Region I
King of Prussia, Pennsylvania 19406

37641770

DEPARTMENT OF THE ARMY
SENECA ARMY DEPOT ACTIVITY
5786 STATE RTE 96, P.O. BOX 9
ROMULUS, NEW YORK 14541-0009

September 2, 2003

REPLY TO
ATTENTION OF

Caretaker Office

Ms. Elizabeth Ullrich
United States Nuclear Regulatory Commission
Region I
Division of Nuclear Materials Safety
Nuclear Materials Safety Branch 2
475 Allendale Road
King of Prussia, PA 19406-1415

Mail Control No. 132746

Dear Ms. Ullrich,

This letter is in response to several telephone conversations over the past several weeks between you, Mr.John Cleary, our Radiation Safety Officer, and Ms. Brenda Brown of the Nuclear Regulatory Commission headquarters, regarding payment of two invoices that we received in August 2003 for license fees for FY 2001 and 2002.

Mr. Cleary's attempts to clarify the situation with Ms. Brown were unsucessful. She insisted that the issuance of the invoices for past fiscal years was generated by you. She could not address exemption from the licensing fees. Mr. Cleary explained to you the problem the week of August 15th, 2003, and you indicated to him that you would speak with Ms. Brown concerning these invoices. Ms. Brown did contact this office and left a message for Mr. Cleary that you and she would contact him to discuss the invoices on August 28, 2003. No discussion has occurred yet.

As background, you may remember that we, as license holder for SUC-1275, requested to be exempt from the annual fees for 3 reasons:

- We no longer possessed licensed materials after September 1999.
- We no longer could accept licensed materials for storage since, because of downsizing of the workforce, we no longer had qualified workers.
- We were in negotiations with your office over a "license termination plan".

Our NRC license status has not changed since our original exemption from the license fees. Since that time we have completed the required license termination plan and

accomplished all field investigations. I expect to submit the final report on the plan to your office NLT December 31, 2003.

Point of contact for the above action is John Cleary, Radiation Safety Officer at (607) 869-1235.

Sincerely,

Stephen M. Absolom
Installation Manager

U. S. NUCLEAR REGULATORY COMMISSION
FY 2003 Annual Materials Fee Invoice
Period 10/1/2002 - 9/30/2003
10 CFR 171.16

Invoice Date	License Anniversary Month	Invoice Number
09/08/2003	September	AM4660-03

ARMY, DEPARTMENT OF THE
ATTENTION: RADIATION SAFETY OFFICER
SENECA ARMY DEPOT ACTIVITY
ATTN: SDSSE-CO
ROMULUS NY 145415001

***** Mark PAYMENT COPY with any billing address changes *****

License/Approval/ Registration/ Certificate Number	Code AA905	Annual Fee Category(s)	Fee Amount
SUC-1275	ANN	2C	$ 5,700.00
		TOTAL:	$ 5,700.00
		TOTAL INVOICE:	$ 5,700.00

Amount Billed Represents 50% Proration

If paid by Fedwire see attached Terms and Conditions. If paid by check, make check payable to the NRC (reference Invoice no.) and mail to:

U.S. Nuclear Regulatory Commission <=== This PO Box address is
License Fee & Accounts Receivable Branch <=== for receipt of payments
P.O. Box 954514 <=== only.
St. Louis, MO 63195-4514

For terms and conditions see attached.
Payment must be received within 30 days of the date of this invoice to avoid late charges.
Questions: call 301/415-7554

L I C E N S E E   C O P Y

IMPORTANT INSTRUCTIONS FOR NRC FORM 526 -- PLEASE READ CAREFULLY
DO NOT COMPLETE OR RETURN THIS FORM IF YOU DO NOT QUALIFY AS A SMALL ENTITY

CERTIFICATION OF SMALL ENTITY STATUS FOR THE PURPOSES OF ANNUAL FEES IMPOSED UNDER 10 CFR PART 171 FY 2004

A licensee who qualifies as a small entity under a specific size standard established by the NRC may pay a reduced annual fee by filing the required certification on NRC Form 526, which is on the reverse side of this page. A separate NRC Form 526 is required for each invoice. Licensees who do not qualify under one of the size standards shown on NRC Form 526 should disregard this form.

1. Complete all items on NRC Form 526 as follows: **(NOTE: Incomplete or improperly completed forms will be returned as unacceptable.)**

   - Enter the license number and invoice number exactly as they appear on the annual fee invoice.

   - Enter the Standard Industrial Classification (SIC) code if it is known. If it is not known, leave this item blank.

   - Enter the licensee's name and address exactly as they appear on the invoice. Annotate name and/or address changes for billing purposes on the payment copy of the invoice -- include contact's name, telephone number, e-mail address, and company web site address. Correcting the name and/or address on NRC Form 526 or on the invoice does not constitute a request to amend the license.

   - Check the appropriate size standard under which the licensee qualifies as a small entity. Check one box only. Note the following:

     a. ***A licensee who is a subsidiary of a large entity does not qualify as a small entity. The calculation of a firm's size includes the employees or receipts of all affiliates. Affiliation with another concern is based on the power to control whether exercised or not. Such factors as common ownership, common management and identity of interest (often found in members of the same family, among others, are indications of affiliation). The affiliated business concerns need not be in the same line of business (67 CFR 59).***

     b. Gross annual receipts, as used in the size standards, include all revenue in whatever form received or accrued from whatever sources, not solely receipts from licensed activities.

     c. NRC's size standards on small entity are based on the Small Business Administration's regulations (13 CFR 121).

     d. The size standards apply to the licensee, not the individual authorized users listed in the license.

2. If the invoice states the "Amount Billed Represents 50% Proration," the amount due is not the prorated amount shown on the invoice but rather one-half of the maximum small entity annual fee shown on NRC Form 526 for the size standard under which the licensee qualifies (either $1,150 or $250) for each category billed.

3. If the invoice amount is less than the reduced small entity annual fee, pay the amount on the invoice; there is no further reduction. In this case, NRC Form 526 does not have to be filed.

4. The completed NRC Form 526 must be submitted with the required annual fee payment and the "Payment Copy" of the invoice to the address shown on the invoice.

5. 10 CFR 171.16(c)(3) states licensees shall submit a new certification with its annual fee payment each year. Failure to submit NRC Form 526 at the time the annual fee is paid will require the licensee to pay the full amount of the invoice.

Because the burden for this information collection is insignificant, Office of Management and Budget (OMB) clearance is not required.

NRC FORM 526
(10-2003)
10 CFR 171

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATION OF SMALL ENTITY STATUS FOR THE PURPOSES OF ANNUAL FEES IMPOSED UNDER 10 CFR PART 171
FY 2004

If you have QUESTIONS, e-mail them to: fees@nrc.gov

SEE IMPORTANT INSTRUCTIONS ON THE REVERSE SIDE

NAME AND ADDRESS OF LICENSEE *(as it appears on the invoice)*:	INVOICE NUMBER	STANDARD INDUSTRIAL CLASSIFICATION CODE
	LICENSE NUMBER	S I C

E-MAIL ADDRESS	CONTACT	WEBSITE ADDRESS	TELEPHONE *(Include Area Code)*
		www.	

SIZE STANDARDS (Check one box only) DO NOT RETURN THIS FORM IF YOU DO NOT QUALIFY UNDER ONE OF THESE SIZE STANDARDS		MAXIMUM ANNUAL FEE PER LICENSED CATEGORY (See Items 2 and 3 on back)
1. SMALL BUSINESS A for-profit concern that provides a service or a concern not engaged in manufacturing with average gross receipts of $5 million or less over its last 3 completed fiscal years.	☐ A. $350,000 TO $5,000,000	$ 2,300
	☐ B. LESS THAN $350,000	$ 500
2. MANUFACTURING INDUSTRY A manufacturing concern with an average number of 500 or fewer employees based upon employment during each pay period for the preceding 12 calendar months.	☐ A. 35 to 500 EMPLOYEES	$ 2,300
	☐ B. LESS THAN 35 EMPLOYEES	$ 500
3. SMALL ORGANIZATION A not-for-profit organization that is independently owned and operated and has annual gross receipts of $5 million or less.	☐ A. $350,000 TO $5,000,000	$ 2,300
	☐ B. LESS THAN $350,000	$ 500
4. SMALL GOVERNMENTAL JURISDICTION (INCLUDING PUBLICLY SUPPORTED EDUCATIONAL INSTITUTIONS) * A government of a city, county, town, township, village, school district, or special district with a population of less than 50,000.	☐ A. 20,000 TO 50,000 POPULATION	$ 2,300
	☐ B. LESS THAN 20,000 POPULATION	$ 500
5. SMALL EDUCATIONAL INSTITUTION THAT IS NOT STATE OR PUBLICLY SUPPORTED AND HAS 500 OR FEWER EMPLOYEES*	☐ A. 35 to 500 EMPLOYEES	$ 2,300
	☐ B. LESS THAN 35 EMPLOYEES	$ 500

* An educational institution referred to in the size standards is an entity whose primary function is education, whose programs are accredited by a nationally recognized accrediting agency or association, who is legally authorized to provide a program of organized instruction or study, who provides an educational program for which it awards academic degrees, and whose educational programs are available to the public.

CERTIFICATION

This certification MUST be signed by the owner of the entity named above or an official empowered to act on behalf of the entity.
I certify that the above named NRC licensee qualifies as a small entity under the size standards established by the NRC for its licensees in 10 CFR 2.810 (60 FR 18344). The licensee qualifies as a small entity under the specific size standard indicated above.

WARNING: 18 U.S.C. Section 1001, Act of June 25, 1948, 62 Stat. 749, makes it a **criminal offense** to make a willfully false statement or representation to any Department or Agency of the United States as to any matter within its jurisdiction. The submittal of willful false statements is punishable by fine or imprisonment, or both, and for purposes of this certification, may result in revocation or suspension of the license.

I CERTIFY UNDER PENALTY OF PERJURY THAT THE FOREGOING IS TRUE AND CORRECT.	TYPED OR PRINTED NAME AND TITLE	SIGNATURE	DATE

See Instructions on Page 2

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

March 13, 2003

Docket No. 04008526 License No. SUC-1275
Control No. 132746

Stephen M. Absolom
Commander's Representative
Department of the Army
Seneca Army Depot Activity
5786 State Route 96
P. O. Box 9
Romulus, NY 14541-0009

SUBJECT: DEPARTMENT OF THE ARMY, REQUEST FOR ADDITIONAL INFORMATION CONCERNING APPLICATION FOR AMENDMENT TO LICENSE, CONTROL NO. 132746

Dear Mr. Absolom:

This is in reference to your letter dated February 11, 2003 requesting to amend Nuclear Regulatory Commission License No. SUC-1275. In order to continue our review, we need the following additional information regarding the "Seneca Army Depot Activity License Termination and License Release Plan" (the Plan):

1. Section 2.2.1 and other sections of the Plan refers to "present standards" for remediation, but does not specify to which standards you refer. If you are referring to the license termination criteria of 25 millirem in a year to a member of the critical population, no further response if required. If you are referring to other standards, please describe them.

2. Section 5.4.2 of the Plan states that Building 612, although classified as a Class 1 area, contains survey units greater than the maximum area recommended. Section 5.5.1.1 further states that Building 612 has already been surveyed in its entirety as a Class 1 survey area. Table 5-2 shows that Building 612 was divided into 28 survey units, ranging in size from 3 square meters (m^2) to 250 m^2. However, MARSSIM states that the maximum survey unit size for a Class 1 survey area is 100 m^2. If Building 612 is appropriately classified as a Class 1 survey area, then survey units and the types of surveys performed must meet the requirements for a Class 1 survey area. Confirm that survey units of appropriate size will be used, and all other criteria for a Class 1 survey area will implemented for Building 612. Alternately, Building 612 may be re-classified if appropriate. Please note, if you intend to perform additional surveys in Building 612, that "double sampling" (taking a second set of samples in a one-stage survey) typically causes the Type I error rate to exceed the rate specified for the one-stage survey, and is usually not permitted. For additional information about double sampling, see MARSSIM guidance at http://www.epa.gov/radiation/marssim/faqsforusers.htm#faq4_1 .

3. Section 5.4.2 states that "121 storage bunkers will each be surveyed as a single Class 3 survey unit." Table 5-2 shows that the 121 storage bunkers are considered 121 survey units, all Class 3 survey areas. We understand this to mean that each bunker is considered a Class 3 survey area, and that each bunker will be surveyed as an individual survey unit. If our understanding is incorrect, please inform us in writing.

4. Section 5.4.2 states that you expect contamination only on floor surfaces, and that direct measurements at specific locations will not be performed of walls and ceilings. For buildings which you have initially classified as Class 1 or Class 2 survey areas, direct measurements are required for all surfaces. However, you may treat floors and/or walls and/or ceilings as separate survey units, which may have different survey area classifications, if that is appropriate. For example, in some facilities, it is appropriate to classify floors as a Class 1 survey area, lower walls as a Class 2 survey area, and upper walls and ceilings as a Class 3 survey area. Please revise your survey procedure to include all required surveys for Class 1 and Class 2 areas. Alternately, please review the classification of the facilities and provide updated classifications as appropriate.

5. Section 5.5 states that soil measurements will be made outside of buildings. Such areas should also be discussed in Section 5.4 and classified as to the type of survey area, or as non-impacted.

6. The information provided in Section 5.5 is sufficient as an example of your planned surveys. However, changes may be required prior to implementation of the final status survey plan:

   a. When site-specific derived concentration guideline levels (DCGL) are approved, several of the necessary survey parameters may need to be re-calculated, especially if the approved DCGLs are different from the proposed DCGLs. Such parameters may include the number of survey points in each survey unit, the necessary scan MDA and static MDA, and other related information. Confirm that the survey parameters will be reviewed and revised if necessary, when the DCGLs are approved.

   b. Information such as that specified in Table 5-4, may be required to change as site-specific information is available. Therefore, this review does not consider the numbers shown in Table 5-4 as "acceptable" or "final." For example, Table 5-4 does not incorporate any information from previous surveys, such as the results shown in Table 5-3, to estimate the standard deviation of the results of samples in the survey unit. Such information is usually determined from characterization and/or remediation surveys. Instead, the Plan used a recommended value of 0.3 for the coefficient of variance and assumed that the LBGR is the mean value of the results of surveys for an area. Confirm that the LBGR and the standard deviation will be evaluated for the various areas when actual surveys are performed, and a determination made if the estimated number of samples

collected was sufficient in each area. Please note that, if the number of samples collected was not sufficient, final status surveys may be required to be repeated.

7. The proposed DCGLs, and the information you provided as the bases of the proposed DCGLs, are under review. We will inform you of the results of that review when it is completed.

In accordance with 10 CFR 2.790, a copy of this letter will be placed in the NRC Public Document Room and will be accessible from the NRC Web site at http://www.nrc.gov/reading-rm.html.

We will continue our review upon receipt of this information. Please reply to my attention at the Region I Office and refer to Mail Control No. 132746. If you have any technical questions regarding this deficiency letter, please call me at (610) 337-5040.

If we do not receive a reply from you within 30 calendar days from the date of this letter, we shall assume that you do not wish to pursue your application.

Sincerely,

Betsy Ullrich

Betsy Ullrich
Senior Health Physicist
Nuclear Materials Safety Branch 2
Division of Nuclear Materials Safety

Enclosure:
10 CFR Parts 19, 20, and 30

cc:
John F. Cleary, Radiation Safety Officer

Response to Comment 5:
The comment asks that Sec 5.4 address the classification of soil survey areas outside of buildings. Sec 5.5.1.2 indicates that all storage bunkers "and surrounding grounds" will be surveyed as Class 3 areas. Sec 5.4 currently does not address outdoor survey units or their classification. During the surveys that were conducted of the storage bunkers and other buildings, no evidence of contamination was apparent. On this basis, it was concluded that contamination of surrounding grounds was highly unlikely. Therefore, no soil areas were surveyed or direct measurements taken. It will be proposed that outdoor areas be classified as un-impacted under MARSSIM. Sec 5.4 will be revised to reflect this classification of outdoor areas. Also, Sec 5.6.3.2 currently indicates that land areas will be initially investigated using in situ gamma measurements. This section will be revised to indicate that such outdoor gamma investigations would be conducted only if contamination was found inside associated buildings.

Response to Comment 6a:
The comment indicates that some survey parameters might change, e.g., the required number of direct measurements in a survey unit, if final DCGLs are different from those in the Plan. It appears that such changes are unlikely, as the Plan over-specified by about 50% the number of samples required as compared to what MARSSIM calculations indicated. Further, the revised DCGLs are, for the most part, somewhat higher than the original values and would require fewer samples than indicated in the Plan. In any case, the sufficiency of sampling will be reviewed upon final approval of DCGLs.

Response to Comment 6b:
This comment raises the issue of data quality assessment (DQA). DQA requires reviewing the sufficiency of the data collected after the fact when the actual coefficient of variance (CV) of measurements is known. The Plan assumed an initial CV of 30% as suggested in MARSSIM. While the sample numbers specified are expected to prove to be sufficient, DQA will be performed to verify the CV assumption and the sufficiency of sample numbers using the results of the collected data.

Draft Responses to March 13, 2003 NRC Comments on the February 2003 License Termination Plan (the Plan) for Seneca Depot

Response to Comment 1:
The comment refers to the statement in Sec 2.2.1 that past release sites that were not remediated to "present day standards" would be classified as Class 1 or Class 2 areas under MARSSIM. The intent of this text was, as suggested in the comment, to refer to the prevailing dose criterion, whether it is NRC's 25 mrem/yr standard, or the State's 10 mrem/yr standard. However, none of the license termination areas were former release sites, so the question of what standard would apply never arose. The statement in the LTP was expressing a generic approach that would have been used if such areas were encountered.

Response to Comment 2:
Sec 5.4.2 of the Plan notes that in the previous Class 1 survey of Building 612 a few of the survey units were as large as 250 m2 and exceeded the suggested maximum size of 100 m2 in MARSSIM. The Plan further indicates that upon review of the survey data in 612 (and in these survey units in particular) if "residual contamination levels are found to be well below action levels, such survey units may be found to be of acceptable size to support release decisions." One option in such cases would be to propose reclassifying all or the affected parts of Building 612 to Class 2 or 3, which would allow the bigger survey units (up to 1000 m2 for Class 2). A second option might be to divide the oversized survey units into smaller units and evaluate the use of existing data for comparison to release criteria. In the original survey of Building 612, systematic samples were collected on floors, walls, and ceilings over a standard sized grid, so sample numbers were proportional to survey unit size. Even in the smallest survey units, however, the number of samples collected, on the order of 10, exceeded the required number determined in the current Plan. A cursory review of swipe sample and gamma survey results for the building suggests that little if any residual activity is present. Given the high density of sampling already completed (up to 200 samples in the larger units) and the expected absence of significant residual contamination, it is not expected that further sampling will be required. The leading option for addressing the survey unit size issue currently is to propose reclassification of all of Building 612 to Class 2 or Class 3. However, if further review of the survey data suggests that Class 1 is an appropriate classification, an examination of the sufficiency of the existing data set under such a classification will be evaluated.

Response to Comment 3:
The comment seeks clarification as to whether each storage bunker would be surveyed individually as a Class 3 survey unit. In accordance with the intent of the LTP each individual storage bunker was surveyed as a Class 3 survey unit.

Response to Comment 4:
This comment addresses text in Sec 5.4.2 of the Plan that states that contamination, if present, is expected to be confined to floors for all buildings, and further states that walls and ceilings in all buildings will receive only biased scanning surveys. The comment correctly points out that rooms classified as Class 1 and Class 2 require direct samples to be collected from all surfaces including walls and perhaps ceilings. Reduced sampling on walls and ceilings can only be justified if these surfaces are separately classified as Class 2 or 3, respectively. Affected buildings include 612 (all Class 1), and buildings 5, 306, 2073, and S-2084, portions of which include a total of 21 Class 2 survey units. However, while the Plan did not explicitly call for such samples, systematic direct measurements on walls and ceilings were taken in the actual surveys conducted of these survey units. This sampling will be reviewed for sufficiency for supporting the pre-designated survey unit classification. If insufficient sampling was conducted, data will be evaluated for possible reclassification of the affected surfaces. The Plan will be revised to reflect the requirement for the collection of such measurements in Class 1 and 2 survey units and/or the possible re-classification of walls and ceilings as justified by data and process knowledge.

to reflect the requirement for the collection of such measurements in Class 1 and 2 survey units and/or the possible re-classification of walls and ceilings as justified by data and process knowledge.

5. The comment asks that Sec 5.4 address the classification of soil survey areas outside of buildings. Sec 5.5.1.2 indicates that all storage bunkers "and surrounding grounds" will be surveyed as Class 3 areas. Sec 5.4 currently does not address outdoor survey units or their classification. During the surveys that were conducted of the storage bunkers and other buildings, no evidence of contamination was apparent. On this basis, it was concluded that contamination of surrounding grounds was highly unlikely. Therefore, no soil areas were surveyed or direct measurements taken. It is proposed that outdoor areas be classified as un-impacted under MARSSIM. Sec 5.4 will be revised to reflect this classification of outdoor areas.

6.a. The comment indicates that some survey parameters might change, e.g., the required number of direct measurements in a survey unit, if final DCGLs are different from those in the Plan. It appears that such changes are unlikely, as the Plan over-specified by about 50% the number of samples required as compared to what MARSSIM calculations indicated. Further, the revised DCGLs are, for the most part, somewhat higher than the original values and would require fewer samples than indicated in the Plan. In any case, the sufficiency of sampling will be reviewed upon final approval of DCGLs.

6.b. This comment, in reference to Table 5-4, raises the issue of data quality assessment (DQA). DQA requires reviewing the sufficiency of the data collected after the fact when the actual coefficient of variance (CV) of measurements is known. The Plan assumed an initial CV of 30% as suggested in MARSSIM. While the sample numbers specified are expected to prove to be sufficient, data quality assessment will be performed to verify the CV assumption and the sufficiency of sample numbers using the results of the collected data.

We look forward to working with the NRC on this issue of great importantance to the United States Army.

Stephen M. Absolom

Ms. Elizabeth Ullrich
United States Nuclear Regulatory Commission
Region 1
Division of Nuclear Materials Safety
Nuclear Materials Safety Branch 2
475 Allendale Road
King of Prussia, PA 19406-1415

Mail Control No. 132746

Dear Ms. Ullirich,

Thank you for the NRC's quick response to our request for concurrence to our license termination plan for NRC license SUC-1275. In response to your questions in your March 13, 2003 letter the following clarification is provided:

1. The comment concerning Section 2.2.1 referring to "present day standards", refers to the prevailing dose criterion, either the NRC's 25 mrem/yr standard, or New York State's 10 mrem.yr standard. Since none of the license termination areas were former release sites, the question of what standard would apply never arose.

2. The comment concerning Section 5.4.2 refers to the survey unit sizes for building 612. Based on a review of the raw data collected we now propose reclassifying building 612 from Class 1 to Class 2. All references in the Plan will be changed to reflect this reclassification.

3. In regards to your comment on storage bunkers, it is our intent that <u>each</u> storage bunker be surveyed as a separate Class 3 survey unit.

4. This comment addresses text in Sec 5.4.2 of the Plan that states that contamination, if present, is expected to be confined to floors for all buildings, and further states that walls and ceilings in all buildings will receive only biased scanning surveys. The comment correctly points out that for rooms classified as Class 1 and Class 2 require direct samples to be collected from all surfaces including walls and perhaps ceilings. Reduced sampling on walls and ceilings can only be justified if these surfaces are separately classified as Class 2 or 3, respectively. Affected buildings include 612 (all Class 1), and buildings 5, 306, 2073, and S-2084, portions of which include a total of 21 Class 2 survey units. However, while the Plan did not explicitly call for such samples, systematic direct measurements on walls and ceilings were taken in the actual surveys conducted of these survey units. This sampling will be reviewed for sufficiency for supporting the pre-designated survey unit classification. If insufficient sampling was conducted, data will be evaluated for possible reclassification of the affected surfaces. The Plan will be revised

DEPARTMENT OF THE ARMY
SENECA ARMY DEPOT ACTIVITY
5786 STATE RTE 96, P.O. BOX 9
ROMULUS, NEW YORK 14541-0009

April 3, 2003

REPLY TO
ATTENTION OF
BRAC Field Office

Ms. Elizabeth Ullrich
United States Nuclear Regulatory Commission
Region 1
Division of Nuclear Materials Safety
Nuclear Materials Safety Branch 2
475 Allendale Road
King of Prussia, PA 19406-1415

Mail Control No. 132746

Dear Ms. Ullrich,

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4. This comment addresses text in Sec 5.4.2 of the Plan that states that contamination, if present, is expected to be confined to floors for all buildings, and further states that walls and ceilings in all buildings will receive only biased scanning surveys. The comment correctly points out that for rooms classified as Class 1 and Class 2 require direct samples to be collected from all surfaces including walls and perhaps ceilings. Affected buildings include 612 (previous Class 1), and buildings 5, 306, 2073, and S-2084, portions of which include a total of 21 Class 2 survey units. However, while the Plan did not explicitly call for such samples, systematic direct measurements on walls and ceilings were taken in the actual surveys conducted of these survey units. This sampling will be reviewed for sufficiency for supporting the pre-designated survey unit classification. If

insufficient sampling was conducted, additional sampling will be done in the affected surfaces. The Plan will be revised to reflect the requirement for the collection of such measurements in Class 1 and 2 survey units.

5. The comment asks that Sec 5.4 address the classification of soil survey areas outside of buildings. Sec 5.5.1.2 indicates that all storage bunkers "and surrounding grounds" will be surveyed as Class 3 areas. Sec 5.4 currently does not address outdoor survey units or their classification. During the surveys that were conducted of the storage bunkers and other buildings, no evidence of contamination was apparent. On this basis, it was concluded that contamination of surrounding grounds was highly unlikely. Therefore, no soil areas were surveyed or direct measurements taken. It is proposed that outdoor areas be classified as un-impacted under MARSSIM. Sec 5.4 will be revised to reflect this classification of outdoor areas.

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6.b. This comment, in reference to Table 5-4, raises the issue of data quality assessment (DQA). DQA requires reviewing the sufficiency of the data collected after the fact when the actual coefficient of variance (CV) of measurements is known. The Plan assumed an initial CV of 30% as suggested in MARSSIM. While the sample numbers specified are expected to prove to be sufficient, data quality assessment will be performed to verify the CV assumption and the sufficiency of sample numbers using the results of the collected data.

The plan will be revised to incorporate these changes and any additional changes on the proposed DCGLs, when they become available. We look forward to working with the NRC on this issue of great importance to the United States Army.

Sincerely,

Stephen M Absolom

Stephen M. Absolom
Commander's Representative

PARSONS

100 Summer Street • Boston, Massachusetts 02110 • (617) 457-7900 • Fax: (617) 457-7979 • www.parsons.com

May 29, 2003

Mr. Julio Vazquez
USEPA Region II
Superfund Federal Facilities Section
290 Broadway, 18th Floor
New York, NY 10007-1866

Mr. George Momberger
New York State Department of Environmental Conservation (NYSDEC)
Bureau of Eastern Remedial Action
Division of Hazardous Waste Remediation
625 Broadway, 11th Floor
Albany, NY 12233-7015

SUBJECT: **NRC License Termination Sites, Seneca Army Depot Activity, Romulus, New York**

Dear Mr. Vazquez/Mr. Momberger:

As you are aware, Parsons has completed the fieldwork for the Final Status Survey (FSS) at the Nuclear Regulatory Commission (NRC) License Termination Sites at Seneca Army Depot Activity (SEDA), Romulus, New York. The survey consisted of the radiological surveying of 120 storage igloos and four buildings (Buildings 5, 306, 2073, and S-2084).

Upon completion of the fieldwork, a letter report was prepared summarizing the final status survey data. This report has been included for your reference. Upon the acceptance of the FSS by the NRC, all radiological licenses at the SEDA will be terminated and the former storage areas for licensed commodities will be considered suitable for unrestricted use.

If you have any questions or concerns regarding this letter report, please do not hesitate to call me at (617) 457-7900.

Sincerely,

Katie Kadlubak for

Todd Heino, P.E.
Program Manager

cc: S. Absolom, SEDA
C. Bethany, NYSDOH
M. Greene, USACOE – Huntsville
T. Enroth, USACOE – NY District
K. Healy, USACOE – Huntsville
J. Cleary, SEDA

P:\PIT\Projects\SENECA\NRC Term\Final Status Survey\transmit to regulators.doc

May 28, 2003

Mr. Stephen Howard
Department of the Army
U.S. Army Aviation and Missile Command
Redstone Arsenal, Alabama 35898-5000

SUBJECT: MIPR to Perform Wipe Sample Analysis for E0800 Row Pitchblende Ore Storage Igloos (SEAD-48), Seneca Army Depot Activity, Romulus, NY

Dear Mr. Howard:

Parsons is preparing to begin a radiological survey at SEAD-48 at the Seneca Army Depot Activity in Romulus, New York. The field program includes collection of approximately 1100 dry wipes to be analyzed for gross alpha/beta/gamma radiation within the storage igloos. The wipes will be collected in May and June 2003.

The Corps of Engineers- Huntsville Division would like to set up a MIPR covering the cost of the alpha/beta/gamma analysis of the 1000 dry wipes. We request a 45-day turn around time. We also request that the data be made available electronically.

Please contact me at (607) 869-1235 with any questions.

Sincerely,

John Cleary
Radiation Safety Officer
Seneca Army Depot Activity

cc: S. Absolom, SEDA
Marshall Greene, USACOE
T. Heino, Parsons
T. Enroth, USACOE – NY District
K. Healy, USACOE

DEPARTMENT OF THE ARMY
UNITED STATES ARMY AVIATION AND MISSILE COMMAND
REDSTONE ARSENAL, ALABAMA 35898-5000

REPLY TO
ATTENTION OF

AMSAM-TMD-SR(C) 28 May 2003

MEMORANDUM FOR Radiological Assistance Team-Seneca (Mr. Cleary), 5786 State Route 96, Romulus, NY 14541-5001

SUBJECT: Quote for Services

1. Reference email from Mr. John Cleary, Installation Radiation Protection Office, 28 May 2003, subject: MIPR to Perform Wipe Sample Analysis for E0800 Row Pitchblende Ore Storage Igloos (SEAD-48) Seneca Army Depot Activity, Romulus, NY.

2. This laboratory can provide the services requested for a price of $70.59 per hour processing 7 samples per hour ($10.08 per sample). The total cost of processing the 1100 alpha/beta/gamma wipe samples is $11,088.00.

3. Sample analyses will be performed on gas proportional counters. We have four Gamma Products Model: G5000E gas proportional counters. A NIST traceable Americium-241 source will be used to standardize the gas proportional counters. The limit of detection will be approximately 10 disintegrations per minute (dpm).

4. This laboratory will report all results in accordance with NCRP 58. Results exceeding the limit of decision will be reported and the limit of detection will be indicated with the results. Results that are less than the limit of decision will be reported as 0.0 dpm. Since the limit of decision is less than the limit of detection, some reported results will be less than the limit of detection. Since the results between the limit of decision and limit of detection are statistically unsure, this laboratory reports them, as they are determined.

5. This laboratory maintains a Nuclear Regulatory License (BML 01-00126-16) that authorizes the analysis of samples from other licensees and organizations. A copy of that license can be provided upon request.

6. This laboratory will provide the wipe media for the alpha/beta/gamma wipes. The wipes should be submitted folded within plastic bags.

7. Since a MIPR for $11,000 has been received, 3 boxes of wipes will be shipped immediately to support the effort.

8. Point of contact for this action is Mr. Stephen Howard, phone DSN 746-0472/3340 or commercial 256-876-0472/3340, email: stephen.howard@redstone.army.mil.

for Stephen V. Howard

PATRICK J. KUYKENDALL
Chief, Radiation Standards and Dosimetry Laboratory

QUALITY SYSTEM REGISTERED TO ISO 9002:1994

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Seneca Army Depot Activity
License Termination and License Release Plan

U.S. Department of the Army,
Seneca Army Depot Activity, New York

prepared by
Argonne National Laboratory
Environmental Assessment Division
Argonne, Illinois

January 2003

CONTENTS

TABLES

FIGURES

Notation

The following is a list of the acronyms, abbreviations, and units of measure used in this report:

Acronyms and Abbreviations

AEC	U.S. Atomic Energy Agency
ALARA	as low as reasonably achievable
Am	americium
AMCCOM	Armament, Munitions and Chemical Command (U.S. Army)
BRAC	Base Realignment and Closure
CFR	*Code of Federal Regulations*
D&D	decontamination and decommissioning
DCGL	derived concentration guideline level
DOA	U.S. Department of the Army
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DQI	data quality indicator
DQO	data quality objective
DSR	dose-to-source (concentration) ratio
DU	depleted uranium
EPA	U.S. Environmental Protection Agency
H-3	tritium
LTC	Lieutenant Colonel (U.S. Army)
LTP	License Termination Plan
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDA	minimum detection activity level
NaI	sodium iodide
NRC	U.S. Nuclear Regulatory Commission
Pm	promethium
Pu	plutonium
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control

Ra	radium
SEDA	Seneca Army Depot Activity
Sm	samarium
Tc	technetium
TEDE	total effective dose equivalent
Th	thorium
U	uranium

Units of Measure

cm	centimeter(s)
cm^2	square centimeter(s)
cm^3	cubic centimeter(s)
cpm	count(s) per minute
d	day(s)
dpm	disintegration(s) per minute
g	gram(s)
h	hour(s)
keV	kiloelectron volt(s)
kg	kilogram(s)
L	liter(s)
m	meter(s)
m^2	square meter(s)
mm	millimeter(s)
mrem	millirem(s)
pCi	picocurie(s)
s	second(s)
yr	year(s)

1 GENERAL INFORMATION

The purpose of this License Termination Plan (LTP) is to successfully terminate Nuclear Regulatory Commission (NRC) license #SUC-1275 (Docket No. 040-08526) held by the Department of the Army (Seneca Army Depot Activity, 5786 State Route 96, Romulus, New York 14541-5001) and to amend, gain release from, or otherwise close out the following licenses and permits:

- SUC-1380, Possession and Storage of depleted uranium as 25 mm, 105 mm, and 120 mm cartridge penetrators, issued to U.S. Army, Operations Support Command (OSC).

- 45-16023-01NA issued to US Navy for 20 mm and 25 mm cartridges.

- SUB-834 held by U.S. Army Combat Systems Test Activity for 7.62 mm and 0.50 caliber cartridges

- BML 12-00722-07, possession of promethium-147 in the light anti-tank rocket system

- STC-133, to store Columbite and tantalum (thorium) ore, managed by Defense Logistic Agency

Seneca Army Depot Activity (SEDA) is located about 40 miles south of Lake Ontario, near Romulus, New York. The 10,587-acre SEDA facility was constructed in 1941 and has been owned by the U.S. Government and operated by the Department of the Army (DOA) since that date. From its inception in 1941 until 1995, SEDA's primary mission was the receipt, storage, maintenance, and supply of military items, including munitions and equipment. The Depot's mission changed in 1995 when the Department of Defense (DOD) recommended closure of the SEDA under its Base Realignment and Closure (BRAC) process. The above NRC license-related activities occurred in the following buildings/structures:

- Building 612

- Building 5

- Building 306

- Building S-2084

- Building 2073

- Warehouse 356

- Total of 121 ammunition storage bunkers

In addition to the buildings covered directly under the license, and in accordance with NRC's July 26, 2000 letter to this effect, the entire site will be evaluated to determine that it meets Radiological Criteria for License Termination specified in CFR 20.1402 and applicable State criteria. This evaluation will include a review of any facilities previously released for unrestricted use and any facilities or areas currently undergoing cleanup. Historical survey records will be reviewed from previously released areas to evaluate whether they meet current release standards, while other ongoing radiological cleanups will be coordinated with license termination activities.

This LTP describes the process to be used in meeting the requirements for terminating, gaining release from, or amending the affected NRC licenses. Section 2 reviews the building histories and the results of past characterization activities. On the basis of this review it is expected that no decontamination would be required. If, during the final status survey, it were found that some areas are above the release criteria, those areas would be remediated to acceptable levels (Sections 3 and 4). Section 5 describes the Final Status Survey Plan, which is consistent with the guidelines of the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM, NRC 1997). Section 6 together with Section 5, describes the process for demonstrating compliance with the radiological criteria of Title 10, *Code of Federal Regulations,* Part 20.1402 (10 CFR 20.1402) for unrestricted future use for the affected buildings and structures.

2 HISTORY AND CHARACTERIZATION

Activities at the SEDA included storage and maintenance of radioactive commodities. The Army radioactive commodities at the site were mainly depleted uranium (DU) munitions. These commodities were used, stored, and maintained under the various licenses issued to the Army by NRC as listed in Section 1. Army radioactive commodities are ruggedly designed and contain a limited amount of radioactivity, which is typically in a nondispersible form. Commodities are not expected to have released contamination in areas where they were stored or handled.

2.1 Historical Site Assessment

A complete review of available records and files for the buildings included under the various license termination and release activities was conducted in 1999 and 2000. None of the inspection reports, survey data, or employee discussions indicated any accidents or incidents involving the commodities, either licensed or unlicensed. The periodic radiological surveys conducted by the Army in accordance with the licenses did not show any areas of concern. This review revealed the following facts:

- The SEDA was established in 1941 as an ammunition and general supply depot.

- During the 1940s, the SEDA stored barrels of pitchblende ore in 11 ammunition storage bunkers (E0801-E0811). In the 1980s, those bunkers were surveyed and remediated to allow unrestricted use (NRC 1988). Survey results showed no elevated readings for E0801 and E0802, the two bunkers included in this LTP (U.S. Army 1986).

- In the early 1950s, the Atomic Energy Commission (AEC) built and operated a special-weapons storage and maintenance facility on the north end of the Depot. In 1956, those facilities were taken over by the U.S. Army and were fully functional until 1993. The 64 special-weapons storage bunkers (A0101, A0102, A0201-A0218, A0301-A0317, A0401-A0409, A0501-A0508, and A0601-A0610) were surveyed in 1992 and 1993 and were released for unrestricted use. The remaining special weapons facilities are currently being surveyed for possible contamination as the part of the Army's environmental remediation program.

- Under license BML 12-00722-07, storage bunker A0701 was used to store light anti-tank rockets, with rocket sights containing promethium-147. The promethium-147 is contained in ceramic microspheres, mixed with self-luminous paint, and laminated between plastic sheets to provide illumination of the 100- and 150-yard markings in the front aiming sight according to the license application (U.S. Army 1997), the promethium-147 cannot escape unless the sight is subject to crushing, melting, or breaking across either the 100- or 150-yard markings. That scenario was considered unlikely.

- Warehouse 356 was used to store Columbite and tantalum ore containing thorium. NRC released the building for unrestricted use under Amendment 16 to STC-133 on December 22, 1994. Results of a June 10, 1993, New York State Department of Environmental Conservation (NYSDEC) survey of Warehouse 356 showed no significant deviations from background (Baker 1993). The interoffice memo in which the results are reported also noted that the Columbite ore (5,284 drums) had been transferred to a facility in Binghamton, New York, approximately 2 weeks prior to the survey date. It further noted that the Army had plans to clean the building with a HEPA filtered vacuum system and that all areas where the ore had been stored were surveyed, and wipes were taken for analysis.

- License SUC-1275 involved the use of five buildings (612, 5, 306, S-2084, and 2073) and 120 ammunition bunkers:

  - *Building 612* was used primarily as a point to unpackage, inspect, and repackage DU ammunition. License SUC-1275 also permitted demilitarization of munitions in Building 612, although this activity was never initiated. That activity would have involved mechanical separation of munitions. The license expressly directs that no cutting, grinding, or metallurgical processes were to be performed on DU. Building 612 underwent an extensive survey for release in 1999. Survey readings were very low. None approached the dose-based release limits used at the time of the survey. However, release limits have since been revised downward using revised inputs to the dose-model used (RESRAD-BUILD). Building 612 survey data will be reevaluated against the revised limits. Building 612 is proceeding directly to a Final Status Survey Report for release.

  - *Buildings 5, 306, S-2084, and 2073* were used as staging points to prepare the DU ammunition for shipment.

  - *120 ammunition bunkers* were only used to store packaged DU ammunition. Periodic surveys of these structures were conducted when DU ammunition operations were being conducted. No elevated levels of radioactivity were ever detected. The last of the depleted ammunition was shipped off the Depot by September 1999. Table 2-1 lists the affected bunkers.

Table 2-1
List of 121 Storage Bunkers under NRC Licenses[a]

A0201	B0109	C0203	D0104	E0103
A0316	B0411	C0303	D0105	E0105
A0317	B0501	C0307	D0107	E0112
A0508	B0602	C0308	D0108	E0211
A0701[b]	B0603	C0401	D0110	E0301
A0706	B0609	C0403	D0113	E0302
A0707	B0610	C0405	D0206	E0303
A0710	B0701	C0406	D0207	E0312
A0711	B0705	C0407	D0305	E0402
A0901	B0707	C0408	D0306	E0410
A0905	B0708	C0501	D0312	E0411
A1108	B0709	C0503	D0401	E0413
A1109	B0711	C0504	D0406	E0504
	B0801	C0505	D0407	E0506
	B0802	C0508	D0413	E0508
	B0804	C0510	D0601	E0510
	B0809	C0511	D0604	E0512
	B0810	C0513	D0607	E0602
	B0811	C0603	D0704	E0604
	B0909	C0604	D0705	E0609
		C0605	D0711	E0610
		C0606	D0712	E0702
		C0608	D0801	E0706
		C0701	D0805	E0711
		C0706		E0801
		C0707		E0802
		C0708		
		C0801		
		C0803		
		C0807		
		C0809		
		C0901		
		C0902		
		C0906		
		C0907		
		C0908		
		C0909		
		C0912[c]		

See footnotes on next page.

Table 2-1 (Con't)

[a]Except as otherwise indicated, bunkers were used for storage of packaged DU ammunition under SUC-1275.

[b]A0701 was used for storage of light anti-tank rockets containing promethium-147 under BML 12-00722-07.

[c]Bunker C0912 is a control bunker to establish radiological background levels.

2.2 Initial Area Classification

Historical site assessments were conducted to identify buildings and other structures, as well as land areas affected by the licensed activities, where radioactive commodities were stored or repaired. A review of the type of operation, as well as any accident/incident/leak test reports, was considered in the classification of areas. On the basis of the available historical information, areas under the license were divided into impacted and nonimpacted areas according to the criteria identified in MARSSIM (NRC 1997). Nonimpacted areas have no reasonable potential for residual contamination and therefore would not be included in the survey effort except to establish background levels. Impacted areas have some potential for containing residual radioactivity and are further divided into the MARSSIM–defined classes of 1, 2, or 3 on the basis of the potential for residual contamination and the BRAC radiological survey policy (U.S. Army 1998). Table 2-2 summarizes information about the areas affected by various NRC licenses.

2.2.1 Class 1 and Class 2 Areas

Areas were classified as Class 1 or 2 if historical information indicated that the commodity repair or maintenance activities conducted there compromised the nondispersible design of the commodities in accordance with the BRAC policy. Areas where tritium repair/maintenance occurred or where a past accidental release has not been remediated to present standards would also classified as Class 1 or Class 2 Areas. The previously surveyed and released 64 special weapons bunkers are the only known facilities where commodities containing tritium were stored and maintained. However, none of these is expected to contain residual tritium contamination.

In accordance with MARSSIM, areas were classified as Class 1 if potential radiological contamination (on the basis of site operating history) or known contamination (on the basis of previous radiological surveys) exists in excess of dose-based action levels. Building 612 is the only building or area classified as Class 1. The basis of this classification, however, relied on activities such as demilitarization of DU munitions that were permitted under SUC 1275, rather than activities that actually took place. As mentioned above, Building 612 has already undergone a survey for release. Survey data are currently being evaluated.

Areas were classified as Class 2 if the residual contamination was expected to be present, but not to exceed action levels at any location. The historical assessment resulted in classifying all of Buildings 5, 306, 2073, and S-2084 as Class 2 areas. This classification, however, is based solely on potential contamination for licensed activities. No confirmed contamination has been identified.

2.2.2 Class 3 Areas

Other indoor and outdoor areas where commodities were repaired, maintained, or stored were classified as Class 3 areas. Any areas where historical information indicated an accidental release had occurred but has already been remediated to present-day standards for unrestricted release were also classified as Class 3 areas. All of the storage bunkers initially have been classified as Class 3 areas. Storage bunkers were used only for storage of containerized DU ammunition, except for five bunkers, four of which were also used for previous special weapons storage, and one which was used for storage of rocket sights containing promethium-147. In addition to DU, the former bunkers will be surveyed for tritium and plutonium, and the latter for promethium-147, all as Class 3 areas. Warehouse 356 has also been classified as a Class 3 area, in this case for thorium associated with storage of Columbite and tantalum ore.

Table 2-2
Information Summary for Buildings under License SUC-1275 and Other NRC Licenses

Buildings/Structures	Radiological Status	Radionuclides of Concern	Area Classification for Final Status Survey	Type and Extent of Contamination	Other Licenses Affected	Operations Performed
Building 612	Building was surveyed in 1999. Walls, ceilings and floors were surveyed.	U-234, U-235, and U-238 (depleted uranium)	Class 1	Contamination, if present, is expected only on floor surfaces.	SUC-1380	Unpackage, inspect, and repackage DU ammunition
Building 5 Building 306 Building S-2084 Building 2073	During operations, periodic surveys were conducted and no elevated levels of radioactivity were ever detected. The last of the depleted ammunition was shipped off in September 1999.	U-234, U-235, and U-238 (depleted uranium)	Class 2	Contamination, if present, is expected only on floor surfaces	SUC-1380	Staging point to prepare DU ammunition for shipment
Storage Bunker A0701		Pm-147	Class 3	Contamination, if present, is expected only on floor surfaces	BML 12-00722-07 license managed by TACOM Rock Island	The license was for the possession of Pm-147 in the light anti-tank rocket system

Table 2-2 (Con't)

Buildings/Structures	Radiological Status	Radionuclides of Concern	Area Classification for Final Status Survey	Type and Extent of Contamination	Other Licenses Affected	Operations Performed
Of 11 pitchblende storage bunkers, E0801 and E-802 were under NRC license for subsequent DU storage	Were decontaminated and released for unrestricted use in 1985	Ra-226 (pitchblende ore) U-234, U-235, U-238	Class 3	Contamination, if present, is expected only on floor surfaces	SUC-1380	During the 1940s, the Depot stored barrels of pitchblende ore
Of 64 special weapons storage bunkers, A0201, A0316, A0317, and A0508 were under NRC license for later DU storage	Were surveyed in 1992 and 1993 and released for unrestricted use	Pu-239, U-234, U-235, U-238, and H-3	Class 3	Contamination, if present, is expected only on floor surfaces	SUC-1380	For special weapons storage
Ammunition Bunkers (see Table 2-1)	During operations, periodic surveys were conducted and elevated levels of radioactivity were never detected. The last of the depleted ammunition was shipped off in September 1999.	U-234, U-235, and U-238 (depleted uranium)	Class 3	Contamination, if present, is expected only on floor surfaces	SUC-1380	Storage of the packaged DU ammunition

Table 2-2 (Con't)

Buildings/Structures	Radiological Status	Radionuclides of Concern	Area Classification for Final Status Survey	Type and Extent of Contamination	Other Licenses Affected	Operations Performed
Warehouse 356	NRC released building for unrestricted use Amendment 16 to STC-133 on 12/22/94	Natural thorium	Class 3	Contamination, if present, is expected only on floor surfaces	STC-133 managed by Defense Logistic Agency	Warehouse was used to store Columbite and tantalum ore

3 IDENTIFICATION OF REMAINING DECONTAMINATION AND DECOMMISSIONING ACTIVITIES

On the basis of the historical site assessment and initial characterization information available, it is expected that no decontamination and decommissioning (D&D) would be required for the Seneca Army Depot Activity license termination. NRC concurred with the conclusion that a Decommissioning Plan is not required for this site in a July 26, 2000, letter to LTC Frank, Commanding Officer of the Depot (NRC 2000). If, during the final status survey, it is found that some areas are above the release criteria, a remediation plan would be developed, and those areas would be remediated.

