This document was prepared in conjunction with work accomplished under Contract No. DE-AC09-96SR18500 with the U. S. Department of Energy.

WSRC-RP-2005-01783

E-Area Performance Assessment Interim Measures Assessment FY2005

by

MARY STALLINGS

Westinghouse Savannah River Company
Savannah River Site
Aiken, South Carolina 29808

Additional Authors:
ROBERT SWINGLE

DOE Contract No. **DE-AC09-96SR18500**

WSRC-RP-2005-01783
Revision 0

KEY WORDS:
LLW Disposal

E-Area Performance Assessment Interim Measures Assessment FY2005

Authors

M. E. Stallings
R. F. Swingle

Washington Savannah River Company

January 31, 2006

Washington Savannah River Company
Savannah River Site
Aiken, SC 29808

SRNL
SAVANNAH RIVER NATIONAL LABORATORY
We Put Science To Work

Prepared for the U.S. Department of Energy Under
Contract Number DE-AC09-96SR18500

DISCLAIMER

Printed in the United States of America

Prepared For
U.S. Department of Energy

REVIEWS AND APPROVALS

Authors

B. T. Butcher for M.E. Stallings 2/28/06

M. E. Stallings, Chemical Science & Technology Date

Robert F. Swingle Jr 2/7/2006

R. F. Swingle, Chemical Science & Technology Date

Design Check

(per Manual E7, Procedure 2.60)

M. J. Ades 2/7/06

M. J. Ades, Waste Management Area Project Date

Approvals

J. C. Griffin 2/27/06

J. C. Griffin, Level 3, Chemical Science & Technology Date

B. T. Butcher 2/7/06

B. T. Butcher, Level 4, Chemical Science & Technology Date

2/8/06

W.T. Goldston, Waste Management Area Project Date

L T Reid 2/7/06

L.T. Reid, Waste Management Area Project Date

K A Stone 2/7/06

K.A. Stone, Waste Management Area Project, Facility Manager Date

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ACRONYMS AND ABBREVIATIONS

BSRI	Bechtel Savannah River Incorporated
CA	Composite analysis
CDP	Cellulose Degradation Product
Ci	curie
CIG	Component-In-Grout
DAS	Disposal Authorization Statement
DOE	Department of Energy
ELLWF	E-Area Low-Level Waste Facility
EPA	Environmental Protection Agency
ET	Engineered Trench
GCL	geosynthetic clay liner
ILV	Intermediate Level Vault
LAWV	Low Activity Waste Vault
LLW	Low-level radioactive waste
MCL	Maximum Contaminant Level
NR	Naval Reactor
PA	Performance Assessment
RWMB	Radioactive Waste Management Basis
SA	Special Analysis
SOF	Sum-of-Fractions of disposal limits
SRS	Savannah River Site
SRNL	Savannah River National Laboratory
ST	Slit Trench
TEF	Tritium Extraction Facility
TPBAR	Tritium Producing Burnable Absorber Rod
TRU	Transuranic
UDQE	Unreviewed Disposal Question Evaluation
WAC	Waste Acceptance Criteria
WMAP	Waste Management Area Project
WIPP	Waste Isolation Pilot Plant
WITS	Waste Information Tracking System

1.0 EXECUTIVE SUMMARY

After major changes to the limits for various disposal units of the E-Area Low Level Waste Facility (ELLWF) last year, no major changes have been made during FY2005. A Special Analysis was completed which removes the air pathway ^{14}C limit from the Intermediate Level Vault (ILV). This analysis will allow the disposal of reactor moderator deionizers which previously had no pathway to disposal. Several studies have also been completed providing groundwater transport input for future special analyses. During the past year, since Slit Trenches #1 and #2 were nearing volumetric capacity, they were operationally closed under a preliminary closure analysis. This analysis was performed using as-disposed conditions and data and showed that concrete rubble from the demolition of 232-F was acceptable for disposal in the STs even though the latest special analysis for the STs had reduced the tritium limits so that the inventory in the rubble exceeded limits.

A number of special studies are planned during the next years; perhaps the largest of these will be revision of the Performance Assessment (PA) for the ELLWF. The revision will be accomplished by incorporating special analyses performed since the last PA revision as well as revising analyses to include new data.

Projected impacts on disposal limits of more recent studies have been estimated. No interim measures will be applied during this year. However, it is being recommended that tritium disposals to the Components-in-Grout (CIG) Trenches be suspended until a limited Special Analysis (SA) currently in progress is completed. This SA will give recommendations for optimum placement of tritiated D-Area tower waste. Further recommendations for tritiated waste placement in the CIG Trenches will be given in the upcoming PA revision.

2.0 INTRODUCTION

Disposal of low-level radioactive waste (LLW) at the Savannah River Site (SRS) E-Area Low-Level Waste Facility (ELLWF) is regulated in part by radionuclide disposal limits determined in the ELLWF performance assessment (PA)[1] and by results of the composite analysis (CA)[2]. Each year, in accordance with DOE requirements to maintain the PA and CA[3,4], an annual review of the ELLWF operations and relevant technical studies is conducted[5].

In 2003, it became evident that, in the development of the groundwater model for the Slit Trenches, the selection of aquifer source nodes (i.e., the spatial elements of the saturated zone model into which the flux of radionuclides from the unsaturated zone model is introduced) was not optimum. Optimizing the source nodes would likely result in increases in the resulting groundwater concentrations, which would suggest that the radionuclide disposal limits should be reduced. Therefore, a decision was made to develop and implement an annual summary of the potential impact of technical studies and other information on radionuclide disposal limits and whether mitigating measures should be imposed pending completion and implementation of the studies. The 2003 report was the first such summary[6].

3.0 PREVIOUS INTERIM MEASURES

In last year's interim assessment, no interim measurements were applied. Waste Management Area Project (WMAP) personnel did apply their own compensatory measures for Slit Trench (ST) #1 by temporarily closing the trench until a Special Analysis was issued addressing the limits for tritium contained in concrete. Later they permanently closed both ST #1 and ST #2 under a preliminary closure analysis.[7] Additionally, WMAP applied compensatory measures on the operation of the Engineered Trench (ET) #1 unit to manage the high tritium fraction of limit. These compensatory measures remain in effect.

WMAP personnel provided the current (June, 2005) inventory of radionuclides in the various ELLWF disposal units[8]. In the 2004 Interim Measures Report, the 2004 inventories were compared to the limits in place in 2003.[9] This year, the limits remain the same as when the 2004 Interim Measures Report was issued. Therefore, there is no separate comparison of the current inventory with the previous year's limits.

4.0 NEW STUDIES AND DATA

The studies completed this year have not resulted in large numbers of limits changes. Therefore, the limits are the same as they were at the time of issuance of the FY2004 interim measures assessment.[9] A recently completed Special Analysis eliminates the air pathway limit for ^{14}C in the ILV.[10] The current limits are given in Tables A-1 – A-5 of the appendix.

Studies completed since FY 2004 include;

- Laboratory studies on the impact of CDP's on K_ds for cations and Pu oxidation states.[12,13]
- A preliminary closure analysis for ST #1 and ST #2.[7]
- A Special Analysis of C-14 for the ILV.[10]

Studies currently in progress are:

- Laboratory studies on colloids and the impact of CDPs on K_ds for anions.
- A modeling study to evaluate the impact of CDPs on K_ds.

Studies planned for FY 2006:

- A modeling study is planned for both numerical dispersion and groundwater plume interaction for the Fiscal Year 2006.
- A revision of the PA for the ELLWF is planned for the Fiscal Year 2006.

Information concerning the new and planned studies of the entire unit types with regards to report status, storage unit type, studies performed, limits and references information are summarized in Table 1.[11] Table 1 also shows the impact interim measures have on the limits.

Table 1. Relevant Information for New and Planned Studies

STATUS*	UNIT	STUDY	NEW AND PLANNED STUDIES	LIMITS#	SECTION@	REF
C	ALL	LAB	CDP impact on rads that are cations	↑	5.1	12, 13, 14
C	ALL	MODEL	CDP groundwater transport	↑	5.1	12, 13, 14
C	ALL	LAB	Material properties	?	5.1	na
C	ALL	REVISION	CA monitoring plan	↔	5.1	15
F	ALL	MODEL	Numerical dispersion	↓	5.1	9
F	ALL	MODEL	Plume interaction	↓	5.1	9
F	ALL	MODEL	Waste layer subsidence	↓	5.1	11
P	ALL	LAB	CDP impact on rads that are anions	↑	5.1	12, 13, 14
P	ALL	LAB	Colloid facilitated transport of rads	↔	5.1	11
C	ALL	UDQE	Downselect disposal option for TPBARs	↑	5.1	16,17,18,19
P	ALL	REVISION	Closure plan	↔	5.1	11
P	ALL	FIELD	Bamboo as long term vegetative cover on cap	↑	5.1	11
P	ALL	REVISION	E-Area PA	↨	5.1	1, 3, 4, 21
C	CIG	SA	Subsidence and new conceptual model	↓	5.5	30, 31
C	CIG	UDQE	Incorrect Intruder limits	↓	5.5	28, 29
P	ET	FIELD	B-25 box corrosion monitoring	?	5.6	11
C	ILV	SA	Reanalysis of C-14 air limit for Rx deionizers	↑	5.3	10
C	ILV	SA	Disposal of initial TEF-TPBARs in a disposal box	↑	5.3	16,17,18, 19
C	ILV	MODEL	Thermal analysis of the TPBAR disposal containers	↑	5.3	19
C	ILV	MODEL	C-14 geochemistry	↑	5.3	25
C	ILV	SA	Disposal of production TEF-TPBARs	↑	5.3	17
C	LAW	UDQE	Impact of Linatron X-Ray machine operation on concrete	↔	5.2	23
P	LAW	MODEL	Vault structural analysis	↓	5.2	11
C	NR	MODEL	Corrosion analysis of TEF TPBAR containers in storage	↑	5.4	18
C	ST	SA	Preliminary closure analysis of ST #1 and #2	↑	5.7	7
C	ST	UDQE	Operational restrictions on non-crushable containers	↔	5.7	35
P	ST	MODEL	Vadose Zone Validation Model	↔	5.7	11

* C-Complete, P-In Progress, F-Future
\# ↑- Potential limit increase, ↓-decrease, ↨-both increases and decreases, ↔ - no impact, ?-Unknown impact
@ Section(s) where study discussed

5.0 POTENTIAL IMPACT OF PLANNED AND IN-PROGRESS STUDIES

We will examine the potential effects of new and planned studies generally. Then, we will discuss each disposal unit in light of these potential effects. For each disposal unit, a table of inventories versus limit for the primary isotopes of concern (i.e., those whose fraction of disposal limit is one percent or greater) is presented. The inventories of all the radionuclides of the disposal facilities considered are provided in Attachment 1, but only the radionuclides with existing limits are considered in the SOF analyses.

5.1 All Units

Groundwater Transport

Several studies dealing with the groundwater transport of radionuclides have been completed or are in progress. A study was completed on the influence of cellulose degradation products (CDP) and pH on cation contaminant sorption to sediment.[12] This study concluded that there was no negative impact on contaminant transport resulting from dissolved organic carbon. In fact, once organic carbon levels are established, this study may result in higher radionuclide K_ds and thus higher inventory limits.

A second study examined the oxidation state of plutonium in the SRS environment and its effect on plutonium transport in the groundwater.[13,14] This study concluded that even though Pu might be introduced to the environment from various disposal units in the more mobile +6 and +5 oxidation states, it is quickly reduced to the less mobile +4 and +3 oxidation states in the SRS environment. Therefore, assumptions previously made about the mobility of plutonium in the SRS environment are still judged conservative.

A third study, currently underway, looks at CDP and pH and their effect on anion sorption to sediment. It is currently anticipated that, as with their effect on cation sorption, CDPs will result in higher K_ds and therefore higher limits for anionic contaminants.

A final study, also underway, looks at the colloid facilitated transport. The specific colloids of concern here are those formed by plutonium. The study looks at colloid formation from the SRS disposal units and colloid removal by SRS sediments. It is not currently anticipated that the results of this study will show a significant effect on the plutonium transport or disposal unit limits. No interim limits will be placed in anticipation of incorporation of this work into the PA.