4 REMEDIATION PLANS

At present, no D&D is thought to be required to meet NRC license termination criteria in Subpart E of 10 CFR 20 or unrestricted release criteria for any of the shared licenses listed in Section 1. Therefore, no remediation plan has been developed.

5 FINAL STATUS SURVEY PLAN

5.1 Introduction

The purpose of the Final Status Survey Plan is to describe the methods to be used in planning, designing, conducting, and evaluating final status surveys at SEDA. These surveys would serve to demonstrate that the dose from residual radioactivity is less than the maximum annual dose criterion for license termination for unrestricted use as specified in 10 CFR 20.1402. The Final Status Survey plan approach was developed following the Army radiological survey policy for BRAC sites (U.S. Army 1988) and MARSSIM (NRC 1997).

The Department of the Army radiological survey policy issued for BRAC sites where Army radioactive commodities have been present would be followed in the design and performance of surveys (U.S. Army 1998). According to that policy, commodity sites would typically proceed directly to closeout surveys (final status surveys under MARSSIM), consistent with a low likelihood of contamination. The overall process encompasses the following steps: (1) historical site assessment, (2) scoping surveys (if advantageous), (3) classification of areas, (4) formulation of survey plans with the host state and the U.S. Environmental Protection Agency (EPA), and (5) performance of closeout survey.

While several buildings remaining to be surveyed have been initially designated as Class 2 survey areas, meaning contamination is potentially present, the proposed surveys will be designed as final status surveys. Also, survey designs will incorporate some additional characterization sampling in selected locations to further confirm the absence of contamination. Sampling could include scans of air ducts and drains and the collection of material samples as deemed appropriate.

5.2 Scope

The Final Status Survey Plan would include the radiological assessment of all impacted structures and buildings and surrounding areas included under the NRC license. The purpose of the plan is to quantify the concentration of any residual radioactivity that may exist. Residual levels will be compared to dose-based concentration limits for all radionuclides of concern identified in the historical site assessment (Table 2-2) for soil and building surfaces. The unity rule will be followed in areas with more than one radionuclide of concern. These limits correspond to the maximum annual dose rate criterion for unrestricted release of licensed facilities as specified in 10 CFR 20.1402. The dose-based concentration limits are developed in Section 6 of this plan.

5.3 Summary of the Final Status Survey Process

The final status survey would provide data to demonstrate that all radiological parameters satisfy the established dose limits and conditions. The primary objectives of the final status survey are to (1) select or verify survey unit classification; (2) demonstrate that the potential dose from residual radioactivity is below the release criterion for each survey unit, and (3) demonstrate that the potential dose from small areas of elevated activity is below the release criterion for each survey unit. The final status survey process consists of four principal elements: (1) planning, (2) design, (3) implementation, and (4) assessment.

5.4 Survey Planning

Survey planning is performed to ensure that radiological surveys produce the data necessary to support release decisions. It involves historical site assessment and review of other pertinent characterization information to establish survey area classification and radionuclides of concern for each study area under the license. Concentration levels that correspond to the maximum annual dose criterion of 10 CFR 20.1402 are established by dose modeling for the type of contamination (surface or volume) found in the contaminated media (soil, building, or structures). The concentration criteria, referred as derived concentration guideline levels (DCGLs), allow for the practical implementation of the health-based dose limits.

For the purpose of performing radiological surveys, survey areas are divided into survey units, which are physical areas for which individual release decisions are made on the basis of survey measurements. A reference system is set up to document the location of survey measurements, whether taken in a biased manner, randomly, or over a grid. Reference areas are identified that are known to be free of contamination and that contain the types of materials existing in the survey units. Before surveying, radionuclide-specific DCGLs determined from dose modeling are converted to operational DCGLs, which are needed to interpret actual survey measurements. The survey measurements are conventionally made with survey instruments that measure gross radioactivity. The availability of the appropriate type and number of survey instruments with sufficient sensitivity to detect the operational DCGLs is then verified.

5.4.1 Classification of Survey Areas

Table 2-2 assigned initial classifications to all buildings and structures and surrounding areas on the basis of potential for residual contamination. These classifications represent the highest level of contamination known or expected to exist in the buildings based on historical information and surveys. The basis for the building classifications is given in Section 2.2. Table 5-1, below, presents the results of the latest round of surveys for the buildings of interest. The survey program has been an integral part of radiation safety portion of the NRC license. Regular surveys have been performed over the life of the license, giving further assurance of the uncontaminated condition of the facilities.

Table 5-1
Summary of Recent Building Surveys

Building No.	Date of Survey	Radio-nuclides of interest	Types of surveys performed	Instruments used	MDA (dpm/100 cm2)	Results
5		U-234, U-235, and U-238 (DU)	Dry swipe samples collected and analyzed at Redstone Arsenal, AL; walk-thru gamma survey	laboratory counters for swipes, Ludlum Model 3 pancake G-M for gamma rates	Alpha: 2 Beta: 6 Gamma: 109 Backgrd: 0.02 mR/hr	No results above background
306		U-234, U-235, and U-238 (DU)	As for Bld 5	As for Bld 5	As for Bld 5	No results above background
356		Th-232	As for Bld 5	As for Bld 5	As for Bld 5	No results above background
612	3/99 to 5/99	U-234, U-235, and U-238 (DU)	Over 2-m grid: Direct and swipes: alpha/beta/gamma Surface Scans alpha/beta/gamma 100 % scans	Hand-held and floor monitor gas-proportional counters, FIDLER low-energy gamma detector, laboratory counters for swipes	Swipes and gamma rate: as for Bld 5 Static direct: Alpha: 20/40 Beta: 1000/2000 Gamma: 16,000	No detects above action levels. (Data to be reviewed against revised action levels.)
2073		U-234, U-235, and U-238 (DU)	As for Bld 5	As for Bld 5	As for Bld 5	No results above background
S-2084		U-234, U-235, and U-238 (DU)	As for Bld 5	As for Bld 5	As for Bld 5	No results above background
Storage Bunkers		DU (all), Ra-226 (2 bunkers), H-3 and Pu-239 (4 bunkers)	As for Bld 5	As for Bld 5	As for Bld 5	No results above background

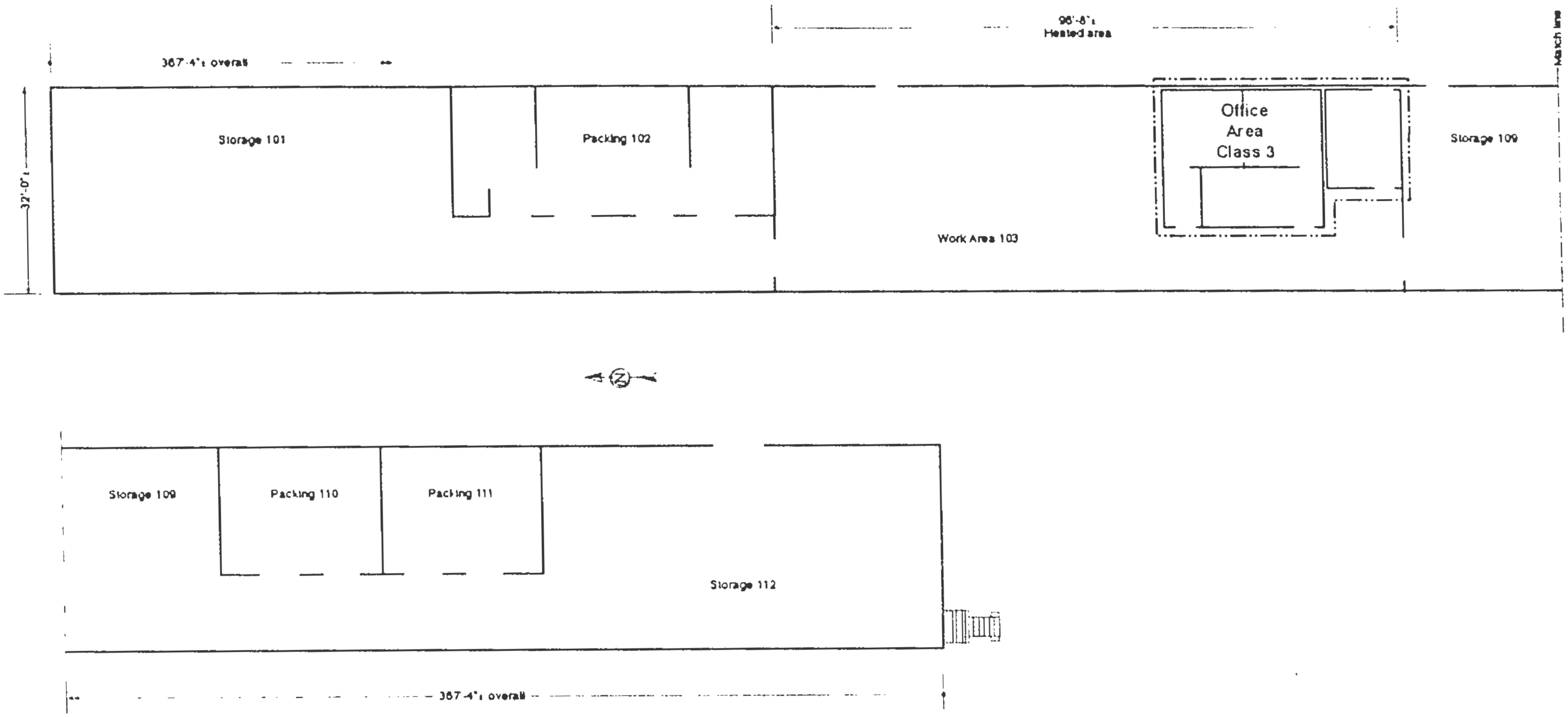
Within a survey area, one or more survey units may be defined that carry the same, or lower (numerically higher), contamination classification as the survey area. A survey unit is a physical area that has been subjected to a consistent set of contamination processes. It is the smallest area to which a release decision would apply. Survey units of the same classification within a survey area may vary substantially in size, but may be sampled with a similar number of measurements if they have similar contamination levels and variability and are subject to the same DCGL.

5.4.2 Survey Units

As described above, a survey unit is a physical area within a building or structure or land area of specified size and shape that would be considered as a unit during the final status survey process. Compliance criteria would be demonstrated for each survey unit. While individual rooms are considered in dose modeling to calculate DCGL values for buildings, survey units used to establish compliance with DCGLs may encompass more than a single room, as long as the total area of the survey unit does not exceed the following guidelines suggested in MARSSIM:

Class 1 Structures:	up to 100 m^2	Class 1 Land Areas:	up to 2,000 m^2
Class 2 Structures:	100 to 1,000 m^2	Class 2 Land Areas:	2,000 to 10,000 m^2
Class 3 Structures:	no limit	Class 3 Land Areas:	no limit

Floor plans showing survey area classifications within the buildings are given in figures 5-1 through 5-7. Table 5-2 presents the number and sizes of survey units proposed within the survey areas. For Class 2 areas within buildings, each room or distinct area within the Class 2 area is designated a separate survey unit. Class 3 areas may comprise a single or several survey units. A total of 21 Class 2 survey units are proposed for the four buildings that have Class 2 areas, and a total of 7 Class 3 survey units are proposed for the three main buildings that have Class 3 areas. The 121 storage bunkers will each be surveyed as a single Class 3 survey unit. The proposed survey unit sizes fall well within the guidelines. Note that Building 612 surveys have already been performed (walls, ceilings, and floors) with some survey units exceeding Class 1 size guidelines. If, upon review, residual contamination levels are found to be well below action levels, the few such survey units may be found to be of acceptable size to support release decisions. As noted in Table 2-2, contamination in all buildings, if present, is expected to exist only on floor surfaces. Walls and ceilings will not be sampled with direct measurements at specific locations, but will be scanned and sampled as determined by judgement.



Bldg. 5
Entire Bldg. Class 2 Except for
Office Area Which is Class 3

FIGURE 5-1 Building 5 Survey Areas

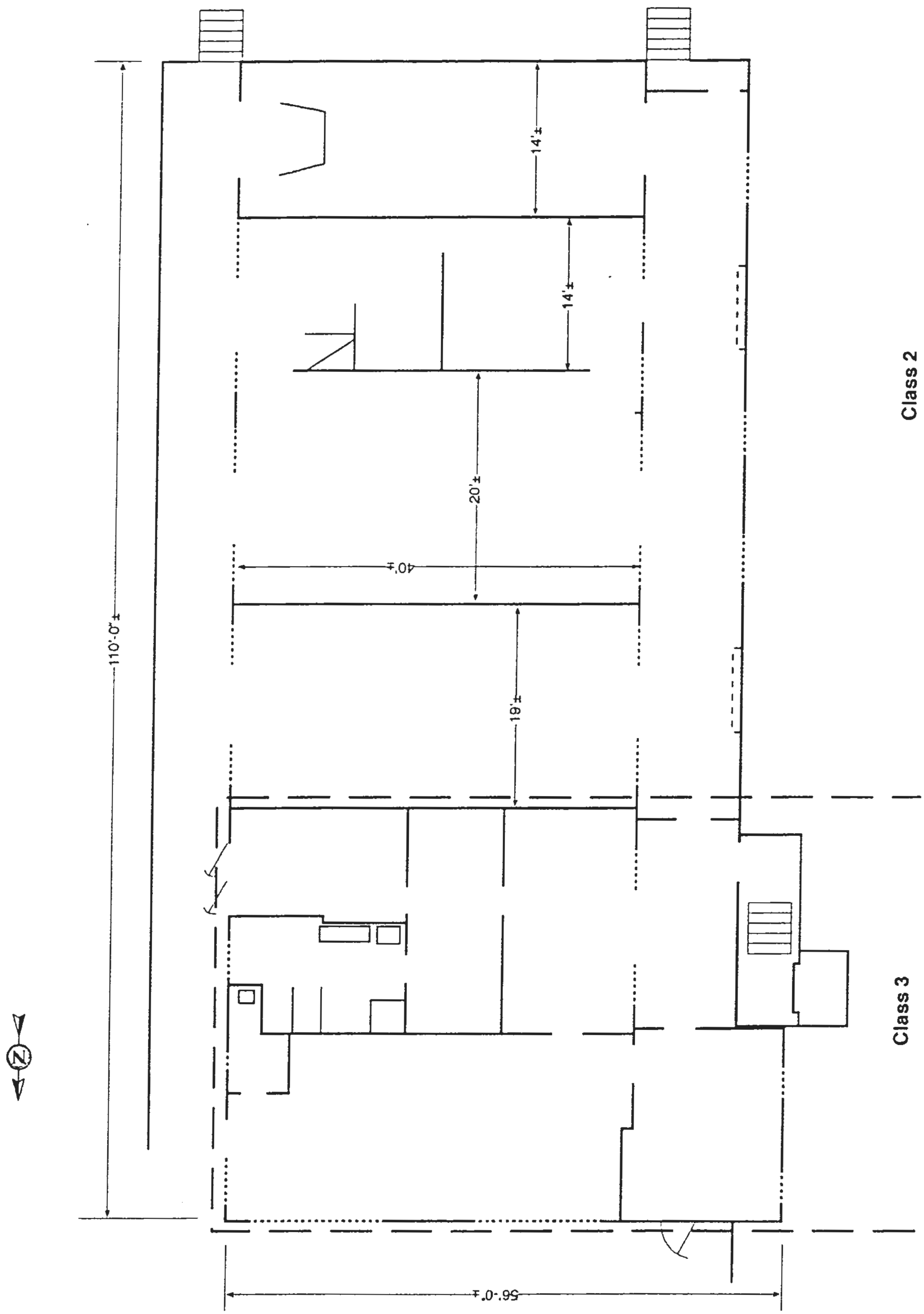


FIGURE 5-2 Building 306 Survey Areas

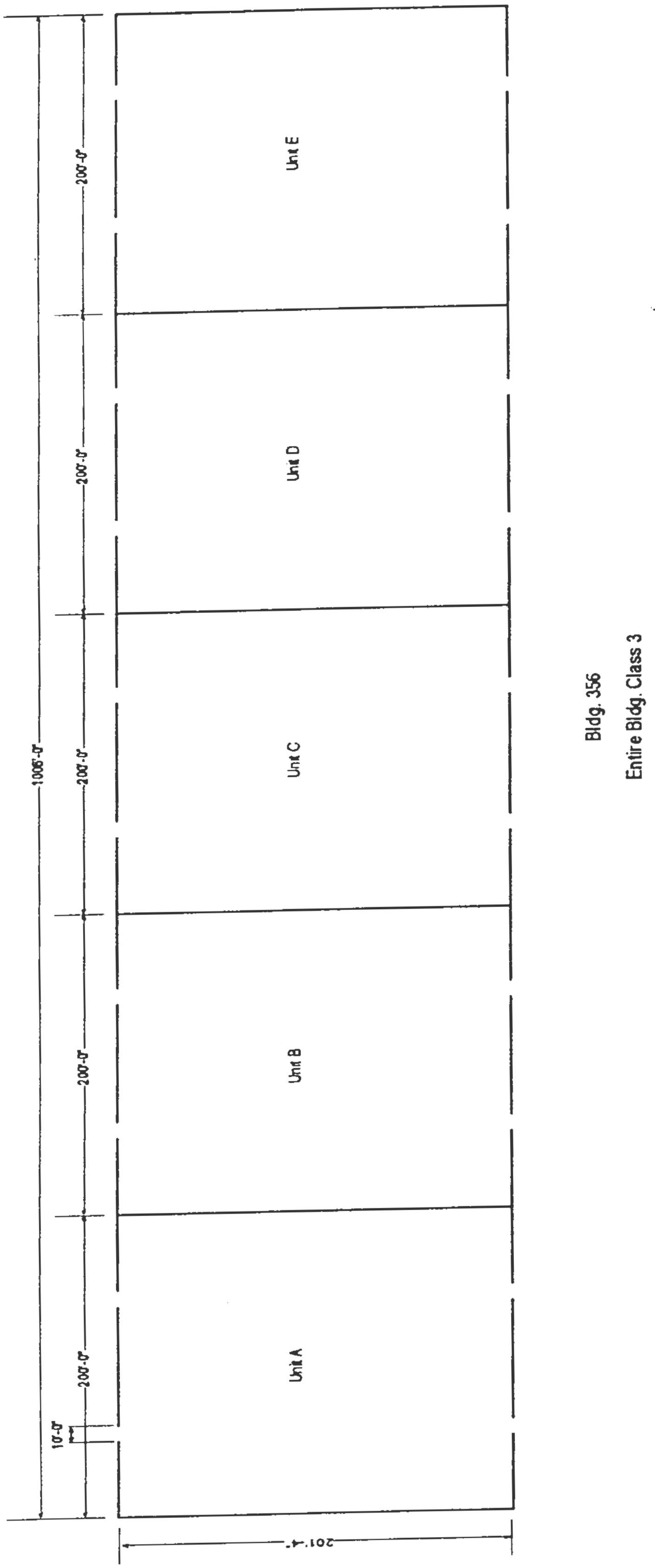


FIGURE 5-3 Building 356 Survey Areas

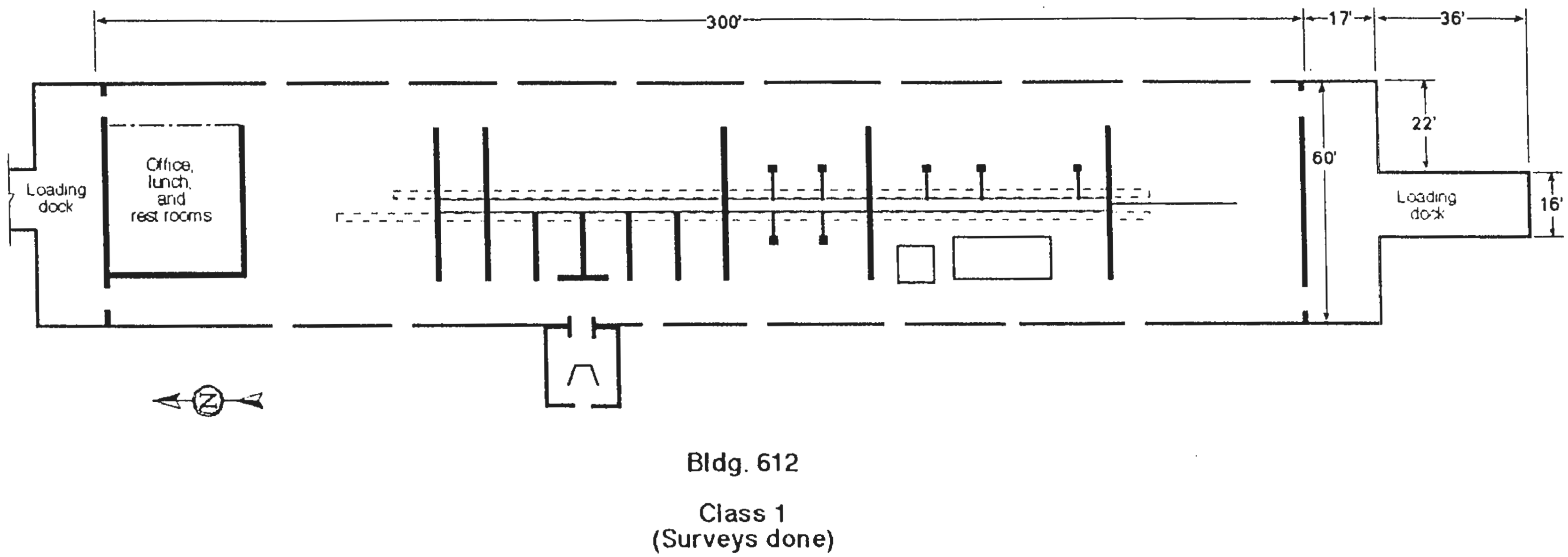


FIGURE 5-4 Floor Plan of Building 612 (surveys previously performed in 28 Class 1 survey units)

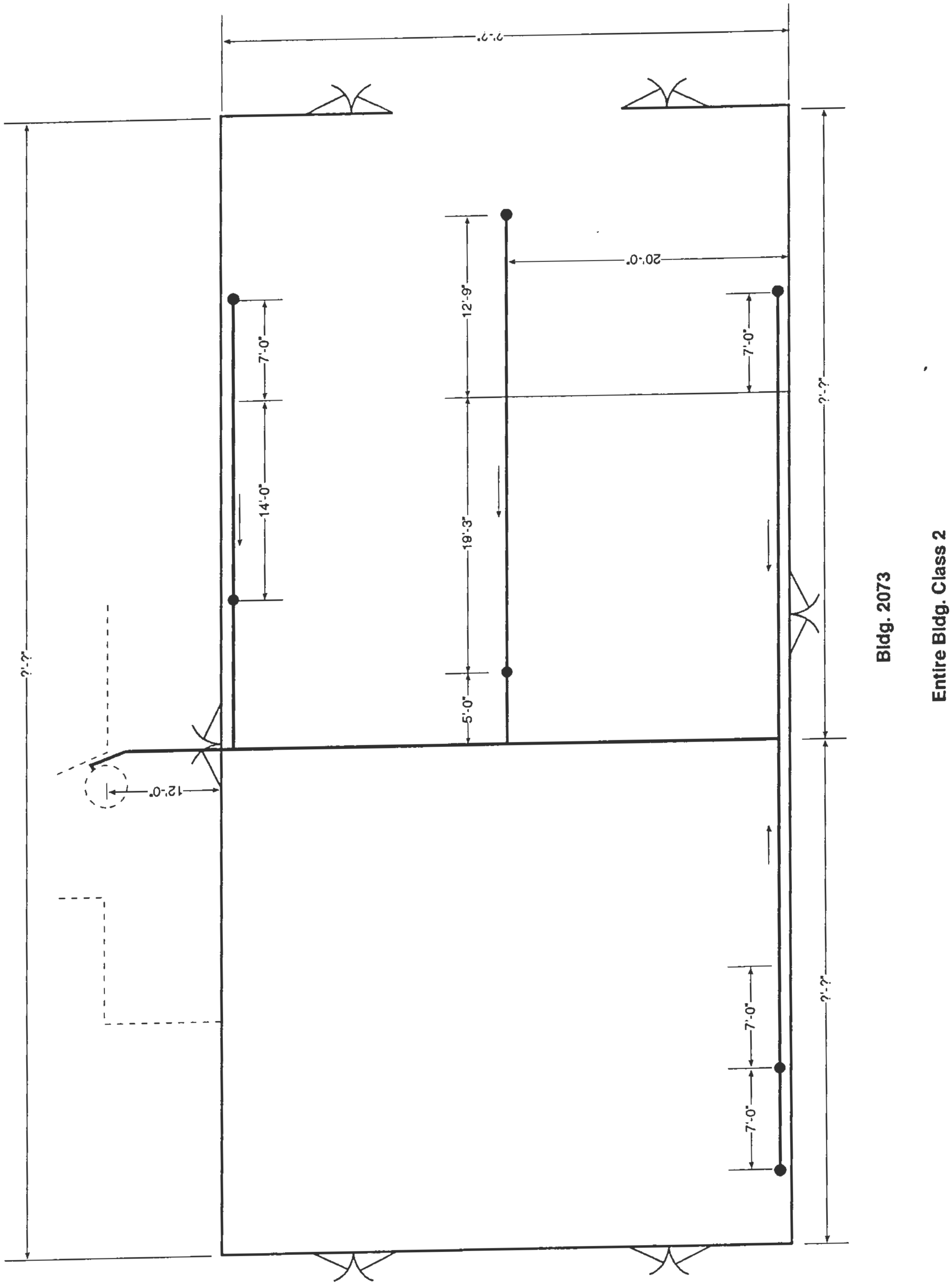
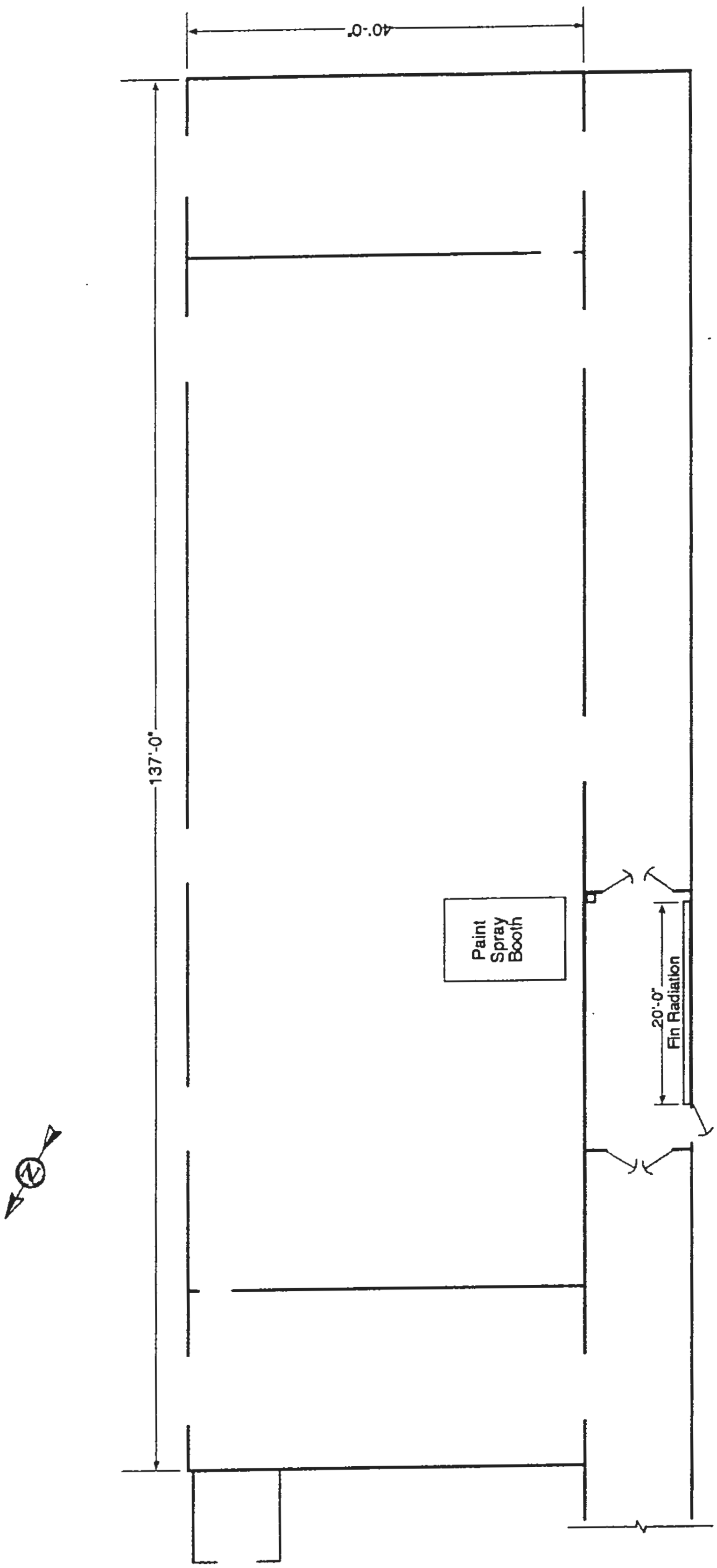


FIGURE 5-5 Survey Areas for Building 2073

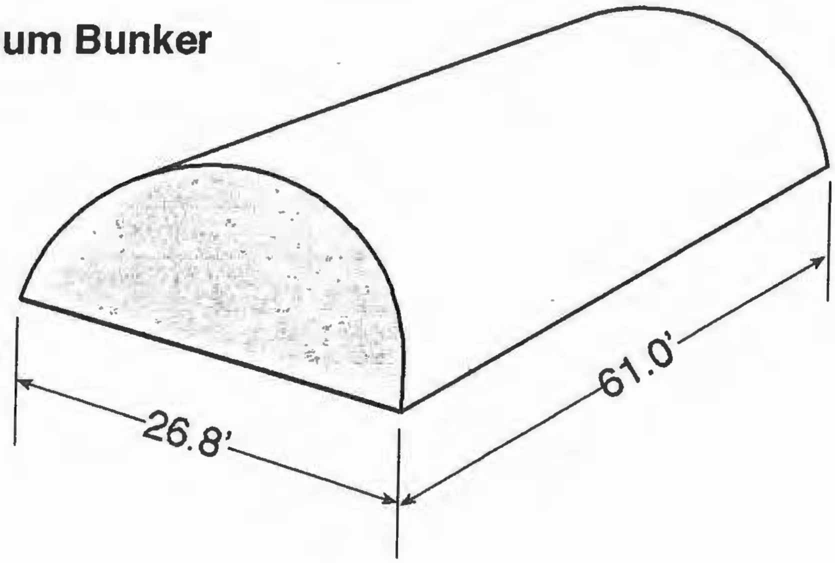


Bldg. 2084

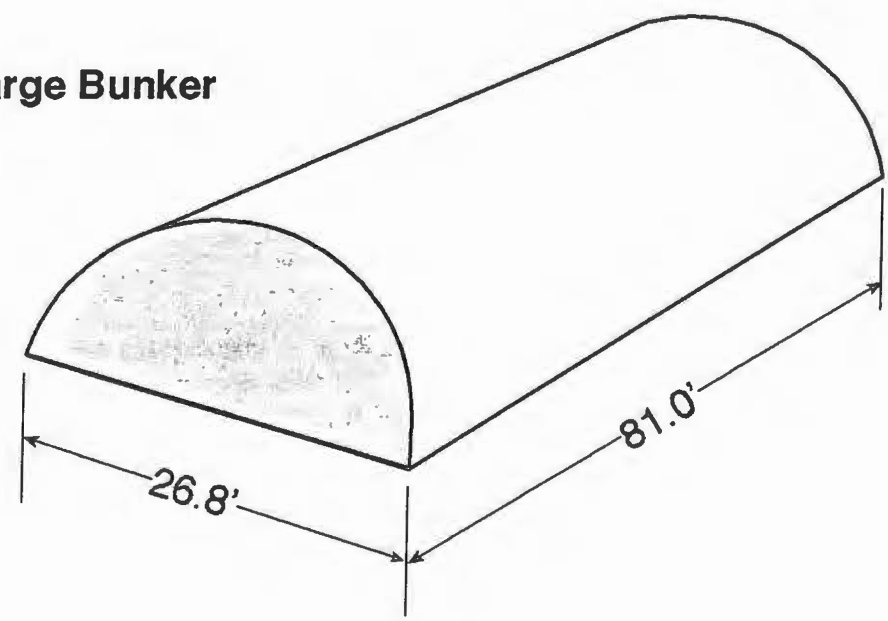
Entire Bldg. Class 2

FIGURE 5-6 Survey Areas for Building S-2084

Medium Bunker



Large Bunker



Class 3

FIGURE 5-7 Survey Areas for Storage Bunkers

Table 5-2
Summary of Building Survey Units

Building No.	Total floor area (m^2)	No. Survey Units/Size (m^2)		
		Class 1	Class 2	Class 3
5	1092	0	7 (1000 total)	1 (92)
306	536	0	7 (312 total)	1 (224)
356	18,600	0	0	5 (3720 ea.)
612	1,730	28 (3-250, completed)	0	0
2073	280	0	3 (280 total)	0
S-2084	510	0	4 (510 total)	0
Storage Bunkers (121 total)	150 (20-m length) 200 (25-m length)	0	0	93 (150 ea.) 28 (200 ea.)

5.4.3 Reference Coordinate Systems

Each survey unit would have a benchmark defined that would serve as an origin for documenting survey results. For buildings, a grid numbering system will be used for buildings that starts, for example, in the northeast corner and is numbered consecutively beginning with an "F" for floors, "W" for walls, "C" for ceilings, and "H" for other horizontal surfaces. The location of judgment samples in buildings will be documented in terms of linear horizontal and vertical distances from a designated corner and will be recorded on a drawing of the area. Samples taken from the grounds outside of buildings will be recorded with a standard geographic reference system with respect to a local geographical marker.

5.4.4 Reference Areas

To represent background radiological conditions at the site (structures and buildings, land areas) and to provide reference areas for conducting statistical comparisons of study areas, measurements will be made in one or more reference areas that have not been affected by site operations. Measurements have previously been made to establish background levels for gross activity in various materials in two different buildings, C0912 and 722. Table 5-3 provides the results of measurements for different survey instruments in C0912, a storage bunker that was not used for any radiological storage (U.S. Army 2001). Bunker C0912 will continue to serve as a control for future surveys of storage bunkers. It will be surveyed again as part of the current license termination effort.

Table 5-3
Survey Results for Different Survey Instruments Used in Building CO912

Instrument	Floor or Wall (Bunker C0912)	Background Range (counts per minute, cpm)
Gas Proportional – Floor Monitor (probe area = 425 cm^2)	Floor- Alpha Floor –Beta Floor – Alpha + Beta (scanning)	3-8 650-757 400-800
Gas Proportional – Hand-Held (probe area = 100 cm^2)	Wall – Alpha Wall- Beta Wall – Alpha + Beta (scanning) Floor – Alpha + Beta (scanning)	0-5 (0 for smears) 121-166 (0 for smears) 60-200 60-200
Phoswich (plastic scintillator, probe area = 86 cm^2)	Floor – Alpha Floor – Beta Wall – Alpha Wall – Beta Floor – Alpha + Beta (scanning) Wall - Alpha + Beta (scanning)	0-3 270-326 0-6 216-411 200-400 200-460
FIDLER (sodium iodide crystal, probe area = 126 cm^2)	Floor – Gamma (direct) Wall – Gamma (direct) Floor – Gamma (scanning) Wall – Gamma (scanning)	7,849-8,219 7,583-8,136 6,000-12,000 5,800-10,500

Building 722 surveys were performed with the same or similar devices on a variety of surfaces, materials, and equipment items. Gross activity levels covered a range similar to that in C0912. Building 722 is no longer available as a reference area for buildings other than storage bunkers. Building 118 is a suitable reference building and is proposed to serve that purpose for buildings other than storage bunkers. In addition, an area of soil that has not been impacted will be surveyed to establish background levels for field sodium iodide (NaI) detectors.

5.4.5 Selection of DCGLs

Two types of DCGLs are used for comparison of survey data. When computed for the average residual radioactivity in a survey unit, the derived guideline level is called a $DCGL_W$. A second guideline is derived for application to smaller areas, typically within a Class 1 survey unit. It is called the $DCGL_{EMC}$, where EMC stands for elevated measurement comparison. Both guidelines derive from the same dose, with the $DCGL_{EMC}$ corresponding to somewhat higher concentration levels in small areas that are computed using area factors. Used together for comparison to survey measurements, the two DCGL values ensure that an individual would not receive a dose in excess of the established criterion for unrestricted use.

Section 6 describes the modeling performed to develop the radionuclide-specific DCGLs for soil and building surfaces. These values will be used to establish operational DCGLs for survey units where measurements will be made that are not radionuclide-specific. They would also be used in the case when surrogate radionuclides were used. The operational DCGLs will be established for each survey unit on the basis of a representative radionuclide mix. For alpha or beta surface activity measurements, field measurements will consist of gross activity assessment. In these cases, gross activity DCGLs would be established on the basis of a representative radionuclide mix. The surrogate DCGLs, if needed, would be computed from the activity ratio between a difficult-to-detect radionuclide and the easy-to-detect radionuclide. The activity ratio would be established from characterization data. To establish $DCGL_{EMCs}$, area factors would be calculated.

In areas where there is more than one radionuclide of concern, the unity rule would be followed. That is, the sum of the ratios of the residual concentration of each radionuclide to its respective DCGL would not exceed unity. For the current plan, DU is the only contaminant of concern for the vast majority of areas. DU consists of U-238, U-235, and U-234, and their associated progeny. To simplify the release criteria, the isotopic composition of DU will be factored into a single operational DCGL value that can be implemented in a single gross alpha activity measurement. The combined DCGL will account for all the radioactive isotopes in the standard composition of DU stored at the Depot.

5.5 Final Status Survey Design Elements

After the $DCGL_w$ is established, a survey design will be developed that will select the appropriate survey instruments and techniques to provide adequate coverage of survey units though a combination of scans, fixed measurements, smears, and material sampling. This survey design process will ensure that data of sufficient quantity and quality are obtained to make decisions as to whether survey units meet the release criterion. Components of this process are as follows:

- Scanning measurements will be used to locate areas of elevated radioactivity, which may be evaluated in terms of the $DCGL_{EMC}$. Scanning measurements are made by moving a detector over an area at a uniform rate and distance from the surface. Measurements of gross alpha, beta and/or gamma activity will be made as determined by the nature of the radioactivity of the radionuclides of concern in a survey unit.

- Direct measurements of gross radioactivity will be taken at the centers of a systematic grid laid over survey units. A direct measurement is made by holding a detector at a fixed location over a surface for a specific counting duration. These measurements will be averaged over a survey unit for statistical comparison to the $DCGL_W$ using the Wilcoxon Rank Sum test. Grids will be laid out with a randomly determined starting point so measurements at the grid centers can be considered unbiased for statistical comparisons.

- Smear samples will be taken in survey units at the same locations as direct measurements. Where tritium is a contaminant of concern, wet smears will be taken. Results will be used for diagnostic purposes.

- Air duct and drain surveys may be performed in Class 2 buildings. Survey instruments, such as a "peanut" NaI detector, may be inserted into ducts or drains by using a rod or similar device to reach the accessible reaches of these conduits for characterization purposes. Smears or material samples may also be taken at the entry points of air ducts and drains.

- In situ measurements of gross gamma activity in soil will be taken at selected locations to detect the presence of any activity that may have been carried outside (e.g., by foot traffic or floor sweeping). Soil samples may be taken at locations of elevated activity. Measurements will be compared to soil DCGLs (Section 6.3).

5.5.1 Selecting the Number of Fixed Measurements and Locations

Fixed measurement surveys will be designed to meet the data quality objectives (DQOs) of the survey program. DQOs define the types, number, and locations of measurements needed to support a decision within prescribed limits of error, in this case, decisions regarding meeting release criteria. DQOs further indicate which survey instruments are appropriate for performing the surveys. Procedures for designing fixed and scanning measurement surveys and selecting instruments to meet program DQOs are given in MARSSIM. The BRAC radiological survey policy applies the principles in MARSSIM to BRAC commodity storage and repair sites in the specification of semi-standard survey designs.

5.5.1.1 Class 1 and 2 Survey Units

In accordance with MARSSIM and the BRAC radiological survey policy, Class 1 and 2 survey units will be surveyed with a combination of scanning measurements, direct measurements, and smear samples of removable activity. Material samples may also be taken from drains and air vents.

Scans will be performed over all or portions of Class 1 and Class 2 survey units:

- Class 1 surface areas receive a 100% scan of all surfaces

- Class 2 survey units receive scans of between 10 and 100% of floor and lower wall sections and between 10 and 50% of upper walls and ceilings. The specific areas to be scanned in Class 2 survey units will be determined by judgment on the basis of process knowledge and the potential for radiological contamination. Scans may also be performed inside drains and air ducts. Also, any fixtures or furniture that will be transferred along with the building will be scanned before release.

Direct measurements of radioactivity will be made on a systematic grid laid over a survey unit:

- For Class 2 areas, the number of direct measurements to be taken within a survey unit have been determined according to the methods and equations given in MARSSIM (Section 5.5.2). For contaminants present in background, such as uranium isotopes, or when gross activity measurements are made, as in the current case, data from direct measurements are evaluated in terms of the $DCGL_W$ by using the Wilcoxon Rank Sum test. The number of samples required to perform this statistical test depends on several factors, including predetermined acceptable rates of decision errors, the width of the "gray region" on a decision plot (MARSSIM, Section 5.5.2.2), and the variability of residual contaminant levels. Specific values of acceptable decision error rates, estimates of the standard deviation, and the resultant number of samples for the currently proposed surveys are provided in Table 5-4. While only 6 or 7 samples are required in survey units because of generally large relative shifts, a standard number of **10 samples per survey unit** is proposed for all Class 2 survey units to ensure a sufficient number of samples.

- Class 1 areas would be subject to an additional effort to detect areas of elevated contamination in excess of the $DCGL_{EMC}$. Because the $DCGL_{EMC}$ corresponds to the same dose as the widearea $DCGL_W$, but for a small area, it has a corresponding higher value. The actual value of the $DCGL_{EMC}$ is a function of the potential size of such elevated areas. The maximum size of an elevated area that would not be detected by direct grid measurements is roughly of the size of a grid cell. Therefore, grid size may have to be reduced and direct measurement numbers increased, to limit the size of elevated areas using Area Factors as described in MARSSIM (Section 5.5.2.4).

The currently proposed surveys include only areas initially classified as Class 2 or Class 3 areas. If any contamination exceeding $DCGL_w$'s were to be found in the scanning measurements of the Class 2 areas, these areas would be reclassified as Class 1 (see Section 5.5.3). As this possibility is considered remote, grid sizes and sample numbers will be determined without regard to the need to meet criteria for elevated areas. Should an area be reclassified as Class 1, however, grid sizes for direct measurements will be recalculated, taking into account the need to implement the $DCGL_{EMC}$ for elevated areas. As indicated above, all non-bunker buildings, except Warehouse 356 and Building 612, and grounds will initially contain at least one Class 2 area. Warehouse 356 is designated a Class 3 area, while Building 612 has already been surveyed in its entirety as Class 1.

Table 5-4
Minimum Number of Direct Measurements to be taken in Class 2 Survey Units

Bldg. No.	Limiting[1] radio-nuclide	Operational[2] $DCGL_w$ (dpm/100 cm^2)	LBGR[3] (dpm/100 cm^2)	CV[4]	Relative[5] Shift	α[6]	β[7]	N/2 for[8] WRS test
5 306 612 2073 S-2084 Storage Bunkers	U-235	5690	500 (alpha)	0.3	35	0.05	0.10	6
356	Th232+ Ra-228+ Th-228	340	200 (alpha)	0.3	2.3	0.05	0.10	7
A0201 A0316 A0317 A0508	Pu-239 H-3	2020 3.58E+09	200 (alpha) 3xE+05 (beta)	0.3 0.3	30 3.9E+4	0.05 0.05	0.10 0.10	6 6
A0701	Pm-147	3.47E+07	3E+04 (beta)	0.3	3850	0.05	0.10	6

[1]The limiting radionuclide of potential concern in a given building has the lowest DCGLw as given in Table 6-8 for any radionuclide for any room size.

[2]The operational DCGLw is associated with the limiting nuclide. It is the lowest value for any room size and allows conservative implementation of dose limits using gross activity field measurements.

[3]The lower bound of the gray region (LBGR) is the highest residual contamination level for which specified decision error rates are applicable. That is, it is the highest residual level that can be shown to be below action levels based on sample data, given expected sampling and analysis error. The selected LBGR affects the number of samples, N, needed to perform the WRS test. The value of 500 dpm/100 cm^2 for U-235 (DU) is an order of magnitude below the DCGL yet far above expected residual levels. The value of 200 dpm/100 cm2 selected for other alpha emitters, including DU, Pu-239, and natural thorium, is an order of magnitude above the MDA of the floor monitor, about 20 dpm/100cm2, yet well below DCGLs. Actual residuals are expected to be close to background (1-2 cpm/100 cm2). The value of 3E+05 dpm/100 cm2 for H-3 is one-half of ANSI N13.12 (1999), the surface standard for clearance. The value 3E+04 dpm/100 cm2 for Pm-147 is an order of magnitude above the MDA for beta for the floor monitor, roughly 3000 dpm/100 cm2, and far below the DCGL.

[4]The coefficient of variation, CV, is the estimated relative standard deviation of measurements of residuals. It is set at 0.3 per MARSSIM, Section 5.5.2.1, in the absence of preliminary data.

[5]The relative shift is defined as (DCGLw – LBGR)/σ, where σ is the estimated standard deviation of the survey unit, in this case, CV x LBGR.

[6]α is the specified acceptable level of Type I (false positive) decision errors, when the null hypothesis is that the survey unit exceeds the cleanup standard.

[7]β is the specified acceptable level of Type II (false negative) decision errors.

[8]N/2 is the number of samples required in survey units and background units to perform the WRS test given the specified relative shift and decision error limits. N is calculated as follows:

$$N = (Z_{1-\alpha}+Z_{1-\beta})^2 \ / \ 3(P_r-0.5)^2$$

Where:

$Z_{1-\alpha}$ and $Z_{1-\beta}$ are values from the standard normal distribution, and

P_r is the probability that a random measurement from the survey unit exceeds a random measurement from the background reference area by less than the $DCGL_w$ when the survey unit median is equal to the LBGR above background.

5.5.1.2 Class 3 Survey Units

By definition, MARSSIM Class 3 survey units are not expected to contain any areas of contamination. They will not, therefore, be subjected to wide-area scanning. Rather, a judgment approach will be used to select areas that would most likely be contaminated if any contamination were present. Areas will be selected on the basis of process knowledge and pathway analysis to select locations that, if free of contamination, would indicate that the survey unit as a whole was also clean.

In accordance with the BRAC radiological survey policy, Class 3 areas will undergo random sampling to verify that release criteria are met. Random sample locations are determined from a random number table or generator; they are not laid out over a grid. Following the BRAC policy, and consistent with MARSSIM, 30 random samples will be collected over an indoor area of up to 1,500 m^2. All of the approximately 120 storage bunkers and surrounding grounds under the license will be surveyed as Class 3 areas.

5.5.2 Judgmental Assessment

As discussed above, radiological surveys will be conducted in a judgmental manner to various extents in Class 2 and Class 3 areas as process knowledge and history would indicate. The purpose of such surveys is to confirm the absence of contamination in locations where it most likely would exist. Locations would be selected from a conceptual model of what processes took place within the facilities and how and where contamination might have migrated or collected. Surveys will typically be performed with scanning measurements. However, if areas of interest are small, such as at a drain opening, direct measurements may also be taken to improve detection limits.

5.5.3 Data Investigations

A review of survey data will be performed as they are collected to support two main objectives — to ensure that measurement devices are working within their expected normal ranges, and to support accurate classification of survey areas, which supports the design of final status surveys. Such data reviews would help assure the effectiveness of the final surveys. Accurate initial classification of areas would prevent under or over surveying of those areas.

The criteria selected for use in data investigations will depend on survey unit classification. In the current program, all survey units will be initially classified as either Class 2 or Class 3. In Class 2 survey units, no measurements are expected to exceed $DCGL_w$'s. Therefore, any direct or scan measurement approaching or exceeding $DCGL_w$'s will be investigated. In Class 3 areas, any direct measurement or scan above background would be investigated, as these areas are assumed to be uncontaminated.

Data investigations would address concerns of the existence of isolated areas of elevated radioactivity that are not addressed in the design of Class 2 or Class 3 surveys. They will involve first confirming the elevated measurement with a second measurement. If the elevated reading is confirmed, the area around the measurement point would be investigated to define the extent of contamination. Possible sources of the contamination would be postulated, and the conceptual model would be modified to suggest other locations of similar concern. Pending the results of these efforts, an area may be reclassified to a more restrictive classification. Such reclassification may require resurvey of the study areas under an appropriate survey design. This procedure may be conducted without NRC approval. Conversely, any reclassifications to less restrictive classifications would require preapproval by NRC.

5.6 Survey Implementation and Data Collection

Survey implementation is the process of carrying out the survey plan for a given survey unit. This consists of making scan measurements and fixed measurements, and collecting and analyzing samples. Scan measurements will always be made, while fixed measurements and sampling may not be necessary.

5.6.1 Survey Methods

Surveys will employ a combination of judgmental and statistical measurements, using scanning, direct, and material sampling, to implement dose-based release criteria. The degree and proportion that each of these types of measurements will be used will depend on area classifications. Measurement devices will be employed that are appropriate in terms of the types of radiation expected and sensitivity required for the various types of measurements being made. The devices will be calibrated to NIST-traceable standards in accordance with the NRC licenses.

5.6.2 Survey Instrumentation

5.6.2.1 Scanning Surveys

Instruments selected for scanning surveys will be of a type that responds to the principal types of radiation, alpha, beta, or gamma that are emitted from radionuclides of concern. As DU is the contaminant of concern in the vast majority of areas covered by this plan and because the primary emissions of its constituents are alpha particles, gross alpha detectors will be the primary instruments used in these surveys. In a few locations, where tritium or promethium-147, which are beta emitters, will be of interest, instruments that detect gross beta will be used. Tritium and other low-energy emitters will be analyzed primarily on smear samples using laboratory liquid scintillation counting (LSC). Gamma detection instruments, such as NaI devices, will be used to a limited extent in buildings, primarily for characterization of uranium isotopes or decay products in selected locations or in locations that are difficult to access with alpha probes. Gamma detectors, however, would play a primary role in any outdoor scanning surveys.

The devices listed in Table 5-5 have been used effectively in the past at the Depot for both scanning and direct measurements (U.S. Army 2000, 2001). The same or similar instruments will be used in the current surveys. The minimum detectable activities (MDAs) listed in Table 5-5 were determined (U.S. Army 2000) using MARSSIM equations 6-8, 6-9, and 6-10 combined as follows:

$$MDA_{scan} = \frac{\frac{60}{i} * 1.38\sqrt{B_R * t}}{\sqrt{p E_d E_s}\,\frac{A}{100cm^2}}$$

MDA_{scan}	= Minimum detectable scanning activity in dpm per 100 cm^2
B_R	= Background rate in cpm
P	= Surveyor efficiency (0.5, MARSSIM)
i	= Observation time interval in seconds
t	= Scan observation interval in minutes (0.03 mins, MARSSIM)
E_s	= Surface efficiency in counts per disintegration (0.5, MARSSIM)
E_d	= Detector efficiency in counts per disintegration
A	= Active probe area in cm^2

The value for the observational time interval (i), the time a given point is under the probe during scanning is assumed to be 2 seconds (0.03 minutes) per MARSSIM guidance. The factor 1.38 in the numerator of the above equation is taken from MARSSIM table 6.5 and corresponds to a 95% rate of true detects and a 60% rate of false positives. Such error rates are compatible with the objective of first-time screening of areas where one wants to err on the side of detection.

5.6.2.2 Direct Measurements

Direct radioactivity measurements will primarily be made with the same devices used for scanning (Table 5-5). When the same device is used for both scanning and direct measurements, such measurements may be carried out concurrently in an area to optimize field efforts. A standard counting time of, for example, 1-minute will be used for direct measurements. MDAs should be no higher than 10-50% of DCGLs to assure detection of concentrations of interest. MDAs listed in Table 5-5 were calculated from MARSSIM equation 6-7 as follows:

$$MDA = \frac{3 + 4.65\sqrt{B}}{E * \frac{A}{100}}$$

where

MDA = Minimum detectable concentration

B = Background counts in cpm

E = Detector efficiency in counts per disintegration

A = Active probe area in cm^2

From the discussion in Section 6.7.1 of MARSSIM, the constants in the numerator of the above equation, 3 and 4.65, correspond to false positive and false negative rates for detection of 5%.

Smear samples will be screened in the field for gross alpha and gross beta activity with a hand-held gas proportional detector. Smears and/or material samples may also be sent for laboratory analysis of specific radionuclides. The analyses would be performed to confirm the radiological composition of the contamination underlying elevated gross activity measurements. Laboratory methods would employ conventional spectrometric and counting methods that meet the survey program measurement objectives.

For the interpretation of gross activity readings in the field, flag values will be computed in terms of the instrument count rate (cpm) that is equivalent to the operational DCGL for a given radionuclide mix in dpm/100 cm^2 plus background (Bkg) count rate (cpm) as follows:

$$\text{Flag cpm} = \text{Bkg cpm} + A \times E \times \text{DCGL}/100\ cm^2$$

where

A = detector probe size (cm^2),

E = detector efficiency (unitless), and

DCGL = the operational DCGL (pCi/g or dpm/100 cm^2).

Table 5-5
Instruments Used in Previous Seneca Depot Activity Surveys[a]

Instrument[b]	Model	Serial No.	Probe Area (cm^2)	Rad Type	Source	Eff	Bkg (cpm)	Scan MDA dpm/100 cm^2)	Static MDA (dpm/100 cm^2)
Floor monitor	Ludlum 2360	138256	425	Alpha	Th-230	0.12	2	60	20
Floor monitor	Ludlum 2360	138256	425	Beta	Tc-99	0.22	800	610	140
Floor monitor	Ludlum 2360	138262	425	Alpha	Th-230	0.09	1	50	20
Floor monitor	Ludlum 2360	138262	425	Beta	Tc-99	0.20	440	500	120
Hand-held	Ludlum 2360	138238	100	Alpha	Th-230	0.18	1	110	40
Hand-held	Ludlum 2360	138238	100	Beta	Tc-99	0.20	73	870	280
Hand-held	Ludlum 2360	138254	100	Alpha	Th-230	0.20	1	100	40
Hand-held	Ludlum 2360	138254	100	Beta	Tc-99	0.21	81	870	210
FIDLER[c]	Bicron Analyst	A959P	126	Gamma	Am-241	0.02	6500	65,000	15,000

[a] Notation:
cm^2 = square centimeters
Eff = detector efficiency (ratio of detector counts per minute to source disintegrations per minute at a fixed geometry)
Bkg = background
cpm = counts per minute
MDA = minimum detectable activity (dpm/100cm^2 of area scanned)
dpm = disintegration per minute

[b] Floor monitor and hand-held devices are gas proportional counters; the FIDLER is a sodium iodide (NaI) detector. Laboratory LSC will be used to analyze low-energy beta emitters, including H-3 on smears.

[c] The apparent low efficiency of the FIDLER will be checked for future surveys.

5.6.3 Survey Considerations

5.6.3.1 Scanning Thresholds and Locations and ALARA

Some guidelines are necessary for the conduct and interpretation of scanning measurements in Class 2 and Class 3 areas. The MDAs of the scanning instruments used may be above the $DCGL_W$ release criteria, particularly in outdoor areas. Also, in Class 2 and Class 3 areas, $DCGL_{EMC}$ criteria for elevated areas are not employed, because the probability of the presence of such areas is considered remote. In such cases, the principle of "best reasonable effort" will be used to achieve practical scanning detection thresholds used in systematic or judgmental scanning surveys.

Detecting DU on building surfaces at $DCGL_W$ release criteria (Section 6) with conventional gas proportional counters does not appear to be a problem, considering established MDAs. Detection limits may be more of an issue for scanning measurements made in land areas with NaI detectors, such as the FIDLER. However, it is expected that direct readings with such devices should be able to detect, for example, uranium-238 at the soil DCGL of 103 pCi/g (MARSSIM, Appendix H, and Section 6.3 of this report). In judgmental surveys using NaI detectors, in order to improve detection limits, scanning speed may be reduced or direct measurements made in locations deemed most likely, on the basis of conceptual models, to be contaminated. This approach would be considered as achieving the goal of detecting contamination "as low as reasonably achievable" or ALARA.

Along these lines, the strategy for selecting locations for 10 to 100% scanning in Class 2 areas will be based on a conceptual model of contaminant distribution, focusing on areas most likely to be contaminated. If no other basis for determining scanning locations exists, at least 10% of areas would be scanned along systematic transects of survey units, or with randomly selected grid cells. In either Class 2 or Class 3 areas, any survey reading above background levels will be investigated further by appropriate means.

5.6.3.2 Surveying Land Areas

The grounds around the major buildings and areas outside the entranceways to the storage bunkers will be included in investigations. Land areas will initially be investigated by taking in situ gamma measurements in selected locations. If any indication of contamination is found, survey units will be defined. Such soil survey units might encompass two or more adjacent buildings. Radionuclides of concern for land areas would be the same as for the associated building or buildings. Survey instruments for land areas, however, will differ from those used inside buildings. Outdoor surveys will rely primarily on gamma detection of radionuclides of concern or associated decay products. Both scanning and direct measurements may be made with a FIDLER or other gamma detector, such as a 2X2 NaI crystal.

5.7 Survey Data Assessment

The survey data assessment process includes data verification and validation, review of survey design basis, and data analysis. For a given survey unit, the survey data are evaluated to determine if the residual radioactivity in the survey unit meets the applicable release criterion and if any areas of elevated activity exist. MARSSIM specifies two non-parametric statistical tests (Sign test and Wilcoxon Rank Sum test) to be applied to final status survey data to evaluate whether a set of measurement results demonstrates compliance with the release criterion for a given survey unit. The Sign test is applied if data are radionuclide specific and the radionuclide of interest is not present in the background. The Wilcoxon Rank Sum test is applied if the radionuclide does appear in the background or if gross activity measurements are considered.

5.8 Final Status Survey Reports

The documentation describing the final status survey for a given survey unit would be prepared and made available to NRC. The survey report would be a stand-alone report and would include the following:

- A physical description of the survey area that encompasses the survey units (the survey areas and survey units may be same);
- The characterization data associated with the survey area;
- The classification history of the survey unit;
- The remediation activities (if any) performed in the survey unit;
- A discussion of the survey design;
- Tabular and graphical depiction of survey results;
- Discussion of data assessment, including graphical depictions; and
- Conclusions that survey units meet all applicable criteria.

5.9 Quality Assurance and Quality Control Measures

Quality assurance and control measures (QA/QC) are employed throughout the final status survey process to ensure that all decisions are made on the basis of data of acceptable quality. As described above, the DQO process would be followed in the design of surveys and in the specification of measurement types and instrumentation. A Quality Assurance Project Plan (QAPP) will be prepared that will cover all project QA/QC requirements and activities, as well as project DQOs.

Data quality indicators (DQIs) are quantitative and qualitative measures of the reliability of the selected measurement methods. Such indicators include the inherent accuracy, precision, representativeness, completeness, and comparability of the data. Measurement instruments and methods will be evaluated in terms of these indicators when they are selected for surveys. DQIs will be included in the QAPP.

A quality assurance program will be carried out during surveys that, in accordance with the QAPP, will specify and measure the performance of measurement methods through the collection of an appropriate number or frequency of QC samples. Such samples could include blanks, replicates, and spiked samples, as well as measurements in reference areas. Field instruments will be calibrated on NIST-traceable standards at a frequency prescribed in the QAPP. Twice-daily response checks will be performed for all field instruments before use. Corrective actions will be carried out if performance falls outside expected ranges.

In addition, QA/QC measures will ensure that trained personnel carry out surveys with approved QAPP procedures and properly calibrated instruments. Procedures would cover sample documentation, chain of custody, field and laboratory QC measurements, and data management.

6 COMPLIANCE WITH THE RADIOLOGICAL CRITERIA FOR LICENSE TERMINATION OR RELEASE

The licensee needs to clearly present in the LTP the radiological criteria proposed for license termination or release. The licensee should describe the methods used to demonstrate compliance.

6.1 Site Release Criteria

The release criteria for the SEDA site will correspond to the dose criterion of 10 mrem/yr (New York State TAGM 4003, 1993). According to this dose criterion, the residual radioactivity that is distinguishable from background radiation results in a total effective dose equivalent (TEDE) to an average member of the critical group that does not exceed 10 mrem/yr.

Levels of residual radioactivity that correspond to the allowable radiation dose are calculated by analysis of various scenarios and pathways through which exposures could be reasonably expected to occur. These derived levels, or derived concentration guideline levels (DCGLs), are the concentration of residual radioactivity distinguishable from background that, if uniformly distributed throughout a survey unit, would result in a TEDE to an average member of a critical group equivalent to the allowable dose. The NRC applies a TEDE standard of 25 mrem/yr; for this site, a TEDE of 10 mrem/yr (a more restrictive criterion) based on the TAGM 4003 guide was selected.

License termination will require evaluation of residual radiological contamination from two sources, building surfaces and soil outside buildings. DCGLs for both sources are calculated below, each based on a dose of 10 mrem/yr to the critical receptor. That receptor, therefore, could not receive a total dose in excess of 20 mrem/yr. Further, such dose would be reduced by at least the amount attributed to soil external gamma to the receptor while indoors, since soil beneath the buildings is not contaminated as assumed in the soil DCGL computations.

6.2 Dose Modeling Approach

6.2.1 Overview

The basic components in a dose modeling assessment include: source term assumptions; exposure scenarios; mathematical dose models; and the parameter values used in the dose models.

Considering the activities that occurred on the SEDA site, it is expected that any residual radioactivity would be confined to the surface soil layer or on the building surfaces. On the basis of the historical site assessment, the radionuclides associated with licensed operations are listed in Table 6-1, along with their half-lives and associated radiations. The radionuclides included are H-3, Pm-147, Pu-239, Ra-226, Ra-228, Th-228, Th-232, U-234, U-235, and U-238. DCGLs were developed for these radionuclides and their progeny in the decay chain (Sm-147, Pa-231, Ac-227, Th-230, and Pb-210).

To calculate DCGLs, dose models which translate levels of residual radioactivity in environmental media or on interior building surfaces into potential radiation doses to members of the public were developed based on the guidance found in several NRC documents (DG-4006, NUREG-1727, NUREG/CR-5521, Volume 1, and NUREG-1549). The approach taken for dose modeling for the SEDA site is consistent with the information provided in Section 5 and Appendix C of NUREG-1727.

Two scenarios were considered — resident farmer and building occupancy — similar to the scenarios described in NUREG/CR-5512, Volume 1. The resident farmer scenario was chosen to develop soil DCGLs, and the building occupancy scenario was used to develop building DCGLs. The RESRAD (Version 6.21) computer code was used to model the resident farmer scenario and RESRAD-BUILD (Version 3.21) was used to model the building occupancy scenario. The DCGLs were derived from the deterministic and the probabilistic modules of RESRAD and RESRAD-BUILD codes. The probabilistic analysis was performed to identify sensitive parameters for individual radionuclides. The conservative parameter values were selected in accordance with the guidance presented in NUREG/CR-6755, -6676, -6692, and -6697. Conservative values for the key (sensitive) parameters were used in the deterministic analysis to ensure conservative results. DCGLs were derived for all radionuclides listed in Table 6-1.

6.2.2 Resident Farmer Scenario

A resident farmer scenario similar to the residential scenario described in NUREG/CR-5512, Volume 1, was selected to estimate the dose resulting from the residual radioactivity in soil. Under this scenario, a hypothetical farmer who resides on the site was identified as the average member of the critical group, the subject of the dose modeling. The resident farmer lives on the site after the site is released for unrestricted use, drinks water obtained from a well located at the downgradient edge of the study area, ingests plant foods grown in a garden in the study area, ingests fish taken from a pond that is assumed to be constructed adjacent to and downgradient of the study area, and ingests meat and milk from livestock raised in the study area. All water used for drinking, household purposes, irrigation, and livestock watering is assumed to be drawn from the on-site well. It is implausible that any other set of human activities would occur on site that would result in a dose exceeding that for a resident farmer. It is more likely that the behavior of the future resident would result in a lower dose. For example, the hypothetical dose in an industrial setting from residual radioactivity in the soil would be much less than for a resident farmer, because the industrial worker would not ingest the food derived from on-site.

Table 6-1

List of Radionuclides, Their Half-Lives, and Associated Radiations (gammas with collapsed energies and yields)

Principal Radionuclides	Half-Life (yr)	Associated Decay Chain	Product Radionuclide	Half-Life (yr)	Associated Radiations
H-3	12.35	-	He-3	-	Beta
Pm-147	2.6234	-	Sm-147	1.06E11	Beta, and gamma (86.4 keV, 5E-5)
Sm-147	1.06E11	-	Nd-143	-	Alpha
Ra-226+D[a]	1600	Rn-222, Po-218, Pb-214, At-218, Bi-214, Po-214, Tl-210	Pb-210	22.3	Alpha, beta, and gammas (26.7 keV, 0.138; 93.0 keV, 0.246; 481 keV, 1.27; 1530 keV, 0.679)
Pb-210	22.3	Bi-210, Po-210	Pb-206	-	Alpha, beta, and gamma (12.4 keV, 0.237; 46.5 keV, 0.0405)
Ra-228+D	5.75	Ac-228	Th-228	1.9131	Beta, and gamma (14.9 keV, 0.358; 301 keV, 0.492; 1010 keV, 0.766)
Th-228+D	1.9131	Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Po-212, Tl-208	Pb-208	-	Alpha, beta, and gamma (13.6 keV, 0.314; 177 keV, 0.947; 654 keV, 0.603; 2550 keV, 0.387)
Th-232[b]	1.41E10	-	Ra-228	5.75	Alpha, few low-energy gamma (14.5 keV, 0.08; 72.1 keV, 0.0025)
U-234	2.45E5	-	Th-230	7.7E4	Alpha, few low-energy gamma (15.3 keV, 0.105; 71.3 keV, 0.00166)
Th-230	7.7E4	-	Ra-226	1600	Alpha and gammas (14.5 keV, 0.081; 82.7 keV, 0.0045)
U-235+D	7.038E8	Th-231	Pa-231	3.28E4	Alpha and gamma (16.8 keV, 1.14; 159 keV, 1.01)
Pa-231	3.28E4	-	Ac-227	21.6	Alpha and gamma (16.2 keV, 0.787; 90.9 keV, 0.00695; 283 keV, 0.13)
Ac-227	21.6	Th-227, Fr-223, Ra-223, Rn-219, Po-215, Pb-211, Bi-211, Tl-207, Po-211	Pb-207	-	Alpha, beta, and gammas (14 keV, 0.641; 94.2 keV, 0.906; 330 keV, 0.86)
U-238+D	4.468E9	Th-234	U-234	2.45E5	Alpha and gamma (15.5 keV, 0.191; 82.7 keV, 0.102; 915 keV, 0.0146)
Pu-239	2.41E4	-	U-235	7.038E8	Alpha and low-energy gamma (16.1 keV, 0.0417; 48.8 keV, 0.00027; 187 keV, 0.00021)

[a]+D indicates that the associated radionuclides with half-lives less than 6 months are assumed to be in equilibrium with principal radionuclide.

[b]Th-232 may actually be in equilibrium with its progeny Ra-228 and Th-228, which means it can be detected from detecting either Ra-228 or Th-228.

6.2.3 Building Occupancy Scenario

A building occupancy scenario similar to the building occupancy scenario described in NUREG/CR-5512, Volume 1, was selected to estimate the dose resulting from residual radioactivity on concrete surfaces in buildings. The scenario identifies a hypothetical person who uses the building as a residence (spends about 16.3 hours per day inside the building) as the average member of the critical group, the subject of the dose modeling. The person occupies the building in a normal manner without deliberately disturbing sources of residual radioactivity. The person is exposed to external radiation directly from the source, radioactive material deposited on the floor; external radiation from submersion in airborne dust; internal dose from inhalation of airborne radionuclides; internal dose from inadvertent ingestion of radionuclides directly from the source; and the internal dose from inadvertent ingestion of radionuclides from the source. It is implausible that any other set of activities would occur in the standing building that would result in a dose exceeding that for a building resident. If a building were used for commercial activities, the building occupant would occupy the building for much less time than a resident, resulting in a lower dose.

6.3 RESRAD and RESRAD-BUILD Codes

RESRAD (Yu et al., 2001) and RESRAD-BUILD (Yu et al., 1994) are two multimedia computer codes developed by Argonne National Laboratory under sponsorship of the U.S. Department of Energy (DOE) for use in evaluating radioactively contaminated sites and buildings, respectively. RESRAD and RESRAD-BUILD are pathway analysis models designed to evaluate the TEDE incurred by an individual who lives at a site with radioactively contaminated soil or who resides/works in a building containing residual radioactive material.

The RESRAD code addresses radioactive contaminants in soil and their transport in air, water, and biological media to a hypothetical receptor. Nine exposure pathways are considered in RESRAD: direct exposure; inhalation of particulates and radon; and ingestion of plant foods, meat, milk, aquatic foods, water, and soil. Figure 6.1 illustrates conceptually the exposure pathways considered in RESRAD. RESRAD calculates the time-integrated annual dose, soil cleanup guidelines, radionuclide concentration, and lifetime cancer risk as a function of time. The code also estimates at which time within the 1,000 year modeling period the peak dose occurs for each radionuclide.

The RESRAD-BUILD code computes dose to a receptor from residual contamination on interior building surfaces. Contamination may be released into the indoor air by diffusion, mechanical removal, or erosion. Seven exposure pathways are considered in RESRAD-BUILD: external exposure directly from the source; external exposure to materials deposited on the floor; external exposure due to air submersion; inhalation of airborne radioactive particulates; inhalation of aerosol indoor radon progeny; inadvertent ingestion of radioactive material directly from the sources; and inadvertent ingestion of materials deposited on the surfaces of the building's rooms

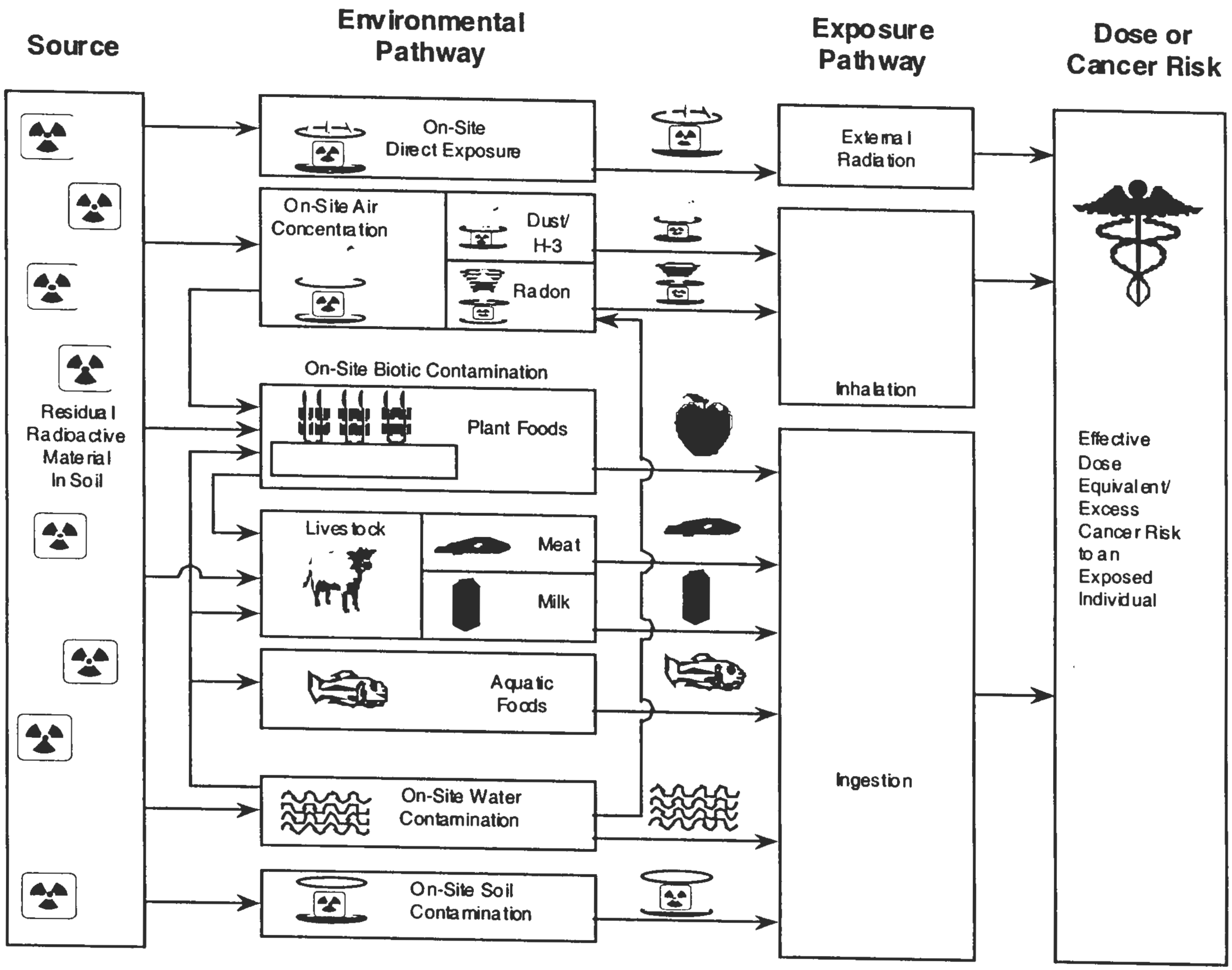


Figure 6.1 Exposure Pathways Considered in the RESRAD Code

or furniture. Figure 6.2 shows the release mechanisms and the pathways considered in RESRAD-BUILD code.

RESRAD and RESRAD-BUILD codes have been used for many years to make deterministic, or single value, estimates of dose. Deterministic analysis uses a single value for each input parameter, resulting in a single-dose output value. The recently developed probabilistic approach, on the other hand, uses a probability distribution for each model input parameter of uncertain value. The model is run repeatedly (for a specified number of iterations), using randomly selected values from the defined distributions of each of the uncertain input parameter for each run. Instead of yielding a single model output as in a deterministic run, probabilistic analysis produces a set (distribution) of output values that quantify the uncertainty in dose estimates resulting from uncertainty in the input parameters.

The two primary reasons for performing probabilistic analysis were (1) to characterize uncertainty in model output (dose) and (2) to identify input parameters that were sources of uncertainty in model output (dose). Most of the variations in the output dose distribution could be attributed to uncertainty in a small set of input parameters that could be considered as sensitive parameter distributions (key parameters). A correlation/regression analysis can be used to identify these key parameters. The probabilistic modules of the RESRAD and RESRAD-BUILD codes facilitate the analysis of effects of uncertainty in input parameters in the model.

The codes output cumulative probability distributions of dose and correlation coefficients that identify the relationship of the resultant doses with the input parameters. The correlation results include a table of partial correlation coefficients (PCC), standardized regression coefficients (SRC), partial rank correlation coefficients (PRCC), and the standardized rank regression coefficient (SRRC) as well as their associated correlation ranks. The correlation ranking of the parameters is based on the absolute value of the correlation coefficients; rank 1 is assigned to the parameter with the highest value. Thus, a parameter with a correlation rank of 1 has the strongest relationship with the dose. Information obtained from this analysis is used to select appropriately conservative values for the sensitive input parameters for the deterministic runs as discussed in the next section.

6.4 Parameter Value Selection Process

The RESRAD/RESRAD-BUILD dose modeling described above requires the selection of values for a large number of input parameters used by the models. The parameter value selection process was developed in accordance with the guidance presented in NUREG/CR-6755, -6676, -6692, and -6697. The process ensures that conservative values are selected in the dose modeling. Figure 6.3 outlines the selection process.

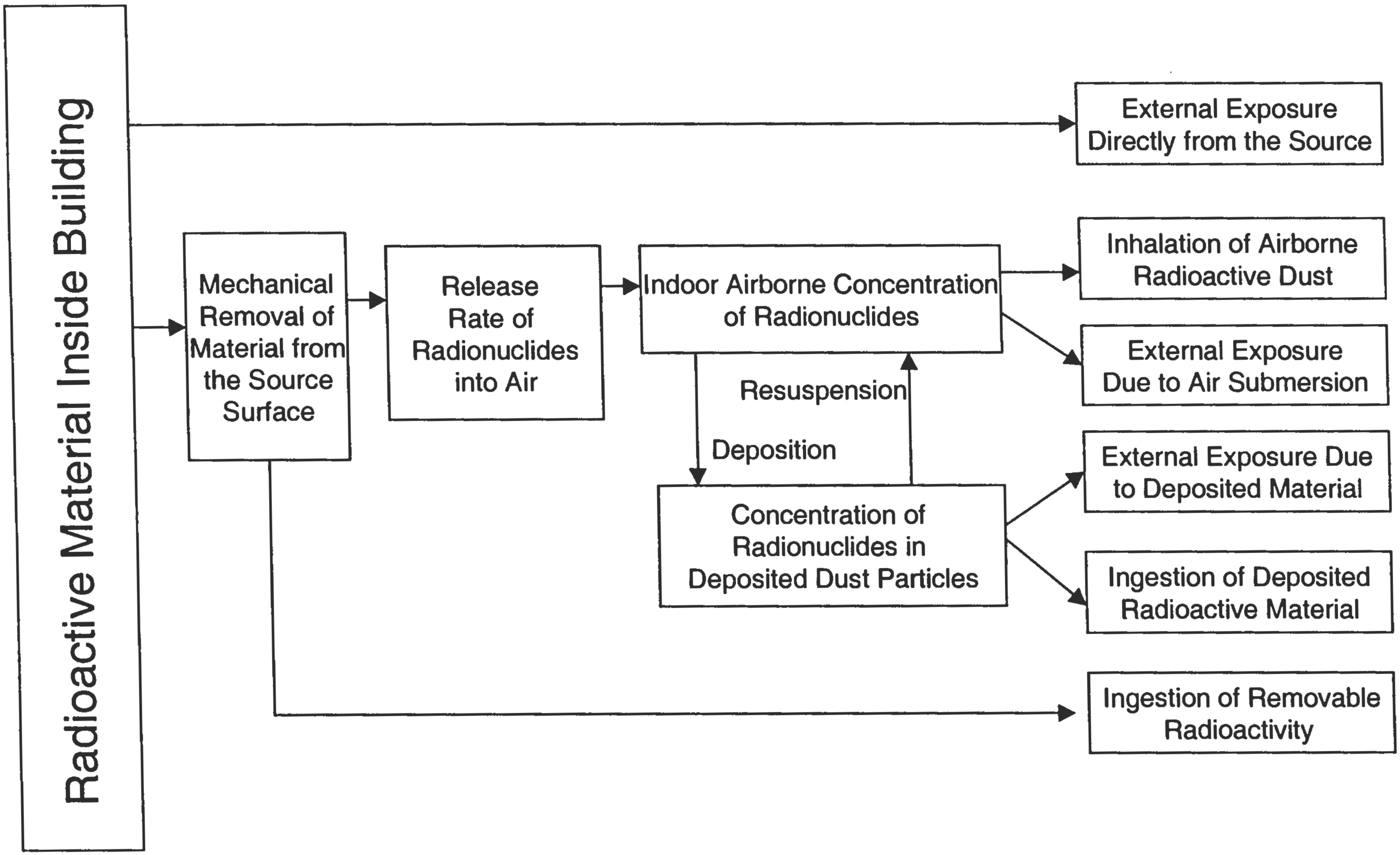


Figure 6.2 Exposure Pathways and Release Mechanisms Considered in the RESRAD-BUILD Code

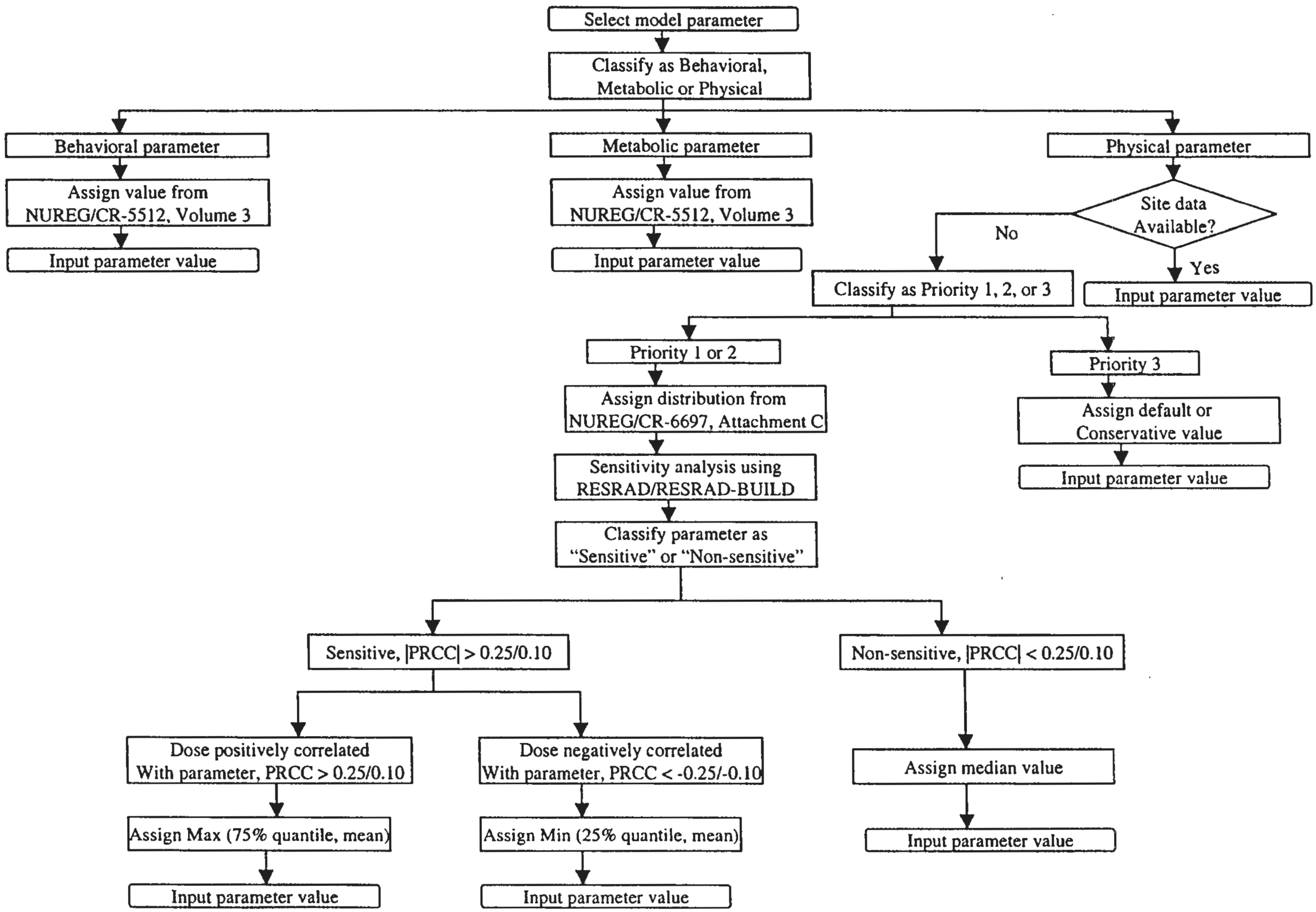


Figure 6.3 Parameter Selection Process

6.4.1 Parameter Classification

The RESRAD code requires about 150 input parameters and RESRAD-BUILD requires about 50 input parameters, which are presented in more detail in the next section. To begin the process of assigning proper input parameter values, parameters were classified into three types - physical, behavioral, and metabolic. The physical parameters are source- and site-specific and would not change if a different group of receptors were considered. Behavioral parameter values depend on the receptor's behavior and the scenario definition. For the same group of receptors, behavior parameter values could change if the scenario changed (e.g., parameters for other use of the site could be different from those for residential use). A metabolic parameter represents a metabolic characteristic of the potential receptor and is independent of the scenario.

6.4.2 Parameter Prioritization

The NUREG/CR-6697 ranked parameters into three priority levels: high priority, medium priority, and low priority. The assignment of priority was based on four attributes: (1) relevance of parameters in dose calculations, (2) variability of radiation dose as a result of changes in the parameter value, (3) parameter type, and (4) data availability. The numeric scores of the four attributes were summed for each parameter, and an overall rank of 1-to-3 was assigned on the basis of the sum of the scores. Thus, the current parameters were ranked and placed in one of three priority categories (priority 1 through 3). Priority 1 was assigned to the most relevant (high priority) parameters and priority 3 to the least (low priority) parameters. Priority 3 parameters were excluded from probabilistic analysis because parameters in this category had already been determined to be of insignificant impact on the overall results of dose estimation (in NUREG/CR-6697 analysis). Therefore, distributions were assigned to most priority 1 and 2 parameters in RESRAD and RESRAD-BUILD.

6.4.3 Parameter Treatment

Deterministic runs were conducted using a single value for all inputs. In the probabilistic runs, the parameters were treated as deterministic or probabilistic depending on parameter type, priority, availability of site-specific data and the relevance of the parameter in dose calculations. As shown in Figure 6.3, the behavioral and metabolic parameters were treated as deterministic. The physical parameters for which site-specific values were available were also treated as deterministic. The remaining physical parameters for which no site specific values were available were classified as priority 1, 2, or 3. Priority 1 and 2 parameters were treated as probabilistic and the priority 3 parameters, which were determined to be of insignificant impact on the overall dose, were treated as deterministic inputs.

6.4.4 Sensitivity Analyses

The purpose of the sensitivity analysis was to determine which of the probabilistic parameters (parameters for which a distribution was developed in NUREG/CR-6697) have the greatest influence on the resultant dose and hence the DCGLs. Based on the sensitivity analysis the parameters found to be sensitive were assigned conservative values in the deterministic analysis. The analysis was performed using the probabilistic modules of the RESRAD, Version 6.21, and RESRAD-BUILD Version 3.21. The probabilistic parameters were assigned distributions from NUREG/CR-6697, Attachment C. The analyses were run using 1000 observations and 1 repetition. The Latin Hypercube Sampling (LHS) technique was used to generate the input parameter values from the assigned distribution. In cases for which a clear relationship exists between parameters (such as density and porosity, porosity and effective porosity), strong rank correlations were used as inputs to ensure proper pairing.

The sensitivity analysis was performed for each of the radionuclides listed in Table 6-1. The partial rank correlation coefficient (PRCC) for the peak dose, which estimates nonlinear monotonic relationship and quantifies the unique contribution of the input parameter to the resultant dose, was used as a measure of the sensitivity of the each parameter to the peak dose. For the resident farmer scenario, a parameter was identified as sensitive if the absolute value of PRCC was greater than or equal to 0.25 and not sensitive if the absolute value of PRCC was less than 0.25. For the building occupancy scenario, a parameter was identified as sensitive if the absolute value of PRCC was greater than or equal to 0.10 and not sensitive if the absolute value of PRCC was less than 0.10. The thresholds for PRCC are based on the guidance in NUREG/CR-6676.

6.4.5 Parameter Value Assignment

For the deterministic RESRAD/RESRAD-BUILD runs, parameter values were assigned based on considerations of the parameter type, site-specific data availability, priority, and the parameter sensitivity in dose calculations. For the probabilistic RESRAD/RESRAD-BUILD runs, if a parameter were treated as probabilistic, the parameter distribution was assigned from NUREG/CR-6697, and if the parameter was treated as deterministic, the same value as the deterministic run was assigned. Figure 6.3 shows how the values are assigned.

The behavioral and metabolic parameters were assigned values from NUREG/CR-5512, Volume 3; NUREG/CR-6697; or RESRAD/RESRAD-BUILD defaults (in order of priority).

The physical parameters were assigned values as follows:

- Physical parameters for which site-specific data were available were assigned site-specific values.

- Priority 1 and 2 physical parameters which were found to be sensitive (|PRCC| ≥ 0.25 in the case of RESRAD and |PRCC| ≥ 0.10 in the case of RESRAD-BUILD) were assigned conservative values. Depending on whether the parameter was positively or negatively correlated with dose, the 75% or 25% quantile value of the distribution for that parameter was used, respectively. The mean value of the distribution was also calculated for those parameters which were positively or negatively correlated with dose. For positively correlated parameters, if the mean of the distribution was greater than the 75% quantile value (skewed distribution), the parameter was assigned the mean value. For negatively correlated parameters, if the mean of the distribution was less than the 25% quantile value (skewed distribution), the parameter was assigned the mean value.

- Priority 1 and 2 physical parameters which were found to be sensitive (|PRCC| ≥ 0.25 in the case of RESRAD and |PRCC| ≥ 0.10 in the case of RESRAD-BUILD) and were also correlated with other physical parameters were assigned conservative values based on the sensitivity and dose correlation.

    - When both parameters were sensitive and the dose correlations were similar to the parameter correlation, values for both parameters were assigned as described above.

    - When both parameters were sensitive and dose correlations were not similar to the parameter correlation (i.e., for positively correlated parameters dose increases with an increase in one parameter and decreases with an increase in the other parameter), mean values were assigned to both parameters.

- Priority 1 and 2 physical parameters shown to be non-sensitive (|PRCC| < 0.25 in the case of RESRAD and |PRCC| < 0.10 in the case of RESRAD-BUILD) but correlated with a physical parameter shown to be sensitive were assigned values based on the conservative value assigned to the sensitive parameter.

- Priority 1 and 2 physical parameters shown to be non-sensitive (|PRCC| < 0.25 in the case of RESRAD and |PRCC| < 0.10 in the case of RESRAD-BUILD) were assigned median values from NUREG/CR-6697, Attachment C.

- Priority 3 physical parameters were assigned values from NUREG/CR-5512, Volume 3, or from the RESRAD/RESRAD-BUILD default library.

6.5 Computing DCGLs for Soil

According to NUREG-1727, Section 6.3.3 of Appendix C, either a probabilistic approach or a deterministic analysis approach can be used to demonstrate compliance with the dose criteria. For the SEDA site, soil DCGLs were derived from both probabilistic and deterministic RESRAD analyses. The deterministic values provide the basis for comparison of survey results.

For the probabilistic analysis, the peak of the mean dose, based on the guidance provided in Section 8.3.2.2 Appendix C of the NUREG/CR-6697, was used in calculating the derived concentration guideline levels. For the deterministic run, conservative values for the key parameters were used. Sensitivity analysis was done to identify the key parameters as discussed above. Figure 6.4 shows the DCGL derivation process for the probabilistic and the deterministic RESRAD runs.

The resident farmer scenario, in accordance with the guidance provided in NUREG/CR-5512, was chosen to derive the soil DCGLs. Considering the activities that occurred on the SEDA site, it is expected that any residual radioactivity would be confined to surface soil; the analysis assumed contamination to be in the top 15 cm of soil. The DCGLs were derived for a dose limit of 10 mrem/yr on the basis of the TAGM 4003 guide.

6.5.1 Dose Model

The DCGLs for soil were calculated using the resident farmer scenario. The residual radioactive material was assumed to be contained in a thin soil layer on the property that can be used for residential and farming activities. The average member of the critical group is the resident farmer, who lives on the contaminated area, ingests plant foods grown on-site, ingests meat and milk from livestock fed with forage grown on-site, and catches and consumes fish and other aquatic organisms from an on-site pond. The groundwater drawn from a well located on-site is the only water source for drinking, household purposes, livestock watering, and irrigation.

The potential pathways used to estimate human radiation exposure resulting from residual radioactivity in the soil include the following:

- Direct exposure to external radiation from the soil containing residual radioactivity,
- Internal dose from inhalation of contaminated dust,
- Internal dose from inhalation of emanating radon,
- Internal dose from ingestion of
  - contaminated soil
  - plant food grown in the soil containing residual radioactivity
  - meat and milk from livestock fed with fodder that is grown in soil containing residual radioactivity and water drawn from the on-site well
  - drinking water drawn from the on-site well
  - fish from a pond downgradient from the site

Doses were calculated over a 1,000-year time frame. The peak dose occurring at any time during this period was used in the calculation of DCGLs.