Material Properties

Studies completed since the last PA revision have improved our understanding of the overall disposal system properties and long-term performance. The latest information on initial material properties for the various materials composing the disposal system will be used. These materials include; geosynthetic clay liner (GCL), concrete, native soil, backfill, crushed rock, grout and the waste layer. Where possible the mechanisms of degradation will be explicitly modeled, for example seismic, settling, erosion, silting, rebar corrosion, etc. SRNL will prepare a hydraulic and diffusional material property data report to establish a baseline reference. No interim limits will be imposed.

Composite Analysis Monitoring Plan

In order to validate the ELLWF and Saltstone Composite Analysis, WMAP, DOE and SRNL have developed a monitoring plan. The elements of this monitoring plan include ground and surface water monitoring. The Site's Environmental Monitoring program well and stream monitoring data will be utilized, when feasible, to validate the CA monitoring activities. Each year the monitoring data reported will be compared with CA results.[15] No interim measurements will be imposed, but monitoring data could result in updates to the CA.

Mingling of Ground Water Plumes

The 2004 Interim Measures Report[9] discussed initial studies concerning the mingling of groundwater plumes from multiple disposal units. No interim measures were imposed at that time. No further work has been completed during the past year; therefore no interim measures will be imposed this year. Further work is planned in the future on this issue and will include considering reorientation of future trenches to produce more favorable limits. Additionally, the location and implications of opening an additional 100 acres of the ELLWF for disposal will be studied.

Numerical Dispersion

Numerical dispersion (artificial spread of contaminants in the computer model) and subsequent artificial reduction in contaminant concentrations was discussed in the 2004 Interim Measures Report.[9] Based on guidance from DOE, it was decided that no interim measures would be applied last year. No further work has been completed on this issue during the past year, and therefore no interim measures will be applied for the next year.

Waste Layer Subsidence

Successful PA modeling of radionuclide contaminant leaching from Engineered Trenches due to waste layer subsidence suggested future studies to evaluate waste layer subsidence for other disposal units (i.e., Slit Trenches, CIG Trenches, LAWV, IL Vault and the NR Pad).[11]However no interim measurements will be applied at this time.

Disposal Options for TPBARs

In the future, the ELLWF will receive waste containers from the new Tritium Extraction Facility (TEF). These containers will contain waste left over from the extraction of tritium from the Tritium Producing Burnable Absorber Rods (TPBARs). During the past year, Special Analyses were completed recommending the ultimate disposal of the initial TEF TPBAR waste container and production waste containers in the Intermediate Level Vault (ILV).[16,17] Corrosion[18] and thermal[19] studies were completed to help determine the final disposal for these waste containers. No interim measures are needed at this time as a result TPBARs impacts.

Revised Closure Plan

SRS LLW management is regulated under DOE Order 435.1. A Disposal Authorization Statement (DAS) was issued by DOE-HQ on 9/28/1999 authorizing continued operations of the SRS ELLWF. The DAS conditions of approval include a requirement to prepare a closure plan complying with the order, and submit to DOE for approval within one year of DAS issuance. SRNL prepared a closure plan complying with DOE O 435.1 and associated guidance. This plan integrates the ELLWF closure with ER RCRA closures at the adjacent old burial ground. The Closure Plan was approved by DOE in FY01 and must now be maintained and modified to reflect facility changes.

DOE comments were received on the FY04 revision to the E-Area Closure Plan (revision 4)[20] that were deferred to the next revision. The FY05 revision to the closure plan will address these comments including major reformatting of the document. This revision will also include the basis for establishing a minimum distance between dynamic compaction operations at the time of final closure and adjacent CIG disposal units.[11]

Bamboo as Long Term Vegetative Cover on Cap

In order to increase the timeframe for integrity of the closure cap and reduce penetration into the waste by deep-rooted vegetation, bamboo is currently being studied as an alternative climax vegetation for planting on the cover cap after final closure. Bamboo has a dense and shallow root system and therefore is expected to stabilize the upper backfill layers of the closure cap from erosion for longer periods of time. The bamboo is also expected to prevent the growth of more deeply rooted vegetation, such as native pines, whose roots might penetrate through to the waste zone and take up radionuclides. Should the bamboo be determined to be effective, it is anticipated that inclusion of it as part of the closure analysis will result in an increase in radionuclide limits by allowing lengthening of the period of stability of the closure cap and prevention of deep-rooted species from bringing radionuclides to the surface. Since, if anything, only an increase in limits is expected to arise from this work, no interim measures will be imposed.[11]

E-Area Performance Assessment Revision

Maintenance of the ELLWF Performance Assessment is required by DOE regulations.[3,4,21] The last major revision to the PA for the ELLWF was completed in 2000.[1] Though the PA has been maintained through the use of SAs and UDQEs, enough new information is now available to warrant the completion of a complete revision to the PA. This process is now underway. Because so many changes will be made, this work will result in increases to some inventory limits and decreases to others. No interim measures will be imposed to anticipate the overall revision. Instead, interim measures will be imposed as needed to account for individual changes.

5.2 Low Activity Waste Vault

Last year, the LAWV limits were revised to include the timed sum of fractions for the ground water limits[22] and to reduce the time for compliance to 1,000 years. Table 2 gives the inventory and sum-of-fractions for the primary isotopes of concern in the LAWV with respect to the latest limits (Table

A-1) No current SOF has a value greater than 10%. With approximately 43.3 % of the volume of the disposal unit filled, the current limits pose no major issues. Mining of the LAWV is planned during FY06. This will reduce the volume fraction filled, possibly by as much as half, by removing waste that may be disposed to the Slit or Engineering Trenches.