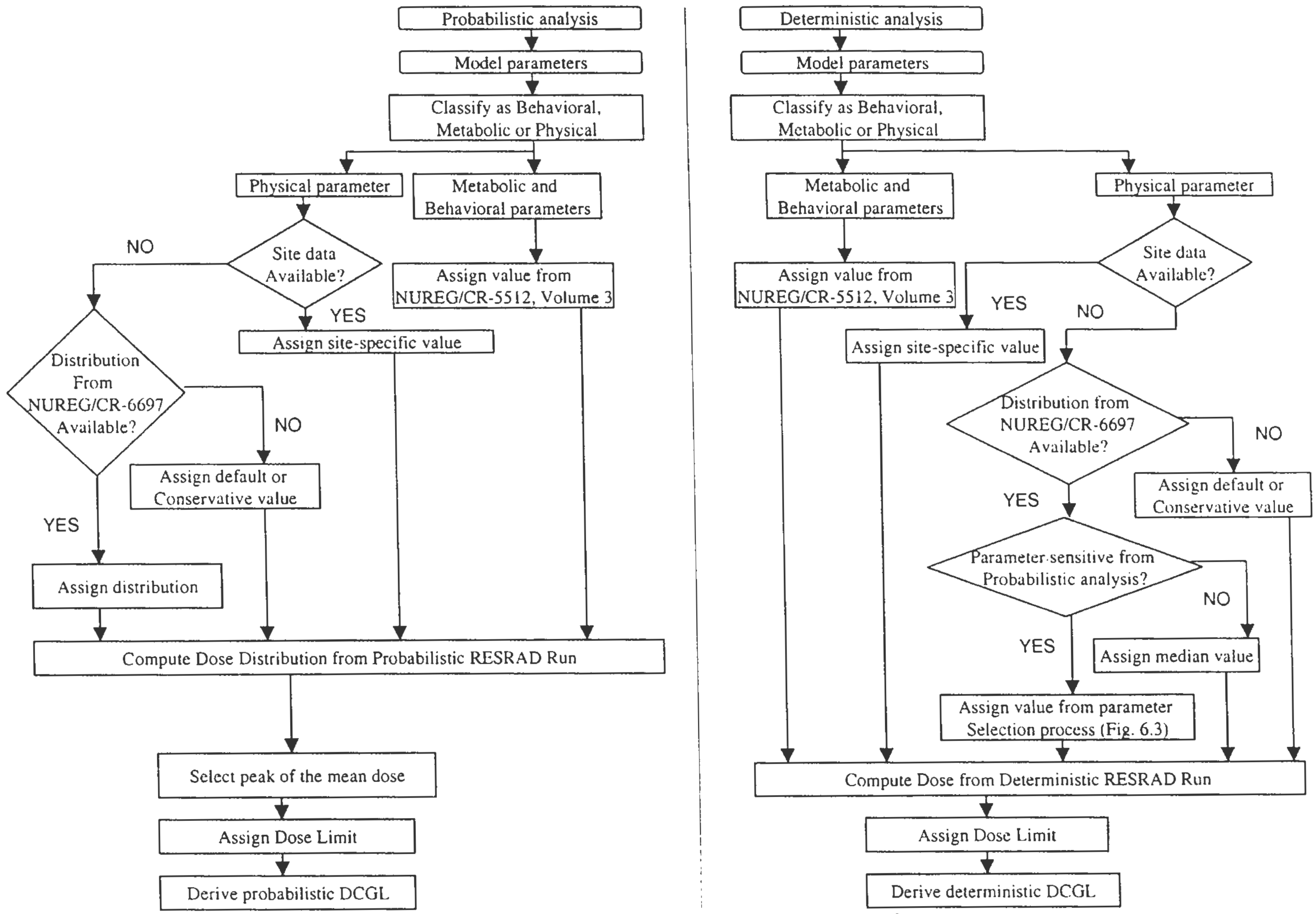


Figure 6.4 DCGL Derivation Process

6.5.2 Conceptual Model

The site conceptual model includes a contaminated zone, an unsaturated zone, and a saturated zone. It was assumed there is no cover on the top of the contaminated soil. The residual radioactivity was assumed to be in top 15 cm of the soil and covered an area of 10,000 m^2. Table 6-2 lists the median parameter values assigned for the deterministic RESRAD run as well as the parameter values/distributions assigned for the probabilistic RESRAD run and the basis for assigning them. For some radionuclides in a deterministic run the value for a priority 1 or priority 2 (see Fig. 6.3) parameter may have been changed from a median value to a more conservative value (see Section 6.4.5) on the basis of the sensitivity analysis. In such cases, the latter value is provided in Table 6-3 for a given radionuclide.

6.5.3 Sensitivity Analysis Results

A probabilistic RESRAD run was performed for an individual radionuclide to identify the sensitive parameters for that radionuclide. An initial radionuclide concentration of 1 pCi/g was assumed. As mentioned in Section 6.4.4, a parameter was identified as sensitive if the absolute value of PRCC was greater than or equal to 0.25 and not sensitive if absolute value of PRCC was less than 0.25 for the resident farmer scenario. Table 6-3 lists the probabilistic parameters identified as sensitive parameters for each radionuclide from peak of the mean dose and peak dose analysis. The sensitive parameters are listed in order of decreasing sensitivity along with their PRCC values and conservative values selected based on the parameter selection process shown in Figure 6.3.

6.5.4 DCGL Determination

The DCGLs are the concentration of residual radioactivity distinguishable from background that, if uniformly distributed throughout a survey unit, would result in a dose equal to the dose limit (10 mrem/yr) to an average member of a critical group. Given a dose limit, DL, the DCGL for an individual radionuclide can be calculated as:

$$DCGL = \frac{DL}{DSR},$$

where DSR is the dose/source concentration ratio.

The sum-of-fractions rule applies when DCGLs for multiple radionuclides are implemented. The summation of the residual radionuclide concentrations, S_i, divided by each respective $DCGL_i$ should not be greater than unity; that is,

TABLE 6-2

Input Parameters Used at Seneca Army Depot Site for Probabilistic and Deterministic RESRAD Analysis

Input Parameter	Units	Type[a]	Priority	Deterministic[b]	Probabilistic analysis					Basis/Reference
					value/ distribution	Distribution's statistical parameters[c]				
						1	2	3	4	
Initial Nuclide Concentration in Soil	pCi/g	P	2	1 for each radionuclide	1 for each radionuclide	NR[d]	NR	NR	NR	DCGLs independent of initial concentration
Distribution coefficients in contaminated, unsaturated, and saturated zones	cm^3/g	P	1		for all truncated lognormal-n					For deterministic analysis median values from distribution are used
Ac-227				825	-	6.72	3.22	.001	.999	NUREG/CR-6697
H-3				0.06	-	-2.81	0.5	.001	.999	NUREG/CR-6697
Pa-231				380	-	5.94	3.22	.001	.999	NUREG/CR-6697
Pb-210+D				2392	-	7.78	2.76	.001	.999	NUREG/CR-6697
Pm-147				825	-	6.72	3.22	.001	.999	NUREG/CR-6697
Pu-239				953	-	6.86	1.89	.001	.999	NUREG/CR-6697
Ra-226+D				3533	-	8.17	1.70	.001	.999	NUREG/CR-6697
Ra-228+D				3533	-	8.17	1.70	.001	.999	NUREG/CR-6697
Sm-147				825	-	6.72	3.22	.001	.999	NUREG/CR-6697
Th-228				5884	-	8.68	3.62	.001	.999	NUREG/CR-6697
Th-230				5884	-	8.68	3.62	.001	.999	NUREG/CR-6697
Th-232				5884	-	8.68	3.62	.001	.999	NUREG/CR-6697
U-234				126	-	4.84	3.13	.001	.999	NUREG/CR-6697
U-235				126	-	4.84	3.13	.001	.999	NUREG/CR-6697
U-238				126	-	4.84	3.13	.001	.999	NUREG/CR-6697
Plant transfer factors	pCi/g plant per pCi/g soil	P	1		for all truncated lognormal-n					For deterministic analysis median values from distribution are used
Ac-227				1E-3		-6.91	1.1	.001	.999	NUREG/CR-6697
H-3				4.8		1.57	1.1	.001	.999	NUREG/CR-6697
Pa-231				1E-2		-4.61	1.1	.001	.999	NUREG/CR-6697
Pb-210+D				4E-3		-5.52	0.9	.001	.999	NUREG/CR-6697
Pm-147				2E-3		-6.21	1.1	.001	.999	NUREG/CR-6697
Pu-239				1E-3		-6.91	0.9	.001	.999	NUREG/CR-6697
Ra-226+D				4E-2		-3.22	0.9	.001	.999	NUREG/CR-6697
Ra-228+D				4E-2		-3.22	0.9	.001	.999	NUREG/CR-6697
Sm-147				2E-3		-6.21	1.1	.001	.999	NUREG/CR-6697
Th-228				1E-3		-6.91	0.9	.001	.999	NUREG/CR-6697

TABLE 6-2 (Cont.)

Input Parameter	Units	Type[a]	Priority	Deterministic[b]	Probabilistic analysis: value/ distribution	Distribution's statistical parameters[c]: 1	2	3	4	Basis/Reference
Th-230				1E-3		-6.91	0.9	.001	.999	NUREG/CR-6697
Th-232				1E-3		-6.91	0.9	.001	.999	NUREG/CR-6697
U-234				2E-2		-6.21	0.9	.001	.999	NUREG/CR-6697
U-235				2E-2		-6.21	0.9	.001	.999	NUREG/CR-6697
U-238				2E-2		-6.21	0.9	.001	.999	NUREG/CR-6697
Meat transfer factor	pCi/kg per pCi/d	P	2		for all truncated lognormal-n					For deterministic analysis median values from distribution are used
Ac-227				2E-5		-10.82	1.0	.001	.999	NUREG/CR-6697
H-3				1.2E-2		-4.42	1.0	.001	.999	NUREG/CR-6697
Pa-231				5E-6		-12.21	1.0	.001	.999	NUREG/CR-6697
Pb-210+D				8E-4		-7.13	0.7	.001	.999	NUREG/CR-6697
Pm-147				2E-3		-6.21	1.0	.001	.999	NUREG/CR-6697
Pu-239				1E-4		-9.21	0.2	.001	.999	NUREG/CR-6697
Ra-226+D				1E-3		-6.91	0.7	.001	.999	NUREG/CR-6697
Ra-228+D				1E-3		-6.91	0.7	.001	.999	NUREG/CR-6697
Sm-147				2E-3		-6.21	1.0	.001	.999	NUREG/CR-6697
Th-228				1E-4		-9.21	1.0	.001	.999	NUREG/CR-6697
Th-230				1E-4		-9.21	1.0	.001	.999	NUREG/CR-6697
Th-232				1E-4		-9.21	1.0	.001	.999	NUREG/CR-6697
U-234				8E-4		-7.13	0.7	.001	.999	NUREG/CR-6697
U-235				8E-4		-7.13	0.7	.001	.999	NUREG/CR-6697
U-238				8E-4		-7.13	0.7	.001	.999	NUREG/CR-6697
Milk transfer factor	pCi/L per pCi/d	P	2		for all truncated lognormal-n					For deterministic analysis median values from distribution are used
Ac-227				2E-6		-13.12	0.9	.001	.999	NUREG/CR-6697
H-3				1.2E-2		-4.61	0.9	.001	.999	NUREG/CR-6697
Pa-231				5E-6		-12.21	0.9	.001	.999	NUREG/CR-6697
Pb-210+D				3E-4		-8.11	0.9	.001	.999	NUREG/CR-6697
Pm-147				6E-5		-9.72	0.9	.001	.999	NUREG/CR-6697
Pu-239				1E-6		-13.82	0.5	.001	.999	NUREG/CR-6697
Ra-226+D				1E-3		-6.91	0.5	.001	.999	NUREG/CR-6697
Ra-228+D				1E-3		-6.91	0.5	.001	.999	NUREG/CR-6697
Sm-147				6E-5		-9.72	0.9	.001	.999	NUREG/CR-6697
Th-228				5E-6		-12.21	0.9	.001	.999	NUREG/CR-6697
Th-230				5E-6		-12.21	0.9	.001	.999	NUREG/CR-6697
Th-232				5E-6		-12.21	0.9	.001	.999	NUREG/CR-6697

TABLE 6-2 (Cont.)

Input Parameter	Units	Type[a]	Priority	Deterministic[b]	Probabilistic analysis: value/ distribution	Distribution's statistical parameters[c]: 1	2	3	4	Basis/Reference
U-234				4E-4		-7.82	0.6	.001	.999	NUREG/CR-6697
U-235				4E-4		-7.82	0.6	.001	.999	NUREG/CR-6697
U-238				4E-4		-7.82	0.6	.001	.999	NUREG/CR-6697
Fish bioaccumulation factor	pCi/kg per pCi/L	P	2		for all lognormal-n					For deterministic analysis median values from distribution are used
Ac-227				15		2.7	1.1			NUREG/CR-6697
H-3				1		0	0.1			NUREG/CR-6697
Pa-231				10		2.3	1.1			NUREG/CR-6697
Pb-210+D				300		5.7	1.1			NUREG/CR-6697
Pm-147				30		3.4	1.1			NUREG/CR-6697
Pu-239				30		3.4	1.1			NUREG/CR-6697
Ra-226+D				50		3.9	1.1			NUREG/CR-6697
Ra-228+D				50		3.9	1.1			NUREG/CR-6697
Sm-147				25		3.2	1.1			NUREG/CR-6697
Th-228				100		4.6	1.1			NUREG/CR-6697
Th-230				100		4.6	1.1			NUREG/CR-6697
Th-232				100		4.6	1.1			NUREG/CR-6697
U-234				10		2.3	1.1			NUREG/CR-6697
U-235				10		2.3	1.1			NUREG/CR-6697
U-238				10		2.3	1.1			NUREG/CR-6697
Crustacea bioaccumulation factor	pCi/kg per pCi/L	P	3							RESRAD default
Ac-227				1,000	1,000	NR	NR	NR	NR	RESRAD default
H-3				1	1	NR	NR	NR	NR	RESRAD default
Pa-231				110	110	NR	NR	NR	NR	RESRAD default
Pb-210+D				100	100	NR	NR	NR	NR	RESRAD default
Pm-147				1,000	1,000	NR	NR	NR	NR	RESRAD default
Pu-239				100	100	NR	NR	NR	NR	RESRAD default
Ra-226+D				250	250	NR	NR	NR	NR	RESRAD default
Ra-228+D				250	250	NR	NR	NR	NR	RESRAD default
Sm-147				1,000	1,000	NR	NR	NR	NR	RESRAD default
Th-228				500	500	NR	NR	NR	NR	RESRAD default
Th-230				500	500	NR	NR	NR	NR	RESRAD default
Th-232				500	500	NR	NR	NR	NR	RESRAD default
U-234				60	60	NR	NR	NR	NR	RESRAD default
U-235				60	60	NR	NR	NR	NR	RESRAD default
U-238				60	60	NR	NR	NR	NR	RESRAD default
Number of unsaturated zones	none	P	3	1	1	NR	NR	NR	NR	RESRAD default

TABLE 6-2 (Cont.)

Input Parameter	Units	Type[a]	Priority	Deterministic[b]	Probabilistic analysis					Basis/Reference
					value/ distribution	Distribution's statistical parameters[c] 1	2	3	4	
Time since material placement	years	P	3	0	0	NR	NR	NR	NR	RESRAD default
Groundwater concentration	pCi/L	P	3	0	0	NR	NR	NR	NR	RESRAD default
Solubility limit	mol/L	P	3	0	0	NR	NR	NR	NR	RESRAD default
Leach rate	/year	P	3	0	0	NR	NR	NR	NR	RESRAD default
Use plant soil ratio	check box	NA	3	No	No	NR	NR	NR	NR	RESRAD default
Basic radiation dose limit	mrem/yr	NA	3	10	10	NR	NR	NR	NR	NYSDEC TAGM
Calculation times	years	P	3	1,3,10,30,100,300,1000	1,3,10,30,100,300,1000	NR	NR	NR	NR	RESRAD default
Thickness of contaminated zone	m	P	2	0.15	0.15	NR	NR	NR	NR	Activity is only on the surface, scenario assumption
Area of contaminated zone	m^2	P	2	10,000	10,000	NR	NR	NR	NR	Scenario assumption
Length parallel to aquifer flow	m	P	2	100	100	NR	NR	NR	NR	Scenario assumption
Cover depth	m	P	2	0	0	NR	NR	NR	NR	Contamination begins at the surface
Density of cover material	g/cm^3	P	1	Not used	Not used	NR	NR	NR	NR	NA
Cover erosion rate	m/yr	P, B	2	Not used	Not used	NR	NR	NR	NR	NA
Density of contaminated zone	g/cm^3	P	1	1.51	Truncated normal	1.5105	0.1855	.001	.999	Distribution from NUREG/CR-6697 for the site specific soil type[e]
Contaminated zone erosion rate	m/yr	P, B	2	1.48E-3	Continuous logarithmic					Distribution from NUREG/CR-6697
Contaminated zone total porosity	none	P	2	0.43	Truncated normal	0.43	0.0699	.001	.999	Distribution from NUREG/CR-6697 for the site specific soil type
Contaminated zone field capacity	none	P	3	0.2	0.2	NR	NR	NR	NR	RESRAD default
Contaminated zone hydraulic conductivity	m/yr	P	2	1.43	Truncated lognormal-n	0.362	1.59	.001	.999	Distribution from NUREG/CR-6697 for the site specific soil type
Contaminated zone b parameter	none	P	2	7.1	Truncated lognormal-n	1.96	0.265	.001	.999	Distribution from NUREG/CR-6697 for the site specific soil type
Humidity in air	g/m^3	P	2	7.24	Truncated lognormal-n	1.98	0.334	.001	.999	Distribution from NUREG/CR-6697
Evapotranspiration coefficient	none	P	2	0.625	Uniform	0.5	0.75			Distribution from NUREG/CR-6697
Wind speed	m/s	P	2	4.24	Bounded lognormal-n	1.445	0.2419	1.4	13	Distribution from NUREG/CR-6697
Precipitation rate	m/yr	P	2	0.87	0.87	NR	NR	NR	NR	Site specific value[f]
Irrigation rate	m/yr	B	3	0.1125	0.1125	NR	NR	NR	NR	Value from NUREG/CR-6697
Irrigation mode	none	B	3	Overhead	Overhead	NR	NR	NR	NR	RESRAD default
Runoff coefficient	none	P	2	0.45	Uniform	0.1	0.8			Distribution from NUREG/CR-6697
Watershed area for nearby stream or pond	m^2	P	3	1E6	13E6	NR	NR	NR	NR	RESRAD default

TABLE 6-2 (Cont.)

Input Parameter	Units	Type[a]	Priority	Deterministic[b]	Probabilistic analysis					Basis/Reference
					value/ distribution	Distribution's statistical parameters[c]				
						1	2	3	4	
Accuracy for water soil computation	none	NA	3	0.001	0.001	NR	NR	NR	NR	RESRAD default
Density of saturated zone	g/cm^3	P	1	1.51	Truncated normal	1.5105	0.1855	.001	.999	Distribution from NUREG/CR-6697 for the site specific soil type
Saturated zone total porosity	none	P	1	0.43	Truncated normal	0.43	0.0699	.001	.999	Distribution from NUREG/CR-6697 for the site specific soil type
Saturated zone effective porosity	none	P	1	0.342	Truncated normal	0.342	0.0705	.001	.999	Distribution from NUREG/CR-6697 for the site specific soil type
Saturated zone field capacity	none	P	3	0.2	0.2	NR	NR	NR	NR	RESRAD default
Saturated zone hydraulic conductivity	m/yr	P	1	1.43	Truncated lognormal-n	0.362	1.59	.001	.999	Distribution from NUREG/CR-6697 for the site specific soil type
Saturated zone hydraulic gradient	none	P	2	6.02E-3	Bounded lognormal-n	-5.11	1.77	7E-5	0.5	Distribution from NUREG/CR-6697
Saturated zone b parameter	none	P	2	7.1	Truncated lognormal-n	1.96	0.265	.001	.999	Distribution from NUREG/CR-6697 for the site specific soil type
Water table drop rate	m/yr	P	3	0.001	0.001	NR	NR	NR	NR	RESRAD default
Well pump intake depth (below water table)	m	P	2	14.5	Triangular	6	10	30		Distribution from NUREG/CR-6697
Model: nondispersion (ND) or mass balance (MB)	none	P	3	ND	ND	NR	NR	NR	NR	RESRAD default
Well pumping rate	m^3 /yr	B, P	2	884	Uniform	250	1519			Minimum is RESRAD default and maximum from NUREG/CR-6697
Number of unsaturated zones	none	P	3	1	1	NR	NR	NR	NR	Default value used
Unsaturated zone thickness	m	P	1	1	1	NR	NR	NR	NR	Site specific value[g]
Unsaturated zone density	g/cm^3	P	2	1.51	Truncated normal	1.5105	0.1855	.001	.999	Distribution from NUREG/CR-6697 for the site specific soil type
Unsaturated zone total porosity	none	P	2	0.43	Truncated normal	0.43	0.0699	.001	.999	Distribution from NUREG/CR-6697 for the site specific soil type
Unsaturated zone effective porosity	none	P	2	0.342	Truncated normal	0.342	0.0705	.001	.999	Distribution from NUREG/CR-6697 for the site specific soil type
Unsaturated zone field capacity	none	P	3	0.2	0.2	NR	NR	NR	NR	RESRAD default
Unsaturated zone hydraulic conductivity	m/yr	P	2	1.43	Truncated lognormal-n	0.362	1.59	.001	.999	Distribution from NUREG/CR-6697 for the site specific soil type
Unsaturated zone b parameter	none	P	2	7.1	Truncated lognormal-n	1.96	0.265	.001	.999	Distribution from NUREG/CR-6697 for the site specific soil type
Inhalation rate	m^3 /yr	M, B	3	8,578	8578	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Mass loading for inhalation	g/m^3	P, B	2	2.35E-5	Continuous linear					Distribution from NUREG/CR-6697
Exposure duration	yr	B	3	30	30	NR	NR	NR	NR	RESRAD default

TABLE 6-2 (Cont.)

Input Parameter	Units	Type[a]	Priority	Deterministic[b]	Probabilistic analysis					Basis/Reference
					value/ distribution	Distribution's statistical parameters[c] 1	2	3	4	
Indoor dust filtration factor	none	P, B	2	0.55	Uniform	0.15	0.95			Distribution from NUREG/CR-6697
External gamma shielding factor	none	P	2	0.27	Bounded lognormal-n	-1.3	0.59	0.044	1	Distribution from NUREG/CR-6697
Indoor time fraction	none	B	3	0.6571	0.6571	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Outdoor time fraction	none	B	3	0.1181	0.1181	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Shape of the contaminated zone	none	P	3	circular	circular	NR	NR	NR	NR	RESRAD default
Fruit vegetable and grain consumption	kg/yr	M, B	2	112	112	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Leafy vegetable consumption	kg/yr	M, B	3	21.4	21.4	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Milk consumption	L/yr	M, B	2	233	233	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Meat and poultry consumption	kg/yr	M, B	3	65.1	65.1	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Fish consumption	kg/yr	M, B	3	20.6	20.6	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Other seafood consumption	kg/yr	M, B	3	0.9	0.9	NR	NR	NR	NR	RESRAD default
Soil ingestion rate	g/yr	M, B	2	18.26	18.26	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Drinking water intake	L/yr	M, B	2	478.8	478.8	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Drinking water contaminated fraction	none	B, P	3	1	1	NR	NR	NR	NR	RESRAD default
Household water contaminated fraction	none	B, P	3	1	1	NR	NR	NR	NR	RESRAD default
Livestock water contaminated fraction	none	B, P	3	1	1	NR	NR	NR	NR	RESRAD default
Irrigation water contaminated fraction	none	B, P	3	1	1	NR	NR	NR	NR	RESRAD default
Aquatic food contaminated fraction	none	B, P	2	1	1	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Plant food contaminated fraction	none	B, P	3	1	1	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Meat contaminated fraction	none	B, P	3	1	1	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Milk contaminated fraction	none	B, P	3	1	1	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Livestock fodder intake for meat	kg/d	M	3	27.1	27.1	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Livestock fodder intake for milk	kg/d	M	3	63.2	63.2	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Livestock water intake for meat	L/d	M	3	50	50	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Livestock water intake for milk	L/d	M	3	60	60	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Livestock soil intake	kg/d	M	3	0.5	0.5	NR	NR	NR	NR	RESRAD default
Mass loading for foliar deposition	g/m^3	P	3	0.0004	0.0004	NR	NR	NR	NR	NUREG/CR-5512, gardening
Depth of soil mixing layer	m	P	2	0.233	Triangular	0	0.15	0.6		Distribution from NUREG/CR-6697
Depth of roots	m	P	1	2.15	Uniform	0.3	4			Distribution from NUREG/CR-6697
Groundwater fractional usage for drinking water	none	B, P	3	1	1	NR	NR	NR	NR	RESRAD default

TABLE 6-2 (Cont.)

Input Parameter	Units	Type[a]	Priority	Deterministic[b]	Probabilistic analysis					Basis/Reference
					value/ distribution	Distribution's statistical parameters[c]				
						1	2	3	4	
Groundwater fractional usage for household water	none	B, P	3	1	1	NR	NR	NR	NR	RESRAD default
Groundwater fractional usage for livestock water	none	B, P	3	1	1	NR	NR	NR	NR	RESRAD default
Groundwater fractional usage for irrigation water	none	B, P	3	1	1	NR	NR	NR	NR	RESRAD default
Wet weight crop yield for non-leafy vegetables	kg/m^2	P	2	1.75	Truncated lognormal-n	0.56	0.48	.001	.999	Distribution from NUREG/CR-6697
Wet weight crop yield for leafy vegetables	kg/m^2	P	3	2.88921	2.88921	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Wet weight crop yield for fodder	kg/m^2	P	3	18868	18868	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Length of growing season for non-leafy vegetables	yr	P	3	0.246	0.246	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Length of growing season for leafy vegetables	yr	P	3	0.123	0.123	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Length of growing season for fodder	yr	P	3	0.082	0.082	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Translocation factor for non-leafy	none	P	3	0.1	0.1	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Translocation factor for leafy	none	P	3	1	1	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Translocation factor for fodder	none	P	3	1	1	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Weathering removal constant	1/yr	P	2	32.9	Triangular	5.1	18	84		Distribution from NUREG/CR-6697
Wet foliar interception fraction for non-leafy	none	P	3	0.35	0.35	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Wet foliar interception fraction for leafy	none	P	2	0.581	Triangular	0.06	0.67	0.95		Distribution from NUREG/CR-6697
Wet foliar interception fraction for fodder	none	P	3	0.35	0.35	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Dry-foliar interception fraction for non-leafy	none	P	3	0.35	0.35	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Dry-foliar interception fraction for leafy	none	P	3	0.35	0.35	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Dry-foliar interception fraction for fodder	none	P	3	0.35	0.35	NR	NR	NR	NR	NUREG/CR-5512, Vol. 3
Storage times of contaminated food stuff										Behavioral priority 3 parameters, default values used
Fruits, non leafy vegetables, and grain	days	B	3	14	14	NR	NR	NR	NR	RESRAD default
Leafy vegetables	days	B	3	1	1	NR	NR	NR	NR	RESRAD default
Milk	days	B	3	1	1	NR	NR	NR	NR	RESRAD default

TABLE 6-2 (Cont.)

Input Parameter	Units	Type[a]	Priority	Deterministic[b]	Probabilistic analysis					Basis/Reference
					value/ distribution	Distribution's statistical parameters[c]				
						1	2	3	4	
Meat	days	B	3	20	20	NR	NR	NR	NR	RESRAD default
Fish	days	B	3	7	7	NR	NR	NR	NR	RESRAD default
Crustacea and mollusk	days	B	3	7	7	NR	NR	NR	NR	RESRAD default
Well water	days	B	3	1	1	NR	NR	NR	NR	RESRAD default
Surface water	days	B	3	1	1	NR	NR	NR	NR	RESRAD default
Livestock fodder	days	B	3	45	45	NR	NR	NR	NR	RESRAD default

[a] P = physical, B = behavioral, and M = metabolic; when more than one parameter type is listed, the more conservative parameter type is used in the analysis.

[b] Parameter values (median value from the distribution for a probabilistic parameter) used in the deterministic run unless changed from a median value to a more conservative value because of sensitivity analysis. See Section 6.4.5 for parameter value assignment process.

[c] For truncated normal and lognormal distributions, distribution parameter 1 is the mean, 2 is the standard deviation, 3 is the lower quantile value, and 4 is the upper quantile. For bounded lognormal distribution, parameter 3 and 4 are the actual lower and upper bounds. Parameters for continuous linear and continuous logarithmic distributions are not provided in this table (values are from NUREG/CR-6697 Appendix C). For uniform distribution, parameter 1 is the minimum and parameter 2 is the maximum value. For triangular distribution, parameter 1 is the minimum value, parameter 2 is the most likely value, and parameter 3 is the maximum value of the distribution.

[d] NR = not required (RESRAD parameters for which distributions are not developed and for which statistical parameters are not required).

[e] SEDA is located within one distinct unit of glacial till that covers the entire area between the western shore of lake Cayuga and the eastern shore of Lake Seneca. The till is consistent across the entire depot. The glacial till in this area have a high percentage of silt and clay with trace amounts of fine gravel (Table E.1 of U.S. Army 2001). Based on these site characteristics the soil properties of silty clay loam are used in the analysis.

[f] The site-specific precipitation value used is from Table 1-1 of the U.S. Army (2001).

[g] The site-specific unsaturated zone thickness used is from Table E.1 of the U.S. Army (2001).

Table 6-3

Results of Probabilistic Analysis of Individual Radionuclide in Identifying Sensitive Parameters

Radionuclide	Sensitive parameters[a], Partial rank correlation coefficient (PRCC), and parameter values selected from parameter selection process for deterministic analysis							
Ac-227	Parameters	BRTF(1)	SHF1	DROOT	DM			
	PRCC	0.79	0.79	-0.61	-0.46			
	Value	2.1E-3	0.398	1.22	0.15			
H-3	Parameters	DROOT	RUNOFF	EVAPTR	DENSCZ			
	PRCC	-0.97	0.88	0.35	0.30			
	Value	1.22	0.625	0.687	1.63			
Pa-231	Parameters	BRTF(1)	DROOT	VCZ	Kd cont			
	PRCC	0.96	-0.89	-0.35	0.32			
	Value	2.1E-2	1.22	7.6E-4	3.3E3			
Pb-210	Parameters	BRTF(1)	DROOT	BRTF(3)	DM	BRTF(2)		
	PRCC	0.80	-0.71	0.66	-0.59	0.46		
	Value	7.3E-3	1.22	5.5E-4	0.15	1.3E-3		
Pm-147	Parameters	BRTF(2)	BRTF(1)	DM	DROOT			
	PRCC	0.81	0.72	-0.61	-0.53			
	Value	3.9E-3	4.2E-3	0.15	1.22			
Pu-239	Parameters	BRTF(1)	DROOT	DM				
	PRCC	0.89	-0.83	-0.75				
	Value	1.8E-3	1.22	0.15				
Ra-226	Parameters	SHF1	BRTF(1)	DROOT	VCZ	BRTF(1) For Pb		
	PRCC	0.87	0.76	-0.66	-0.30	0.25		
	Value	0.398	7.3E-2	1.22	7.6E-4	7.3E-3		
Ra-228	Parameters	SHF1	BRTF(1)	DROOT				
	PRCC	0.84	0.75	-0.63				
	Value	0.398	7.3E-2	1.22				
Sm-147	Parameters	BRTF(2)	BRTF(1)	DM	DROOT			
	PRCC	0.84	0.72	-0.69	-0.54			
	Value	3.9E-3	4.2E-3	0.15	1.22			

Table 6-3 (Cont.)

Radionuclide	Sensitive parameters[a], Partial rank correlation coefficient (PRCC), and parameter values selected from parameter selection process for deterministic analysis						
Th-228	Parameters	SHF1	Kd cont				
	PRCC	0.98	0.25				
	Value	0.398	1.3E6				
Th-230	Parameters	VCZ	Kd cont	DROOT	SHF1		
	PRCC	-0.65	0.48	-0.36	0.36		
	Value	7.6E-4	1.3E6	1.22	0.398		
Th-232	Parameters	SHF1	VCZ	BRTF(1) for Ra	Kd cont	DROOT	
	PRCC	0.68	-0.59	0.46	0.41	-0.40	
	Value	0.398	7.6E-4	7.3E-2	1.3E6	1.22	
U-234	Parameters	DM	BRTF(1)	BRTF(3)	DROOT	BRTF(2)	Kd cont
	PRCC	-0.72	0.71	0.61	-0.60	0.46	0.31
	Value	0.15	3.7E-3	6.0E-4	1.22	1.3E-3	8.5E3
U-235	Parameters	SHF1	Kd cont	BRTF(1)			
	PRCC	0.92	0.53	0.28			
	Value	0.398	8.5E3	3.7E-3			
U-238	Parameters	SHF1	DM	BRTF(1)	BRTF(3)	DROOT	Kd cont	BRTF(2)
	PRCC	0.77	-0.54	0.53	0.48	-0.45	0.42	0.32
	Value	0.398	0.15	3.7E-3	6.0E-4	1.22	8.5E3	1.3E-3

[a] For sensitive parameters, only parameter abbreviations are listed. Parameter units are provided in Table 6.2. The abbreviation used are: plant transfer factor [BRTF (1)], external gamma shielding (SHF1), depth of soil mixing layer (DM), depth of roots (DROOT), density of contaminated zone (DENSCZ), evapotranspiration coefficient (EVAPTR), runoff coefficient (RUNOFF), contaminated zone erosion rate (VCZ), Kd of contaminated zone (Kd cont), meat transfer factor [BRTF(2)], and milk transfer factor [BRTF(3)].

$$\sum_i \frac{S_i}{DCGL_i} < 1.$$

6.5.4.1 Probabilistic DCGL Derivation

Parameter values/distributions assigned in the probabilistic run were taken from Table 6-2 for each individual radionuclide. RESRAD Version 6.21 was used in this analysis. Table 6-4 provides the probabilistic peak dose distribution. The peak dose distribution is provided at each 5 percentile increment along with the minimum, maximum, and the mean of the peak dose at an initial radionuclide concentration of 1 pCi/g. Table 6-4 also provides the peak of the mean dose. Since the mean of the peak dose is calculated from the peak dose distribution it is always greater than or equal to the peak of the mean dose. Therefore, the mean calculated from the peak dose distribution is used in calculating the soil DCGLs. The DCGLs as determined for the radiation dose limit of 10 mrem/yr are provided in Table 6-5.

6.5.4.2 Deterministic DCGL Derivation

Parameter values assigned in the deterministic run were from Table 6-3 (for parameters found to be sensitive) and from Table 6-2 (for parameters not found to be sensitive) for each individual radionuclide. RESRAD Version 6.21 was used in this analysis. The soil DCGLs determined for the radiation dose limit of 10 mrem/yr are provided in Table 6-5. Table 6-6 provides the maximum dose-to-source concentration ratios (DSR) and contribution of different pathways to the calculated maximum DSRs. The time when the maximum dose occurs is also provided. The deterministic wide area DCGLs in Table 6-5 are the values that should be used in the evaluation of survey data.

6.5.5 Area Factor Calculations for Soil Contamination

The above DCGLs assume exposure to a large homogeneously contaminated area and are termed wide-area-derived concentration levels ($DCGL_w$). For a small, isolated area of contamination (a hot spot), a soil concentration higher than the $DCGL_w$, would correspond to the same dose limit, depending on the size of the contaminated area. Values of the $DCGL_w$ may be scaled through the use of area factors to obtain a $DCGL_{EMC}$ that corresponds to the same dose over a smaller area, where EMC stands for elevated measurement comparison. The $DCGL_{EMC}$ is computed as the product of the applicable $DCGL_w$ and the area factor. The area factors for use with DCGL values were calculated for the residential farmer scenario. The deterministic RESRAD code was run repeatedly while changing the size of contaminated area and the corresponding fractions of plant

Table 6-4

Dose/Source Concentration Ratios (mrem/yr per pCi/g) at Different Dose Percentiles from Peak Dose Distribution for the Residential Farmer Scenario at the Seneca Army Depot Activity from the Probabilistic RESRAD Run

Percentile	Ac-227	H-3	Pa-231	Pb-210	Pm-147	Pu-239	Ra-226	Ra-228	Sm-147	Th-228	Th-230	Th-232	U-234	U-235	U-238
5%	5.64E-01	3.34E-04	4.19E-01	2.88E-01	4.14E-05	3.77E-02	2.40E+00	1.89E+00	6.19E-03	1.26E+00	1.67E-02	1.00E+00	1.07E-02	1.29E-01	3.74E-02
10%	6.24E-01	3.82E-04	5.76E-01	3.71E-01	4.83E-05	4.39E-02	2.66E+00	2.06E+00	7.62E-03	1.38E+00	2.17E-02	2.05E+00	1.28E-02	1.52E-01	4.23E-02
15%	6.75E-01	4.26E-04	6.57E-01	4.29E-01	5.42E-05	5.05E-02	2.87E+00	2.21E+00	8.55E-03	1.48E+00	2.78E-02	2.38E+00	1.46E-02	1.65E-01	4.61E-02
20%	7.22E-01	4.63E-04	7.86E-01	4.85E-01	5.98E-05	5.71E-02	3.05E+00	2.39E+00	9.80E-03	1.56E+00	3.25E-02	2.68E+00	1.64E-02	1.74E-01	4.88E-02
25%	7.56E-01	5.10E-04	8.83E-01	5.29E-01	6.81E-05	6.16E-02	3.26E+00	2.51E+00	1.09E-02	1.63E+00	3.69E-02	2.92E+00	1.76E-02	1.86E-01	5.16E-02
30%	7.97E-01	5.52E-04	9.98E-01	5.94E-01	7.43E-05	6.71E-02	3.38E+00	2.62E+00	1.22E-02	1.72E+00	4.22E-02	3.13E+00	1.93E-02	1.94E-01	5.41E-02
35%	8.33E-01	5.96E-04	1.09E+00	6.57E-01	7.96E-05	7.13E-02	3.53E+00	2.77E+00	1.36E-02	1.79E+00	4.63E-02	3.32E+00	2.09E-02	2.05E-01	5.65E-02
40%	8.71E-01	6.35E-04	1.21E+00	7.04E-01	8.51E-05	7.56E-02	3.69E+00	2.89E+00	1.49E-02	1.87E+00	5.15E-02	3.50E+00	2.23E-02	2.13E-01	5.91E-02
45%	9.04E-01	6.88E-04	1.39E+00	7.50E-01	9.30E-05	8.09E-02	3.84E+00	3.02E+00	1.67E-02	1.95E+00	5.77E-02	3.69E+00	2.44E-02	2.20E-01	6.16E-02
50%	9.38E-01	7.41E-04	1.55E+00	8.18E-01	1.02E-04	8.64E-02	4.08E+00	3.19E+00	1.80E-02	2.06E+00	6.75E-02	3.89E+00	2.64E-02	2.30E-01	6.41E-02
55%	9.84E-01	8.01E-04	1.73E+00	8.82E-01	1.12E-04	9.12E-02	4.30E+00	3.37E+00	1.98E-02	2.13E+00	7.87E-02	4.10E+00	2.88E-02	2.40E-01	6.79E-02
60%	1.03E+00	8.75E-04	1.93E+00	9.67E-01	1.23E-04	9.68E-02	4.45E+00	3.61E+00	2.24E-02	2.21E+00	8.85E-02	4.32E+00	3.12E-02	2.50E-01	7.09E-02
65%	1.08E+00	9.87E-04	2.16E+00	1.04E+00	1.35E-04	1.06E-01	4.63E+00	3.82E+00	2.45E-02	2.33E+00	1.02E-01	4.62E+00	3.38E-02	2.62E-01	7.46E-02
70%	1.15E+00	1.12E-03	2.50E+00	1.14E+00	1.50E-04	1.16E-01	4.96E+00	4.00E+00	2.76E-02	2.47E+00	1.19E-01	4.92E+00	3.66E-02	2.74E-01	7.82E-02
75%	1.22E+00	1.27E-03	2.93E+00	1.28E+00	1.66E-04	1.30E-01	5.28E+00	4.27E+00	3.08E-02	2.59E+00	1.41E-01	5.30E+00	3.99E-02	2.90E-01	8.27E-02
80%	1.33E+00	1.54E-03	3.63E+00	1.43E+00	1.88E-04	1.41E-01	5.82E+00	4.57E+00	3.51E-02	2.79E+00	1.90E-01	5.68E+00	4.45E-02	3.11E-01	8.89E-02
85%	1.44E+00	1.81E-03	4.59E+00	1.66E+00	2.16E-04	1.69E-01	6.35E+00	5.03E+00	4.05E-02	3.02E+00	3.58E-01	6.14E+00	4.98E-02	3.30E-01	9.37E-02
90%	1.63E+00	2.26E-03	6.15E+00	1.96E+00	2.64E-04	2.14E-01	7.04E+00	5.69E+00	5.09E-02	3.37E+00	8.55E-01	6.92E+00	5.79E-02	3.64E-01	1.04E-01
95%	2.19E+00	3.23E-03	8.82E+00	2.63E+00	3.58E-04	3.04E-01	8.34E+00	6.99E+00	6.95E-02	3.87E+00	1.39E+00	8.21E+00	7.77E-02	4.23E-01	1.20E-01
Mean	1.13E+00	1.10E-03	2.90E+00	1.09E+00	1.39E-04	1.17E-01	4.56E+00	3.69E+00	2.61E-02	2.22E+00	2.60E-01	4.27E+00	3.62E-02	2.47E-01	7.05E-02
Min	1.93E-01	1.95E-04	9.60E-02	1.00E-01	1.94E-05	2.17E-02	1.40E+00	1.32E+00	2.45E-03	9.47E-01	3.49E-03	5.99E-02	2.73E-03	4.82E-02	1.59E-02
Max	1.76E+01	7.84E-03	6.99E+01	1.77E+01	1.24E-03	1.54E+00	1.62E+01	1.73E+01	3.32E-01	5.35E+00	6.63E+00	1.98E+01	1.26E+00	9.53E-01	3.31E-01
Peak of the mean	1.13E+00	1.09E-03	2.62E+00	1.09E+00	1.39E-4	1.17E-01	4.37E+00	3.55E+00	2.59E-02	2.22E+00	1.91E-01	3.99E+00	3.08E-02	2.45E-01	6.96E-02

Table 6-5

Soil DCGLw's for the Residential Farmer Scenario from Deterministic and Probabilistic RESRAD Run at Seneca Army Depot Activity

Radionuclide	Wide Area DCGLs (pCi/g)	
	Deterministic[a]	Probabilistic
Ac-227	6.9	8.8
H-3	5800	9100
Pa-231	2.5	3.4
Pb-210	5.6	9.2
Pm-147	46000	72000
Pu-239	59	85
Ra-226	1.7	2.2
Ra-228	2.2	2.7
Sm-147	240	380
Th-228	3.8	4.5
Th-230	54	38
Th-232	1.5	2.3
U-234	180	280
U-235	33	40
U-238	98	140

[a] Deterministic value to be used for evaluating survey data.

Table 6-6

Maximum Dose/Source Concentration Ratios (mrem/yr per pCi/g) for the Resident Farmer Scenario at the Seneca Army Depot Activity from the Deterministic RESRAD Run

Radionuclide	Ac-227	H-3	Pa-231	Pb-210	Pm-147	Pu-239	Ra-226	Ra-228	Sm-147	Th-228	Th-230	Th-232	U-234	U-235	U-238
Peak Time	0	0	15.4	0	0	0	18.1	1.4	0	0	110.8	30.9	0	0	0
External exposure	6.84E-1	0	2.60E-1	1.72E-3	1.26E-5	8.21E-5	3.41	2.89	0	2.63	1.15E-1	4.63	1.14E-4	2.69E-1	5.02E-2
Inhalation of dust	5.20E-2	1.48E-5	1.83E-2	1.80E-4	2.71E-7	3.37E-3	8.55E-5	7.72E-4	5.87E-4	1.47E-3	7.25E-4	8.46E-3	1.04E-3	6.23E-4	9.28E-4
Ingestion of plant foods	4.99E-1	7.43E-4	3.53	8.54E-1	6.34E-5	1.05E-1	1.77	1.36	1.27E-2	1.14E-2	5.21E-2	1.51	1.71E-2	9.20E-3	1.63E-4
Ingestion of meat	9.57E-3	1.23E-4	3.53E-3	3.16E-1	1.20E-4	1.16E-2	1.28E-1	4.26E-2	2.40E-2	1.43E-3	4.61E-3	4.97E-2	1.22E-2	7.40E-3	1.16E-2
Ingestion of milk	3.49E-3	8.32E-4	6.33E-3	5.09E-1	6.84E-6	4.22E-4	3.87E-1	2.33E-1	2.51E-3	2.59E-4	1.08E-2	2.44E-1	2.08E-2	1.26E-2	1.98E-2
Ingestion of soil	2.05E-1	1.39E-7	1.37E-1	1.01E-1	1.30E-5	4.98E-2	3.69E-2	1.34E-2	2.60E-3	6.15E-3	3.38E-3	3.76E-2	3.99E-3	2.42E-3	3.79E-3
Ingestion of water	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ingestion of fish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total of all pathways	1.45E+0	1.71E-3	3.96	1.78	2.16E-4	1.70E-1	5.74	4.55	4.24E-2	2.65	1.86E-1	6.47	5.53E-2	3.01E-1	1.03E-1

food, meat, and milk from the site, and keeping other parameters unchanged. The area factor was calculated by taking the ratio of the dose from large contaminated area (10,000 m^2) to the dose from smaller contaminated areas.

Table 6-7 provides the contaminated fractions of plant food, meat, and milk from the site used for different contaminated area sizes used in area factor calculations. Equation D.5 of the RESRAD manual is used in calculating the contaminated fractions. Since the wide area DCGLs are derived by using a conservative contaminated fraction (twice the value calculated from D.5), the contaminated fractions calculated for smaller areas are also multiplied by a factor of 2. Table 6-8 lists the calculated area factors for the residential farmer scenario for all radionuclides. Linear extrapolation would be used when necessary for in-between area sizes. In the current application, the $DCGL_{EMC}$ for a given radionuclide is determined by multiplying its $DCGL_w$ in Table 6-5 by the area factor for the elevated area size of concern. For multiple radionuclides, the area factor for the radionuclide that would give the most conservative dose, a lowest area factor, would be used in the determination of $DCGL_{EMC}$ for all radionuclides.

6.6 DCGLs for Buildings

The RESRAD-BUILD code was used to calculate dose to a receptor from residual contamination on interior building surfaces. Figure 6.2 shows the exposure pathways and release mechanisms considered in the RESRAD-BUILD code. As for soil DCGLs, building DCGLs were derived from both the probabilistic and the deterministic RESRAD-BUILD analyses for all radionuclides listed in Table 6-1. A deterministic analysis uses a single value for each input parameter, resulting in a single-dose output value. A probabilistic analysis uses a probability distribution for each model input parameter of uncertain value. The probabilistic analysis was performed to characterize uncertainty in dose and to identify sensitive parameters. Based on the probabilistic analysis, sensitive parameters identified were assigned conservative values in deterministic analysis.

For the probabilistic analysis, the peak of the mean dose, based on the guidance provided in Section 8.3.2.2 Appendix C of the NUREG/CR-6697, was used in calculating the derived concentration guideline levels. For the deterministic run, conservative values for the key parameters were used. Sensitivity analysis was done to identify the key parameters as shown in Figure 6.3 and discussed in Section 6.4.4. Figure 6.4 shows the DCGL derivation process for the probabilistic and the deterministic RESRAD-BUILD analyses. The process shown in Figure 6.4 is discussed in detail in Section 6.5.

The building occupancy scenario, in accordance with the guidance provided in NUREG/CR-5512, was chosen to derive the DCGLs for buildings. Considering the activities that occurred on the SEDA site, it is expected that any residual radioactivity would be confined to the floor surface. The DCGLs were derived for a dose limit of 10 mrem/yr on the basis of the TAGM 4003 guide.