Table 2. 2005 LAWV Primary Isotopes of Concern vs. 2005 Limits

				GROUNDWATER	
Isotope	**Current LAWV Inventory (Ci)**	**Air Fraction of Limits**	**Radon Fraction of Limits**	**0-100 years Fraction of Limits**	**100 - 1000 years Fraction of Limits**
C14	1.5E-01	5.4E-02			
Cl36	8.0E-04			1.7E-02	
Tc99	1.0E-01			1.7E-02	1.7E-02
U234	3.6E+00		3.0E-02		
Total SOF		5.4E-02	3.0E-02	3.4E-02	1.7E-02
Vol Fraction Filled	0.43				

Vault Structural Analysis

The E-Area PA published in 1994 evaluated LAWV structural performance under the static load of the design-basis closure cap. This calculation and result were carried into the 2000 PA revision. This early structural modeling incorporated the effects of chemical degradation of the concrete and rebar in calculating the time to roof failure. However, the structural calculation failed to account for seismic and settlement loads (addressed only qualitatively in the PA). Since that time structural codes have become more sophisticated in representing long-term performance of concrete structures under these kinds of loads. In FY05 SRNL began work with Bechtel Savannah River Incorporated (BSRI) to perform structural modeling to evaluate the impact of seismic and settlement loads in promulgating cracks in the LAWV. The effect of chemical degradation processes will also be taken into account in the structural calculations. Results from this work will be used in the LAWV PA model to determine how to represent vault degradation. A new Special Analysis is underway incorporating the vault structural analysis into the LAWV limits. This analysis also corrects a previous assumption that the waste was to be encapsulated in grout. The SA will also add consideration for isotopes previously not considered in the generation of radon, and decrease the time of compliance from the previously used 10,000 years to the currently applicable 1,000 years. The LAWV Special Analysis will incorporate the new automated intruder analysis and will likely remove the intruder-agriculture and intruder-post drilling limits.

In general, when the LAWV analysis is next revised, the limits are expected to decrease, although the new analysis will likely increase the ^{14}C limit for the air pathway. The decrease in the limits is not expected to significantly impact the largest sum-of-fractions in relation to the volume-filled fraction because of the relatively low sum-of-fractions to volume ratio currently in the LAWV. Should revision of the LAWV limits cause exceedance of sum-of-fractions for any limits, waste disposed to the LAWV is retrievable, and therefore specific containers that cause the LAWV to exceed its limits may be removed for disposal in a more advantageous facility. Therefore, no interim limits are being applied at this time.

Impact of Linatron X-Ray Machine Operation on Concrete

During FY 2006, HYTEC Engineering, Inc. will be installing a Varian Model M3 Linatron x-ray machine in Cell 2 of the LAWV to examine containers of Transuranic (TRU) waste for compliance with the Waste Isolation Pilot Plant (WIPP) Waste Acceptance Criteria (WAC). An examination of the effect of the x-rays from the Linatron on the concrete of the LAWV walls indicated that the damage to the concrete will be minimal and should not affect the assumptions used to generate the Performance Assessment for the LAWV.[23] No interim measures or new SA will be required for this activity.

5.3 Intermediate Level Vault

Table 3 gives the inventory and sum-of-fractions for the primary isotopes of concern in the ILV with respect to the latest limits (Table A-4).[24]

Table 3. 2005 IL Vault Primary Isotopes of Concern Inventory vs 2005 Limits

					GROUNDWATER	
Isotope	**IL Vault Inventory (Ci)**	**Intruder Resident Fraction of Limits**	**Air Fraction of Limits**	**Radon Fraction of Limits**	**0-100 years Fraction of Limits**	**100 - 1350 years Fraction of Limits**
I129	5.2E-05					1.1E-01
I129 ETF Activated Carbon	2.0E-03					2.1E-02
Ra226	7.7E-01			3.0E-01		
	Total SOF	0.0E+00	0.0E+00	3.0E-01	0.0E+00	1.3E-01
Vol Fraction Filled	0.38					

The largest sum-of-fractions is 0.3 for the radon pathway, which compares well with the volume fraction filled of 38 %.

C-14 Geochemistry Re-Analysis of C-14 Air Limit

During the past year, a Special Analysis has been completed allowing disposal of 52 reactor moderator deionizers containing 1040 Ci of ^{14}C to the ILV. Under the previous limits, the air emissions limit for ^{14}C was only 4.21 Ci. An examination of the chemistry of ^{14}C in the grout environment of the waste zone of the ILV has led to the removal of the ^{14}C air limit.[10,25] As a result, ^{14}C which had been a significant isotope (>1 % SOF) for the air limit is no longer an isotope of concern.

Disposal of TEF TPBARS

The initial and production TEF TPBAR waste containers are planned to be disposed to the ILV.[16,17]

5.4 Naval Reactor Pads

During the past year, a Special Analysis was completed which implemented the timed ground water analyses and the multiple sum-of-fractions for the NR Pad.[22] It should be noted that because of the strict rules for packaging this waste for transportation, the intruder scenarios were not considered valid and are therefore not given for the NR Pad. Tables 4 and 5 give the inventory and sum-of-fractions for the primary isotopes of concern in the NR Pads with respect to the latest limits (Table A-2).

5.4.1 Old Burial Ground 643-7E NR Pad

An Unresolved Disposal Question Evaluation (UDQE) was performed last year of a proposal to permanently dispose of Naval Reactor waste that is currently stored in the 643-7E Naval Reactor Component Storage Area[26]. The evaluation found it acceptable to permanently dispose of the waste in its current location. This waste is not included in the current NR (643-26E) pad inventory but has been added as an additional disposal unit in WITS. Furthermore, based on the findings in UDQE, the 643-7E Naval Reactor Component Storage Area has been closed. Under the closure, the SOF of the 643-7E NR Pad is only at 20%, while the disposal unit is volumetrically full.

Table 4. 2005 NR Pad NR-643-7E Primary Isotopes of Concern Inventory vs. 2005 Limits

				GROUNDWATER	
Isotope	**NR Pad Inventory (Ci)**	**Air Fraction of Limits**	**Radon Fraction of Limits**	**0-100 years Fraction of Limits**	**100 - 1000 years Fraction of Limits**
C14	1.4E+02			1.8E-01	1.8E-01
I129 Generic	1.5E-05			1.7E-02	1.7E-02
	Total SOF	0.0E+00	0.0E+00	2.0E-01	2.0E-01
Vol Fraction Filled	1.00				

5.4.2 ELLWF (643-26E) NR Pad

Table 5. 2005 NR Pad NR-643-26E Primary Isotopes of Concern Inventory vs. 2005 Limits

				GROUNDWATER	
Isotope	**NR Pad Inventory (Ci)**	**Air Fraction of Limits**	**Radon Fraction of Limits**	**0-100 years Fraction of Limits**	**100 - 1000 years Fraction of Limits**
C14	8.1E+01			1.1E-01	1.1E-01
Cl36	1.3E-02			2.7E-01	
	Total SOF	0.0E+00	0.0E+00	3.8E-01	1.1E-01
Vol Fraction Filled	0.17				

The total sum-of-fractions for the NR Pad NR-643-26E is approximately 38 % for the 0 – 100-year groundwater limits. With a volume fraction filled of approximately 17 %, there currently appears to be a problem with ^{36}Cl. The ^{36}Cl interim limit was not explicitly determined in the NR Pad analysis, but was based on trench analysis.[27] After a radionuclide screening revealed that it should be included in the analysis. When the NR Pad analysis is next revised, it is expected that the ^{36}Cl limit will be larger than the interim limit.[27]

5.5 Components-in-Grout Trenches

Table 6 gives the inventory and sum-of-fractions for the primary isotopes of concern in the CIG Trenches with respect to the latest limits (Table A-3).

Table 6. 2005 CIG Trench Primary Isotopes of Concern Inventory vs. 2005 Limits

							GROUNDWATER	
Isotope	**Inventory (Ci)**	**Intruder Agriculture Fraction of Limits**	**Intruder Resident Fraction of Limits**	**Intruder Post-Drilling Fraction of Limits**	**Air Fraction of Limits**	**Radon Fraction of Limits**	**0-100 years Fraction of Limits**	**100 - 1000 years Fraction of Limits**
H3	4.2E+03				1.0E-02			
I129 Generic	1.2E-05							2.0E-02
Tc99	6.3E-03							1.7E-02
	Total SOF	0.0E+00	0.0E+00	0.0E+00	1.0E-02	0.0E+00	0.0E+00	3.7E-02
Vol Fraction Filled	0.21							

The maximum sum-of-fractions for the CIG Trench is approximately 4 % for the 100 – 1000-year ground water limits. With a volume fraction filled of approximately 21 %, there is not a problem at this time.

Incorrect Intruder Limits UDQE

In the time since the last SA for the CIG Trenches was issued, SRNL discovered two inconsistencies in the development of the limits for the SA.[28] The changes that result from correcting these inconsistencies are small (< 10% of the disposal limits) or conservative (elimination of a limit entirely) and therefore were not addressed immediately. The corrections will be made during the completion of the next regularly scheduled SA for the CIG disposal unit. Implementation of the automated intruder analysis application will correct these errors in all future intruder pathway limits analyses.[29] Because the errors were <10% or conservative, no interim measures will be applied.

Subsidence and New Conceptual Model

A number of issues have arisen challenging the CIG conceptual model in the PA and its implementation in the field. New structural criteria were established in a UDQE in FY04 to ensure long-term (300 year) structural stability of grouted waste forms in accordance with assumptions in the E-Area PA.[30] A subset of prior CIG disposals contained B-25 boxes and other suspect containers not likely to meet these new criteria.[31] Another problem has been the assumption in the PA that the grout envelope surrounding waste components would perform hydraulically in a similar manner as an interim cover. Preliminary calculations demonstrated that this nonconservative assumption resulted in overestimating the true tritium limits for this facility by at least an order of magnitude. Contributing to the uncertainty in the analysis is the lack of data on the actual hydraulic conductivity of the field emplaced grout layer. A limited SA is being performed in FY06 to support disposal of D-Area towers and associated wastes from D&D containing tritium. In addition, a field experiment has been installed containing a test pour of CIG high-flow grout for taking measurements of grout hydraulic properties. The full PA level analysis evaluating all radionuclides and pathways will be performed as part of the PA revision. Several operational options have been presented to Waste Management Area Project personnel. It appears that all subsidence damage should be repaired in a timely manner to avoid increases in the groundwater concentrations of radionuclide contaminants at the point of compliance. It is also recommended that tritiated waste disposals to the CIG be suspended until this SA is completed. This SA will recommend optimum placement of tritiated waste from the D-Area towers. Further guidance on the placement of tritiated waste will be provided in the upcoming revision to the PA.

5.6 Engineered Trenches

Box Corrosion Monitoring Field Study

Sealand/B-25/B-12 waste disposal boxes were buried in E-Area test pit environment for 8 years to examine the corrosion rate and extent of weathering. Utilizing this data the material condition and integrity of the B-25 boxes buried in E-Area can be estimated over longer periods of time. However the measured corrosion rate can increase with time, remain constant, or decrease with time depending on the specific conditions of the disposal environment. Since the data utilized to predict the future corrosion represents only one data point obtained at 8 years post-burial, it is not known which corrosion rate model is more appropriate. The objective is to determine the long term B-25/B-12/Sealand container material corrosion rate and how that rate changes with time in an Engineered Trench environment. This information is needed in order to select the optimum time for performing dynamic compaction and to minimize the cost of cap maintenance during institutional control period. Continuing from previous studies, tests to complete a field corrosion monitoring plan and deploy metal coupons and instrumentation in a designated unused area near ET # 2 will be initiated. To support long term corrosion projections data will need to be collected ~15 years.[11] No current interim measures will result from this study.

5.6.1 Engineered Trench #1

Table 7 gives the inventory and sum-of-fractions for the primary isotopes of concern in the ET #1 with respect to the latest limits (Table A-5).[32]

Table 7. 2005 ET #1 Primary Isotopes of Concern Inventory vs. 2005 Limits

Isotope	ET #1 Inventory (CI)	Intruder Resident Fraction of Limits	Intruder Post-Drilling Fraction of Limits	Air Fraction of Limits	Radon Fraction of Limits	GROUNDWATER		
						0 - 12 years Fraction of Limit	12 - 100 years Fraction of Limit	100-1000 years Fraction of Limit
C14	1.0E-01							2.2E-02
H3	1.7E+00$^{\alpha}$					8.4E-01$^{\alpha}$	1.3E-01$^{\alpha}$	
I129	5.9E-05						2.1E-01	
Np237	3.4E-03							1.9E-01
Sr90	1.3E+01							1.4E-02
Tc99	3.0E-02					4.4E-02	1.8E-01	
	Total SOF	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.8E-01$^{\alpha}$	5.2E-01$^{\alpha}$	2.3E-01
Vol Fraction Filled	0.71							

$^{\alpha}$ This table represents the sum-of-fractions with respect to the official inventory and limits. Waste Management Area Project recently completed a calculation of tritium decay between the time of the inventory and the time of waste emplacement in ET#1. This calculation considerably reduced the tritium inventory. However, since the inventory was scattered among a number of containers with varying degrees of depletion, Waste Management Area Project chose to implement this tritium inventory reduction as an increase in the limits. The actual SOF for the most limiting (GW1) case is 7.8E-01.[33]

For the ET #1, the intruder, air and radon limits do not pose a current problem. However, the groundwater SOFs, particularly for years 0 - 12, are approaching their limits. Tritium provides the bulk of the sum-of-fractions during the first 12 years. During the 12 – 100-year timeframe, ^{129}I is the largest contributor to the sum-of-fractions. Groundwater limits are not an issue for the 100 – 1000-year timeframe since the sum-of-fractions for groundwater in that period is only 23 % of the limit with 71 % of the volume of the trench already filled.