Table 6-7

Contaminated Area, Length Parallel to Aquifer Flow, and the Corresponding Contaminated Fraction of Plant Food, Meat, and Milk Used in Area Factor Calculation

Contaminated area, m^2	Length parallel to aquifer flow, m	Contaminated fraction		
		Plant	Meat	Milk
10,000	100	1	1.0	1.0
3,000	54.8	1	0.3	0.3
1,000	31.6	1	0.1	0.1
300	17.3	0.3	0.03	0.03
100	10.0	0.1	0.01	0.01
30	5.48	0.03	0.003	0.003
10	3.16	0.01	0.001	0.001
3	1.73	0.003	0.0003	0.0003
1	1	0.001	0.0001	0.0001

Table 6-8

Area factors for Resident Farmer Scenario for Different Contaminants in Surface Soil at the Seneca Army Depot Activity

Area, m^2	Area factor for contaminant of concern[a]														
	Ac-227	H-3	Pa-231	Pb-210	Pm-147	Pu-239	Ra-226	Ra-228	Sm-147	Th-228	Th-230	Th-232	U-234	U-235	U-238
10,000	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
3,000	1.0	1.7	1.0	1.5	1.7	1.1	1.1	1.1	1.8	1.0	1.1	1.1	1.7	1.1	1.3
1,000	1.0	2.0	1.0	1.7	2.1	1.1	1.1	1.1	2.3	1.0	1.1	1.1	2.2	1.1	1.4
300	1.7	6.7	2.8	5.7	5.6	3.5	1.6	1.5	7.3	1.1	1.6	1.4	6.8	1.2	1.9
100	2.1	20.1	5.8	16.9	10.9	9.6	1.9	1.8	19.7	1.3	2.1	1.7	17.4	1.3	2.3
30	2.9	65.9	10.6	55.0	18.6	26.1	2.5	2.4	49.9	1.6	3.1	2.3	40.5	1.6	3.1
10	4.2	193	17.6	157	29.0	53.4	3.7	3.6	93.1	2.4	4.8	3.5	69.6	2.3	4.4
3	8.3	618	37.4	489	61.3	90.7	7.9	7.7	144	5.2	10.3	7.5	104	4.9	9.2
1	16.9	1740	80.6	1340	131	122	18.6	17.3	184	12.0	24.1	17.5	133	11.0	20.4

[a] The $DCGL_{EMC}$ for a given radionuclide is determined by multiplying the $DCGL_W$ in Table 6-5 by the area factor for the area size of concern.

6.6.1 Dose Model

The building DCGLs were calculated using the building occupancy scenario. The residual radioactive material was assumed to be uniformly distributed over the floor surface of the room. The average member of the critical group is the resident, who lives in the contaminated building without deliberately disturbing the source.

The potential pathways used to estimate human radiation exposure resulting from residual radioactivity on the building floor surfaces include the following:

- External exposure directly from the source,
- External exposure from the material deposited on the floor,
- External exposure due to air submersion,
- Inhalation of airborne radioactive particulates and tritium,
- Inadvertent ingestion of radioactive material directly from the source,
- Inadvertent ingestion of radioactive material deposited on the surfaces of the building.

The peak dose at time zero, the time the building would be released, was used in the calculation of DCGLs.

6.6.2 Conceptual Model

A site conceptual model of a contaminated building provides the basis for computing dose estimates using RESRAD-BUILD code. For the current effort, it was conservatively assumed that the building can be modeled as one room and that the source and receptor were in the same room. Therefore, many parameters related with inflow and outflow from one room to another were not required. It was assumed that there was no shielding between the source and the receptor, and that the receptor was at the center of the source at a height of 1 m. The whole floor of the room was assumed to be contaminated, and the contamination was confined to a surface layer. Table 6-9 lists the median parameter values assigned for the deterministic RESRAD-BUILD run as well as the parameter values/distributions assigned for the probabilistic RESRAD-BUILD run and the basis for assigning them. For some radionuclides in a deterministic run the value for a priority 1 or priority 2 (see Figure 6.3) parameter may have been changed from a median value to a more conservative value (see Section 6.4.5) on the basis of the sensitivity analysis. In such cases, the latter value is provided in Table 6-10 for a given radionuclide.

6.6.3 Sensitivity Analysis Results

A probabilistic RESRAD-BUILD run was performed for an individual radionuclide to identify the sensitive parameters for that radionuclide. An initial radionuclide concentration of

Table 6-9

Input Parameters Used at Seneca Army Depot Site for Probabilistic and Deterministic RESRAD-BUILD Analysis

Input Parameter	Units	Type[a]	Priority	Deterministic[b]	Probabilistic analysis				Remarks
					value/ distribution	Distributions statistical parameters[c]			
						1	2	3	
External dose conversion factor	(mrem/yr) per (pCi/g)	M	3	Nuclide specific	Nuclide specific	NR[d]	NR	NR	Values are from Federal Guidance Report No.12 (FGR-12).
Inhalation dose conversion factor	mrem/pCi	M	3	Nuclide specific	Nuclide specific	NR	NR	NR	Values are from Federal Guidance Report No.11 (FGR-11).
Ingestion dose conversion factor	mrem/pCi	M	3	Nuclide specific	Nuclide specific	NR	NR	NR	Values are from Federal Guidance Report No.11 (FGR-11).
Air submersion dose conversion factor	(mrem/yr) per (pCi/m^3)	M	3	Nuclide specific	Nuclide specific	NR	NR	NR	Values are from Federal Guidance Report No.12 (FGR-12).
Exposure duration	days	B	3	365.25	365.25	NR	NR	NR	To match the occupancy period of 365.25 days in NUREG/CR-5512 building occupancy scenario.
Indoor fraction	none	B	2	0.6792	0.6792	NR	NR	NR	Resident spends16.3 h/d inside the building. The value greater than the indoor fraction of 0.6571 used in NUREG/CR-5512 resident scenario.
Number of evaluation times	none	P	3	1	1	NR	NR	NR	Dose is calculated at the time when the building is released for all the radionuclides of concern including progeny.
Time	yr	P	3	0	0	NR	NR	NR	Dose is calculated for one year exposure at the time (t =0 yr) building is released
Number of rooms	none	P	3	1	1	NR	NR	NR	NUREG/CR-5512 building occupancy scenario assumes only one contaminated room.
Deposition velocity	m/s	P	2	8.52E-5	Loguniform	2.7E-6	2.7E-3		Distribution from NUREG/CR-6697. Based on the guidance provided in NUREG/CR-6676, deposition velocity and resuspension rate were positively correlated (correlation coefficient = 0.9).
Resuspension rate	1/s	P, B	1	6.22E-8	Loguniform	2.8E-10	1.4E-5		Distribution from NUREG/CR-6697. Based on the guidance provided in NUREG/CR-6676, deposition velocity and resuspension rate were positively correlated (correlation coefficient = 0.9).
Room height	m	P	2	3.25	Uniform	2.5	4.0		To capture variability in room heights in different survey units at Seneca Army Depot
Room area	m^2	P	2	141	Loguniform	10	2000		To capture variability in room sizes in different survey units at Seneca Army Depot. Correlated with the source area, correlation coefficient = 0.99
Air exchange rate for building and room	1/h	B	2	1.52	1.52	NR	NR	NR	Median of the distribution from NUREG/CR-6697
Net flow	m^3/h	B	3	NR	NR	NR	NR	NR	Not required since only one room model is used.

Table 6-9 (Cont.)

Input Parameter	Units	Type[a]	Priority	Deterministic[b]	Probabilistic analysis: value/ distribution	Distributions statistical parameters[c]: 1	2	3	Remarks
Outdoor inflow	m^3/h	B, P	3	NR	NR	NR	NR	NR	Outdoor inflow is calculated from room volume and air exchange rate.
Number of receptors	none	B	3	1	1	NR	NR	NR	Dose is calculated for one receptor.
Receptor room	none	B	3	1	1	NR	NR	NR	Only one room model is used.
Receptor location	m	B	3	0,0,1	0,0,1	NR	NR	NR	At 1-m height from the center of the contaminated floor surface.
Receptor time fraction	none	B	3	1	1	NR	NR	NR	Most conservative value
Receptor inhalation rate	m^3/d	M, B	2	23.5	23.5	NR	NR	NR	For the building resident it matches the breathing rate of the resident in the resident farmer scenario of NUREG/CR-5512
Receptor indirect ingestion rate	m^2/h	B	2	9E-5	9E-5	NR	NR	NR	Median of the distribution from NUREG/CR-6697
Number of sources	none	P	3	1	1	NR	NR	NR	Floor of the room is contaminated.
Source type	none	P	3	Area	Area	NR	NR	NR	Only surface source is considered in building occupancy scenario.
Source room or primary room	none	P	3	1	1	NR	NR	NR	Only one room is considered.
Source direction	none	P	3	z	z	NR	NR	NR	The direction perpendicular to the exposed area.
Source location	m	P	3	0,0,0	0,0,0	NR	NR	NR	Source center location.
Source area	m^2	P	2	141	Loguniform	10	2000		Correlated with the room area (Floor is contaminated), correlation coefficient = 0.99
Air release fraction	none	B	2	0.07/1.0	0.07/1.0	NR	NR	NR	For all radionuclides except tritium value used (0.07) is equal to the upper bound value for noncombustible solids from NUREG/CR-6697 and the value used for tritium (1.0) is the recommended value for gaseous form of tritium.
Direct ingestion rate	1/h	B	2	5.5E-8	5.5E-8	NR	NR	NR	Calculated from the default ingestion rate of 1.1E-4 m^2/h in NUREG/CR-5512 building occupancy scenario and the maximum contaminated area of 2,000 m2.
Removable fraction	none	P, B	1	0.1	0.1	NR	NR	NR	10% of the contamination is removable (NUREG/CR-5512 building occupancy scenario default).
Time for source removal or source lifetime	days	P, B	2	33230	Triangular	1,000	10,000	100,000	Distribution from NUREG/CR-6697
Radon release fraction	none	P, B	3	0	0	NR	NR	NR	Radon inhalation pathway is suppressed.
Radionuclide concentration	dpm/m^2	P	3	100	100	NR	NR	NR	DCGLs are independent of initial radionuclide concentration
Shielding thickness	cm	P, B	2	0	0	NR	NR	NR	No shielding is assumed between the source and receptor.
Shielding density	g/cm^3	P	1	NR	NR	NR	NR	NR	No shielding is assumed between the source and receptor.

Table 6-9 (Cont.)

Input Parameter	Units	Type[a]	Priority	Deterministic[b]	Probabilistic analysis				Remarks
					value/ distribution	Distributions statistical parameters[c]			
						1	2	3	
Shielding material	none	P	3	NR	NR	NR	NR	NR	No shielding is assumed between the source and receptor.

[a] P = physical, B = behavioral, and M = metabolic; when more than one parameter type is listed, the more conservative parameter type is used in the analysis.

[b] Parameter values (median value from the distribution for a probabilistic parameter) used in the deterministic run. Values for the deterministic analysis are subject to change from a median value to a more conservative value on the basis of sensitivity analysis. See Section 6.4.5 for parameter value assignment process.

[c] For uniform and loguniform distributions, parameter 1 is the minimum and parameter 2 is the maximum value. For triangular distribution, parameter 1 is the minimum value, parameter 2 is the most likely value, and parameter 3 is the maximum value of the distribution.

[d] NR = not required for the analysis (RESRAD-BUILD parameters for which distributions are not developed or for which statistical parameters are not required.

Table 6-10

Results of Probabilistic Analysis in Identifying Sensitive Parameters and Parameter Values for Use As Inputs in Deterministic Analysis Using RESRAD-BUILD

Radionuclide	Sensitive parameters, Partial rank correlation coefficient (PRCC), and parameter values selected from parameter selection process for deterministic analysis				
Ac-227[a]	Parameters	Source lifetime	Source area	Room area	Room height
	PRCC	-0.77	0.49	-0.23	-0.19
	Value	18240	376	376	2.87
H-3[b]	Parameters	Source area	Source lifetime		
	PRCC	0.99	-0.47		
	Value	530	18240		
Pa-231[a]	Parameters	Source lifetime	Source area	Room area	Room height
	PRCC	-0.67	0.55	-0.17	-0.13
	Value	18240	376	376	2.87
Pb-210[b]	Parameters	Source area	Source lifetime		
	PRCC	0.98	-0.49		
	Value	530	18240		
Pm-147[a]	Parameters	Source area	Source lifetime	Room area	Room height
	PRCC	0.74	-0.60	-0.13	-0.10
	Value	376	18240	376	2.87
Pu-239[a]	Parameters	Source lifetime	Source area	Room area	Room height
	PRCC	-0.67	0.55	-0.17	-0.13
	Value	18240	376	376	2.87
Ra-226[a]	Parameters	Source area	Source lifetime	Room area	
	PRCC	1.00	-0.54	-0.15	
	Value	376	18240	376	
Ra-228[a]	Parameters	Source area	Source lifetime	Room area	
	PRCC	1.00	-0.51	-0.14	
	Value	376	18240	376	
Sm-147[a]	Parameters	Source lifetime	Source area	Room area	Room height
	PRCC	-0.76	0.48	-0.23	-0.18
	Value	18240	376	376	2.87
Th-228[a]	Parameters	Source lifetime	Source area	Room area	Room height
	PRCC	-0.70	0.68	-0.21	-0.15
	Value	18240	376	376	2.87
Th-230[a]	Parameters	Source lifetime	Source area	Room area	Room height
	PRCC	-0.79	0.48	-0.25	-0.20
	Value	18240	376	376	2.87
Th-232[a]	Parameters	Source lifetime	Source area	Room area	Room height
	PRCC	-0.78	0.48	-0.25	-0.21
	Value	18240	376	376	2.87
U-234[a]	Parameters	Source lifetime	Source area	Room area	Room height
	PRCC	-0.77	0.48	-0.23	-0.19
	Value	18240	376	376	2.87
U-235[a]	Parameters	Source lifetime	Source area	Room area	Room height
	PRCC	-0.74	0.57	-0.22	-0.17
	Value	18240	376	376	2.87
U-238[a]	Parameters	Source lifetime	Source area	Room area	Room height
	PRCC	-0.76	0.50	-0.23	-0.18
	Value	18240	376	376	2.87

1 dpm/100 cm^2 was assumed. As mentioned in Section 6.4.4, a parameter was identified as sensitive if the absolute value of PRCC was greater than or equal to 0.10 and not sensitive if the absolute value of PRCC was less than 0.10 for the building occupancy scenario. Table 6-10 lists the probabilistic parameters identified as sensitive parameters for each radionuclide from the peak dose analysis. The sensitive parameters are listed along with their PRCC values and conservative values selected on the basis of the parameter selection process shown in Figure 6.3 and described in Section 6.4.5.

6.6.4 DCGL Determination

The building DCGLs were derived for a dose limit of 10 mrem/yr, in a similar way as the soil DCGLs were derived (Section 6.5.4).

6.6.4.1 Probabilistic DCGL Derivation

Parameter values/distributions assigned in the probabilistic run were taken from Table 6-9 for each individual radionuclide. RESRAD-BUILD Version 3.21 was used in this analysis. Table 6-11 provides the probabilistic peak dose distribution. The peak dose distribution is provided at each 5 percentile increment along with the minimum, maximum, and the mean peak dose at initial radionuclide concentration of 1 dpm/100 cm^2. The DCGLs were determined for the radiation dose limit of 10 mrem/yr. The calculated DCGLs are provided in Table 6-12.

6.6.4.2 Deterministic DCGL Derivation

Parameter values assigned in the deterministic run were from Table 6-10 (for parameters found to be sensitive) and from Table 6-9 (for parameters not found to be sensitive) for each individual radionuclide. RESRAD-BUILD Version 3.21 was used in this analysis. The calculated DCGL values are provided in Table 6-12 for the radiation dose limit of 10 mrem/yr. Table 6-13 provides the contributions of different pathways to the calculated maximum DSRs. The deterministic wide area DCGL ($DCGL_w$) values in Table 6-12 should be used in the evaluation of survey data.

6.6.5 Area Factor Calculations for Building Contamination

The area factors for use with $DCGL_w$ values were also calculated for the building occupancy scenario. The deterministic RESRAD-BUILD code was run repeatedly while changing the source area and keeping other parameters unchanged. The area factor was calculated by taking the ratio of the dose from large contaminated area to the dose from smaller contaminated areas. Table 6-14 lists the calculated area factors for the building occupancy scenario for all

Table 6-11

Dose/Source Concentration Ratios (mrem/yr per dpm/100 cm^2) at Different Dose Percentiles from Peak Dose Distribution for the Building Occupancy Scenario at the Seneca Army Depot Activity from the Probabilistic RESRAD-BUILD Run

Percentile	Ac-227	H-3	Pa-231	Pb-210	Pm-147	Pu-239	Ra-226	Ra-228	Sm-147	Th-228	Th-230	Th-232	U-234	U-235	U-238
5%	2.43E-3	1.31E-9	6.89E-4	1.59E-4	5.67E-8	2.20E-4	9.57E-4	5.55E-4	2.46E-5	9.47E-4	9.83E-5	4.90E-4	4.31E-5	1.53E-4	6.09E-5
10%	3.02E-3	1.66E-9	8.59E-4	2.02E-4	7.06E-8	2.76E-4	1.08E-3	6.29E-4	3.09E-5	1.09E-3	1.23E-4	6.15E-4	5.41E-5	1.78E-4	7.43E-5
15%	3.63E-3	2.21E-9	1.08E-3	2.64E-4	8.59E-8	3.49E-4	1.22E-3	7.15E-4	3.81E-5	1.23E-3	1.47E-4	7.32E-4	6.60E-5	2.04E-4	8.64E-5
20%	4.18E-3	2.79E-9	1.29E-3	3.35E-4	1.00E-7	4.19E-4	1.37E-3	8.02E-4	4.41E-5	1.35E-3	1.73E-4	8.63E-4	7.65E-5	2.25E-4	9.86E-5
25%	4.91E-3	3.61E-9	1.50E-3	4.24E-4	1.18E-7	4.89E-4	1.52E-3	8.96E-4	5.22E-5	1.48E-3	2.00E-4	9.92E-4	8.98E-5	2.48E-4	1.11E-4
30%	5.51E-3	4.76E-9	1.74E-3	5.52E-4	1.38E-7	5.71E-4	1.68E-3	1.00E-3	5.92E-5	1.60E-3	2.27E-4	1.14E-3	1.01E-4	2.66E-4	1.25E-4
35%	6.13E-3	6.08E-9	1.98E-3	7.09E-4	1.67E-7	6.48E-4	1.85E-3	1.11E-3	6.69E-5	1.74E-3	2.56E-4	1.28E-3	1.13E-4	2.89E-4	1.38E-4
40%	6.90E-3	7.96E-9	2.40E-3	9.21E-4	2.01E-7	7.84E-4	2.03E-3	1.23E-3	7.56E-5	1.91E-3	2.90E-4	1.45E-3	1.29E-4	3.17E-4	1.55E-4
45%	7.92E-3	1.03E-8	2.91E-3	1.19E-3	2.49E-7	9.56E-4	2.23E-3	1.37E-3	8.67E-5	2.07E-3	3.26E-4	1.63E-3	1.47E-4	3.45E-4	1.71E-4
50%	8.95E-3	1.34E-8	3.44E-3	1.55E-3	3.01E-7	1.13E-3	2.43E-3	1.52E-3	9.83E-5	2.22E-3	3.76E-4	1.88E-3	1.67E-4	3.80E-4	1.93E-4
55%	1.04E-2	1.74E-8	4.18E-3	2.00E-3	3.70E-7	1.38E-3	2.66E-3	1.69E-3	1.17E-4	2.42E-3	4.22E-4	2.11E-3	1.93E-4	4.17E-4	2.24E-4
60%	1.20E-2	2.28E-8	5.05E-3	2.60E-3	4.58E-7	1.67E-3	2.92E-3	1.89E-3	1.37E-4	2.60E-3	4.83E-4	2.41E-3	2.23E-4	4.58E-4	2.55E-4
65%	1.37E-2	2.96E-8	6.18E-3	3.37E-3	5.74E-7	2.04E-3	3.20E-3	2.13E-3	1.56E-4	2.80E-3	5.64E-4	2.81E-3	2.58E-4	5.03E-4	2.87E-4
70%	1.65E-2	3.86E-8	7.72E-3	4.40E-3	7.30E-7	2.56E-3	3.54E-3	2.41E-3	1.88E-4	3.05E-3	6.53E-4	3.27E-3	3.11E-4	5.61E-4	3.37E-4
75%	1.89E-2	5.05E-8	9.62E-3	5.75E-3	9.21E-7	3.19E-3	3.94E-3	2.77E-3	2.21E-4	3.36E-3	7.63E-4	3.81E-3	3.58E-4	6.30E-4	3.87E-4
80%	2.25E-2	6.56E-8	1.21E-2	7.49E-3	1.18E-6	4.01E-3	4.40E-3	3.19E-3	2.66E-4	3.63E-3	8.91E-4	4.44E-3	4.24E-4	7.05E-4	4.56E-4
85%	2.73E-2	8.53E-8	1.51E-2	9.71E-3	1.49E-6	5.02E-3	4.95E-3	3.71E-3	3.20E-4	3.99E-3	1.08E-3	5.36E-3	5.18E-4	7.98E-4	5.39E-4
90%	3.31E-2	1.11E-7	1.97E-2	1.26E-2	1.92E-6	6.54E-3	5.64E-3	4.38E-3	3.95E-4	4.46E-3	1.30E-3	6.49E-3	6.37E-4	9.34E-4	6.48E-4
95%	4.05E-2	1.45E-7	2.50E-2	1.65E-2	2.47E-6	8.31E-3	6.48E-3	5.22E-3	4.86E-4	5.01E-3	1.57E-3	7.81E-3	7.67E-4	1.08E-3	7.89E-4
Mean	1.38E-2	3.56E-8	6.91E-3	4.06E-3	6.60E-7	2.29E-3	2.91E-3	2.03E-3	1.59E-4	2.51E-3	5.52E-4	2.75E-3	2.59E-4	4.70E-4	2.82E-4
Min	1.38E-3	9.80E-10	4.07E-4	1.18E-4	4.08E-8	1.28E-4	8.30E-4	4.80E-4	1.34E-5	7.62E-4	5.44E-5	2.69E-4	2.41E-5	1.15E-4	3.99E-5
Max	8.73E-2	1.89E-7	3.27E-2	2.15E-2	3.22E-6	1.09E-2	7.54E-3	6.29E-3	9.69E-4	6.27E-3	4.18E-3	2.10E-2	1.71E-3	1.81E-3	1.57E-3

Table 6-12

Building DCGLw's for the Building Occupancy Scenario from Deterministic and Probabilistic RESRAD-BUILD Run at Seneca Army Depot Activity

Radionuclide	Wide Area DCGLs (dpm/100cm^2)	
	Deterministic[a]	Probabilistic
Ac-227	6.70E2	7.25E2
H-3	2.07E8	2.81E8
Pa-231	1.36E3	1.45E3
Pb-210	1.79E3	2.46E3
Pm-147	1.69E7	1.52E7
Pu-239	4.24E3	4.37E3
Ra-226	2.87E3	3.44E3
Ra-228	3.79E3	4.93E3
Sm-147	5.75E4	6.29E4
Th-228	3.95E3	3.98E3
Th-230	1.62E4	1.81E4
Th-232	3.09E3	3.64E3
U-234	3.51E4	3.86E4
U-235	1.82E4	2.13E4
U-238	3.16E4	3.55E4

[a] Deterministic value to be used for evaluating survey data.

Table 6-13

Percentage Contribution of Different Pathways[a] for the Building Occupancy Scenario at the Seneca Army Depot Activity from the Deterministic RESRAD-BUILD Run

Radionuclide	External	Deposition	Immersion	Inhalation	Ingestion
Ac-227	4.21	0.00	0.00	42.47	53.40
H-3	0.00	0.00	0.00	0.16	99.79
Pa-231	1.15	0.00	0.00	18.16	80.76
Pb-210+D	0.18	0.00	0.00	0.35	99.46
Pm-147	8.89	0.00	0.00	5.55	85.67
Pu-239	0.06	0.00	0.00	17.50	82.63
Ra-226+D	77.08	0.00	0.00	0.22	22.69
Ra-228+D	67.42	0.00	0.00	1.86	30.87
Sm-147	0.00	0.00	0.00	41.38	58.62
Th-228+D	74.31	0.00	0.00	10.91	14.74
Th-230	0.40	0.00	0.00	50.81	48.71
Th-232	3.21	0.00	0.00	48.77	47.84
U-234	0.85	0.00	0.00	44.56	54.74
U-235+D	51.64	0.00	0.00	21.72	26.82
U-238+D	17.22	0.00	0.00	36.08	46.84

[a] Because of round off error total pathway dose may be different than 100. Dose from deposition and immersion pathways is very small compared to other pathways.

Table 6-14

Area Factors for the Building Occupancy Scenario for Different Contaminants at the Seneca Army Depot Activity

Area, m^2	Area factor for contaminant of concern[a]														
	Ac-227	H-3	Pa-231	Pb-210	Pm-147	Pu-239	Ra-226	Ra-228	Sm-147	Th-228	Th-230	Th-232	U-234	U-235	U-238
530	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
376	1.0	1.4	1.0	1.4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
300	1.2	1.8	1.3	1.8	1.2	1.3	1.1	1.1	1.3	1.1	1.3	1.2	1.3	1.1	1.2
100	3.5	5.3	3.7	5.3	3.3	3.8	1.6	1.7	3.8	1.6	3.7	3.6	3.7	2.0	2.9
30	10.3	17.7	11.8	17.4	8.8	12.5	2.5	2.8	12.5	2.6	12.2	10.8	11.8	3.4	6.6
10	26.3	53.0	33.4	51.7	20.3	37.1	4.2	4.7	37.7	4.4	35.7	28.2	33.3	5.9	13.4
3	74.3	177	104	169	52.9	122	9.1	10.3	125	9.4	115	81.6	103	12.9	32.0
1	202	530	299	498	139	365	22.2	25.1	377	23.0	338	225	295	31.7	80.8

[a] The $DCGL_{EMC}$ for a given radionuclide is determined by multiplying the $DCGL_w$ in Table 6-12 by the area factor for the area size of concern.

radionuclides. Linear extrapolation would be used when necessary for in-between area sizes. In the current application, the $DCGL_{EMC}$ for a given radionuclide is determined by multiplying the corresponding $DCGL_w$ in Table 6-12 by the area factor for the elevated area size of concern. For multiple radionuclides, the area factor for the radionuclide that would give the most conservative dose, a lowest area factor, would be used in the determination of $DCGL_{EMC}$ for all radionuclides.

6.7 Demonstration of Compliance with Site Release Criteria

To demonstrate compliance with the 10 mrem/yr criterion, derived concentration guideline values are developed for all radionuclides of concern at the SEDA site for soil and building surfaces. In practice, all radionuclides may not be present in a survey unit. For example, in Building 612, contaminants of concern are U-234, U-235, and U-238; whereas, in storage bunker A-701, only Pm-147 was handled. Therefore, to demonstrate compliance, DCGLs only of radionuclides of concern in a survey unit would be considered in the conversion and interpretation of field instrument readings. If individual radionuclides are assayed, using spectrometric measurements, for example, DCGLs would be interpreted using the unity rule to assure compliance.

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DEPARTMENT OF THE ARMY
UNITED STATES ARMY AVIATION AND MISSILE COMMAND
REDSTONE ARSENAL, ALABAMA 35898-5000

REPLY TO
ATTENTION OF

AMSAM-TMD-SR(C) 3 December 2003

MEMORANDUM FOR Commander, Seneca Army Depot Activity, ATTN: SIOSE-S, 5786 State Route 96, Romulus, NY 14541-5001

SUBJECT: Decommissioning Wipe Test Results

1. The results of area wipe tests made at your facility from 7 May to 10 July 2003, which this laboratory received on 9, 23, 27 June, and 4 August 2003, are indicated at Enclosure 1. Limit of Detection (LD) is also included in Enclosure 1. Results exceeding the limit of decision are reported as defined by NCRP 58.

2. Traceability to NIST is provided by an Am-241 source, SN: SS-805, last calibrated date: 29 May 2002, a Sr-90 source, SN SS-810, last calibrated date: 30 May 2002, and a Cs-137 source, SN: SS-799, last calibrated date: 30 May 2002. These sources were calibrated at NIST and were used to calibrate the counters used to evaluate your leak tests. The NIST calibration documents are maintained on file at this facility. ***This laboratory is ISO-9002 registered.***

3. The POC is the undersigned, COM 256-876-0472/3340/7666 or DSN 746-0472/3340/7666.

STEPHEN V. HOWARD
Lead Health Physicist, Nuclear Counting
and Special Projects

Sample Identification			DPM			Limit of Detection			Date Rec'd	Notes
			Alpha	Beta	Gamma	Alpha	Beta	Gamma		
803		**1**	**0.7**	**0.0**	**0.0**	**2**	**9**	**83**	**08/04/03**	
803		2	0.0	4.0	0.0	2	9	83	08/04/03	
803		3	0.7	0.0	0.0	2	9	83	08/04/03	
803		4	0.0	0.0	0.0	2	9	83	08/04/03	
803		5	1.5	7.9	0.0	2	9	83	08/04/03	
803		6	0.7	4.0	0.0	2	9	83	08/04/03	
803		7	0.0	0.0	0.0	2	9	83	08/04/03	
803		8	1.1	0.0	0.0	2	9	83	08/04/03	
803		9	0.7	4.8	0.0	2	9	83	08/04/03	
803		10	1.5	11.1	0.0	2	9	83	08/04/03	
803		11	1.1	5.6	0.0	2	9	83	08/04/03	
803		12	0.0	9.1	0.0	2	9	83	08/04/03	
803		13	2.0	0.0	43.6	2	9	83	08/04/03	
803		14	2.0	11.5	0.0	2	9	83	08/04/03	
803		15	0.0	0.0	0.0	2	9	83	08/04/03	
803		16	2.0	18.2	0.0	2	9	83	08/04/03	
803		17	0.7	0.0	0.0	2	9	83	08/04/03	
803		18	0.0	8.3	0.0	2	9	83	08/04/03	
803		19	2.0	6.0	46.9	2	9	83	08/04/03	
803		20	1.1	0.0	0.0	2	9	83	08/04/03	
803		21	1.5	4.8	0.0	2	9	83	08/04/03	
803		22	0.0	4.4	0.0	2	9	83	08/04/03	
803		23	1.1	4.4	0.0	2	9	83	08/04/03	
803		24	2.4	6.4	0.0	2	9	83	08/04/03	
803		25	0.7	0.0	0.0	2	9	83	08/04/03	
803		26	0.0	0.0	0.0	2	9	83	08/04/03	
803		27	0.0	0.0	0.0	2	9	83	08/04/03	
803		28	0.0	0.0	0.0	2	9	83	08/04/03	
803		29	0.7	0.0	0.0	2	9	83	08/04/03	
803		30	0.0	0.0	0.0	2	9	83	08/04/03	
804	**A**	**1**	**11.9**	**32.2**	**0.0**	**3**	**10**	**91**	**06/23/03**	
804	A	2	14.8	36.0	0.0	3	10	91	06/23/03	
804	A	3	10.7	27.2	0.0	3	10	91	06/23/03	
804	A	4	14.1	32.9	0.0	3	10	91	06/23/03	
804	A	5	6.7	19.6	0.0	3	10	91	06/23/03	
804	A	6	10.7	21.9	0.0	3	10	91	06/23/03	
804	A	7	21.6	28.4	0.0	3	10	91	06/23/03	
804	A	8	10.7	23.1	0.0	3	10	91	06/23/03	
804	A	9	11.9	24.6	0.0	3	10	91	06/23/03	
804	A	10	11.5	24.6	0.0	3	10	91	06/23/03	
804	A	11	36.8	82.0	0.0	3	10	91	06/23/03	
804	A	12	21.9	43.6	0.0	3	10	91	06/23/03	
804	A	13	8.9	13.2	0.0	3	10	91	06/23/03	
804	A	6HS1	35.0	96.8	0.0	3	10	91	06/23/03	
804	A	5HS2	89.0	202.9	65.6	3	10	91	06/23/03	
804	A	5HS1	35.3	92.3	0.0	3	10	91	06/23/03	
804	A	5HS3	35.3	128.0	0.0	3	10	91	06/23/03	
804	A	3HS1	39.4	89.2	0.0	3	10	91	06/23/03	
804	A	4HS1	32.4	63.8	0.0	3	10	91	06/23/03	
804	A	4HS2	106.5	254.3	87.7	3	10	91	06/23/03	

Sample Identification			DPM			Limit of Detection			Date Rec'd	Notes
			Alpha	Beta	Gamma	Alpha	Beta	Gamma		
804	A	13HS1	20.8	46.6	0.0	3	10	91	06/23/03	
804	A	12HS1	27.5	49.3	0.0	3	10	91	06/23/03	
804	A	8HS1	35.3	79.6	0.0	3	10	91	06/23/03	
804	A	2HS1	29.0	60.7	0.0	3	10	91	06/23/03	
804	A	7HS1	46.1	93.4	0.0	3	10	91	06/23/03	
804	A	1HS1	42.8	152.4	64.0	3	10	91	06/23/03	
804	A	2HS2	33.8	95.7	0.0	3	10	91	06/23/03	
804	B	1	7.4	15.8	0.0	3	10	91	06/23/03	
804	B	2	10.4	28.4	0.0	3	10	91	06/23/03	
804	B	3	9.6	20.8	0.0	3	10	91	06/23/03	
804	B	4	18.9	42.5	0.0	3	10	91	06/23/03	
804	B	5	21.9	39.8	0.0	3	10	91	06/23/03	
804	B	6	9.6	21.9	0.0	3	10	91	06/23/03	
804	B	7	8.1	17.0	0.0	3	10	91	06/23/03	
804	B	8	9.3	17.7	0.0	3	10	91	06/23/03	
804	B	9	12.2	30.7	0.0	3	10	91	06/23/03	
804	B	10	16.3	37.1	0.0	3	10	91	06/23/03	
804	B	11	16.0	34.5	0.0	3	10	91	06/23/03	
804	B	12	10.4	20.0	0.0	3	10	91	06/23/03	
804	B	13	2.2	0.0	0.0	3	10	91	06/23/03	
804	B	6HS1	31.2	98.4	0.0	3	10	91	06/23/03	
804	B	3HS1	18.9	30.3	0.0	3	10	91	06/23/03	
804	B	4HS1	46.9	104.1	0.0	3	10	91	06/23/03	
804	B	5HS1	21.6	55.0	0.0	3	10	91	06/23/03	
804	B	12HS2	33.1	67.6	0.0	3	10	91	06/23/03	
804	B	1HS1	19.3	45.1	0.0	3	10	91	06/23/03	
804	B	2HS1	52.8	106.3	0.0	3	10	91	06/23/03	
804	B	12HS3	31.6	69.1	0.0	3	10	91	06/23/03	
804	B	12HS1	25.3	59.2	0.0	3	10	91	06/23/03	
804	B	11HS2	32.7	91.5	0.0	3	10	91	06/23/03	
804	B	13HS1	22.7	35.2	0.0	3	10	91	06/23/03	
804	B	11HS1	37.9	119.6	0.0	3	10	91	06/23/03	
804	B	10HS1	24.2	57.3	0.0	3	10	91	06/23/03	
804	B	8HS2	15.6	32.6	0.0	3	10	91	06/23/03	
804	B	8HS1	17.8	53.9	0.0	3	10	91	06/23/03	
804	B	12HS4	27.5	52.3	0.0	3	10	91	06/23/03	
804	B	7HS1	23.8	37.1	0.0	3	10	91	06/23/03	
804	C	1	14.5	29.9	0.0	3	10	91	06/23/03	
804	C	2	14.8	46.3	0.0	3	10	91	06/23/03	
804	C	3	12.6	28.8	0.0	3	10	91	06/23/03	
804	C	4	10.7	17.0	0.0	3	10	91	06/23/03	
804	C	5	5.5	17.4	0.0	3	10	91	06/23/03	
804	C	6	8.5	18.9	0.0	3	10	91	06/23/03	
804	C	7	7.8	17.0	0.0	3	10	91	06/23/03	
804	C	8	21.2	48.5	0.0	3	10	91	06/23/03	
804	C	9	11.1	14.3	0.0	3	10	91	06/23/03	
804	C	10	15.6	55.4	0.0	3	10	91	06/23/03	
804	C	11	25.3	53.5	0.0	3	10	91	06/23/03	
804	C	12	41.3	86.9	0.0	3	10	91	06/23/03	
804	C	13	11.9	26.9	0.0	3	10	91	06/23/03	

Sample Identification			DPM			Limit of Detection			Date Rec'd	Notes
			Alpha	Beta	Gamma	Alpha	Beta	Gamma		
804	C	9HS1	36.8	86.9	0.0	3	10	91	06/23/03	
804	C	7HS1	32.0	64.9	0.0	3	10	91	06/23/03	
804	C	6HS1	23.8	52.7	0.0	3	10	91	06/23/03	
804	C	13HS1	12.2	40.6	0.0	3	10	91	06/23/03	
804	C	8HS1	46.9	94.9	0.0	3	10	91	06/23/03	
804	C	10HS1	42.0	97.6	0.0	3	10	91	06/23/03	
804	C	4HS1	25.6	64.1	0.0	3	10	91	06/23/03	
804	C	5HS1	18.2	33.7	0.0	3	10	91	06/23/03	
804	C	3HS1	19.3	44.4	0.0	3	10	91	06/23/03	
804	C	1HS1	14.5	26.5	0.0	3	10	91	06/23/03	
804	C	3HS2	43.9	101.4	0.0	3	10	91	06/23/03	
804	C	2HS1	19.7	37.1	0.0	3	10	91	06/23/03	
804	C	11HS2	32.7	80.1	0.0	3	10	91	06/23/03	
804	C	11HS1	40.5	66.4	0.0	3	10	91	06/23/03	
804	C	12HS2	51.4	91.1	0.0	3	10	91	06/23/03	
804	C	12HS1	52.1	105.2	0.0	3	10	91	06/23/03	
804	D	1	21.5	45.8	50.0	3	9	84	06/23/03	
804	D	2	12.0	38.1	44.2	3	9	84	06/23/03	
804	D	3	9.1	17.0	51.4	3	9	84	06/23/03	
804	D	4	11.6	14.5	0.0	3	9	84	06/23/03	
804	D	5	9.1	15.7	0.0	3	9	84	06/23/03	
804	D	6	5.4	18.8	41.8	3	9	84	06/23/03	
804	D	7	8.7	11.5	0.0	3	9	84	06/23/03	
804	D	8	15.7	31.6	0.0	3	9	84	06/23/03	
804	D	9	26.4	44.5	0.0	3	9	84	06/23/03	
804	D	10	27.7	52.2	58.2	3	9	84	06/23/03	
804	D	11	8.3	14.5	0.0	3	9	84	06/23/03	
804	D	12	40.5	99.9	57.7	3	9	84	06/23/03	
804	D	13	10.3	22.2	22.2	3	9	84	06/23/03	
804	D	10HS1	48.3	133.8	63.5	3	9	84	06/23/03	
804	D	9HS1	120.2	317.2	172.4	3	9	84	06/23/03	
804	D	8HS1	117.3	272.9	130.5	3	9	84	06/23/03	
804	D	7HS1	53.7	126.5	68.3	3	9	84	06/23/03	
804	D	12HS2	54.9	117.9	71.2	3	9	84	06/23/03	
804	D	12HS1	16.9	48.8	64.0	3	9	84	06/23/03	
804	D	13HS1	70.6	290.1	146.4	3	9	84	06/23/03	
804	D	11HS1	34.7	103.8	87.1	3	9	84	06/23/03	
804	D	11HS2	54.5	146.3	108.8	3	9	84	06/23/03	
804	D	4HS1	120.2	287.5	155.6	3	9	84	06/23/03	
804	D	5HS1	84.2	232.6	84.7	3	9	84	06/23/03	
804	D	1HS1	30.1	105.1	99.2	3	9	84	06/23/03	
804	D	2HS1	104.9	307.7	120.9	3	9	84	06/23/03	
804	D	6HS1	81.3	202.1	83.2	3	9	84	06/23/03	
804	D	3HS1	117.3	380.3	174.4	3	9	84	06/23/03	
804	E	1	5.8	5.9	0.0	3	9	84	06/23/03	
804	E	2	3.3	11.5	0.0	3	9	84	06/23/03	
804	E	3	1.2	5.0	0.0	3	9	84	06/23/03	
804	E	4	1.7	8.4	0.0	3	9	84	06/23/03	
804	E	5	1.7	0.0	0.0	3	9	84	06/23/03	
804	E	6	2.1	5.9	0.0	3	9	84	06/23/03	

Sample Identification			DPM			Limit of Detection			Date Rec'd	Notes
			Alpha	Beta	Gamma	Alpha	Beta	Gamma		
804	E	7	1.2	4.2	0.0	3	9	84	06/23/03	
804	E	8	0.0	0.0	0.0	3	9	84	06/23/03	
804	E	9	1.2	5.9	0.0	3	9	84	06/23/03	
804	E	10	0.0	0.0	0.0	3	9	84	06/23/03	
804	E	11	2.9	4.2	0.0	3	9	84	06/23/03	
804	E	12	0.0	4.2	45.6	3	9	84	06/23/03	
804	E	13	0.0	5.4	0.0	3	9	84	06/23/03	
804	E	2HS1	29.7	62.6	0.0	3	9	84	06/23/03	
804	E	3HS1	71.8	175.0	66.8	3	9	84	06/23/03	
804	E	4HS1	151.5	448.6	171.5	3	9	84	06/23/03	
804	E	5HS1	93.3	215.0	0.0	3	9	84	06/23/03	
804	E	6HS1	153.6	371.3	133.4	3	9	84	06/23/03	
804	E	7HS1	646.6	1378.6	556.8	3	9	84	06/23/03	
804	E	8HS1	653.7	1591.6	663.8	3	9	84	06/23/03	
804	E	9HS1	526.1	1293.6	479.1	3	9	84	06/23/03	
804	F	1	10.7	18.3	0.0	3	9	84	06/23/03	
804	F	2	7.8	17.5	0.0	3	9	84	06/23/03	
804	F	3	3.3	17.9	0.0	3	9	84	06/23/03	
804	F	4	1.7	8.4	0.0	3	9	84	06/23/03	
804	F	5	3.3	8.0	0.0	3	9	84	06/23/03	
804	F	6	8.3	15.3	0.0	3	9	84	06/23/03	
804	F	7	7.0	13.2	0.0	3	9	84	06/23/03	
804	F	8	2.5	0.0	0.0	3	9	84	06/23/03	
804	F	9	4.1	8.9	0.0	3	9	84	06/23/03	
804	F	10	2.9	14.9	0.0	3	9	84	06/23/03	
804	F	11	5.0	11.0	0.0	3	9	84	06/23/03	
804	F	12	3.3	7.2	0.0	3	9	84	06/23/03	
804	F	13	0.0	5.9	0.0	3	9	84	06/23/03	
804	G	1	0.0	0.0	0.0	3	9	84	06/23/03	
804	G	2	3.3	5.9	0.0	3	9	84	06/23/03	
804	G	3	2.9	7.6	0.0	3	9	84	06/23/03	
804	G	4	3.3	6.3	0.0	3	9	84	06/23/03	
804	G	5	0.0	0.0	0.0	3	9	84	06/23/03	
804	G	6	0.0	4.2	0.0	3	9	84	06/23/03	
804	G	7	1.7	9.3	47.1	3	9	84	06/23/03	
804	G	8	1.2	0.0	0.0	3	9	84	06/23/03	
804	G	9	0.0	0.0	0.0	3	9	84	06/23/03	
804	G	10	0.0	0.0	0.0	3	9	84	06/23/03	
804	G	11	1.2	0.0	0.0	3	9	84	06/23/03	
804	G	12	0.0	0.0	0.0	3	9	84	06/23/03	
804	G	13	2.9	7.2	0.0	3	9	84	06/23/03	
804	G	7HS1	1.7	8.4	0.0	3	9	84	06/23/03	
804	G	5HS1	1.2	0.0	0.0	3	9	84	06/23/03	
804	G	6HS1	3.7	0.0	0.0	3	9	84	06/23/03	
804	G	8HS1	2.1	9.3	0.0	3	9	84	06/23/03	
804	H	1	5.8	9.3	0.0	3	9	84	06/23/03	
804	H	2	2.5	8.9	0.0	3	9	84	06/23/03	
804	H	3	6.6	13.6	0.0	3	9	84	06/23/03	
804	H	4	2.9	6.7	0.0	3	9	84	06/23/03	
804	H	5	3.7	11.9	0.0	3	9	84	06/23/03	

Sample Identification			DPM			Limit of Detection			Date Rec'd	Notes
			Alpha	Beta	Gamma	Alpha	Beta	Gamma		
804	H	6	5.8	11.5	0.0	3	9	84	06/23/03	
804	H	7	0.0	6.7	48.5	3	9	84	06/23/03	
804	H	8	1.2	0.0	0.0	3	9	84	06/23/03	
804	H	9	2.5	6.7	0.0	3	9	84	06/23/03	
804	H	10	0.0	0.0	0.0	3	9	84	06/23/03	
804	H	11	1.7	5.9	0.0	3	9	84	06/23/03	
804	H	12	1.7	7.2	0.0	3	9	84	06/23/03	
804	H	13	4.1	15.7	0.0	3	9	84	06/23/03	
804	H	7HS1	3.3	14.0	0.0	3	9	84	06/23/03	
804	I	1	4.4	12.1	0.0	3	10	90	06/23/03	
804	I	2	3.7	6.7	0.0	3	10	90	06/23/03	
804	I	3	5.2	19.1	0.0	3	10	90	06/23/03	
804	I	4	1.8	6.7	0.0	3	10	90	06/23/03	
804	I	5	0.0	0.0	0.0	3	10	90	06/23/03	
804	I	6	2.2	5.5	0.0	3	10	90	06/23/03	
804	I	7	4.8	11.0	0.0	3	10	90	06/23/03	
804	I	8	3.3	6.3	0.0	3	10	90	06/23/03	
804	I	9	1.8	0.0	0.0	3	10	90	06/23/03	
804	I	10	3.7	14.5	0.0	3	10	90	06/23/03	
804	I	11	1.4	5.2	0.0	3	10	90	06/23/03	
804	I	12	5.9	12.1	0.0	3	10	90	06/23/03	
804	I	13	1.4	0.0	0.0	3	10	90	06/23/03	
804	J	1	6.3	12.9	0.0	3	10	90	06/23/03	
804	J	2	1.1	0.0	0.0	3	10	90	06/23/03	
804	J	3	0.0	4.4	0.0	3	10	90	06/23/03	
804	J	4	1.4	0.0	0.0	3	10	90	06/23/03	
804	J	5	0.0	0.0	0.0	3	10	90	06/23/03	
804	J	6	1.4	7.9	0.0	3	10	90	06/23/03	
804	J	7	1.1	7.1	0.0	3	10	90	06/23/03	
804	J	8	1.8	0.0	0.0	3	10	90	06/23/03	
804	J	9	1.8	0.0	0.0	3	10	90	06/23/03	
804	J	10	2.9	0.0	0.0	3	10	90	06/23/03	
804	J	11	2.6	0.0	0.0	3	10	90	06/23/03	
804	J	12	1.8	0.0	0.0	3	10	90	06/23/03	
804	J	13	0.0	0.0	0.0	3	10	90	06/23/03	
804	K	1	2.2	7.9	0.0	3	10	90	06/23/03	
804	K	2	2.2	7.5	0.0	3	10	90	06/23/03	
804	K	3	2.9	9.8	0.0	3	10	90	06/23/03	
804	K	4	1.4	7.9	0.0	3	10	90	06/23/03	
804	K	5	4.4	17.6	0.0	3	10	90	06/23/03	
804	K	6	0.0	12.9	0.0	3	10	90	06/23/03	
804	K	7	6.7	12.9	0.0	3	10	90	06/23/03	
804	K	8	4.1	9.8	0.0	3	10	90	06/23/03	
804	K	9	2.2	4.8	0.0	3	10	90	06/23/03	
804	K	9HS1	56.1	97.5	55.5	3	10	90	06/23/03	
804	K	3HS1	2.6	9.8	0.0	3	10	90	06/23/03	
804	L	1	0.0	0.0	0.0	3	10	90	06/23/03	
804	L	2	0.0	0.0	0.0	3	10	90	06/23/03	
804	L	3	0.0	4.8	0.0	3	10	90	06/23/03	
804	L	4	0.0	0.0	0.0	3	10	90	06/23/03	