As a consequence of the reduction in the tritium limit in the Slit and Engineering Trenches[32], Waste Management Area Project last year established a tritium screening criterion for trenches to limit the amount of tritium routinely accepted[34]. This screening criterion remained in effect until WAC 3.17 could be revised to account for the lower tritium limits. WMAP also temporarily stopped disposals in ET #1 while assessing ways to balance volume consumption and PA SOF consumption and continue disposal to ET #1. WMAP developed three compensatory measures for re-starting ET #1 operation:

- Consideration of decay of tritium from the time of waste generation to the time of emplacement in ET #1. (Some waste had been stored for 7 years prior to emplacement.)
- Reassessing the 5% set-aside for controlled clean soil.
- Establishing guidelines in WITS for ET #1 to focus on waste packages that do not impact the GW1 or GW2 limits.

WMAP implemented these compensatory measures and has re-opened ET #1 for waste disposal. The recalculation of the tritium inventory resulted in a significant reduction which was implemented by WMAP in the WITS program as an increase in the limits for tritium. An engineering calc note determined the controlled clean soil impact was less than 0.1% for ET#1, thus allowing the ET#1 PA operating limit to be raised in WITS from 0.90 to 0.95 of the actual limit. Package screening limits were developed in WITS for GW1 and GW2 in ET#1 only. These limits use the remaining volume space and the remaining PA margin space for GW1 and GW2 for an average container. If packages received for ET#1 fail the screening tests, then WMAP Operations checks ET#2 for disposal. Since these limits were put in place in 10/2004 for re-opening ET#1, this practice has allowed the volume to increase in the ET#1 from 65.6% to 70.6%. The most limiting PA pathway for ET#1 is GW1. The GW1 PA space in ET#1 since 10/2004 has increased from 0.777 to 0.779 (very small). Thus, the ET#1 is being managed effectively with these screening limits and the use of ET#2.[33]

5.6.2 Engineered Trench #2

Table 8 gives the inventory and sum-of-fractions for the primary isotopes of concern with respect to the limits for ET #2. The SOFs are currently in good shape with respect to the volume filled.

Table 8. 2005 ET #2 Primary Isotopes of Concern Inventory vs. 2005 Limits

Isotope	ET #2 Inventory (CI)	Intruder Resident Fraction of Limits	Intruder-Post Drilling Fraction of Limits	Air Fraction of Limits	Radon Fraction of Limits	GROUNDWATER		
						0 - 12 years Fraction of Limits	12 - 100 years Fraction of Limits	100-1000 years Fraction of Limits
H3	7.7E-02					3.9E-02		
I129	4.4E-06						1.6E-02	
Np237	5.2E-04							2.9E-02
Tc99	7.3E-03					1.1E-02	4.3E-02	
	Total SOF	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.0E-02	5.9E-02	2.9E-02
Vol Fraction Filled	0.07							

5.7 Slit Trenches

Preliminary Closure Analysis of ST#1 and #2

An FY04 comprehensive re-evaluation of solid radioactive waste disposal in E-Area Slit Trenches produced a significantly lower disposal limit for tritium. This new limit for tritium waste forms was lower than the activity already placed in Slit Trench #1 from building 232-F (old tritium facility) demolition, producing a sum-of-fractions of 2.37 for the groundwater pathway. This observation raised alarm that the disposal unit might not meet performance objectives defined under DOE Order 435.1. SRNL led an effort to perform a preliminary closure analysis[7] this new analysis required innovation in representing tritium migration through the disposal unit considering the impact of impervious concrete rubble on trench water flow, and diffusive release of tritium from concrete chunks of varying sizes. Tritium releases were temporally and spatially distributed throughout both Slit Trench #1 and #2 units in order to obtain a much more realistic representation of actual conditions. Slit Trenches #1 and #2 are adjacent to one another and share the same PA model. Slit Trench #2 was incorporated into this closure analysis because it was also essentially full. Finally, predictions from this analysis were compared with field measurements of tritium acquired through the Vadose Zone Monitoring System installed beneath the trenches providing a ground truth verification of the results. The effort was successful in demonstrating that Slit Trenches #1 and #2 will meet PA performance objectives for groundwater resource protection.

Operational Restrictions on non-crushable containers

The issue of waste and cover subsidence caused by corrosion of non-crushable waste containers (those with significant void space that will not be stabilized by dynamic compaction of the E-Area Slit Trenches) was examined.[35] In order to keep the PA within the required 10% change for insignificance, the following recommendations were made:

- In general, the amount of the waste area that contains non-crushable containers should not exceed 10 percent for two adjacent Slit Trench disposal units.
- If the amount of the waste area that contains non-crushable containers exceeds 10 % for two adjacent Slit Trenches, then the allowable non-crushable area can be increased from 10 % to a maximum of 20 %. If the allowable non-crushable percent area is increased to more than 10 %, then the maximum allowable sum-of-fractions must be reduced by multiplying by 0.87. This requirement only applies to ground water pathway time intervals that occur after placement of the final cover (i.e., currently only the GW3 limit).

Vadose Zone Validation Model

Studies to develop a quasi 3-dimensional vadose zone model utilizing information about soil hydraulics, lithology and other pertinent data collected during installation of the vadose zone monitoring equipment will be used for measurement comparison of tritium releases beneath Slit Trenches, Engineered Trenches and results from the baseline PA Slit Trench model.[11] No interim measures will result from this work.

5.7.1 Slit Trench #1

As with the Engineered Trenches, ST #1 was covered under the recent Special Analysis for the Engineered and Slit Trenches.[32] Table 9 gives the inventory and sum-of-fractions for the primary isotopes of concern with respect to the latest limits (Table A-5).

Table 9. 2005 ST #1 Primary Isotopes of Concern Inventory vs. 2005 Limits

Isotope	ST # 1 Inventory (CI)	Intruder Resident Fraction of Limits	Intruder-Post Drilling Fraction of Limits	Air Fraction of Limits	Radon Fraction of Limits	GROUNDWATER		
						0 - 12 years Fraction of Limits	12 - 100 years Fraction of Limits	100-1000 years Fraction of Limits
C14	6.1E-02							1.3E-02
H3	4.7E+00					2.4E+00	3.6E-01	
I129	2.0E-05						7.1E-02	
I129 F area Filtercake	8.1E-05						1.6E-02	3.0E-02
Np237	1.1E-03							6.1E-02
Tc99	5.3E-03						3.1E-02	
	Total SOF	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.4E+00	4.8E-01	1.0E-01
Vol Fraction Filled	0.87							

For Slit Trench #1, the 0 – 12-year ground water SOF is well over the limit at a sum-of-fractions of 2.4. This sum-of-fractions is dominated by tritium. The total tritium disposed in the first set of Slit Trenches is 4.7 Ci, largely due to tritium contained in concrete rubble from the demolition of the 232-F building. The limits set for the operational phase of each Slit Trench disposal unit are conservatively derived using conservative assumptions and model inputs to cover unknown/general conditions during future facility operations. By contrast, actual closure analyses assess projected performance under actual as-filled conditions using model assumptions and inputs tailored to known conditions for the facilities being closed. Since Slit Trench #1 is nearing volumetric capacity (87 %), it was decided to complete a preliminary closure analysis using as-filled conditions. This study indicates that the waste already in place in Slit Trench #1 may remain there without exceeding Environmental Protection Agency (EPA) Maximum Contaminant Levels (MCLs). The preliminary closure analysis predicts that Slit Trench #1 will reach a maximum SOF of 0.84 of the MCLs, thus satisfying the groundwater performance objective.[7] WMAP has operationally closed Slit Trench #1 under this Special Analysis.

5.7.2 Slit Trench #2

Table 10 gives the inventory and sum-of-fractions for the primary isotopes of concern with respect to the latest limits (Table A-5). As with ST #1, Slit Trench #2 is closed per Special Analysis.[7]

Table 10. 2005 ST #2 Primary Isotopes of Concern Inventory vs. 2005 Limits

Isotope	ST # 2 Inventory (CI)	Intruder Resident Fraction of Limits	Intruder-Post Drilling Fraction of Limits	Air Fraction of Limits	Radon Fraction of Limits	GROUNDWATER		
						0 - 12 years Fraction of Limits	12 - 100 years Fraction of Limits	100-1000 years Fraction of Limits
C14	1.2E-01							2.6E-02
H3	1.1E+00					5.6E-01	8.6E-02	
I129	2.0E-05						7.0E-02	
I129 F-CG-8	5.2E-05						1.1E-02	1.8E-02
I129-F-Dowex-21k	4.4E-03							5.3E-02
I129-F-Filtercake	3.5E-04						6.8E-02	1.3E-01
I129 H-CG-8	1.2E-04							1.7E-02
Np237	2.0E-03							1.1E-01
Tc99	2.0E-02					2.9E-02	1.2E-01	
	Total SOF	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.9E-01	3.6E-01	3.5E-01
Vol Fraction Filled	0.95							

For ST #2 there appear to be no issues. The highest sums-of-fractions are for the 0 -12 and 12-100 year ground water analyses at 59 % of the limit. However, since the preliminary closure for Slit Trench #1 also included Slit Trench #2, and with the trench already filled to 95% of its total volume, it was decided to operationally close Slit Trench #2 under the same preliminary closure analysis as used for Slit Trench #1.[7]

5.7.3 Slit Trench #3

Table 11 gives the inventory and sum-of-fractions for the primary isotopes of concern with respect to the latest limits (Table A-5).

Table 11. 2005 ST #3 Primary Isotopes of Concern Inventory vs. 2005 Limits

Isotope	ST # 3 Inventory (CI)	Intruder Resident Fraction of Limits	Intruder-Post Drilling Fraction of Limits	Air Fraction of Limits	Radon Fraction of Limits	GROUNDWATER		
						0 - 12 years Fraction of Limits	12 - 100 years Fraction of Limits	100-1000 years Fraction of Limits
H3	4.8E-01					2.4E-01	3.7E-02	
I129	1.2E-05						4.3E-02	
I129ETF Carbon	1.6E-02							1.8E-01
Np237	8.0E-03							4.5E-01
Sr90	1.2E+01							1.4E-02
Tc99	2.9E-02					4.1E-02	1.7E-01	
	Total SOF	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.8E-01	2.5E-01	6.4E-01
Vol Fraction Filled	0.81							

With 81 % of the volume of ST #3 filled and the highest sum-of-fractions being the 100 – 1000-year ground water analysis at 0.64, there is not any immediate problem with ST #3. However, ST #3 is temporarily closed until the removal of TRU Pad 24 is completed.

5.7.4 Slit Trench #4

Table 12 gives the inventory and sum-of-fractions for the primary isotopes of concern with respect to the latest limits (Table A-5).

Table 12. 2005 ST #4 Primary Isotopes of Concern Inventory vs. 2005 Limits

Isotope	ST # 4 Inventory (CI)	Intruder Resident Fraction of Limits	Intruder-Post Drilling Fraction of Limits	Air Fraction of Limits	Radon Fraction of Limits	GROUNDWATER		
						0 - 12 years Fraction of Limits	12 - 100 years Fraction of Limits	100-1000 years Fraction of Limits
H3	2.4E-01					1.2E-01	1.8E-02	
I129	6.2E-06						2.2E-02	
Np237	1.5E-03							8.4E-02
Tc99	1.8E-02					2.6E-02	1.1E-01	
	Total SOF	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.5E-01	1.5E-01	8.4E-02
Vol Fraction Filled	0.52							

With 52 % of the volume of ST #4 filled and the highest sum-of-fractions being the 0 - 12-year and 12 - 100-year ground water analysis at 0.15, there is not any immediate problem with ST #4.

5.7.5 Slit Trench #5

Table 13 gives the inventory and sum-of-fractions for the primary isotopes of concern with respect to the latest limits (Table A-5).