Sample Identification			DPM			Limit of Detection			Date Rec'd	Notes
			Alpha	Beta	Gamma	Alpha	Beta	Gamma		
804	L	5	8.5	15.6	0.0	3	10	90	06/23/03	
804	L	6	6.3	13.7	0.0	3	10	90	06/23/03	
804	L	7	12.3	15.2	0.0	3	10	90	06/23/03	
804	L	8	7.4	18.3	0.0	3	10	90	06/23/03	
804	L	9	1.1	0.0	0.0	3	10	90	06/23/03	
805	**A**	**1**	**3.3**	**5.4**	**0.0**	**3**	**10**	**90**	**06/09/03**	
805	A	2	2.9	7.3	0.0	3	10	90	06/09/03	
805	A	3	4.8	0.0	0.0	3	10	90	06/09/03	
805	A	4	2.6	9.3	0.0	3	10	90	06/09/03	
805	A	5	2.9	0.0	0.0	3	10	90	06/09/03	
805	A	6	0.0	0.0	0.0	3	10	90	06/09/03	
805	A	7	1.4	6.9	0.0	3	10	90	06/09/03	
805	A	8	2.6	6.5	0.0	3	10	90	06/09/03	
805	A	9	3.3	8.1	0.0	3	10	90	06/09/03	
805	A	10	2.2	7.7	0.0	3	10	90	06/09/03	
805	A	11	2.2	0.0	0.0	3	10	90	06/09/03	
805	A	12	2.9	6.2	0.0	3	10	90	06/09/03	
805	A	13	10.0	22.5	0.0	3	10	90	06/09/03	
805	A	1HS1	2.9	5.0	0.0	3	10	90	06/09/03	
805	A	10HS1	19.4	52.4	0.0	3	10	90	06/09/03	
805	A	8HS1	15.6	43.0	0.0	3	10	90	06/09/03	
805	B	1	3.3	0.0	0.0	3	10	90	06/09/03	
805	B	2	2.9	12.4	0.0	3	10	90	06/09/03	
805	B	3	2.6	5.0	0.0	3	10	90	06/09/03	
805	B	4	2.2	0.0	0.0	3	10	90	06/09/03	
805	B	5	2.6	5.4	0.0	3	10	90	06/09/03	
805	B	6	1.4	7.7	0.0	3	10	90	06/09/03	
805	B	7	1.4	0.0	0.0	3	10	90	06/09/03	
805	B	8	0.0	0.0	0.0	3	10	90	06/09/03	
805	B	9	1.1	0.0	0.0	3	10	90	06/09/03	
805	B	10	2.2	0.0	0.0	3	10	90	06/09/03	
805	B	11	2.2	0.0	0.0	3	10	90	06/09/03	
805	B	12	2.6	6.5	0.0	3	10	90	06/09/03	
805	B	13	1.4	0.0	0.0	3	10	90	06/09/03	
805	B	13HS1	1.8	6.5	0.0	3	10	90	06/09/03	
805	B	7HS1	4.4	0.0	0.0	3	10	90	06/09/03	
805	C	1	4.1	0.0	0.0	3	10	90	06/09/03	
805	C	2	2.9	9.7	0.0	3	10	90	06/09/03	
805	C	3	2.2	0.0	0.0	3	10	90	06/09/03	
805	C	4	4.4	5.0	0.0	3	10	90	06/09/03	
805	C	5	2.9	8.5	0.0	3	10	90	06/09/03	
805	C	6	2.2	6.9	0.0	3	10	90	06/09/03	
805	C	7	3.3	0.0	0.0	3	10	90	06/09/03	
805	C	8	0.0	0.0	0.0	3	10	90	06/09/03	
805	C	9	0.0	0.0	0.0	3	10	90	06/09/03	
805	C	10	1.1	0.0	0.0	3	10	90	06/09/03	
805	C	11	0.0	0.0	0.0	3	10	90	06/09/03	
805	C	12	2.9	0.0	0.0	3	10	90	06/09/03	
805	C	13	5.2	0.0	0.0	3	10	90	06/09/03	
805	C	11HS1	2.2	8.9	0.0	3	10	90	06/09/03	

Sample Identification			DPM			Limit of Detection			Date Rec'd	Notes
			Alpha	Beta	Gamma	Alpha	Beta	Gamma		
805	C	1HS1	11.2	15.9	0.0	3	10	90	06/09/03	
805	D	1	1.8	0.0	0.0	3	10	90	06/09/03	
805	D	2	4.8	8.9	0.0	3	10	90	06/09/03	
805	D	3	4.1	13.5	0.0	3	10	90	06/09/03	
805	D	4	5.5	15.9	0.0	3	10	90	06/09/03	
805	D	5	10.4	19.7	0.0	3	10	90	06/09/03	
805	D	6	5.9	8.5	0.0	3	10	90	06/09/03	
805	D	7	2.2	0.0	0.0	3	10	90	06/09/03	
805	D	8	5.2	11.6	0.0	3	10	90	06/09/03	
805	D	9	1.8	0.0	0.0	3	10	90	06/09/03	
805	D	10	1.4	5.8	0.0	3	10	90	06/09/03	
805	D	11	3.3	0.0	0.0	3	10	90	06/09/03	
805	D	12	5.2	6.2	0.0	3	10	90	06/09/03	
805	D	13	18.3	33.7	0.0	3	10	90	06/09/03	
805	D	1HS1	6.3	8.1	0.0	3	10	90	06/09/03	
805	D	11HS1	12.6	28.7	53.3	3	10	90	06/09/03	
805	D	13HS1	13.8	24.4	0.0	3	10	90	06/09/03	
805	E	1	0.0	5.8	0.0	3	10	90	06/09/03	
805	E	2	0.0	0.0	0.0	3	10	90	06/09/03	
805	E	3	1.1	0.0	0.0	3	10	90	06/09/03	
805	E	4	0.0	0.0	0.0	3	10	90	06/09/03	
805	E	5	1.1	0.0	0.0	3	10	90	06/09/03	
805	E	6	0.0	0.0	0.0	3	10	90	06/09/03	
805	E	7	0.0	0.0	0.0	3	10	90	06/09/03	
805	E	8	1.1	0.0	0.0	3	10	90	06/09/03	
805	E	9	0.0	0.0	0.0	3	10	90	06/09/03	
805	E	10	0.0	0.0	0.0	3	10	90	06/09/03	
805	E	11	0.0	0.0	0.0	3	10	90	06/09/03	
805	E	12	0.0	0.0	0.0	3	10	90	06/09/03	
805	E	13	1.1	0.0	0.0	3	10	90	06/09/03	
805	F	2	2.9	0.0	0.0	3	10	90	06/09/03	
805	F	4	1.8	0.0	0.0	3	10	90	06/09/03	
805	F	6	1.4	0.0	0.0	3	10	90	06/09/03	
805	F	8	2.6	0.0	0.0	3	10	90	06/09/03	
805	F	10	1.8	0.0	0.0	3	10	90	06/09/03	
805	F	12	0.0	0.0	0.0	3	10	90	06/09/03	
805	G	1	2.2	5.8	46.5	3	10	90	06/09/03	
805	G	3	7.0	9.7	0.0	3	10	90	06/09/03	
805	G	5	5.5	12.4	0.0	3	10	90	06/09/03	
805	G	7	7.0	12.4	0.0	3	10	90	06/09/03	
805	G	9	1.8	0.0	0.0	3	10	90	06/09/03	
805	G	11	2.2	10.4	0.0	3	10	90	06/09/03	
805	G	13	5.9	14.7	0.0	3	10	90	06/09/03	
805	H	2	1.4	5.8	0.0	3	10	90	06/09/03	
805	H	4	4.1	13.5	0.0	3	10	90	06/09/03	
805	H	6	3.3	5.0	0.0	3	10	90	06/09/03	
805	H	8	1.8	9.3	0.0	3	10	90	06/09/03	
805	H	10	2.9	5.4	0.0	3	10	90	06/09/03	
805	H	12	2.6	6.9	0.0	3	10	90	06/09/03	
805	I	1	1.4	8.2	0.0	3	10	90	06/09/03	

Sample Identification			DPM			Limit of Detection			Date Rec'd	Notes
			Alpha	Beta	Gamma	Alpha	Beta	Gamma		
805	I	3	5.2	0.0	0.0	3	10	90	06/09/03	
805	I	5	0.0	0.0	0.0	3	10	90	06/09/03	
805	I	7	1.1	6.7	0.0	3	10	90	06/09/03	
805	I	9	2.5	0.0	0.0	3	10	90	06/09/03	
805	I	11	3.7	8.9	0.0	3	10	90	06/09/03	
805	I	13	2.9	4.8	0.0	3	10	90	06/09/03	
805	J	1	2.2	0.0	0.0	3	10	90	06/09/03	
805	J	2	1.1	0.0	0.0	3	10	90	06/09/03	
805	J	3	0.0	0.0	0.0	3	10	90	06/09/03	
805	J	4	0.0	0.0	0.0	3	10	90	06/09/03	
805	J	5	0.0	0.0	0.0	3	10	90	06/09/03	
805	J	6	0.0	0.0	0.0	3	10	90	06/09/03	
805	J	7	0.0	0.0	0.0	3	10	90	06/09/03	
805	J	8	0.0	0.0	0.0	3	10	90	06/09/03	
805	J	9	0.0	0.0	0.0	3	10	90	06/09/03	
805	J	10	1.1	0.0	0.0	3	10	90	06/09/03	
805	J	11	0.0	0.0	0.0	3	10	90	06/09/03	
805	J	12	0.0	0.0	0.0	3	10	90	06/09/03	
805	J	13	1.4	0.0	0.0	3	10	90	06/09/03	
805	K	1	2.2	5.5	0.0	3	10	90	06/09/03	
805	K	2	1.4	0.0	0.0	3	10	90	06/09/03	
805	K	3	1.1	4.8	0.0	3	10	90	06/09/03	
805	K	4	2.2	0.0	0.0	3	10	90	06/09/03	
805	K	6	1.8	0.0	0.0	3	10	90	06/09/03	
805	K	8	1.4	0.0	0.0	3	10	90	06/09/03	
805	K	9	5.5	13.4	0.0	3	10	90	06/09/03	
805	L	1	0.0	0.0	0.0	3	10	90	06/09/03	
805	L	2	1.4	0.0	0.0	3	10	90	06/09/03	
805	L	3	1.4	0.0	0.0	3	10	90	06/09/03	
805	L	4	1.8	0.0	0.0	3	10	90	06/09/03	
805	L	5	1.8	0.0	0.0	3	10	90	06/09/03	
805	L	7	2.9	12.3	0.0	3	10	90	06/09/03	
805	L	9	5.5	15.3	0.0	3	10	90	06/09/03	
806	**A**	**1**	**6.2**	**14.7**	**0.0**	**3**	**9**	**85**	**08/04/03**	
806	A	2	2.2	5.6	0.0	3	9	85	08/04/03	
806	A	3	6.2	12.7	0.0	3	9	85	08/04/03	
806	A	4	9.4	19.0	0.0	3	9	85	08/04/03	
806	A	5	33.8	56.9	0.0	3	9	85	08/04/03	
806	A	6	10.6	13.9	0.0	3	9	85	08/04/03	
806	A	7	7.4	17.1	0.0	3	9	85	08/04/03	
806	A	8	8.2	10.4	0.0	3	9	85	08/04/03	
806	A	9	23.4	54.5	0.0	3	9	85	08/04/03	
806	A	10	13.0	19.8	0.0	3	9	85	08/04/03	
806	A	11	11.0	22.6	0.0	3	9	85	08/04/03	
806	A	12	11.0	32.0	0.0	3	9	85	08/04/03	
806	A	13	8.6	18.3	0.0	3	9	85	08/04/03	
806	B	1	5.0	8.4	0.0	3	9	85	08/04/03	
806	B	2	4.6	4.5	0.0	3	9	85	08/04/03	
806	B	3	2.2	9.2	0.0	3	9	85	08/04/03	
806	B	4	6.2	14.3	0.0	3	9	85	08/04/03	

Sample Identification			DPM			Limit of Detection			Date Rec'd	Notes
			Alpha	Beta	Gamma	Alpha	Beta	Gamma		
806	B	5	2.2	10.4	0.0	3	9	85	08/04/03	
806	B	6	3.8	6.4	0.0	3	9	85	08/04/03	
806	B	7	4.2	6.0	0.0	3	9	85	08/04/03	
806	B	8	3.8	9.2	0.0	3	9	85	08/04/03	
806	B	9	3.8	9.6	0.0	3	9	85	08/04/03	
806	B	10	3.8	8.8	0.0	3	9	85	08/04/03	
806	B	11	3.0	9.6	0.0	3	9	85	08/04/03	
806	B	12	5.0	13.5	0.0	3	9	85	08/04/03	
806	B	13	11.4	19.0	0.0	3	9	85	08/04/03	
806	C	1	2.2	9.2	0.0	3	9	85	08/04/03	
806	C	2	4.6	0.0	0.0	3	9	85	08/04/03	
806	C	3	3.4	4.5	0.0	3	9	85	08/04/03	
806	C	4	3.0	6.0	0.0	3	9	85	08/04/03	
806	C	5	4.2	0.0	0.0	3	9	85	08/04/03	
806	C	6	1.4	0.0	0.0	3	9	85	08/04/03	
806	C	7	6.2	8.0	0.0	3	9	85	08/04/03	
806	C	8	3.8	11.2	0.0	3	9	85	08/04/03	
806	C	9	5.4	0.0	0.0	3	9	85	08/04/03	
806	C	10	3.8	0.0	0.0	3	9	85	08/04/03	
806	C	11	5.4	10.0	0.0	3	9	85	08/04/03	
806	C	12	4.2	6.8	0.0	3	9	85	08/04/03	
806	C	13	5.8	29.7	0.0	3	9	85	08/04/03	
806	D	1	5.4	8.4	0.0	3	9	85	08/04/03	
806	D	2	6.6	9.2	0.0	3	9	85	08/04/03	
806	D	3	1.8	12.7	0.0	3	9	85	08/04/03	
806	D	4	7.8	15.5	0.0	3	9	85	08/04/03	
806	D	5	6.2	11.2	0.0	3	9	85	08/04/03	
806	D	6	7.4	17.9	0.0	3	9	85	08/04/03	
806	D	7	2.2	5.6	0.0	3	9	85	08/04/03	
806	D	8	7.4	13.1	0.0	3	9	85	08/04/03	
806	D	9	4.6	15.5	0.0	3	9	85	08/04/03	
806	D	10	6.6	8.4	0.0	3	9	85	08/04/03	
806	D	11	6.6	15.9	0.0	3	9	85	08/04/03	
806	D	12	19.4	70.2	0.0	3	9	85	08/04/03	
806	D	13	19.4	37.9	0.0	3	9	85	08/04/03	
806	E	1	0.0	0.0	0.0	3	9	85	08/04/03	
806	E	2	0.0	0.0	0.0	3	9	85	08/04/03	
806	E	3	0.0	0.0	0.0	3	9	85	08/04/03	
806	E	4	0.0	0.0	0.0	3	9	85	08/04/03	
806	E	5	0.0	0.0	0.0	3	9	85	08/04/03	
806	E	6	0.0	0.0	0.0	3	9	85	08/04/03	
806	E	7	0.0	0.0	0.0	3	9	85	08/04/03	
806	E	8	0.0	0.0	0.0	3	9	85	08/04/03	
806	E	9	0.0	0.0	0.0	3	9	85	08/04/03	
806	E	10	0.0	0.0	0.0	3	9	85	08/04/03	
806	E	11	1.4	0.0	0.0	3	9	85	08/04/03	
806	E	12	0.0	0.0	0.0	3	9	85	08/04/03	
806	E	13	0.0	0.0	0.0	3	9	85	08/04/03	
806	F	1	0.0	0.0	0.0	3	9	85	08/04/03	
806	F	2	2.2	4.5	0.0	3	9	85	08/04/03	

Sample Identification			DPM			Limit of Detection			Date Rec'd	Notes
			Alpha	Beta	Gamma	Alpha	Beta	Gamma		
806	F	3	0.0	4.9	0.0	3	9	85	08/04/03	
806	F	4	0.0	0.0	0.0	3	9	85	08/04/03	
806	F	5	0.0	5.3	0.0	3	9	85	08/04/03	
806	F	6	2.2	6.0	0.0	3	9	85	08/04/03	
806	F	7	3.0	6.4	0.0	3	9	85	08/04/03	
806	F	8	3.0	0.0	0.0	3	9	85	08/04/03	
806	F	9	1.8	11.6	0.0	3	9	85	08/04/03	
806	F	10	3.4	0.0	0.0	3	9	85	08/04/03	
806	F	11	0.0	0.0	0.0	3	9	85	08/04/03	
806	F	12	0.0	4.5	0.0	3	9	85	08/04/03	
806	F	13	3.8	0.0	0.0	3	9	85	08/04/03	
806	G	1	3.0	0.0	0.0	3	9	85	08/04/03	
806	G	2	1.8	6.8	0.0	3	9	85	08/04/03	
806	G	3	0.0	0.0	0.0	3	9	85	08/04/03	
806	G	4	1.4	4.5	0.0	3	9	85	08/04/03	
806	G	5	5.8	8.0	0.0	3	9	85	08/04/03	
806	G	6	2.6	4.9	0.0	3	9	85	08/04/03	
806	G	7	2.6	8.8	0.0	3	9	85	08/04/03	
806	G	8	0.0	5.3	0.0	3	9	85	08/04/03	
806	G	9	3.0	0.0	0.0	3	9	85	08/04/03	
806	G	10	1.8	4.9	0.0	3	9	85	08/04/03	
806	G	11	1.4	0.0	0.0	3	9	85	08/04/03	
806	G	12	1.8	0.0	0.0	3	9	85	08/04/03	
806	G	13	3.8	0.0	0.0	3	9	85	08/04/03	
806	H	1	3.3	11.5	0.0	3	8	84	08/04/03	
806	H	2	3.3	11.9	0.0	3	8	84	08/04/03	
806	H	3	2.5	8.8	0.0	3	8	84	08/04/03	
806	H	4	2.9	8.8	0.0	3	8	84	08/04/03	
806	H	5	0.9	0.0	0.0	3	8	84	08/04/03	
806	H	6	3.7	8.1	0.0	3	8	84	08/04/03	
806	H	7	2.9	11.1	0.0	3	8	84	08/04/03	
806	H	8	1.7	3.9	0.0	3	8	84	08/04/03	
806	H	9	1.3	5.8	0.0	3	8	84	08/04/03	
806	H	10	0.0	0.0	0.0	3	8	84	08/04/03	
806	H	11	0.0	0.0	0.0	3	8	84	08/04/03	
806	H	12	0.0	0.0	0.0	3	8	84	08/04/03	
806	H	13	2.1	5.4	0.0	3	8	84	08/04/03	
806	I	1	3.7	3.9	0.0	3	8	84	08/04/03	
806	I	2	0.0	0.0	0.0	3	8	84	08/04/03	
806	I	3	1.7	10.7	0.0	3	8	84	08/04/03	
806	I	4	3.7	5.8	0.0	3	8	84	08/04/03	
806	I	5	2.1	5.4	0.0	3	8	84	08/04/03	
806	I	6	2.9	6.5	0.0	3	8	84	08/04/03	
806	I	7	2.1	10.7	0.0	3	8	84	08/04/03	
806	I	8	2.1	0.0	0.0	3	8	84	08/04/03	
806	I	9	0.9	3.9	0.0	3	8	84	08/04/03	
806	I	10	2.1	0.0	0.0	3	8	84	08/04/03	
806	I	11	0.0	0.0	0.0	3	8	84	08/04/03	
806	I	12	2.9	8.4	0.0	3	8	84	08/04/03	
806	I	13	3.3	4.6	0.0	3	8	84	08/04/03	

Sample Identification			DPM Alpha	DPM Beta	DPM Gamma	Limit of Detection Alpha	Limit of Detection Beta	Limit of Detection Gamma	Date Rec'd	Notes
806	J	1	2.9	8.1	0.0	3	8	84	08/04/03	
806	J	2	0.0	0.0	0.0	3	8	84	08/04/03	
806	J	3	0.9	0.0	0.0	3	8	84	08/04/03	
806	J	4	0.0	4.6	0.0	3	8	84	08/04/03	
806	J	5	1.7	5.4	0.0	3	8	84	08/04/03	
806	J	6	0.9	0.0	0.0	3	8	84	08/04/03	
806	J	7	0.0	0.0	0.0	3	8	84	08/04/03	
806	J	8	0.0	0.0	0.0	3	8	84	08/04/03	
806	J	9	0.0	0.0	0.0	3	8	84	08/04/03	
806	J	10	0.9	0.0	0.0	3	8	84	08/04/03	
806	J	11	1.3	0.0	0.0	3	8	84	08/04/03	
806	J	12	0.0	4.2	0.0	3	8	84	08/04/03	
806	J	13	1.7	0.0	0.0	3	8	84	08/04/03	
806	K	1	3.7	4.6	0.0	3	8	84	08/04/03	
806	K	2	2.9	5.0	0.0	3	8	84	08/04/03	
806	K	3	2.1	3.9	0.0	3	8	84	08/04/03	
806	K	4	1.7	9.2	0.0	3	8	84	08/04/03	
806	K	5	4.9	11.9	0.0	3	8	84	08/04/03	
806	K	6	4.1	8.8	0.0	3	8	84	08/04/03	
806	K	7	2.1	5.8	0.0	3	8	84	08/04/03	
806	K	8	2.1	0.0	0.0	3	8	84	08/04/03	
806	K	9	1.3	8.1	0.0	3	8	84	08/04/03	
806	L	1	0.0	0.0	0.0	3	8	84	08/04/03	
806	L	2	0.0	0.0	0.0	3	8	84	08/04/03	
806	L	3	0.0	0.0	0.0	3	8	84	08/04/03	
806	L	4	2.5	3.9	0.0	3	8	84	08/04/03	
806	L	5	0.9	0.0	0.0	3	8	84	08/04/03	
806	L	6	1.7	0.0	0.0	3	8	84	08/04/03	
806	L	7	2.1	0.0	0.0	3	8	84	08/04/03	
806	L	8	0.0	0.0	0.0	3	8	84	08/04/03	
806	L	9	3.3	6.9	0.0	3	8	84	08/04/03	
806	A	1HS1	3.2	6.4	0.0	2	9	83	08/04/03	
806	A	2HS1	2.8	0.0	0.0	2	9	83	08/04/03	
806	A	2HS2	26.4	74.9	43.1	2	9	83	08/04/03	
806	A	3HS1	30.4	92.3	46.9	2	9	83	08/04/03	
806	A	4HS1	40.2	112.1	0.0	2	9	83	08/04/03	
806	A	5HS1	60.6	137.4	77.1	2	9	83	08/04/03	
806	A	6HS1	162.3	464.6	210.5	2	9	83	08/04/03	
806	A	6HS2	7.7	8.7	0.0	2	9	83	08/04/03	
806	A	7HS1	96.4	281.2	143.5	2	9	83	08/04/03	
806	A	8HS1	39.4	79.6	41.2	2	9	83	08/04/03	
806	A	9HS1	51.6	74.5	52.2	2	9	83	08/04/03	
806	A	10HS1	146.0	244.0	123.4	2	9	83	08/04/03	
806	A	11HS1	33.7	86.4	83.7	2	9	83	08/04/03	
806	A	12HS1	14.6	80.8	0.0	2	9	83	08/04/03	
806	A	13HS1	30.4	102.6	102.6	2	9	83	08/04/03	
806	A	13HS2	13.4	27.7	0.0	2	9	83	08/04/03	
806	B	1HS1	4.4	5.2	0.0	2	9	83	08/04/03	
806	B	1HS2	2.4	5.6	0.0	2	9	83	08/04/03	
806	B	4HS1	6.8	18.6	0.0	2	9	83	08/04/03	

Sample Identification			DPM			Limit of Detection			Date Rec'd	Notes
			Alpha	Beta	Gamma	Alpha	Beta	Gamma		
806	B	6HS1	3.6	0.0	0.0	2	9	83	08/04/03	
806	B	6HS2	5.6	5.6	0.0	2	9	83	08/04/03	
806	B	6HS3	2.4	8.3	0.0	2	9	83	08/04/03	
806	B	7HS2	3.6	8.7	0.0	2	9	83	08/04/03	
806	B	7HS3	6.4	7.2	0.0	2	9	83	08/04/03	
806	B	7HS4	3.6	7.2	0.0	2	9	83	08/04/03	
806	B	8HS1	5.6	6.8	0.0	2	9	83	08/04/03	
806	B	9HS1	3.2	4.0	0.0	2	9	83	08/04/03	
806	B	10HS1	7.7	13.9	0.0	2	9	83	08/04/03	
806	C	2HS1	3.6	0.0	0.0	2	9	83	08/04/03	
806	C	5HS1	4.4	8.7	0.0	2	9	83	08/04/03	
806	C	6HS1	4.8	6.4	0.0	2	9	83	08/04/03	
806	C	6HS2	4.8	9.1	0.0	2	9	83	08/04/03	
806	C	8HS1	4.4	7.9	0.0	2	9	83	08/04/03	
806	C	11HS1	5.2	16.7	0.0	2	9	83	08/04/03	
806	C	11HS2	4.0	6.0	0.0	2	9	83	08/04/03	
806	C	11HS3	12.1	30.5	0.0	2	9	83	08/04/03	
806	C	12HS1	4.4	6.4	0.0	2	9	83	08/04/03	
806	C	12HS2	4.0	8.3	0.0	2	9	83	08/04/03	
806	C	13HS1	56.9	248.7	103.4	2	9	83	08/04/03	
806	D	1HS1	6.0	17.4	0.0	2	9	83	08/04/03	
806	D	2HS1	18.2	69.3	0.0	2	9	83	08/04/03	
806	D	2HS2	4.4	6.8	0.0	2	9	83	08/04/03	
806	D	3HS1	22.7	62.2	46.0	2	9	83	08/04/03	
806	D	3HS2	15.8	57.8	0.0	2	9	83	08/04/03	
806	D	4HS1	10.1	21.0	45.0	2	9	83	08/04/03	
806	D	4HS2	41.8	136.7	68.4	2	9	83	08/04/03	
806	D	5HS1	8.5	12.7	0.0	2	9	83	08/04/03	
806	D	5HS2	110.2	310.1	148.8	2	9	83	08/04/03	
806	D	6HS1	74.0	203.2	71.8	2	9	83	08/04/03	
806	D	7HS1	43.1	111.3	81.8	2	9	83	08/04/03	
806	D	8HS1	26.0	64.2	0.0	2	9	83	08/04/03	
806	D	9HS1	180.2	803.2	438.7	2	9	83	08/04/03	
806	D	10HS1	55.7	133.1	62.2	2	9	83	08/04/03	
806	D	11HS1	96.0	304.2	162.7	2	9	83	08/04/03	
806	D	12HS1	16.2	39.2	0.0	2	9	83	08/04/03	
806	D	12HS2	17.0	43.6	0.0	2	9	83	08/04/03	
806	D	13HS1	244.1	1039.2	479.3	2	9	83	08/04/03	
806	J	3HS1	19.0	64.6	44.5	2	9	83	08/04/03	
806	J	4HS1	26.4	82.4	0.0	2	9	83	08/04/03	
806	J	5HS1	15.4	36.5	0.0	2	9	83	08/04/03	
806	J	6HS1	21.9	78.0	72.3	2	9	83	08/04/03	
806	J	7HS1	16.6	35.3	0.0	2	9	83	08/04/03	
806	J	8HS1	10.5	36.1	0.0	2	9	83	08/04/03	
806	J	9HS1	38.2	223.0	184.7	2	9	83	08/04/03	
806	J	10HS1	51.2	114.5	69.9	2	9	83	08/04/03	
807	**A**	**1**	**0.0**	**0.0**	**0.0**	**3**	**10**	**90**	**06/23/03**	
807	A	2	1.6	5.2	0.0	3	10	90	06/23/03	
807	A	3	1.2	0.0	0.0	3	10	90	06/23/03	
807	A	4	1.2	0.0	0.0	3	10	90	06/23/03	

Sample Identification			DPM			Limit of Detection			Date Rec'd	Notes
			Alpha	Beta	Gamma	Alpha	Beta	Gamma		
807	A	5	1.6	0.0	0.0	3	10	90	06/23/03	
807	A	6	1.6	9.4	0.0	3	10	90	06/23/03	
807	A	7	5.4	4.8	0.0	3	10	90	06/23/03	
807	A	8	1.2	0.0	0.0	3	10	90	06/23/03	
807	A	9	2.7	0.0	0.0	3	10	90	06/23/03	
807	A	10	1.2	0.0	0.0	3	10	90	06/23/03	
807	A	11	2.4	0.0	0.0	3	10	90	06/23/03	
807	A	12	3.9	7.5	0.0	3	10	90	06/23/03	
807	A	13	8.7	19.5	0.0	3	10	90	06/23/03	
807	A	6HS1	19.2	45.1	0.0	3	10	90	06/23/03	
807	A	12HS1	60.1	154.0	48.8	3	10	90	06/23/03	
807	A	13HS1	24.5	47.4	0.0	3	10	90	06/23/03	
807	B	1	3.5	4.8	0.0	3	10	90	06/23/03	
807	B	2	1.6	0.0	0.0	3	10	90	06/23/03	
807	B	3	2.0	0.0	0.0	3	10	90	06/23/03	
807	B	4	0.0	0.0	0.0	3	10	90	06/23/03	
807	B	5	0.0	5.6	0.0	3	10	90	06/23/03	
807	B	6	1.2	9.4	0.0	3	10	90	06/23/03	
807	B	7	2.0	6.3	0.0	3	10	90	06/23/03	
807	B	8	2.4	0.0	0.0	3	10	90	06/23/03	
807	B	9	1.2	0.0	0.0	3	10	90	06/23/03	
807	B	10	1.2	5.6	0.0	3	10	90	06/23/03	
807	B	11	4.6	8.2	0.0	3	10	90	06/23/03	
807	B	12	2.0	6.7	0.0	3	10	90	06/23/03	
807	B	13	6.9	15.0	0.0	3	10	90	06/23/03	
807	B	11HS1	19.6	37.6	0.0	3	10	90	06/23/03	
807	B	13HS1	20.7	52.7	0.0	3	10	90	06/23/03	
807	C	1	1.6	7.1	0.0	3	10	90	06/23/03	
807	C	2	1.2	0.0	0.0	3	10	90	06/23/03	
807	C	3	3.1	9.0	0.0	3	10	90	06/23/03	
807	C	4	0.0	0.0	0.0	3	10	90	06/23/03	
807	C	5	1.2	9.0	0.0	3	10	90	06/23/03	
807	C	6	2.4	12.4	0.0	3	10	90	06/23/03	
807	C	7	4.6	10.5	0.0	3	10	90	06/23/03	
807	C	8	1.6	0.0	0.0	3	10	90	06/23/03	
807	C	9	3.1	6.0	0.0	3	10	90	06/23/03	
807	C	10	2.7	6.0	0.0	3	10	90	06/23/03	
807	C	11	4.6	0.0	0.0	3	10	90	06/23/03	
807	C	12	0.0	0.0	0.0	3	10	90	06/23/03	
807	C	13	5.4	10.9	0.0	3	10	90	06/23/03	
807	D	1	2.7	6.3	0.0	3	10	90	06/23/03	
807	D	2	3.5	12.4	0.0	3	10	90	06/23/03	
807	D	3	2.7	0.0	0.0	3	10	90	06/23/03	
807	D	4	0.0	0.0	0.0	3	10	90	06/23/03	
807	D	5	0.0	0.0	0.0	3	10	90	06/23/03	
807	D	6	0.0	5.2	0.0	3	10	90	06/23/03	
807	D	7	1.2	0.0	0.0	3	10	90	06/23/03	
807	D	8	0.0	0.0	0.0	3	10	90	06/23/03	
807	D	9	0.0	0.0	0.0	3	10	90	06/23/03	
807	D	10	1.6	0.0	0.0	3	10	90	06/23/03	

Sample Identification			DPM			Limit of Detection			Date Rec'd	Notes
			Alpha	Beta	Gamma	Alpha	Beta	Gamma		
807	D	11	0.0	8.6	0.0	3	10	90	06/23/03	
807	D	12	12.5	23.3	0.0	3	10	90	06/23/03	
807	D	13	3.1	9.7	0.0	3	10	90	06/23/03	
807	E	1	0.0	0.0	0.0	3	10	90	06/23/03	
807	E	2	0.0	0.0	0.0	3	10	90	06/23/03	
807	E	3	0.0	0.0	0.0	3	10	90	06/23/03	
807	E	4	0.0	0.0	0.0	3	10	90	06/23/03	
807	E	5	0.0	0.0	0.0	3	10	90	06/23/03	
807	E	6	0.0	0.0	0.0	3	10	90	06/23/03	
807	E	7	0.0	0.0	0.0	3	10	90	06/23/03	
807	E	8	0.0	0.0	0.0	3	10	90	06/23/03	
807	E	9	0.0	0.0	0.0	3	10	90	06/23/03	
807	E	10	0.0	0.0	0.0	3	10	90	06/23/03	
807	E	11	0.0	0.0	0.0	3	10	90	06/23/03	
807	E	12	0.0	0.0	0.0	3	10	90	06/23/03	
807	E	13	0.0	5.2	0.0	3	10	90	06/23/03	
807	F	2	0.0	5.6	0.0	3	10	90	06/23/03	
807	F	4	1.6	0.0	0.0	3	10	90	06/23/03	
807	F	6	0.0	0.0	0.0	3	10	90	06/23/03	
807	F	8	0.0	6.0	0.0	3	10	90	06/23/03	
807	F	10	2.0	0.0	0.0	3	10	90	06/23/03	
807	F	12	1.2	0.0	0.0	3	10	90	06/23/03	
807	G	1	0.0	0.0	0.0	3	10	90	06/23/03	
807	G	3	0.0	4.8	0.0	3	10	90	06/23/03	
807	G	5	0.0	0.0	0.0	3	10	90	06/23/03	
807	G	7	2.4	6.3	0.0	3	10	90	06/23/03	
807	G	9	0.0	0.0	0.0	3	10	90	06/23/03	
807	G	11	0.0	0.0	0.0	3	10	90	06/23/03	
807	G	13	0.0	0.0	0.0	3	10	90	06/23/03	
807	H	2	2.0	6.0	0.0	3	10	90	06/23/03	
807	H	4	0.0	0.0	0.0	3	10	90	06/23/03	
807	H	6	1.2	0.0	0.0	3	10	90	06/23/03	
807	H	8	0.0	0.0	0.0	3	10	90	06/23/03	
807	H	10	0.0	6.3	0.0	3	10	90	06/23/03	
807	H	12	0.0	0.0	0.0	3	10	90	06/23/03	
807	I	1	2.7	4.8	0.0	3	10	90	06/23/03	
807	I	3	0.0	0.0	0.0	3	10	90	06/23/03	
807	I	5	2.4	5.6	0.0	3	10	90	06/23/03	
807	I	7	0.0	5.6	0.0	3	10	90	06/23/03	
807	I	9	2.0	0.0	0.0	3	10	90	06/23/03	
807	I	11	1.6	0.0	0.0	3	10	90	06/23/03	
807	I	13	0.0	8.6	0.0	3	10	90	06/23/03	
807	J	1	1.2	6.4	0.0	3	9	83	06/23/03	
807	J	2	1.2	4.3	0.0	3	9	83	06/23/03	
807	J	3	0.0	0.0	0.0	3	9	83	06/23/03	
807	J	4	1.2	3.9	0.0	3	9	83	06/23/03	
807	J	5	0.0	0.0	0.0	3	9	83	06/23/03	
807	J	6	0.0	6.0	0.0	3	9	83	06/23/03	
807	J	7	0.0	0.0	0.0	3	9	83	06/23/03	
807	J	8	0.0	0.0	0.0	3	9	83	06/23/03	

Sample Identification			DPM			Limit of Detection			Date Rec'd	Notes
			Alpha	Beta	Gamma	Alpha	Beta	Gamma		
807	J	9	0.0	0.0	0.0	3	9	83	06/23/03	
807	J	10	0.0	0.0	0.0	3	9	83	06/23/03	
807	J	11	0.0	0.0	0.0	3	9	83	06/23/03	
807	J	12	0.0	0.0	0.0	3	9	83	06/23/03	
807	J	13	0.0	0.0	0.0	3	9	83	06/23/03	
807	K	1	0.0	0.0	0.0	3	9	83	06/23/03	
807	K	2	0.0	0.0	0.0	3	9	83	06/23/03	
807	K	3	0.0	6.0	0.0	3	9	83	06/23/03	
807	K	4	0.0	0.0	0.0	3	9	83	06/23/03	
807	K	5	2.4	25.1	0.0	3	9	83	06/23/03	
807	K	7	1.6	0.0	0.0	3	9	83	06/23/03	
807	K	9	0.0	0.0	0.0	3	9	83	06/23/03	
807	L	1	0.0	0.0	0.0	3	9	83	06/23/03	
807	L	2	0.0	0.0	0.0	3	9	83	06/23/03	
807	L	3	0.0	0.0	0.0	3	9	83	06/23/03	
807	L	4	0.0	0.0	0.0	3	9	83	06/23/03	
807	L	6	1.6	6.0	0.0	3	9	83	06/23/03	
807	L	8	0.0	6.4	0.0	3	9	83	06/23/03	
807	L	9	1.6	14.3	0.0	3	9	83	06/23/03	
808	**A**	**1**	**3.3**	**36.2**	**0.0**	**3**	**9**	**90**	**06/27/03**	
808	A	2	3.3	25.5	0.0	3	9	90	06/27/03	
808	A	3	2.2	22.8	0.0	3	9	90	06/27/03	
808	A	4	3.6	19.8	0.0	3	9	90	06/27/03	
808	A	5	3.6	14.8	0.0	3	9	90	06/27/03	
808	A	6	6.2	24.4	0.0	3	9	90	06/27/03	
808	A	7	5.1	25.5	0.0	3	9	90	06/27/03	
808	A	8	2.5	23.2	0.0	3	9	90	06/27/03	
808	A	9	1.0	12.9	0.0	3	9	90	06/27/03	
808	A	10	1.0	15.6	0.0	3	9	90	06/27/03	
808	A	11	2.5	14.8	0.0	3	9	90	06/27/03	
808	A	12	7.3	21.7	0.0	3	9	90	06/27/03	
808	A	13	10.7	44.6	0.0	3	9	90	06/27/03	
808	B	1	0.0	11.0	0.0	3	9	90	06/27/03	
808	B	2	2.5	7.2	0.0	3	9	90	06/27/03	
808	B	3	1.4	6.4	0.0	3	9	90	06/27/03	
808	B	4	3.6	8.7	0.0	3	9	90	06/27/03	
808	B	5	1.8	8.3	0.0	3	9	90	06/27/03	
808	B	6	5.9	14.8	0.0	3	9	90	06/27/03	
808	B	7	4.0	14.8	0.0	3	9	90	06/27/03	
808	B	8	1.4	8.3	0.0	3	9	90	06/27/03	
808	B	9	5.1	21.7	0.0	3	9	90	06/27/03	
808	B	10	4.0	14.8	0.0	3	9	90	06/27/03	
808	B	11	9.9	62.2	0.0	3	9	90	06/27/03	
808	B	12	1.8	27.4	0.0	3	9	90	06/27/03	
808	B	13	19.2	72.5	0.0	3	9	90	06/27/03	
808	C	1	0.0	17.5	0.0	3	9	90	06/27/03	
808	C	2	1.0	8.7	0.0	3	9	90	06/27/03	
808	C	3	4.0	15.2	0.0	3	9	90	06/27/03	
808	C	4	1.0	9.8	0.0	3	9	90	06/27/03	
808	C	5	3.3	13.7	0.0	3	9	90	06/27/03	

Sample Identification			DPM			Limit of Detection			Date Rec'd	Notes
			Alpha	Beta	Gamma	Alpha	Beta	Gamma		
808	C	6	2.9	0.0	0.0	3	9	90	06/27/03	
808	C	7	2.5	11.0	0.0	3	9	90	06/27/03	
808	C	8	3.6	13.7	0.0	3	9	90	06/27/03	
808	C	9	5.5	33.5	0.0	3	9	90	06/27/03	
808	C	10	4.8	27.8	0.0	3	9	90	06/27/03	
808	C	11	16.2	45.6	0.0	3	9	90	06/27/03	
808	C	12	4.0	25.5	0.0	3	9	90	06/27/03	
808	C	13	5.5	33.5	0.0	3	9	90	06/27/03	
808	D	1	5.9	40.4	0.0	3	9	90	06/27/03	
808	D	2	3.6	17.5	0.0	3	9	90	06/27/03	
808	D	3	4.4	15.2	0.0	3	9	90	06/27/03	
808	D	4	1.0	11.4	0.0	3	9	90	06/27/03	
808	D	5	2.9	11.7	0.0	3	9	90	06/27/03	
808	D	6	2.2	6.0	0.0	3	9	90	06/27/03	
808	D	7	5.1	14.4	0.0	3	9	90	06/27/03	
808	D	8	2.5	10.2	0.0	3	9	90	06/27/03	
808	D	9	6.2	30.8	0.0	3	9	90	06/27/03	
808	D	10	5.1	23.6	0.0	3	9	90	06/27/03	
808	D	11	1.8	6.8	0.0	3	9	90	06/27/03	
808	D	12	10.7	69.8	0.0	3	9	90	06/27/03	
808	D	13	5.5	31.2	0.0	3	9	90	06/27/03	
808	E	1	3.6	10.6	0.0	3	9	90	06/27/03	
808	E	2	0.0	5.3	0.0	3	9	90	06/27/03	
808	E	3	1.8	0.0	0.0	3	9	90	06/27/03	
808	E	4	0.0	4.9	0.0	3	9	90	06/27/03	
808	E	5	1.8	6.0	0.0	3	9	90	06/27/03	
808	E	6	0.0	0.0	0.0	3	9	90	06/27/03	
808	E	7	0.0	0.0	0.0	3	9	90	06/27/03	
808	E	8	0.0	5.3	0.0	3	9	90	06/27/03	
808	E	9	1.0	0.0	0.0	3	9	90	06/27/03	
808	E	10	0.0	0.0	0.0	3	9	90	06/27/03	
808	E	11	0.0	0.0	0.0	3	9	90	06/27/03	
808	E	12	0.0	5.3	0.0	3	9	90	06/27/03	
808	E	13	0.0	7.9	0.0	3	9	90	06/27/03	
808	F	1	0.0	0.0	0.0	4	11	91	08/04/03	
808	F	2	0.0	0.0	0.0	4	11	91	08/04/03	
808	F	3	0.0	0.0	0.0	4	11	91	08/04/03	
808	F	4	0.0	0.0	0.0	4	11	91	08/04/03	
808	F	5	0.0	0.0	0.0	4	11	91	08/04/03	
808	F	6	0.0	0.0	0.0	4	11	91	08/04/03	
808	F	7	0.0	0.0	0.0	4	11	91	08/04/03	
808	F	8	0.0	0.0	0.0	4	11	91	08/04/03	
808	F	9	0.0	0.0	0.0	4	11	91	08/04/03	
808	F	10	0.0	0.0	0.0	4	11	91	08/04/03	
808	F	11	0.0	0.0	0.0	4	11	91	08/04/03	
808	F	12	0.0	0.0	0.0	4	11	91	08/04/03	
808	F	13	0.0	7.4	0.0	4	11	91	08/04/03	
808	G	1	0.0	5.9	0.0	4	11	91	08/04/03	
808	G	2	0.0	5.5	0.0	4	11	91	08/04/03	
808	G	3	0.0	5.9	0.0	4	11	91	08/04/03	

Sample Identification			DPM			Limit of Detection			Date Rec'd	Notes
			Alpha	Beta	Gamma	Alpha	Beta	Gamma		
808	G	4	0.0	0.0	0.0	4	11	91	08/04/03	
808	G	5	0.0	5.5	0.0	4	11	91	08/04/03	
808	G	6	0.0	0.0	0.0	4	11	91	08/04/03	
808	G	7	0.0	0.0	0.0	4	11	91	08/04/03	
808	G	8	0.0	0.0	0.0	4	11	91	08/04/03	
808	G	9	0.0	0.0	0.0	4	11	91	08/04/03	
808	G	10	0.0	0.0	0.0	4	11	91	08/04/03	
808	G	11	0.0	0.0	0.0	4	11	91	08/04/03	
808	G	12	0.0	0.0	0.0	4	11	91	08/04/03	
808	G	13	0.0	0.0	0.0	4	11	91	08/04/03	
808	H	1	2.5	29.0	0.0	4	11	91	08/04/03	
808	H	2	2.1	19.9	0.0	4	11	91	08/04/03	
808	H	3	0.0	0.0	0.0	4	11	91	08/04/03	
808	H	4	0.0	6.6	0.0	4	11	91	08/04/03	
808	H	5	0.0	0.0	0.0	4	11	91	08/04/03	
808	H	6	0.0	5.5	0.0	4	11	91	08/04/03	
808	H	7	0.0	0.0	0.0	4	11	91	08/04/03	
808	H	8	0.0	0.0	0.0	4	11	91	08/04/03	
808	H	9	0.0	0.0	0.0	4	11	91	08/04/03	
808	H	10	0.0	0.0	0.0	4	11	91	08/04/03	
808	H	11	0.0	0.0	0.0	4	11	91	08/04/03	
808	H	12	0.0	0.0	0.0	4	11	91	08/04/03	
808	H	13	2.5	19.1	0.0	4	11	91	08/04/03	
808	I	1	0.0	0.0	0.0	4	11	91	08/04/03	
808	I	2	0.0	0.0	0.0	4	11	91	08/04/03	
808	I	3	0.0	7.8	0.0	4	11	91	08/04/03	
808	I	4	0.0	0.0	0.0	4	11	91	08/04/03	
808	I	5	0.0	0.0	0.0	4	11	91	08/04/03	
808	I	6	0.0	7.4	0.0	4	11	91	08/04/03	
808	I	7	0.0	5.5	0.0	4	11	91	08/04/03	
808	I	8	0.0	0.0	0.0	4	11	91	08/04/03	
808	I	9	0.0	0.0	0.0	4	11	91	08/04/03	
808	I	10	0.0	0.0	0.0	4	11	91	08/04/03	
808	I	11	0.0	0.0	0.0	4	11	91	08/04/03	
808	I	12	0.0	0.0	0.0	4	11	91	08/04/03	
808	I	13	0.0	5.1	0.0	4	11	91	08/04/03	
808	J	1	3.3	8.3	0.0	3	9	90	06/27/03	
808	J	2	2.2	17.9	0.0	3	9	90	06/27/03	
808	J	3	0.0	8.7	0.0	3	9	90	06/27/03	
808	J	4	0.0	0.0	0.0	3	9	90	06/27/03	
808	J	5	2.2	0.0	0.0	3	9	90	06/27/03	
808	J	6	0.0	6.8	0.0	3	9	90	06/27/03	
808	J	7	2.9	8.3	0.0	3	9	90	06/27/03	
808	J	8	0.0	7.9	0.0	3	9	90	06/27/03	
808	J	9	1.0	9.1	0.0	3	9	90	06/27/03	
808	J	10	0.0	4.9	0.0	3	9	90	06/27/03	
808	J	11	1.8	8.3	0.0	3	9	90	06/27/03	
808	J	12	1.8	0.0	0.0	3	9	90	06/27/03	
808	J	13	2.5	18.6	0.0	3	9	90	06/27/03	
808	K	1	0.0	21.4	0.0	4	11	91	08/04/03	

Sample Identification			DPM			Limit of Detection			Date Rec'd	Notes
			Alpha	Beta	Gamma	Alpha	Beta	Gamma		
808	K	2	0.0	0.0	0.0	4	11	91	08/04/03	
808	K	3	1.7	16.5	0.0	4	11	91	08/04/03	
808	K	4	0.0	0.0	0.0	4	11	91	08/04/03	
808	K	5	0.0	0.0	0.0	4	11	91	08/04/03	
808	K	6	0.0	11.6	0.0	4	11	91	08/04/03	
808	K	7	0.0	5.5	0.0	4	11	91	08/04/03	
808	K	8	0.0	16.9	0.0	4	11	91	08/04/03	
808	K	9	0.0	5.1	0.0	4	11	91	08/04/03	
808	L	1	0.0	0.0	0.0	4	11	91	08/04/03	
808	L	2	0.0	0.0	0.0	4	11	91	08/04/03	
808	L	3	0.0	0.0	0.0	4	11	91	08/04/03	
808	L	4	0.0	0.0	0.0	4	11	91	08/04/03	
808	L	5	0.0	0.0	0.0	4	11	91	08/04/03	
808	L	6	0.0	0.0	0.0	4	11	91	08/04/03	
808	L	7	0.0	0.0	0.0	4	11	91	08/04/03	
808	L	8	0.0	0.0	0.0	4	11	91	08/04/03	
808	L	9	6.9	20.3	0.0	4	11	91	08/04/03	
808	A	7HS1	122.5	421.0	159.1	4	11	91	08/04/03	
808	B	5HS1	11.8	40.0	0.0	4	11	91	08/04/03	
808	B	6HS1	12.1	59.8	0.0	4	11	91	08/04/03	
808	B	7HS1	27.0	170.7	53.0	4	11	91	08/04/03	
808	C	3HS1	8.4	24.1	0.0	4	11	91	08/04/03	
808	C	5HS1	16.6	83.3	0.0	4	11	91	08/04/03	
808	C	11HS1	27.4	136.9	0.0	4	11	91	08/04/03	
808	J	7HS1	121.0	775.7	320.2	4	11	91	08/04/03	
809	**A**	**1**	**0.0**	**0.0**	**0.0**	**3**	**10**	**90**	**06/09/03**	
809	A	2	0.0	0.0	0.0	3	10	90	06/09/03	
809	A	3	3.3	9.3	0.0	3	10	90	06/09/03	
809	A	4	1.4	0.0	0.0	3	10	90	06/09/03	
809	A	5	0.0	0.0	0.0	3	10	90	06/09/03	
809	A	6	1.1	0.0	0.0	3	10	90	06/09/03	
809	A	7	1.8	0.0	0.0	3	10	90	06/09/03	
809	A	8	2.2	0.0	0.0	3	10	90	06/09/03	
809	A	9	1.4	0.0	0.0	3	10	90	06/09/03	
809	A	10	2.2	0.0	0.0	3	10	90	06/09/03	
809	A	11	1.4	0.0	0.0	3	10	90	06/09/03	
809	A	12	2.9	5.1	0.0	3	10	90	06/09/03	
809	A	13	3.3	0.0	0.0	3	10	90	06/09/03	
809	A	1HS1	2.2	0.0	0.0	3	10	90	06/09/03	
809	A	3HS1	1.1	5.5	0.0	3	10	90	06/09/03	
809	A	4HS1	3.3	4.8	0.0	3	10	90	06/09/03	
809	A	6HS1	8.1	15.7	0.0	3	10	90	06/09/03	
809	A	9HS1	9.3	11.6	0.0	3	10	90	06/09/03	
809	A	10HS1	4.8	5.1	0.0	3	10	90	06/09/03	
809	A	11HS1	7.0	10.8	0.0	3	10	90	06/09/03	
809	A	13HS1	1.8	7.0	0.0	3	10	90	06/09/03	
809	B	1	2.9	7.0	0.0	3	10	90	06/09/03	
809	B	2	0.0	0.0	0.0	3	10	90	06/09/03	
809	B	3	0.0	0.0	0.0	3	10	90	06/09/03	
809	B	4	0.0	0.0	0.0	3	10	90	06/09/03	

Sample Identification			DPM			Limit of Detection			Date Rec'd	Notes
			Alpha	Beta	Gamma	Alpha	Beta	Gamma		
809	B	5	1.8	0.0	0.0	3	10	90	06/09/03	
809	B	6	3.3	7.0	0.0	3	10	90	06/09/03	
809	B	7	0.0	0.0	0.0	3	10	90	06/09/03	
809	B	8	1.1	0.0	0.0	3	10	90	06/09/03	
809	B	9	1.8	0.0	0.0	3	10	90	06/09/03	
809	B	10	1.1	0.0	0.0	3	10	90	06/09/03	
809	B	11	3.3	7.4	0.0	3	10	90	06/09/03	
809	B	12	2.5	8.5	0.0	3	10	90	06/09/03	
809	B	13	1.4	8.2	0.0	3	10	90	06/09/03	
809	B	13HS1	1.8	4.8	0.0	3	10	90	06/09/03	
809	B	8HS1	4.0	6.7	0.0	3	10	90	06/09/03	
809	C	1	0.0	0.0	0.0	3	10	90	06/09/03	
809	C	2	0.0	0.0	0.0	3	10	90	06/09/03	
809	C	3	0.0	0.0	0.0	3	10	90	06/09/03	
809	C	4	1.4	0.0	0.0	3	10	90	06/09/03	
809	C	5	0.0	0.0	0.0	3	10	90	06/09/03	
809	C	6	0.0	0.0	0.0	3	10	90	06/09/03	
809	C	7	0.0	0.0	0.0	3	10	90	06/09/03	
809	C	8	1.4	5.5	0.0	3	10	90	06/09/03	
809	C	9	2.5	0.0	0.0	3	10	90	06/09/03	
809	C	10	4.0	0.0	0.0	3	10	90	06/09/03	
809	C	11	3.7	11.9	0.0	3	10	90	06/09/03	
809	C	12	2.9	0.0	0.0	3	10	90	06/09/03	
809	C	13	1.4	5.9	0.0	3	10	90	06/09/03	
809	C	1HS1	4.8	14.2	0.0	3	10	90	06/09/03	
809	D	1	1.6	3.7	0.0	3	8	84	06/09/03	
809	D	2	3.3	5.4	0.0	3	8	84	06/09/03	
809	D	3	0.0	0.0	0.0	3	8	84	06/09/03	
809	D	4	1.2	3.7	0.0	3	8	84	06/09/03	
809	D	5	1.2	0.0	0.0	3	8	84	06/09/03	
809	D	6	2.5	8.8	0.0	3	8	84	06/09/03	
809	D	7	0.0	0.0	0.0	3	8	84	06/09/03	
809	D	8	2.9	5.8	0.0	3	8	84	06/09/03	
809	D	9	1.6	6.2	0.0	3	8	84	06/09/03	
809	D	10	1.6	0.0	0.0	3	8	84	06/09/03	
809	D	11	2.9	7.1	0.0	3	8	84	06/09/03	
809	D	12	0.0	5.8	0.0	3	8	84	06/09/03	
809	D	13	0.0	0.0	0.0	3	8	84	06/09/03	
809	E	1	1.2	5.8	0.0	3	8	84	06/09/03	
809	E	2	2.9	6.2	0.0	3	8	84	06/09/03	
809	E	3	3.7	7.5	0.0	3	8	84	06/09/03	
809	E	4	0.0	5.0	0.0	3	8	84	06/09/03	
809	E	5	0.0	4.1	0.0	3	8	84	06/09/03	
809	E	6	0.0	6.7	0.0	3	8	84	06/09/03	
809	E	7	0.0	0.0	0.0	3	8	84	06/09/03	
809	E	8	1.2	6.7	0.0	3	8	84	06/09/03	
809	E	9	0.0	4.5	0.0	3	8	84	06/09/03	
809	E	10	2.0	3.7	0.0	3	8	84	06/09/03	
809	E	11	1.2	6.2	0.0	3	8	84	06/09/03	
809	E	12	0.0	0.0	0.0	3	8	84	06/09/03	

Sample Identification			DPM			Limit of Detection			Date Rec'd	Notes
			Alpha	Beta	Gamma	Alpha	Beta	Gamma		
809	E	13	1.6	9.6	0.0	3	8	84	06/09/03	
809	F	1	1.2	5.4	0.0	3	8	84	06/09/03	
809	F	3	0.0	7.5	0.0	3	8	84	06/09/03	
809	F	5	0.0	3.7	0.0	3	8	84	06/09/03	
809	F	7	0.0	6.7	0.0	3	8	84	06/09/03	
809	F	9	0.0	0.0	0.0	3	8	84	06/09/03	
809	F	11	3.3	9.2	0.0	3	8	84	06/09/03	
809	F	13	3.3	5.8	0.0	3	8	84	06/09/03	
809	G	2	1.2	6.7	0.0	3	8	84	06/09/03	
809	G	4	0.0	4.5	0.0	3	8	84	06/09/03	
809	G	6	1.2	0.0	0.0	3	8	84	06/09/03	
809	G	8	1.2	4.5	0.0	3	8	84	06/09/03	
809	G	10	0.0	10.9	0.0	3	8	84	06/09/03	
809	G	12	0.0	9.2	0.0	3	8	84	06/09/03	
809	H	1	0.0	6.2	0.0	3	8	84	06/09/03	
809	H	3	1.2	9.2	0.0	3	8	84	06/09/03	
809	H	5	0.0	5.4	0.0	3	8	84	06/09/03	
809	H	7	0.0	10.1	0.0	3	8	84	06/09/03	
809	H	9	2.5	5.0	0.0	3	8	84	06/09/03	
809	H	11	2.0	7.5	0.0	3	8	84	06/09/03	
809	H	13	1.2	7.5	0.0	3	8	84	06/09/03	
809	I	2	0.0	5.0	0.0	3	8	84	06/09/03	
809	I	4	2.5	5.4	0.0	3	8	84	06/09/03	
809	I	6	1.6	0.0	0.0	3	8	84	06/09/03	
809	I	8	0.0	0.0	0.0	3	8	84	06/09/03	
809	I	10	0.0	0.0	0.0	3	8	84	06/09/03	
809	I	12	0.0	8.8	0.0	3	8	84	06/09/03	
809	J	1	0.0	5.0	0.0	3	8	84	06/09/03	
809	J	2	0.0	7.5	0.0	3	8	84	06/09/03	
809	J	3	0.0	0.0	0.0	3	8	84	06/09/03	
809	J	4	0.0	0.0	0.0	3	8	84	06/09/03	
809	J	5	0.0	0.0	0.0	3	8	84	06/09/03	
809	J	6	0.0	6.7	0.0	3	8	84	06/09/03	
809	J	7	1.2	0.0	0.0	3	8	84	06/09/03	
809	J	8	0.0	0.0	0.0	3	8	84	06/09/03	
809	J	9	0.0	6.7	0.0	3	8	84	06/09/03	
809	J	10	0.0	0.0	0.0	3	8	84	06/09/03	
809	J	11	2.0	0.0	0.0	3	8	84	06/09/03	
809	J	12	0.0	3.7	0.0	3	8	84	06/09/03	
809	J	13	1.2	0.0	0.0	3	8	84	06/09/03	
809	K	1	2.0	14.3	0.0	3	8	84	06/09/03	
809	K	2	2.9	7.1	0.0	3	8	84	06/09/03	
809	K	3	1.2	9.2	0.0	3	8	84	06/09/03	
809	K	4	2.9	7.9	0.0	3	8	84	06/09/03	
809	K	6	1.2	6.7	0.0	3	8	84	06/09/03	
809	K	8	3.3	17.3	0.0	3	8	84	06/09/03	
809	K	9	3.7	7.9	0.0	3	8	84	06/09/03	
809	L	1	1.6	0.0	0.0	3	8	84	06/09/03	
809	L	2	1.6	0.0	0.0	3	8	84	06/09/03	
809	L	3	3.7	0.0	0.0	3	8	84	06/09/03	

Sample Identification			DPM			Limit of Detection			Date Rec'd	Notes
			Alpha	Beta	Gamma	Alpha	Beta	Gamma		
809	L	4	1.2	6.2	0.0	3	8	84	06/09/03	
809	L	5	20.9	72.5	0.0	3	8	84	06/09/03	
809	L	7	12.3	49.1	0.0	3	8	84	06/09/03	
809	L	9	3.3	11.8	0.0	3	8	84	06/09/03	
809	L	7HS1	4.5	10.1	0.0	3	8	84	06/09/03	
810	**A**	**1**	**1.4**	**0.0**	**0.0**	**3**	**11**	**90**	**06/09/03**	
810	A	2	4.7	5.7	0.0	3	11	90	06/09/03	
810	A	3	2.9	0.0	0.0	3	11	90	06/09/03	
810	A	4	2.5	0.0	0.0	3	11	90	06/09/03	
810	A	5	1.4	0.0	0.0	3	11	90	06/09/03	
810	A	6	1.0	0.0	0.0	3	11	90	06/09/03	
810	A	7	1.4	0.0	0.0	3	11	90	06/09/03	
810	A	8	2.5	0.0	0.0	3	11	90	06/09/03	
810	A	9	0.0	0.0	0.0	3	11	90	06/09/03	
810	A	10	3.2	8.3	0.0	3	11	90	06/09/03	
810	A	11	1.4	0.0	0.0	3	11	90	06/09/03	
810	A	12	1.8	5.3	0.0	3	11	90	06/09/03	
810	A	13	0.0	0.0	0.0	3	11	90	06/09/03	
810	A	3HS1	5.1	4.9	0.0	3	11	90	06/09/03	
810	A	4HS1	7.7	0.0	0.0	3	11	90	06/09/03	
810	A	6HS1	2.9	6.4	0.0	3	11	90	06/09/03	
810	A	8HS1	10.3	23.2	0.0	3	11	90	06/09/03	
810	A	8HS2	2.5	0.0	0.0	3	11	90	06/09/03	
810	A	9HS1	7.7	19.0	0.0	3	11	90	06/09/03	
810	A	10HS1	5.5	7.9	0.0	3	11	90	06/09/03	
810	A	11HS1	5.1	7.9	0.0	3	11	90	06/09/03	
810	A	12HS1	13.7	30.8	0.0	3	11	90	06/09/03	
810	A	12HS2	3.6	11.0	0.0	3	11	90	06/09/03	
810	A	12HS3	3.6	6.8	0.0	3	11	90	06/09/03	
810	B	1	0.0	0.0	0.0	3	11	90	06/09/03	
810	B	2	12.9	21.3	0.0	3	11	90	06/09/03	
810	B	3	4.7	11.7	0.0	3	11	90	06/09/03	
810	B	4	8.5	15.6	0.0	3	11	90	06/09/03	
810	B	5	6.2	8.3	0.0	3	11	90	06/09/03	
810	B	6	4.4	9.5	0.0	3	11	90	06/09/03	
810	B	7	9.2	9.5	0.0	3	11	90	06/09/03	
810	B	8	5.1	12.9	0.0	3	11	90	06/09/03	
810	B	9	2.9	6.0	0.0	3	11	90	06/09/03	
810	B	10	7.7	16.3	0.0	3	11	90	06/09/03	
810	B	11	7.3	18.6	0.0	3	11	90	06/09/03	
810	B	12	5.5	11.4	0.0	3	11	90	06/09/03	
810	B	13	2.1	4.9	0.0	3	11	90	06/09/03	
810	B	4HS1	8.8	32.3	0.0	3	11	90	06/09/03	
810	B	4HS2	13.3	25.4	0.0	3	11	90	06/09/03	
810	B	5HS1	5.5	14.4	0.0	3	11	90	06/09/03	
810	B	6HS1	2.5	7.9	0.0	3	11	90	06/09/03	
810	B	6HS3	10.3	13.7	0.0	3	11	90	06/09/03	
810	B	8HS1	16.3	34.9	0.0	3	11	90	06/09/03	
810	B	10HS1	20.8	40.6	0.0	3	11	90	06/09/03	
810	B	11HS1	14.1	23.9	0.0	3	11	90	06/09/03	

Sample Identification			DPM			Limit of Detection			Date Rec'd	Notes
			Alpha	Beta	Gamma	Alpha	Beta	Gamma		
810	B	12HS1	28.2	80.9	0.0	3	11	90	06/09/03	
810	C	1	1.8	0.0	0.0	3	11	90	06/09/03	
810	C	2	14.8	33.8	0.0	3	11	90	06/09/03	
810	C	3	5.5	8.3	0.0	3	11	90	06/09/03	
810	C	4	4.7	6.8	0.0	3	11	90	06/09/03	
810	C	5	2.9	0.0	0.0	3	11	90	06/09/03	
810	C	6	5.5	10.6	0.0	3	11	90	06/09/03	
810	C	7	6.2	5.7	0.0	3	11	90	06/09/03	
810	C	8	2.5	0.0	0.0	3	11	90	06/09/03	
810	C	9	6.2	7.9	0.0	3	11	90	06/09/03	
810	C	10	5.5	10.2	0.0	3	11	90	06/09/03	
810	C	11	0.0	0.0	0.0	3	11	90	06/09/03	
810	C	12	4.0	0.0	0.0	3	11	90	06/09/03	
810	C	13	1.4	6.0	0.0	3	11	90	06/09/03	
810	C	2HS1	13.3	38.7	0.0	3	11	90	06/09/03	
810	C	2HS2	8.1	29.2	0.0	3	11	90	06/09/03	
810	C	3HS1	11.8	33.0	0.0	3	11	90	06/09/03	
810	C	3HS2	8.5	24.7	0.0	3	11	90	06/09/03	
810	C	4HS1	13.7	39.1	0.0	3	11	90	06/09/03	
810	C	4HS2	11.8	23.5	0.0	3	11	90	06/09/03	
810	C	5HS1	7.7	15.9	0.0	3	11	90	06/09/03	
810	C	5HS2	7.0	0.0	0.0	3	11	90	06/09/03	
810	C	6HS1	8.1	16.7	0.0	3	11	90	06/09/03	
810	C	6HS2	5.1	11.7	0.0	3	11	90	06/09/03	
810	C	7HS1	11.8	23.5	0.0	3	11	90	06/09/03	
810	C	7HS2	10.3	15.9	0.0	3	11	90	06/09/03	
810	C	8HS1	8.8	9.1	0.0	3	11	90	06/09/03	
810	C	8HS2	6.2	15.2	0.0	3	11	90	06/09/03	
810	C	9HS1	4.7	12.9	0.0	3	11	90	06/09/03	
810	C	10HS1	15.5	41.8	0.0	3	11	90	06/09/03	
810	C	11HS1	27.1	74.1	0.0	3	11	90	06/09/03	
810	D	1	4.4	12.1	0.0	3	11	90	06/09/03	
810	D	2	9.6	21.3	0.0	3	11	90	06/09/03	
810	D	3	1.4	0.0	0.0	3	11	90	06/09/03	
810	D	4	3.6	4.9	0.0	3	11	90	06/09/03	
810	D	5	2.5	0.0	0.0	3	11	90	06/09/03	
810	D	6	1.8	0.0	0.0	3	11	90	06/09/03	
810	D	7	4.0	7.9	0.0	3	11	90	06/09/03	
810	D	8	2.9	6.4	0.0	3	11	90	06/09/03	
810	D	9	3.2	6.0	0.0	3	11	90	06/09/03	
810	D	10	0.0	4.9	0.0	3	11	90	06/09/03	
810	D	11	1.4	0.0	0.0	3	11	90	06/09/03	
810	D	12	3.6	0.0	0.0	3	11	90	06/09/03	
810	D	13	4.0	5.7	0.0	3	11	90	06/09/03	
810	D	2HS1	10.7	25.4	0.0	3	11	90	06/09/03	
810	D	3HS1	13.3	31.9	0.0	3	11	90	06/09/03	
810	D	3HS2	8.5	10.2	0.0	3	11	90	06/09/03	
810	D	4HS1	30.8	67.3	0.0	3	11	90	06/09/03	
810	D	5HS1	2.1	0.0	0.0	3	11	90	06/09/03	
810	D	7HS1	39.0	97.7	0.0	3	11	90	06/09/03	

Sample Identification			DPM			Limit of Detection			Date Rec'd	Notes
			Alpha	Beta	Gamma	Alpha	Beta	Gamma		
810	D	11HS1	1.4	0.0	0.0	3	11	90	06/09/03	
810	D	12HS1	8.5	12.5	0.0	3	10	90	06/09/03	
810	E	1	0.0	0.0	0.0	3	10	90	06/09/03	
810	E	2	0.0	6.0	0.0	3	10	90	06/09/03	
810	E	3	0.0	0.0	0.0	3	10	90	06/09/03	
810	E	4	0.0	0.0	0.0	3	10	90	06/09/03	
810	E	5	0.0	0.0	0.0	3	10	90	06/09/03	
810	E	6	0.0	0.0	0.0	3	10	90	06/09/03	
810	E	7	0.0	0.0	0.0	3	10	90	06/09/03	
810	E	8	0.0	0.0	0.0	3	10	90	06/09/03	
810	E	9	0.0	0.0	0.0	3	10	90	06/09/03	
810	E	10	0.0	0.0	0.0	3	10	90	06/09/03	
810	E	11	1.1	0.0	0.0	3	10	90	06/09/03	
810	E	12	0.0	0.0	0.0	3	10	90	06/09/03	
810	E	13	0.0	0.0	0.0	3	10	90	06/09/03	
810	F	2	0.0	5.6	0.0	3	10	90	06/09/03	
810	F	4	1.1	0.0	0.0	3	10	90	06/09/03	
810	F	6	0.0	6.0	0.0	3	10	90	06/09/03	
810	F	8	1.4	0.0	0.0	3	10	90	06/09/03	
810	F	10	1.4	0.0	0.0	3	10	90	06/09/03	
810	F	12	0.0	4.8	0.0	3	10	90	06/09/03	
810	G	1	3.3	8.3	0.0	3	10	90	06/09/03	
810	G	3	0.0	4.4	0.0	3	10	90	06/09/03	
810	G	5	0.0	0.0	0.0	3	10	90	06/09/03	
810	G	7	1.4	0.0	0.0	3	10	90	06/09/03	
810	G	9	2.9	0.0	0.0	3	10	90	06/09/03	
810	G	11	1.4	6.7	0.0	3	10	90	06/09/03	
810	G	13	0.0	8.3	0.0	3	10	90	06/09/03	
810	H	2	2.2	6.7	0.0	3	10	90	06/09/03	
810	H	4	0.0	0.0	0.0	3	10	90	06/09/03	
810	H	6	1.8	6.0	0.0	3	10	90	06/09/03	
810	H	8	1.1	6.3	0.0	3	10	90	06/09/03	
810	H	10	1.1	0.0	0.0	3	10	90	06/09/03	
810	H	12	0.0	0.0	0.0	3	10	90	06/09/03	
810	I	1	2.6	12.9	0.0	3	10	90	06/09/03	
810	I	3	3.3	10.2	0.0	3	10	90	06/09/03	
810	I	5	2.6	4.8	0.0	3	10	90	06/09/03	
810	I	7	1.1	5.2	0.0	3	10	90	06/09/03	
810	I	9	1.1	6.0	0.0	3	10	90	06/09/03	
810	I	11	1.4	0.0	0.0	3	10	90	06/09/03	
810	I	13	1.8	8.3	0.0	3	10	90	06/09/03	
810	J	1	0.0	0.0	0.0	3	10	90	06/09/03	
810	J	2	0.0	0.0	0.0	3	10	90	06/09/03	
810	J	3	0.0	0.0	0.0	3	10	90	06/09/03	
810	J	4	0.0	0.0	0.0	3	10	90	06/09/03	
810	J	5	0.0	0.0	0.0	3	10	90	06/09/03	
810	J	6	0.0	0.0	0.0	3	10	90	06/09/03	
810	J	7	0.0	4.4	0.0	3	10	90	06/09/03	
810	J	8	1.1	0.0	0.0	3	10	90	06/09/03	
810	J	9	0.0	4.8	0.0	3	10	90	06/09/03	

Sample Identification			DPM			Limit of Detection			Date Rec'd	Notes
			Alpha	Beta	Gamma	Alpha	Beta	Gamma		
810	J	10	0.0	0.0	0.0	3	10	90	06/09/03	
810	J	11	1.1	0.0	0.0	3	10	90	06/09/03	
810	J	12	0.0	0.0	0.0	3	10	90	06/09/03	
810	J	13	0.0	5.2	0.0	3	10	90	06/09/03	
810	K	1	1.4	0.0	0.0	3	10	90	06/09/03	
810	K	2	0.0	5.6	0.0	3	10	90	06/09/03	
810	K	3	1.1	4.4	0.0	3	10	90	06/09/03	
810	K	4	5.5	5.6	0.0	3	10	90	06/09/03	
810	K	5	0.0	4.8	0.0	3	10	90	06/09/03	
810	K	7	4.0	7.1	0.0	3	10	90	06/09/03	
810	K	9	2.9	0.0	0.0	3	10	90	06/09/03	
810	L	1	0.0	6.0	0.0	3	10	90	06/09/03	
810	L	2	0.0	0.0	0.0	3	10	90	06/09/03	
810	L	3	0.0	0.0	0.0	3	10	90	06/09/03	
810	L	4	0.0	0.0	0.0	3	10	90	06/09/03	
810	L	5	1.4	5.2	0.0	3	10	90	06/09/03	
810	L	7	0.0	0.0	0.0	3	10	90	06/09/03	
810	L	9	2.9	11.4	0.0	3	10	90	06/09/03	
811	**A**	**1**	**4.6**	**0.0**	**0.0**	**3**	**9**	**85**	**06/09/03**	
811	A	2	1.9	0.0	0.0	3	9	85	06/09/03	
811	A	3	0.0	0.0	0.0	3	9	85	06/09/03	
811	A	4	1.1	0.0	0.0	3	9	85	06/09/03	
811	A	5	1.1	0.0	0.0	3	9	85	06/09/03	
811	A	6	1.5	0.0	0.0	3	9	85	06/09/03	
811	A	7	1.5	0.0	0.0	3	9	85	06/09/03	
811	A	8	0.0	0.0	0.0	3	9	85	06/09/03	
811	A	9	0.0	0.0	0.0	3	9	85	06/09/03	
811	A	10	0.0	0.0	0.0	3	9	85	06/09/03	
811	A	11	1.9	0.0	0.0	3	9	85	06/09/03	
811	A	12	0.0	0.0	0.0	3	9	85	06/09/03	
811	A	13	1.5	0.0	0.0	3	9	85	06/09/03	
811	A	4HS1	2.6	0.0	0.0	3	9	85	06/09/03	
811	A	8HS1	5.4	4.4	0.0	3	9	85	06/09/03	
811	A	11HS1	4.2	0.0	0.0	3	9	85	06/09/03	
811	A	11HS2	39.8	66.3	0.0	3	9	85	06/09/03	
811	A	12HS1	17.4	20.5	43.5	3	9	85	06/09/03	
811	B	1	1.1	0.0	0.0	3	9	85	06/09/03	
811	B	2	3.0	4.8	0.0	3	9	85	06/09/03	
811	B	3	3.4	4.8	0.0	3	9	85	06/09/03	
811	B	4	5.4	16.1	0.0	3	9	85	06/09/03	
811	B	5	3.4	11.0	0.0	3	9	85	06/09/03	
811	B	6	3.0	9.2	0.0	3	9	85	06/09/03	
811	B	7	3.8	0.0	0.0	3	9	85	06/09/03	
811	B	8	6.1	6.6	0.0	3	9	85	06/09/03	
811	B	9	5.0	5.1	0.0	3	9	85	06/09/03	
811	B	10	2.3	0.0	0.0	3	9	85	06/09/03	
811	B	11	0.0	0.0	0.0	3	9	85	06/09/03	
811	B	12	1.5	0.0	0.0	3	9	85	06/09/03	
811	B	13	0.0	0.0	0.0	3	9	85	06/09/03	
811	B	11HS1	1.9	0.0	0.0	3	9	85	06/09/03	

Sample Identification			DPM			Limit of Detection			Date Rec'd	Notes
			Alpha	Beta	Gamma	Alpha	Beta	Gamma		
811	C	1	2.6	0.0	0.0	3	9	85	06/09/03	
811	C	2	1.1	5.9	46.7	3	9	85	06/09/03	
811	C	3	3.0	12.5	0.0	3	9	85	06/09/03	
811	C	4	6.1	20.1	0.0	3	9	85	06/09/03	
811	C	5	7.7	16.1	0.0	3	9	85	06/09/03	
811	C	6	3.8	0.0	0.0	3	9	85	06/09/03	
811	C	7	3.0	0.0	0.0	3	9	85	06/09/03	
811	C	8	0.0	0.0	0.0	3	9	85	06/09/03	
811	C	9	6.9	0.0	0.0	3	9	85	06/09/03	
811	C	10	1.5	4.0	0.0	3	9	85	06/09/03	
811	C	11	0.0	0.0	0.0	3	9	85	06/09/03	
811	C	12	0.0	0.0	0.0	3	9	85	06/09/03	
811	C	13	0.0	0.0	45.1	3	9	85	06/09/03	
811	D	1	5.7	4.8	48.8	3	9	85	06/09/03	
811	D	2	1.5	4.4	0.0	3	9	85	06/09/03	
811	D	3	2.3	0.0	0.0	3	9	85	06/09/03	
811	D	4	0.0	0.0	0.0	3	9	85	06/09/03	
811	D	5	1.9	0.0	0.0	3	9	85	06/09/03	
811	D	6	1.9	0.0	0.0	3	9	85	06/09/03	
811	D	7	1.9	0.0	0.0	3	9	85	06/09/03	
811	D	8	0.0	0.0	0.0	3	9	85	06/09/03	
811	D	9	0.0	0.0	0.0	3	9	85	06/09/03	
811	D	10	2.3	0.0	0.0	3	9	85	06/09/03	
811	D	11	1.9	0.0	0.0	3	9	85	06/09/03	
811	D	12	3.0	0.0	0.0	3	9	85	06/09/03	
811	D	13	0.0	0.0	0.0	3	9	85	06/09/03	
811	D	3HS1	17.0	20.9	0.0	3	9	85	06/09/03	
811	E	1	4.2	8.1	0.0	3	9	85	06/09/03	
811	E	2	3.4	0.0	0.0	3	9	85	06/09/03	
811	E	3	0.0	0.0	0.0	3	9	85	06/09/03	
811	E	4	0.0	0.0	0.0	3	9	85	06/09/03	
811	E	5	0.0	0.0	0.0	3	9	85	06/09/03	
811	E	6	10.8	15.4	0.0	3	9	85	06/09/03	
811	E	7	0.0	0.0	0.0	3	9	85	06/09/03	
811	E	8	0.0	0.0	0.0	3	9	85	06/09/03	
811	E	9	1.5	0.0	0.0	3	9	85	06/09/03	
811	E	10	1.1	0.0	0.0	3	9	85	06/09/03	
811	E	11	0.0	0.0	0.0	3	9	85	06/09/03	
811	E	12	0.0	0.0	0.0	3	9	85	06/09/03	
811	E	13	5.0	5.5	0.0	3	9	85	06/09/03	
811	F	2	3.8	9.5	0.0	3	9	85	06/09/03	
811	F	4	2.6	4.4	0.0	3	9	85	06/09/03	
811	F	6	2.3	0.0	0.0	3	9	85	06/09/03	
811	F	8	1.5	8.8	0.0	3	9	85	06/09/03	
811	F	10	4.6	7.3	0.0	3	9	85	06/09/03	
811	F	12	3.0	4.4	0.0	3	9	85	06/09/03	
811	G	1	3.4	15.0	0.0	3	9	85	06/09/03	
811	G	3	3.0	5.9	0.0	3	9	85	06/09/03	
811	G	5	4.6	10.6	0.0	3	9	85	06/09/03	
811	G	7	5.0	16.1	0.0	3	9	85	06/09/03	

Sample Identification			DPM			Limit of Detection			Date Rec'd	Notes
			Alpha	Beta	Gamma	Alpha	Beta	Gamma		
811	G	9	3.0	7.7	0.0	3	9	85	06/09/03	
811	G	11	0.0	4.8	0.0	3	9	85	06/09/03	
811	G	13	0.0	0.0	45.1	3	9	85	06/09/03	
811	H	2	3.8	8.1	0.0	3	9	85	06/09/03	
811	H	4	1.5	7.3	0.0	3	9	85	06/09/03	
811	H	6	10.8	9.5	0.0	3	9	85	06/09/03	
811	H	8	3.0	9.2	0.0	3	9	85	06/09/03	
811	H	10	5.4	15.8	0.0	3	9	85	06/09/03	
811	H	12	4.2	0.0	0.0	3	9	85	06/09/03	
811	I	1	15.8	32.2	0.0	3	9	86	06/09/03	
811	I	3	1.3	5.2	0.0	3	9	86	06/09/03	
811	I	5	8.4	12.5	0.0	3	9	86	06/09/03	
811	I	7	4.5	11.0	0.0	3	9	86	06/09/03	
811	I	9	8.4	15.8	0.0	3	9	86	06/09/03	
811	I	11	2.1	7.0	0.0	3	9	86	06/09/03	
811	I	13	6.0	14.0	0.0	3	9	86	06/09/03	
811	J	1	2.1	0.0	0.0	3	9	86	06/09/03	
811	J	2	0.0	0.0	0.0	3	9	86	06/09/03	
811	J	3	0.0	0.0	0.0	3	9	86	06/09/03	
811	J	4	0.0	0.0	0.0	3	9	86	06/09/03	
811	J	5	0.0	0.0	0.0	3	9	86	06/09/03	
811	J	6	0.0	0.0	0.0	3	9	86	06/09/03	
811	J	7	0.0	0.0	0.0	3	9	86	06/09/03	
811	J	8	1.3	0.0	0.0	3	9	86	06/09/03	
811	J	9	0.0	0.0	0.0	3	9	86	06/09/03	
811	J	10	1.7	0.0	0.0	3	9	86	06/09/03	
811	J	10x	1.7	5.6	0.0	3	9	86	06/09/03	Enclosed with 811-J 11
811	J	11	0.0	0.0	0.0	3	9	86	06/09/03	
811	J	12	0.0	0.0	0.0	3	9	86	06/09/03	
811	J	13	0.0	4.1	0.0	3	9	86	06/09/03	
811	K	1	1.3	4.1	0.0	3	9	86	06/09/03	
811	K	2	1.3	0.0	0.0	3	9	86	06/09/03	
811	K	3	0.0	0.0	0.0	3	9	86	06/09/03	
811	K	4	4.8	11.8	0.0	3	9	86	06/09/03	
811	K	5	5.6	8.5	0.0	3	9	86	06/09/03	
811	K	7	6.4	8.1	0.0	3	9	86	06/09/03	
811	K	9	4.1	17.2	0.0	3	9	86	06/09/03	
811	L	1	2.1	7.8	0.0	3	9	86	06/09/03	
811	L	2	2.1	5.2	0.0	3	9	86	06/09/03	
811	L	3	1.3	0.0	0.0	3	9	86	06/09/03	
811	L	4	1.7	0.0	0.0	3	9	86	06/09/03	
811	L	6	16.2	27.8	0.0	3	9	86	06/09/03	
811	L	8	4.8	8.5	0.0	3	9	86	06/09/03	
811	L	9	1.3	0.0	0.0	3	9	86	06/09/03	

Job No. 740497-03400
Project: Seneca SEAD-48
Contact: Katie Kadlubak (617) 457-7869

IGLOO E0803

Bldg. 5417
Redstone Arsenal, AL 35898-5400
MR. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
803 - 1	7/10/2003	X
803 - 2	7/10/2003	X
803 - 3	7/10/2003	X
803 - 4	7/10/2003	X
803 - 5	7/10/2003	X
803 - 6	7/10/2003	X
803 - 7	7/10/2003	X
803 - 8	7/10/2003	X
803 - 9	7/10/2003	X
803 - 10	7/10/2003	X
803 - 11	7/10/2003	X
803 - 12	7/10/2003	X
803 - 13	7/10/2003	X
803 - 14	7/10/2003	X
803 - 15	7/10/2003	X
803 - 16	7/10/2003	X
803 - 17	7/10/2003	X
803 - 18	7/10/2003	X
803 - 19	7/10/2003	X
803 - 20	7/10/2003	X
803 - 21	7/10/2003	X
803 - 22	7/10/2003	X
803 - 23	7/10/2003	X
803 - 24	7/10/2003	X
803 - 25	7/10/2003	X
803 - 26	7/10/2003	X
803 - 27	7/10/2003	X
803 - 28	7/10/2003	X
803 - 29	7/10/2003	X
803 - 30	7/10/2003	X
total smears		30

Sampled and relinquished by
Sign: Kathleen L. Kadlubak
Print: K. Kadlubak
Firm: Parsons
Date: 7-29-03 Time: 1300

Received By
Sign:
Print:
Firm:
Date: Time:

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AUG - 4 2003
28
30 323202 dbs

Job No. 740497-03400
Project: Seneca SEAD-48
Contact: Katie Kadlubak (617) 457-7869

IGLOO E0804

Bldg. 5417
Redstone Arsenal, AL 35898-5400
MR. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
804 - A 1	6/4/2003	X
804 - A 2	6/4/2003	X
804 - A 3	6/4/2003	X
804 - A 4	6/4/2003	X
804 - A 5	6/4/2003	X
804 - A 6	6/4/2003	X
804 - A 7	6/4/2003	X
804 - A 8	6/4/2003	X
804 - A 9	6/4/2003	X
804 - A 10	6/4/2003	X
804 - A 11	6/4/2003	X
804 - A 12	6/4/2003	X
804 - A 13	6/4/2003	X
804 - A 6HS1	6/11/2003	X
804 - A 5HS2	6/11/2003	X
804 - A 5HS1	6/11/2003	X
804 - A 5HS3	6/11/2003	X
804 - A 3HS1	6/11/2003	X
804 - A 4HS1	6/11/2003	X
804 - A 4HS2	6/11/2003	X
804 - A 13HS1	6/11/2003	X
804 - A 12HS1	6/11/2003	X
804 - A 8HS1	6/11/2003	X
804 - A 2HS1	6/10/2003	X
804 - A 7HS1	6/11/2003	X
804 - A 1HS1	6/10/2003	X
804 - A 2HS2	6/10/2003	X
804 - B 1	6/4/2003	X
804 - B 2	6/4/2003	X
804 - B 3	6/4/2003	X
804 - B 4	6/4/2003	X
804 - B 5	6/4/2003	X
804 - B 6	6/4/2003	X
804 - B 7	6/4/2003	X
804 - B 8	6/4/2003	X
804 - B 9	6/4/2003	X
804 - B 10	6/4/2003	X
804 - B 11	6/4/2003	X
804 - B 12	6/4/2003	X
804 - B 13	6/4/2003	X
804 - B 6HS1	6/11/2003	X
804 - B 3HS1	6/11/2003	X

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28
86 317601 2b8
93 317602 2b8
46 317603 2b8

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Sign: Ed Ashton
Print: Ed Ashton
Firm: Parsons
Date: 6/19/03 Time: 1600

Received By
Sign:
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Firm:
Date: Time:

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Job No. 740497-03400
Project: Seneca SEAD-48
Contact: Katie Kadlubak (617) 457-7869

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Bldg. 5417
Redstone Arsenal, AL 35898-5400
MR. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
804 - B 4HS1	6/11/2003	X
804 - B 5HS1	6/11/2003	X
804 - B 12HS2	6/11/2003	X
804 - B 1HS1	6/11/2003	X
804 - B 2HS1	6/11/2003	X
804 - B 12HS3	6/11/2003	X
804 - B 12HS1	6/11/2003	X
804 - B 11HS2	6/11/2003	X
804 - B 13HS1	6/11/2003	X
804 - B 11HS1	6/11/2003	X
804 - B 10HS1	6/11/2003	X
804 - B 8HS2	6/11/2003	X
804 - B 8HS1	6/11/2003	X
804 - B 12HS4	6/11/2003	X
804 - B 7HS1	6/11/2003	X
804 - C 1	6/4/2003	X
804 - C 2	6/4/2003	X
804 - C 3	6/4/2003	X
804 - C 4	6/4/2003	X
804 - C 5	6/4/2003	X
804 - C 6	6/4/2003	X
804 - C 7	6/4/2003	X
804 - C 8	6/4/2003	X
804 - C 9	6/4/2003	X
804 - C 10	6/4/2003	X
804 - C 11	6/4/2003	X
804 - C 12	6/4/2003	X
804 - C 13	6/4/2003	X
804 - C 9HS1	6/11/2003	X
804 - C 7HS1	6/11/2003	X
804 - C 6HS1	6/11/2003	X
804 - C 13HS1	6/11/2003	X
804 - C 8HS1	6/11/2003	X
804 - C 10HS1	6/11/2003	X
804 - C 4HS1	6/11/2003	X
804 - C 5HS1	6/11/2003	X
804 - C 3HS1	6/11/2003	X
804 - C 1HS1	6/11/2003	X
804 - C 3HS2	6/11/2003	X
804 - C 2HS1	6/11/2003	X
804 - C 11HS2	6/11/2003	X
804 - C 11HS1	6/11/2003	X

Sampled and relinquished by
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Print: Ed Ashton
Firm: Parsons
Date: 6/19/03 Time: 1600

Received By
Sign:
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Firm:
Date: Time:

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Job No. 740497-03400
Project: Seneca SEAD-48
Contact: Katie Kadlubak (617) 457-7869

IGLOO E0804

Bldg. 5417
Redstone Arsenal, AL 35898-5400
MR. Steve Howard/David Walsh

86

Sample_ID	Dry smear date	Dry Smear
804 - C 12HS2	6/11/2003	X
804 - C 12HS1	6/11/2003	X
804 - D 1	6/4/2003	X
804 - D 2	6/4/2003	X
804 - D 3	6/4/2003	X
804 - D 4	6/4/2003	X
804 - D 5	6/4/2003	X
804 - D 6	6/4/2003	X
804 - D 7	6/4/2003	X
804 - D 8	6/4/2003	X
804 - D 9	6/4/2003	X
804 - D 10	6/4/2003	X
804 - D 11	6/4/2003	X
804 - D 12	6/4/2003	X
804 - D 13	6/4/2003	X
804 - D 10HS1	6/11/2003	X
804 - D 9HS1	6/11/2003	X
804 - D 8HS1	6/11/2003	X
804 - D 7HS1	6/11/2003	X
804 - D 12HS2	6/11/2003	X
804 - D 12HS1	6/11/2003	X
804 - D 13HS1	6/11/2003	X
804 - D 11HS1	6/11/2003	X
804 - D 11HS2	6/11/2003	X
804 - D 4HS1	6/11/2003	X
804 - D 5HS1	6/11/2003	X
804 - D 1HS1	6/11/2003	X
804 - D 2HS1	6/11/2003	X
804 - D 6HS1	6/11/2003	X
804 - D 3HS1	6/11/2003	X
804 - E 1	6/10/2003	X
804 - E 2	6/10/2003	X
804 - E 3	6/10/2003	X
804 - E 4	6/10/2003	X
804 - E 5	6/10/2003	X
804 - E 6	6/10/2003	X
804 - E 7	6/10/2003	X
804 - E 8	6/10/2003	X
804 - E 9	6/10/2003	X
804 - E 10	6/10/2003	X
804 - E 11	6/10/2003	X
804 - E 12	6/5/2003	X

Sampled and relinquished by
Sign: Ed Ashton
Print: Ed Ashton
Firm: Parsons
Date: 8/18/03 Time: 1600

Received By
Sign:
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Firm:
Date: Time:

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Job No. 740497-03400
Project: Seneca SEAD-48
Contact: Katie Kadlubak (617) 457-7869

IGLOO E0804

Bldg. 5417
Redstone Arsenal, AL 35898-5400
MR. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
804 - E 13	6/5/2003	X
804 - E 2HS1	6/11/2003	X
804 - E 3HS1	6/11/2003	X
804 - E 4HS1	6/11/2003	X
804 - E 5HS1	6/11/2003	X
804 - E 6HS1	6/11/2003	X
804 - E 7HS1	6/11/2003	X
804 - E 8HS1	6/11/2003	X
804 - E 9HS1	6/11/2003	X
804 - F 1	6/5/2003	X
804 - F 2	6/5/2003	X
804 - F 3	6/5/2003	X
804 - F 4	6/5/2003	X
804 - F 5	6/5/2003	X
804 - F 6	6/5/2003	X
804 - F 7	6/5/2003	X
804 - F 8	6/5/2003	X
804 - F 9	6/5/2003	X
804 - F 10	6/5/2003	X
804 - F 11	6/5/2003	X
804 - F 12	6/9/2003	X
804 - F 13	6/9/2003	X
804 - G 1	6/8/2003	X
804 - G 2	6/8/2003	X
804 - G 3	6/8/2003	X
804 - G 4	6/8/2003	X
804 - G 5	6/9/2003	X
804 - G 6	6/9/2003	X
804 - G 7	6/9/2003	X
804 - G 8	6/9/2003	X
804 - G 9	6/9/2003	X
804 - G 10	6/9/2003	X
804 - G 11	6/5/2003	X
804 - G 12	6/5/2003	X
804 - G 13	6/5/2003	X
804 - G 7HS1	6/9/2003	X
804 - G 5HS1	6/9/2003	X
804 - G 6HS1	6/9/2003	X
804 - G 8HS1	6/9/2003	X
804 - H 1	6/8/2003	X
804 - H 2	6/8/2003	X
804 - H 3	6/7/2003	X

Sampled and relinquished by
Sign: Ed Ashton
Print: Ed Ashton
Firm: Parsons
Date: 6/19/03 Time: 16 00

Received By
Sign:
Print:
Firm:
Date: Time:

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Job No. 740497-03400
Project: Seneca SEAD-48
Contact: Katie Kadlubak (617) 457-7869

IGLOO E0804

Bldg. 5417
Redstone Arsenal, AL 35898-5400
MR. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
804 - H 4	6/7/2003	X
804 - H 5	6/7/2003	X
804 - H 6	6/7/2003	X
804 - H 7	6/6/2003	X
804 - H 8	6/6/2003	X
804 - H 9	6/6/2003	X
804 - H 10	6/6/2003	X
804 - H 11	6/6/2003	X
804 - H 12	6/6/2003	X
804 - H 13	6/5/2003	X
804 - H 7HS1	6/7/2003	X
804 - I 1	6/9/2003	X
804 - I 2	6/10/2003	X
804 - I 3	6/10/2003	X
804 - I 4	6/10/2003	X
804 - I 5	6/10/2003	X
804 - I 6	6/10/2003	X
804 - I 7	6/10/2003	X
804 - I 8	6/10/2003	X
804 - I 9	6/10/2003	X
804 - I 10	6/10/2003	X
804 - I 11	6/11/2003	X
804 - I 12	6/11/2003	X
804 - I 13	6/10/2003	X
804 - J 1	6/6/2003	X
804 - J 2	6/6/2003	X
804 - J 3	6/6/2003	X
804 - J 4	6/6/2003	X
804 - J 5	6/6/2003	X
804 - J 6	6/6/2003	X
804 - J 7	6/11/2003	X
804 - J 8	6/11/2003	X
804 - J 9	6/11/2003	X
804 - J 10	6/11/2003	X
804 - J 11	6/11/2003	X
804 - J 12	6/11/2003	X
804 - J 13	6/11/2003	X
804 - K 1	6/6/2003	X
804 - K 2	6/6/2003	X
804 - K 3	6/6/2003	X
804 - K 4	6/6/2003	X
804 - K 5	6/11/2003	X

Sampled and relinquished by
Sign: Ed Ashton
Print: Ed Ashton
Firm: Parsons
Date: 6/19/03 Time: 1600

Received By
Sign:
Print:
Firm:
Date: Time:

Copy (A) B C

Job No. 740497-03400
Project: Seneca SEAD-48
Contact: Katie Kadlubak (617) 457-7869

IGLOO E0804

Bldg. 5417
Redstone Arsenal, AL 35898-5400
MR. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
804 - K 6	6/11/2003	X
804 - K 7	6/11/2003	X
804 - K 8	6/9/2003	X
804 - K 9	6/11/2003	X
804 - K 9HS1	6/11/2003	X
804 - K 3HS1	6/10/2003	X
804 - L 1	6/6/2003	X
804 - L 2	6/6/2003	X
804 - L 3	6/6/2003	X
804 - L 4	6/6/2003	X
804 - L 5	6/9/2003	X
804 - L 6	6/5/2003	X
804 - L 7	6/5/2003	X
804 - L 8	6/9/2003	X
46 804 - L 9	6/5/2003	X
total smears		139

Sampled and relinquished by
Sign: Ed Ashton
Print: Ed Ashton
Firm: Parsons
Date: 6/19/03 Time: 1600

Received By
Sign:
Print:
Firm:
Date: Time:

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Job No. 740497-03400
Project: Seneca SEAD-48
Contact: Katie Kadlubak (617) 457-7869

IGLOO E0805

Bldg. 5417
Redstone Arsenal, AL 35898-5400
Mr. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
805 - A 1	5/7/2003	X
805 - A 2	5/7/2003	X
805 - A 3	5/7/2003	X
805 - A 4	5/7/2003	X
805 - A 5	5/7/2003	X
805 - A 6	5/7/2003	X
805 - A 7	5/7/2003	X
805 - A 8	5/7/2003	X
805 - A 9	5/7/2003	X
805 - A 10	5/7/2003	X
805 - A 11	5/7/2003	X
805 - A 12	5/7/2003	X
805 - A 13	5/7/2003	X
805 - A 1HS1	5/10/2003	X
805 - A 10HS1	5/10/2003	X
805 - A 8HS1	5/10/2003	X
805 - B 1	5/7/2003	X
805 - B 2	5/7/2003	X
805 - B 3	5/7/2003	X
805 - B 4	5/7/2003	X
805 - B 5	5/7/2003	X
805 - B 6	5/7/2003	X
805 - B 7	5/7/2003	X
805 - B 8	5/7/2003	X
805 - B 9	5/7/2003	X
805 - B 10	5/7/2003	X
805 - B 11	5/7/2003	X
805 - B 12	5/7/2003	X
805 - B 13	5/7/2003	X
805 - B 13HS1	5/10/2003	X
805 - B 7HS1	5/10/2003	X
805 - C 1	5/7/2003	X
805 - C 2	5/7/2003	X
805 - C 3	5/7/2003	X
805 - C 4	5/7/2003	X
805 - C 5	5/7/2003	X
805 - C 6	5/7/2003	X
805 - C 7	5/7/2003	X
805 - C 8	5/7/2003	X
805 - C 9	5/7/2003	X
805 - C 10	5/7/2003	X
805 - C 11	5/7/2003	X

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28 34
34 316104 cby

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94 316113 cby

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Job No. 740497-03400
Project: Seneca SEAD-48
Contact: Katie Kadlubak (617) 457-7869

IGLOO E0805

Bldg. 5417
Redstone Arsenal, AL 35898-5400
Mr. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
805 - C 12	5/7/2003	X
805 - C 13	5/7/2003	X
805 - C 11HS1	5/10/2003	X
805 - C 1HS1	5/10/2003	X
805 - D 1	5/7/2003	X
805 - D 2	5/7/2003	X
805 - D 3	5/7/2003	X
805 - D 4	5/7/2003	X
805 - D 5	5/7/2003	X
805 - D 6	5/7/2003	X
805 - D 7	5/7/2003	X
805 - D 8	5/7/2003	X
805 - D 9	5/7/2003	X
805 - D 10	5/7/2003	X
805 - D 11	5/7/2003	X
805 - D 12	5/7/2003	X
805 - D 13	5/7/2003	X
805 - D 1HS1	5/10/2003	X
805 - D 11HS1	5/10/2003	X
805 - D 13HS1	5/10/2003	X
805 - E 1	5/8/2003	X
805 - E 2	5/8/2003	X
805 - E 3	5/8/2003	X
805 - E 4	5/8/2003	X
805 - E 5	5/8/2003	X
805 - E 6	5/8/2003	X
805 - E 7	5/8/2003	X
805 - E 8	5/8/2003	X
805 - E 9	5/8/2003	X
805 - E 10	5/8/2003	X
805 - E 11	5/8/2003	X
805 - E 12	5/8/2003	X
805 - E 13	5/8/2003	X
805 - F 2	5/9/2003	X
805 - F 4	5/9/2003	X
805 - F 6	5/9/2003	X
805 - F 8	5/9/2003	X
805 - F 10	5/9/2003	X
805 - F 12	5/9/2003	X
805 - G 1	5/9/2003	X
805 - G 3	5/9/2003	X
805 - G 5	5/9/2003	X

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Contact: Katie Kadlubak (617) 457-7869

IGLOO E0805

Bldg. 5417
Redstone Arsenal, AL 35898-5400
Mr. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
805 - G 7	5/9/2003	X
805 - G 9	5/9/2003	X
805 - G 11	5/9/2003	X
805 - G 13	5/9/2003	X
805 - H 2	5/8/2003	X
805 - H 4	5/8/2003	X
805 - H 6	5/8/2003	X
805 - H 8	5/8/2003	X
805 - H 10	5/8/2003	X
805 - H 12	5/8/2003	X
805 - I 1	5/8/2003	X
805 - I 3	5/8/2003	X
805 - I 5	5/8/2003	X
805 - I 7	5/8/2003	X
805 - I 9	5/8/2003	X
805 - I 11	5/8/2003	X
805 - I 13	5/8/2003	X
805 - J 1	5/8/2003	X
805 - J 2	5/8/2003	X
805 - J 3	5/8/2003	X
805 - J 4	5/8/2003	X
805 - J 5	5/8/2003	X
805 - J 6	5/8/2003	X
805 - J 7	5/8/2003	X
805 - J 8	5/8/2003	X
805 - J 9	5/8/2003	X
805 - J 10	5/8/2003	X
805 - J 11	5/8/2003	X
805 - J 12	5/8/2003	X
805 - J 13	5/8/2003	X
805 - K 1	5/8/2003	X
805 - K 2	6/6/2003	X
805 - K 3	6/6/2003	X
805 - K 4	6/6/2003	X
805 - K 6	5/9/2003	X
805 - K 8	5/9/2003	X
805 - K 9	5/9/2003	X
805 - L 1	5/8/2003	X
805 - L 2	5/8/2003	X
805 - L 3	5/8/2003	X
805 - L 4	5/8/2003	X
805 - L 5	5/9/2003	X

94

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IGLOO E0805

Bldg. 5417
Redstone Arsenal, AL 35898-5400
Mr. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
805 - L 7	5/9/2003	X
805 - L 9	6/6/2003	X
total smears		128

34

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IGLOO E0806

Bldg. 5417
Redstone Arsenal, AL 35898-5400
MR. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
806 - A 1	6/16/2003	X
806 - A 2	6/16/2003	X
806 - A 3	6/16/2003	X
806 - A 4	6/16/2003	X
806 - A 5	6/18/2003	X
806 - A 6	6/18/2003	X
806 - A 7	6/18/2003	X
806 - A 8	6/18/2003	X
806 - A 9	6/18/2003	X
806 - A 10	6/18/2003	X
806 - A 11	6/18/2003	X
806 - A 12	6/18/2003	X
806 - A 13	6/18/2003	X
806 - B 1	6/18/2003	X
806 - B 2	6/18/2003	X
806 - B 3	6/18/2003	X
806 - B 4	6/18/2003	X
806 - B 5	6/18/2003	X
806 - B 6	6/17/2003	X
806 - B 7	6/17/2003	X
806 - B 8	6/18/2003	X
806 - B 9	6/18/2003	X
806 - B 10	6/18/2003	X
806 - B 11	6/18/2003	X
806 - B 12	6/18/2003	X
806 - B 13	6/18/2003	X
806 - C 1	6/18/2003	X
806 - C 2	6/18/2003	X
806 - C 3	6/18/2003	X
806 - C 4	6/18/2003	X
806 - C 5	6/18/2003	X
806 - C 6	6/18/2003	X
806 - C 7	6/18/2003	X
806 - C 8	6/18/2003	X
806 - C 9	6/18/2003	X
806 - C 10	6/18/2003	X
806 - C 11	6/18/2003	X
806 - C 12	6/18/2003	X
806 - C 13	6/23/2003	X
806 - D 1	6/23/2003	X
806 - D 2	6/23/2003	X
806 - D 3	6/23/2003	X

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28
57 323103 dbr

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91 323102 dby

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Project: Seneca SEAD-48
Contact: Katie Kadlubak (617) 457-7869

IGLOO E0806

Bldg. 5417
Redstone Arsenal, AL 35898-5400
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Sample_ID	Dry smear date	Dry Smear
806 - D 4	6/23/2003	X
806 - D 5	6/23/2003	X
806 - D 6	6/23/2003	X
806 - D 7	6/23/2003	X
806 - D 8	6/23/2003	X
806 - D 9	6/23/2003	X
806 - D 10	6/23/2003	X
806 - D 11	6/23/2003	X
806 - D 12	6/23/2003	X
806 - D 13	6/23/2003	X
806 - E 1	6/18/2003	X
806 - E 2	6/18/2003	X
806 - E 3	6/18/2003	X
806 - E 4	6/18/2003	X
806 - E 5	6/23/2003	X
806 - E 6	6/16/2003	X
806 - E 7	6/16/2003	X
806 - E 8	6/16/2003	X
806 - E 9	6/16/2003	X
806 - E 10	6/16/2003	X
806 - E 11	6/16/2003	X
806 - E 12	6/16/2003	X
806 - E 13	6/16/2003	X
806 - F 1	6/16/2003	X
806 - F 2	6/16/2003	X
806 - F 3	6/16/2003	X
806 - F 4	6/17/2003	X
806 - F 5	6/17/2003	X
806 - F 6	6/17/2003	X
806 - F 7	6/17/2003	X
806 - F 8	6/17/2003	X
806 - F 9	6/17/2003	X
806 - F 10	6/17/2003	X
806 - F 11	6/17/2003	X
806 - F 12	6/17/2003	X
806 - F 13	6/17/2003	X
806 - G 1	6/18/2003	X
806 - G 2	6/18/2003	X
806 - G 3	6/23/2003	X
806 - G 4	6/23/2003	X
806 - G 5	6/23/2003	X
806 - G 6	6/23/2003	X

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Contact: Katie Kadlubak (617) 457-7869

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Bldg. 5417
Redstone Arsenal, AL 35898-5400
MR. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
806 - G 7	6/23/2003	X
806 - G 8	6/23/2003	X
806 - G 9	6/23/2003	X
806 - G 10	6/23/2003	X
806 - G 11	6/18/2003	X
806 - G 12	6/18/2003	X
806 - G 13	6/18/2003	X
806 - H 1	6/26/2003	X
806 - H 2	6/26/2003	X
806 - H 3	6/26/2003	X
806 - H 4	6/26/2003	X
806 - H 5	6/26/2003	X
806 - H 6	6/26/2003	X
806 - H 7	6/27/2003	X
806 - H 8	6/27/2003	X
806 - H 9	6/27/2003	X
806 - H 10	6/27/2003	X
806 - H 11	6/24/2003	X
806 - H 12	6/23/2003	X
806 - H 13	6/23/2003	X
806 - I 1	6/17/2003	X
806 - I 2	6/17/2003	X
806 - I 3	6/17/2003	X
806 - I 4	6/17/2003	X
806 - I 5	6/17/2003	X
806 - I 6	6/17/2003	X
806 - I 7	6/17/2003	X
806 - I 8	6/18/2003	X
806 - I 9	6/18/2003	X
806 - I 10	6/18/2003	X
806 - I 11	6/18/2003	X
806 - I 12	6/18/2003	X
806 - I 13	6/18/2003	X
806 - J 1	6/23/2003	X
806 - J 2	6/23/2003	X
806 - J 3	6/23/2003	X
806 - J 4	6/23/2003	X
806 - J 5	6/23/2003	X
806 - J 6	6/23/2003	X
806 - J 7	6/23/2003	X
806 - J 8	6/23/2003	X
806 - J 9	6/23/2003	X

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Bldg. 5417
Redstone Arsenal, AL 35898-5400
MR. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
806 - J 10	6/23/2003	X
806 - J 11	6/23/2003	X
806 - J 12	6/23/2003	X
806 - J 13	6/23/2003	X
806 - K 1	6/23/2003	X
806 - K 2	6/23/2003	X
806 - K 3	6/23/2003	X
806 - K 4	6/24/2003	X
806 - K 5	6/27/2003	X
806 - K 6	6/27/2003	X
806 - K 7	6/24/2003	X
806 - K 8	6/24/2003	X
806 - K 9	6/24/2003	X
806 - L 1	6/24/2003	X
806 L 2	6/24/2003	X
806 L 3	6/24/2003	X
806 L 4	6/24/2003	X
806 L 5	6/24/2003	X
806 L 6	6/24/2003	X
806 L 7	6/24/2003	X
806 L 8	6/24/2003	X
806 L 9	6/24/2003	X
total smears		148

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IGLOO E0806-hotspots

Bldg. 5417
Redstone Arsenal, AL 35898-5400
MR. Steve Howard/David Walsh

Sample_ID		Dry smear date	Dry Smear
806 - A 1	HS1	6/16/2003	X
806 - A 2	HS1	6/16/2003	X
806 - A 2	HS2	6/16/2003	X
806 - A 3	HS1	6/16/2003	X
806 - A 4	HS1	6/18/2003	X
806 - A 5	HS1	6/18/2003	X
806 - A 6	HS1	6/18/2003	X
806 - A 6	HS2	6/18/2003	X
806 - A 7	HS1	6/18/2003	X
806 - A 8	HS1	6/18/2003	X
806 - A 9	HS1	6/18/2003	X
806 - A 10	HS1	6/18/2003	X
806 - A 11	HS1	6/18/2003	X
806 - A 12	HS1	6/18/2003	X
806 - A 13	HS1	6/18/2003	X
806 - A 13	HS2	6/18/2003	X
806 - B 1	HS1	6/18/2003	X
806 - B 1	HS2	6/18/2003	X
806 - B 4	HS1	6/18/2003	X
806 - B 6	HS1	6/18/2003	X
806 - B 6	HS2	6/18/2003	X
806 - B 6	HS3	6/18/2003	X
806 - B 7	HS2	6/18/2003	X
806 - B 7	HS3	6/17/2003	X
806 - B 7	HS4	6/17/2003	X
806 - B 8	HS1	6/17/2003	X
806 - B 9	HS1	6/17/2003	X
806 - B 10	HS1	6/17/2003	X
806 - C 2	HS1	6/18/2003	X
806 - C 5	HS1	6/18/2003	X
806 - C 6	HS1	6/18/2003	X
806 - C 6	HS2	6/18/2003	X
806 - C 8	HS1	6/18/2003	X
806 - C 11	HS1	6/18/2003	X
806 - C 11	HS2	6/18/2003	X
806 - C 11	HS3	6/18/2003	X
806 - C 12	HS1	6/18/2003	X
806 - C 12	HS2	6/18/2003	X
806 - C 13	HS1	6/24/2003	X
806 - D 1	HS1	6/23/2003	X
806 - D 2	HS1	6/23/2003	X
806 - D 2	HS2	6/23/2003	X

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AUG - 4 2003
28
65 323101 068

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28
91 323101 058

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IGLOO E0806-hotspots

Bldg. 5417
Redstone Arsenal, AL 35898-5400
MR. Steve Howard/David Walsh

Sample_ID		Dry smear date	Dry Smear
806 - D 3	HS1	6/23/2003	X
806 - D 3	HS2	6/23/2003	X
806 - D 4	HS1	6/23/2003	X
806 - D 4	HS2	6/23/2003	X
806 - D 5	HS1	6/23/2003	X
806 - D 5	HS2	6/23/2003	X
806 - D 6	HS1	6/23/2003	X
806 - D 7	HS1	6/23/2003	X
806 - D 8	HS1	6/24/2003	X
806 - D 9	HS1	6/24/2003	X
806 - D 10	HS1	6/24/2003	X
806 - D 11	HS1	6/24/2003	X
806 - D 12	HS1	6/24/2003	X
806 - D 12	HS2	6/24/2003	X
806 - D 13	HS1	6/24/2003	X
806 - J 3	HS1	6/23/2003	X
806 - J 4	HS1	6/23/2003	X
806 - J 5	HS1	6/23/2003	X
806 - J 6	HS1	6/23/2003	X
806 - J 7	HS1	6/23/2003	X
806 - J 8	HS1	6/23/2003	X
806 - J 9	HS1	6/23/2003	X
806 - J 10	HS1	6/23/2003	X
total smears			65

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IGLOO E0807

Bldg. 5417
Redstone Arsenal, AL 35898-5400
MR. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
807 - A 1	5/23/2003	X
807 - A 2	5/23/2003	X
807 - A 3	5/23/2003	X
807 - A 4	5/23/2003	X
807 - A 5	5/23/2003	X
807 - A 6	5/23/2003	X
807 - A 7	5/23/2003	X
807 - A 8	5/23/2003	X
807 - A 9	5/23/2003	X
807 - A 10	5/23/2003	X
807 - A 11	5/23/2003	X
807 - A 12	5/23/2003	X
807 - A 13	5/23/2003	X
807 - A 6HS1	6/4/2003	X
807 - A 12HS1	6/4/2003	X
807 - A 13HS1	6/18/2003	X
807 - B 1	6/4/2003	X
807 - B 2	6/4/2003	X
807 - B 3	5/23/2003	X
807 - B 4	5/23/2003	X
807 - B 5	5/23/2003	X
807 - B 6	5/23/2003	X
807 - B 7	6/2/2003	X
807 - B 8	6/2/2003	X
807 - B 9	6/2/2003	X
807 - B 10	6/2/2003	X
807 - B 11	6/2/2003	X
807 - B 12	6/2/2003	X
807 - B 13	6/2/2003	X
807 B 11HS1	6/4/2003	X
807 B 13HS1	6/4/2003	X
807 - C 1	6/3/2003	X
807 - C 2	6/3/2003	X
807 - C 3	6/3/2003	X
807 - C 4	6/3/2003	X
807 - C 5	6/3/2003	X
807 - C 6	6/3/2003	X
807 - C 7	6/3/2003	X
807 - C 8	6/3/2003	X
807 - C 9	6/3/2003	X
807 - C 10	6/3/2003	X
807 - C 11	6/3/2003	X

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28
96 317604 ~ by
27 317605 ~ by

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Bldg. 5417
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MR. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
807 - C 12	6/3/2003	X
807 - C 13	6/2/2003	X
807 - D 1	6/2/2003	X
807 - D 2	6/2/2003	X
807 - D 3	6/2/2003	X
807 - D 4	6/2/2003	X
807 - D 5	6/2/2003	X
807 - D 6	6/2/2003	X
807 - D 7	6/2/2003	X
807 - D 8	6/2/2003	X
807 - D 9	6/2/2003	X
807 - D 10	6/2/2003	X
807 - D 11	6/2/2003	X
807 - D 12	6/2/2003	X
807 - D 13	6/2/2003	X
807 - E 1	6/2/2003	X
807 - E 2	6/2/2003	X
807 - E 3	6/2/2003	X
807 - E 4	6/2/2003	X
807 - E 5	6/2/2003	X
807 - E 6	6/2/2003	X
807 - E 7	6/2/2003	X
807 - E 8	6/2/2003	X
807 - E 9	6/2/2003	X
807 - E 10	6/2/2003	X
807 - E 11	6/2/2003	X
807 - E 12	6/2/2003	X
807 - E 13	6/2/2003	X
807 - F 2	6/4/2003	X
807 - F 4	6/4/2003	X
807 - F 6	6/4/2003	X
807 - F 8	6/4/2003	X
807 - F 10	6/4/2003	X
807 - F 12	6/4/2003	X
807 - G 1	5/23/2003	X
807 - G 3	5/22/2003	X
807 - G 5	5/22/2003	X
807 - G 7	5/22/2003	X
807 - G 9	5/23/2003	X
807 - G 11	5/23/2003	X
807 - G 13	6/2/2003	X
807 - H 2	6/3/2003	X

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Redstone Arsenal, AL 35898-5400
MR. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
807 - H 4	6/3/2003	X
807 - H 6	5/23/2003	X
807 - H 8	5/23/2003	X
807 - H 10	6/2/2003	X
807 - H 12	6/2/2003	X
807 - I 1	6/3/2003	X
807 - I 3	6/3/2003	X
807 - I 5	6/3/2003	X
807 - I 7	6/3/2003	X
807 - I 9	6/3/2003	X
807 - I 11	6/3/2003	X
96 807 - I 13	6/4/2003	X
807 - J 1	6/2/2003	X
807 - J 2	6/2/2003	X
807 - J 3	6/2/2003	X
807 - J 4	6/2/2003	X
807 - J 5	6/2/2003	X
807 - J 6	6/2/2003	X
807 - J 7	6/2/2003	X
807 - J 8	6/2/2003	X
807 - J 9	6/2/2003	X
807 - J 10	6/2/2003	X
807 - J 11	6/2/2003	X
807 - J 12	6/2/2003	X
807 - J 13	6/2/2003	X
807 - K 1	6/2/2003	X
807 - K 2	6/2/2003	X
807 - K 3	6/2/2003	X
807 - K 4	6/3/2003	X
807 - K 5	6/3/2003	X
807 - K 7	6/3/2003	X
807 - K 9	6/4/2003	X
807 - L 1	6/4/2003	X
807 - L 2	6/4/2003	X
807 - L 3	6/4/2003	X
807 - L 4	6/4/2003	X
807 - L 6	6/3/2003	X
807 - L 8	6/3/2003	X
27 807 - L 9	6/2/2003	X
total smears		123

Sampled and relinquished by
Sign: Ed Ashton
Print: Ed Ashton
Firm: Parsons
Date: 6/18/03 Time: 1400

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Sign:
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Firm:
Date: Time:

Copy: (A) B C

Job No. 740497-03400
Project: Seneca SEAD-48
Contact: Katie Kadlubak (617) 457-7869

IGLOO E0808- sent 6-25-03

Bldg. 5417
Redstone Arsenal, AL 35898-5400
MR. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
808 - A 1	6/24/2003	X
808 - A 2	6/24/2003	X
808 - A 3	6/24/2003	X
808 - A 4	6/24/2003	X
808 - A 5	6/24/2003	X
808 - A 6	6/24/2003	X
808 - A 7	6/24/2003	X
808 - A 8	6/24/2003	X
808 - A 9	6/24/2003	X
808 - A 10	6/24/2003	X
808 - A 11	6/24/2003	X
808 - A 12	6/24/2003	X
808 - A 13	6/24/2003	X
808 - B 1	6/24/2003	X
808 - B 2	6/24/2003	X
808 - B 3	6/24/2003	X
808 - B 4	6/24/2003	X
808 - B 5	6/24/2003	X
808 - B 6	6/24/2003	X
808 - B 7	6/24/2003	X
808 - B 8	6/24/2003	X
808 - B 9	6/24/2003	X
808 - B 10	6/24/2003	X
808 - B 11	6/24/2003	X
808 - B 12	6/24/2003	X
808 - B 13	6/24/2003	X
808 - C 1	6/24/2003	X
808 - C 2	6/24/2003	X
808 - C 3	6/24/2003	X
808 - C 4	6/24/2003	X
808 - C 5	6/24/2003	X
808 - C 6	6/24/2003	X
808 - C 7	6/24/2003	X
808 - C 8	6/24/2003	X
808 - C 9	6/24/2003	X
808 - C 10	6/24/2003	X
808 - C 11	6/24/2003	X
808 - C 12	6/24/2003	X
808 - C 13	6/24/2003	X
808 - D 1	6/24/2003	X
808 - D 2	6/24/2003	X
808 - D 3	6/24/2003	X

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Sampled and relinquished by
Sign: Kathleen L. Kadlubak
Print: Kathleen Kadlubak
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page 1/2

Job No. 740497-03400
Project: Seneca SEAD-48
Contact: Katie Kadlubak (617) 457-7869

IGLOO E0808- sent 6-25-03

Bldg. 5417
Redstone Arsenal, AL 35898-5400
MR. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
808 - D 4	6/24/2003	X
808 - D 5	6/24/2003	X
808 - D 6	6/24/2003	X
808 - D 7	6/24/2003	X
808 - D 8	6/24/2003	X
808 - D 9	6/24/2003	X
808 - D 10	6/24/2003	X
808 - D 11	6/24/2003	X
808 - D 12	6/24/2003	X
808 - D 13	6/24/2003	X
808 - E 1	6/24/2003	X
808 - E 2	6/24/2003	X
808 - E 3	6/24/2003	X
808 - E 4	6/24/2003	X
808 - E 5	6/24/2003	X
808 - E 6	6/24/2003	X
808 - E 7	6/24/2003	X
808 - E 8	6/24/2003	X
808 - E 9	6/24/2003	X
808 - E 10	6/24/2003	X
808 - E 11	6/24/2003	X
808 - E 12	6/24/2003	X
808 - E 13	6/24/2003	X
808 - J 1	6/24/2003	X
808 - J 2	6/24/2003	X
808 - J 3	6/24/2003	X
808 - J 4	6/24/2003	X
808 - J 5	6/24/2003	X
808 - J 6	6/24/2003	X
808 - J 7	6/24/2003	X
808 - J 8	6/24/2003	X
808 - J 9	6/24/2003	X
808 - J 10	6/24/2003	X
808 - J 11	6/24/2003	X
808 - J 12	6/24/2003	X
808 - J 13	6/24/2003	X
total smears		78

Sampled and relinquished by
Sign: Kathleen J. Kadlubak
Print: Kathleen Kadlubak
Firm: Parsons
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page 1 of 1

Job No. 740497-03400
Project: Seneca SEAD-48
Contact: Katie Kadlubak (617) 457-7869

IGLOO E0808 Hotspots

Bldg. 5417
Redstone Arsenal, AL 35898-5400
MR. Steve Howard/David Walsh

Sample_ID		Dry smear date	Dry Smear
808 - A 7	HS1	6/25/2003	X
808 - B 7	HS1	7/8/2003	X
808 - B 6	HS1	7/8/2003	X
808 - B 5	HS1	7/8/2003	X
808 - C 3	HS1	7/8/2003	X
808 - C 5	HS1	7/8/2003	X
808 - C 11	HS1	7/8/2003	X
808 - J 7	HS1	7/8/2003	X
total smears			8

Sampled and relinquished by
Sign: K. Kadlubak
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Firm: PARSONS
Date: 7-29-03 Time: 1330

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Firm:
Date: Time:

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Job No. 740497-03400
Project: Seneca SEAD-48
Contact: Katie Kadlubak (617) 457-7869

IGLQO E0809

Bldg. 5417
Redstone Arsenal, AL 35898-5400
Mr. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
809 - A 1	5/10/2003	X
809 - A 2	5/10/2003	X
809 - A 3	5/10/2003	X
809 - A 4	5/10/2003	X
809 - A 5	5/10/2003	X
809 - A 6	5/10/2003	X
809 - A 7	5/10/2003	X
809 - A 8	5/10/2003	X
809 - A 9	5/10/2003	X
809 - A 10	5/10/2003	X
809 - A 11	5/10/2003	X
809 - A 12	5/10/2003	X
809 - A 13	5/10/2003	X
809 - A 1HS1	5/11/2003	X
809 - A 3HS1	5/11/2003	X
809 - A 4HS1	5/11/2003	X
809 - A 6HS1	5/11/2003	X
809 - A 9HS1	5/11/2003	X
809 - A 10HS1	5/11/2003	X
809 - A 11HS1	5/11/2003	X
809 - A 13HS1	5/11/2003	X
809 - B 1	5/10/2003	X
809 - B 2	5/10/2003	X
809 - B 3	5/10/2003	X
809 - B 4	5/10/2003	X
809 - B 5	5/10/2003	X
809 - B 6	5/10/2003	X
809 - B 7	5/10/2003	X
809 - B 8	5/10/2003	X
809 - B 9	5/10/2003	X
809 - B 10	5/10/2003	X
809 - B 11	5/10/2003	X
809 - B 12	5/10/2003	X
809 - B 13	5/10/2003	X
809 - B 13HS1	5/11/2003	X
809 - B 8HS1	5/11/2003	X
809 - C 1	5/10/2003	X
809 - C 2	5/10/2003	X
809 - C 3	5/10/2003	X
809 - C 4	5/10/2003	X
809 - C 5	5/10/2003	X
809 - C 6	5/10/2003	X

Sampled and relinquished by:
Sign: Scott B. Dillman
Print: Scott B. Dillman
Firm: Parsons
Date: 6/6/03 Time: 1812

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Firm:
Date: Time:

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50 316705 oby
80 316801 oby

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Job No. 740497-03400
Project: Seneca SEAD-48
Contact: Katie Kadlubak (617) 457-7869

IGLOO E0809

Bldg. 5417
Redstone Arsenal, AL 35898-5400
Mr. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
809 - C 7	5/10/2003	X
809 - C 8	5/10/2003	X
809 - C 9	5/10/2003	X
809 - C 10	5/10/2003	X
809 - C 11	5/10/2003	X
809 - C 12	5/10/2003	X
809 - C 13	5/10/2003	X
809 - C 1HS1	5/11/2003	X
809 - D 1	5/10/2003	X
809 - D 2	5/10/2003	X
809 - D 3	5/10/2003	X
809 - D 4	5/10/2003	X
809 - D 5	5/10/2003	X
809 - D 6	5/10/2003	X
809 - D 7	5/10/2003	X
809 - D 8	5/10/2003	X
809 - D 9	5/10/2003	X
809 - D 10	5/10/2003	X
809 - D 11	5/10/2003	X
809 - D 12	5/10/2003	X
809 - D 13	5/10/2003	X
809 - E 1	5/10/2003	X
809 - E 2	5/11/2003	X
809 - E 3	5/11/2003	X
809 - E 4	5/11/2003	X
809 - E 5	5/11/2003	X
809 - E 6	5/11/2003	X
809 - E 7	5/11/2003	X
809 - E 8	5/11/2003	X
809 - E 9	5/11/2003	X
809 - E 10	5/11/2003	X
809 - E 11	5/11/2003	X
809 - E 12	5/11/2003	X
809 - E 13	5/11/2003	X
809 - F 1	5/11/2003	X
809 - F 3	5/11/2003	X
809 - F 5	5/11/2003	X
809 - F 7	5/11/2003	X
809 - F 9	5/11/2003	X
809 - F 11	5/11/2003	X
809 - F 13	5/11/2003	X
809 - G 2	5/10/2003	X

Sampled and relinquished by
Sign: Scott B. Dillman
Print: Scott B. Dillman
Firm: Parsons
Date: 6/6/03 Time: 1812

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Contact: Katie Kadlubak (617) 457-7869

IGLOO E0809

Bldg. 5417
Redstone Arsenal, AL 35898-5400
Mr. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
809 - G 4	5/10/2003	X
809 - G 6	5/11/2003	X
809 - G 8	5/11/2003	X
809 - G 10	5/11/2003	X
809 - G 12	5/11/2003	X
809 - H 1	5/10/2003	X
809 - H 3	5/10/2003	X
809 - H 5	5/12/2003	X
809 - H 7	5/11/2003	X
809 - H 9	5/11/2003	X
809 - H 11	5/11/2003	X
809 - H 13	5/11/2003	X
809 - I 2	5/11/2003	X
809 - I 4	5/11/2003	X
809 - I 6	5/11/2003	X
809 - I 8	5/11/2003	X
809 - I 10	5/11/2003	X
809 - I 12	5/11/2003	X
809 - J 1	5/11/2003	X
809 - J 2	5/11/2003	X
809 - J 3	5/11/2003	X
809 - J 4	5/11/2003	X
809 - J 5	5/11/2003	X
809 - J 6	5/11/2003	X
809 - J 7	5/11/2003	X
809 - J 8	5/11/2003	X
809 - J 9	5/11/2003	X
809 - J 10	5/11/2003	X
809 - J 11	5/11/2003	X
809 - J 12	5/11/2003	X
809 - J 13	5/11/2003	X
809 - K 1	5/11/2003	X
809 - K 2	5/11/2003	X
809 - K 3	5/11/2003	X
809 - K 4	5/11/2003	X
809 - K 6	5/12/2003	X
809 - K 8	5/12/2003	X
809 - K 9	5/11/2003	X
809 - L 1	5/11/2003	X
809 - L 2	5/11/2003	X
809 - L 3	5/11/2003	X
809 - L 4	5/11/2003	X

Sampled and relinquished by
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Print: Scott B. Dillman
Firm: Parsons
Date: 6/6/03 Time: 1812

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Date: Time:

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Job No. 740497-03400
Project: Seneca SEAD-48
Contact: Katie Kadlubak (617) 457-7869

IGLOO E0809

Bldg. 5417
Redstone Arsenal, AL 35898-5400
Mr. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
809 - L 5	5/12/2003	X
809 - L 7	5/12/2003	X
809 - L 9	6/6/2003	X
809 - L 7HS1	5/12/2003	X
total smears		130

Sampled and relinquished by
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Firm: Parsons
Date: 6/6/03 Time: 1812

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Date: Time:

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Job No. 740497-03400
Project: Seneca SEAD-48
Contact: Katie Kadlubak (617) 457-7869

IGLOO E0810

Bldg. 5417
Redstone Arsenal, AL 35898-5400
MR. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
810 - A 1	5/12/2003	X
810 - A 2	5/12/2003	X
810 - A 3	5/12/2003	X
810 - A 4	5/12/2003	X
810 - A 5	5/12/2003	X
810 - A 6	5/12/2003	X
810 - A 7	5/12/2003	X
810 - A 8	5/12/2003	X
810 - A 9	5/12/2003	X
810 - A 10	5/12/2003	X
810 - A 11	5/12/2003	X
810 - A 12	5/12/2003	X
810 - A 13	5/12/2003	X
810 - A 3HS1	5/13/2003	X
810 - A 4HS1	5/13/2003	X
810 - A 6HS1	5/13/2003	X
810 - A 8HS1	5/13/2003	X
810 - A 8HS2	5/13/2003	X
810 - A 9HS1	5/13/2003	X
810 - A 10HS1	5/13/2003	X
810 - A 11HS1	5/13/2003	X
810 - A 12HS1	5/13/2003	X
810 - A 12HS2	5/13/2003	X
810 - A 12HS3	5/13/2003	X
810 - B 1	5/12/2003	X
810 - B 2	5/12/2003	X
810 - B 3	5/12/2003	X
810 - B 4	5/12/2003	X
810 - B 5	5/12/2003	X
810 - B 6	5/12/2003	X
810 - B 7	5/12/2003	X
810 - B 8	5/12/2003	X
810 - B 9	5/12/2003	X
810 - B 10	5/12/2003	X
810 - B 11	5/12/2003	X
810 - B 12	5/12/2003	X
810 - B 13	5/12/2003	X
810 - B 4HS1	5/14/2003	X
810 - B 4HS2	5/14/2003	X
810 - B 5HS1	5/13/2003	X
810 - B 6HS1	5/13/2003	X
810 - B 6HS3	5/13/2003	X
810 - B 8HS1	5/13/2003	X
810 - B 10HS1	5/13/2003	X
810 - B 11HS1	5/13/2003	X
810 - B 12HS1	5/13/2003	X
810 - C 1	5/12/2003	X
810 - C 2	5/12/2003	X

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JUN - 9 2003
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96 316804 aby
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Sign: Scott B. Dillman
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Firm: Parsons
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Date: Time:

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Job No. 740497-03400
Project: Seneca SEAD-48
Contact: Katie Kadlubak (617) 457-7869

IGLOO E0810

Bldg. 5417
Redstone Arsenal, AL 35898-5400
MR. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
810 - C 3	5/12/2003	X
810 - C 4	5/12/2003	X
810 - C 5	5/12/2003	X
810 - C 6	5/12/2003	X
810 - C 7	5/12/2003	X
810 - C 8	5/12/2003	X
810 - C 9	5/12/2003	X
810 - C 10	5/12/2003	X
810 - C 11	5/12/2003	X
810 - C 12	5/12/2003	X
810 - C 13	5/12/2003	X
810 - C 2HS1	5/14/2003	X
810 - C 2HS2	5/14/2003	X
810 - C 3HS1	5/14/2003	X
810 - C 3HS2	5/14/2003	X
810 - C 4HS1	5/14/2003	X
810 - C 4HS2	5/14/2003	X
810 - C 5HS1	5/13/2003	X
810 - C 5HS2	5/13/2003	X
810 - C 6HS1	5/13/2003	X
810 - C 6HS2	5/13/2003	X
810 - C 7HS1	5/13/2003	X
810 - C 7HS2	5/13/2003	X
810 - C 8HS1	5/13/2003	X
810 - C 8HS2	5/13/2003	X
810 - C 9HS1	5/13/2003	X
810 - C 10HS1	5/13/2003	X
810 - C 11HS1	5/13/2003	X
810 - D 1	5/12/2003	X
810 - D 2	5/12/2003	X
810 - D 3	5/12/2003	X
810 - D 4	5/12/2003	X
810 - D 5	5/12/2003	X
810 - D 6	5/12/2003	X
810 - D 7	5/12/2003	X
810 - D 8	5/12/2003	X
810 - D 9	5/12/2003	X
810 - D 10	5/12/2003	X
810 - D 11	5/12/2003	X
810 - D 12	5/12/2003	X
810 - D 13	5/12/2003	X
810 - D 2HS1	5/14/2003	X
810 - D 3HS1	5/13/2003	X
810 - D 3HS2	5/13/2003	X
810 - D 4HS1	5/13/2003	X
810 - D 5HS1	5/13/2003	X
810 - D 7HS1	5/13/2003	X
810 - D 11HS1	5/13/2003	X

Sampled and relinquished by
Sign: Scott B Dillman
Print: Scott B. Dillman
Firm: Parsons
Date: 6/6/03 Time: 1420

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Job No. 740497-03400
Project: Seneca SEAD-48
Contact: Katie Kadlubak (617) 457-7869

IGLOO E0810

Bldg. 5417
Redstone Arsenal, AL 35898-5400
MR. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
810 - D 12HS1	5/13/2003	X
810 - E 1	5/12/2003	X
810 - E 2	5/12/2003	X
810 - E 3	5/12/2003	X
810 - E 4	5/12/2003	X
810 - E 5	5/12/2003	X
810 - E 6	5/12/2003	X
810 - E 7	5/12/2003	X
810 - E 8	5/12/2003	X
810 - E 9	5/12/2003	X
810 - E 10	5/12/2003	X
810 - E 11	5/12/2003	X
810 - E 12	5/12/2003	X
810 - E 13	5/12/2003	X
810 - F 2	5/12/2003	X
810 - F 4	5/12/2003	X
810 - F 6	5/12/2003	X
810 - F 8	5/12/2003	X
810 - F 10	5/12/2003	X
810 - F 12	5/13/2003	X
810 - G 1	5/13/2003	X
810 - G 3	5/12/2003	X
810 - G 5	5/12/2003	X
810 - G 7	5/12/2003	X
810 - G 9	5/12/2003	X
810 - G 11	5/12/2003	X
810 - G 13	5/12/2003	X
810 - H 2	5/13/2003	X
810 - H 4	5/13/2003	X
810 - H 6	5/13/2003	X
810 - H 8	5/13/2003	X
810 - H 10	5/13/2003	X
810 - H 12	5/13/2003	X
810 - I 1	5/14/2003	X
810 - I 3	5/14/2003	X
810 - I 5	5/14/2003	X
810 - I 7	5/14/2003	X
810 - I 9	5/14/2003	X
810 - I 11	5/14/2003	X
810 - I 13	5/14/2003	X
810 - J 1	5/13/2003	X
810 - J 2	5/13/2003	X
810 - J 3	5/13/2003	X
810 - J 4	5/13/2003	X
810 - J 5	5/13/2003	X
810 - J 6	5/13/2003	X
810 - J 7	5/13/2003	X
810 - J 8	5/13/2003	X

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Sign: Scott G. Dillman
Print: Scott G. Dillman
Firm: Parsons
Date: 6/6/03 Time: 1420

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Job No. 740497-03400
Project: Seneca SEAD-48
Contact: Katie Kadlubak (617) 457-7869

IGLOO E0810

Bldg. 5417
Redstone Arsenal, AL 35898-5400
MR. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
810 - J 9	5/13/2003	X
810 - J 10	5/13/2003	X
810 - J 11	5/13/2003	X
810 - J 12	5/13/2003	X
810 - J 13	5/13/2003	X
810 - K 1	5/13/2003	X
810 - K 2	5/13/2003	X
810 - K 3	5/13/2003	X
810 - K 4	5/13/2003	X
810 - K 5	5/12/2003	X
810 - K 7	5/12/2003	X
810 - K 9	6/6/2003	X
810 - L 1	5/13/2003	X
810 - L 2	5/13/2003	X
810 - L 3	5/13/2003	X
810 - L 4	5/13/2003	X
810 - L 5	5/13/2003	X
810 - l 7	5/13/2003	X
810 - L 9	6/6/2003	X
total smears		163

Sampled and relinquished by
Sign: Scott B. Dillman
Print: Scott B. Dillman
Firm: Parsons
Date: 6/6/03 Time: 1420

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Project: Seneca SEAD-48
Contact: Katie Kadlubak (617) 457-7869

IGLOO E0811

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Redstone Arsenal, AL 35898-5400
MR. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
811 - A 1	5/19/2003	X
811 - A 2	5/19/2003	X
811 - A 3	5/19/2003	X
811 - A 4	5/19/2003	X
811 - A 5	5/19/2003	X
811 - A 6	5/19/2003	X
811 - A 7	5/19/2003	X
811 - A 8	5/19/2003	X
811 - A 9	5/19/2003	X
811 - A 10	5/19/2003	X
811 - A 11	5/19/2003	X
811 - A 12	5/19/2003	X
811 - A 13	5/19/2003	X
811 - A 4HS1	5/22/2003	X
811 - A 8HS1	5/22/2003	X
811 - A 11HS1	5/22/2003	X
811 - A 11HS2	5/22/2003	X
811 - A 12HS1	5/22/2003	X
811 - B 1	5/20/2003	X
811 - B 2	5/20/2003	X
811 - B 3	5/20/2003	X
811 - B 4	5/20/2003	X
811 - B 5	5/20/2003	X
811 - B 6	5/20/2003	X
811 - B 7	5/20/2003	X
811 - B 8	5/20/2003	X
811 - B 9	5/20/2003	X
811 - B 10	5/20/2003	X
811 - B 11	5/20/2003	X
811 - B 12	5/20/2003	X
811 - B 13	5/20/2003	X
811 - B 11HS1	5/22/2003	X
811 - C 1	5/20/2003	X
811 - C 2	5/20/2003	X
811 - C 3	5/20/2003	X
811 - C 4	5/20/2003	X
811 - C 5	5/20/2003	X
811 - C 6	5/20/2003	X
811 - C 7	5/20/2003	X
811 - C 8	5/20/2003	X
811 - C 9	5/20/2003	X
811 - C 10	5/20/2003	X

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28
91 316802 aby
34 316803 aby
1 ~~316~~ 317001 aby

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Project: Seneca SEAD-48
Contact: Katie Kadlubak (617) 457-7869

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Bldg. 5417
Redstone Arsenal, AL 35898-5400
MR. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
811 - C 11	5/20/2003	X
811 - C 12	5/20/2003	X
811 - C 13	5/20/2003	X
811 - D 1	5/20/2003	X
811 - D 2	5/20/2003	X
811 - D 3	5/20/2003	X
811 - D 4	5/20/2003	X
811 - D 5	5/20/2003	X
811 - D 6	5/20/2003	X
811 - D 7	5/20/2003	X
811 - D 8	5/20/2003	X
811 - D 9	5/20/2003	X
811 - D 10	5/20/2003	X
811 - D 11	5/20/2003	X
811 - D 12	5/20/2003	X
811 - D 13	5/20/2003	X
811 - D 3HS1	5/22/2003	X
811 - E 1	5/20/2003	X
811 - E 2	5/20/2003	X
811 - E 3	5/20/2003	X
811 - E 4	5/20/2003	X
811 - E 5	5/20/2003	X
811 - E 6	5/20/2003	X
811 - E 7	5/20/2003	X
811 - E 8	5/20/2003	X
811 - E 9	5/20/2003	X
811 - E 10	5/20/2003	X
811 - E 11	5/20/2003	X
811 - E 12	5/20/2003	X
811 - E 13	5/20/2003	X
811 - F 2	5/21/2003	X
811 - F 4	5/21/2003	X
811 - F 6	5/21/2003	X
811 - F 8	5/21/2003	X
811 - F 10	5/21/2003	X
811 - F 12	5/21/2003	X
811 - G 1	5/19/2003	X
811 - G 3	5/19/2003	X
811 - G 5	5/19/2003	X
811 - G 7	5/19/2003	X
811 - G 9	5/19/2003	X
811 - G 11	5/19/2003	X

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Bldg. 5417
Redstone Arsenal, AL 35898-5400
MR. Steve Howard/David Walsh

Sample_ID	Dry smear date	Dry Smear
811 - G 13	5/19/2003	X
811 - H 2	5/19/2003	X
811 - H 4	5/19/2003	X
811 - H 6	5/20/2003	X
811 - H 8	5/20/2003	X
811 - H 10	5/20/2003	X
811 - H 12	5/20/2003	X
811 - I 1	5/21/2003	X
811 - I 3	5/21/2003	X
811 - I 5	5/21/2003	X
811 - I 7	5/21/2003	X
811 - I 9	5/21/2003	X
811 - I 11	5/21/2003	X
811 - I 13	5/21/2003	X
811 - J 1	5/21/2003	X
811 - J 2	5/21/2003	X
811 - J 3	5/21/2003	X
811 - J 4	5/21/2003	X
811 - J 5	5/21/2003	X
811 - J 6	5/21/2003	X
811 - J 7	5/21/2003	X
811 - J 8	5/21/2003	X
811 - J 9	5/21/2003	X
811 - J 10	6/6/2003	X
811 - J 11	5/21/2003	X
811 - J 12	5/21/2003	X
811 - J 13	5/21/2003	X
811 - K 1	5/21/2003	X
811 - K 2	5/21/2003	X
811 - K 3	5/21/2003	X
811 - K 4	5/21/2003	X
811 - K 5	5/21/2003	X
811 - K 7	5/21/2003	X
811 - K 9	5/22/2003	X
811 - L 1	5/21/2003	X
811 - L 2	5/21/2003	X
811 - L 3	5/21/2003	X
811 - L 4	5/21/2003	X
811 - L 6	5/20/2003	X
811 - L 8	5/20/2003	X
811 - L 9	5/22/2003	X
total smears		125

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