Table 13. 2005 ST #5 Primary Isotopes of Concern Inventory vs. 2005 Limits

Isotope	ST # 5 Inventory (CI)	Intruder Resident Fraction of Limits	Intruder-Post Drilling Fraction of Limits	Air Fraction of Limits	Radon Fraction of Limits	GROUNDWATER		
						0 - 12 years Fraction of Limits	12 - 100 years Fraction of Limits	100-1000 years Fraction of Limits
H3	7.2E-02					3.6E-02		
Np237	2.3E-03							1.3E-01
Tc99	8.4E-03					1.2E-02	5.0E-02	
	Total SOF	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.8E-02	5.0E-02	1.3E-01
Vol Fraction Filled	0.40							

With 40 % of the volume of ST #5 filled and the highest sum-of-fractions being the 100 - 1000-year ground water analysis at 0.13, there is not any immediate problem with ST #5.

6.0 SUMMARY

A summary of the current status of the ELLWF disposal units is shown in Table 14. With the exception of ET #1, ST #1 and the NR Pad, the largest sum-of-fractions for each disposal unit is less than the volume fraction filled. Both ST #s 1 and 2 have been satisfactorily closed under a preliminary closure analysis.[7]

The largest sum-of-fractions for ET #1 was calculated to be 0.88 (actually 0.78, see explanation above in Section 5.7). Compensatory measures have been instituted by Waste Management Area Project personnel to allow continued additions to ET#1.

The SOF for the NR Pad of 0.38 is dominated by ^{36}Cl. The ^{36}Cl limit is an interim limit, which was determined for the trenches. When the NR Pad analysis is next revised, the ^{36}Cl limit should be considerably increased, thus reducing the SOF.[27]

Table 14. Summary of Current Disposal Unit Status

DISPOSAL UNIT	VOLUME FRACTION FILLED	LARGEST SOF	COMMENT
LAWV	0.43	0.05	
ILV	0.38	0.30	
ET #1	0.71	0.88	
ET #2	0.07	0.06	
SLIT1	0.87	2.40	Operationally closed per SRNL Special Analysis, WSRC-TR-2005-00093
SLIT2	0.95	0.59	Operationally closed per SRNL Special Analysis, WSRC-TR-2005-00093
SLIT3	0.81	0.64	Facility is temporarily operationally closed until TRU Pad 24 is removed.
SLIT4	0.52	0.15	
SLIT5	0.40	0.13	
NR-643-7E	1.00	0.20	Operationally closed per SRNL UDQ-E, WSRC-RP-2004-00443
NR-643-26E	0.17	0.38	^{36}Cl limit from trenches expected to be reduced with new SA. NR reduction from limited disposal from NRCSA to Slit Trenches.
CIG	0.21	0.04	

7.0 CONCLUSIONS

No interim measures were imposed last year, but Waste Management Area Project did impose compensatory measures which helped ensure that ET #1 continues to operate in an acceptable manner. These compensatory measures will continue in force.

Additionally, Waste Management Area Project closed ST #s 1 and 2 during the past year. A preliminary closure analysis indicates that ground water from the waste disposal units will remain below the EPA MCLs for drinking water.

Although additional work is needed by SRNL on a number of topics, no interim measures need to be established for this year.

8.0 RECOMMENDATIONS

The following recommendations arise from this study. They are:

1. Engineered Trench #1 should continue to operate under Waste Management Area Project's compensatory measures.
2. Suspend tritiated waste disposal to the CIG until the current SA is completed giving placement location recommendations for D-Area tower tritiated waste. Placement recommendations for further tritium waste placement will be given in the upcoming PA revision.

3. Studies of numerical dispersion and groundwater plume mingling should be performed during Fiscal Year 2006.
4. A Special Analysis on the CIG disposals not meeting the stabilization criteria should be completed.

9.0 DESIGN REVIEW (SRNL-WPT-2005-00123)

Maurice Ades provided the design check which is documented in reference 35.[36]

10.0 REFERENCES

---

[1] L. McDowell-Boyer, A. D. Yu, J. R. Cook, et al, *Radiological Performance Assessment for the E-Area Low-Level Waste Facility*, WSRC-RP-94-218, Revision 1, Savannah River Technology Center, Westinghouse Savannah River Company, Aiken, SC., January 31, 2000.

[2] *Composite Analysis E-Area Vaults and Saltstone Disposal Facilities*, WSRC-RP-97-311, Revision 0, Westinghouse Savannah River Company, Aiken, SC., September 1997.

[3] *Radioactive Waste Management*, Order, Manual, and Implementation Guide 435.1, U.S. Department of Energy, July 9, 1999.

[4] *Maintenance Guide for U.S. Department of Energy Low-Level Waste Disposal Facility Performance Assessments and Composite Analyses*, U.S. Department of Energy, November 10, 1999.

[5] H. Holmes, et al, *FY2004 Annual Review E-Area Low-Level Waste Facility (ELLWF) Performance Assessment and Composite Analysis*, OBU-GSE-2004-00024, Westinghouse Savannah River Company, Aiken, SC., February 25, 2005.

[6] E. L. Wilhite and B. T. Butcher, *E-Area Performance Assessment Interim Measures Assessment FY2003*, WSRC-RP-2003-00436, Rev 0, Westinghouse Savannah River Company, Aiken, SC., July 15, 2003.

[7] G. P. Flach, L. B. Collard, et al, *Preliminary Closure Analysis for Slit Trenches #1 and #2*, WSRC-TR-2005-00093, Revision 0, Westinghouse Savannah River Company, Aiken, SC., March 9, 2005.

[8] Personal communication Don Sink to Rob Swingle, June 23, 2005 (attachment #1).

[9] R. F. Swingle and E. L. Wilhite, *E-Area Performance Assessment Interim Measures Assessment FY 2004*, WSRC-RP-2004-00636, Revision 0, September 30, 2004.

[10] R. A. Hiergesell and R. F. Swingle, *Special Analysis: Atmospheric Dose Resulting from the Release of ^{14}C from Reactor Moderator Deionizers in a Disposal Environment*, WSRC-TR-2005-00331, Rev 0, Westinghouse Savannah River Company, Aiken, SC., August 18, 2005.

[11] *Performance Assessment and Composite Analysis Maintenance Program*, OBU-SWI-2005-00003, Westinghouse Savannah River Company, Aiken, SC., January 31, 2005.

---

[12] D. I. Kaplan and S. M. Serkiz, *Influence of Dissolved Organic Carbon and pH on Contaminant Sorption to Sediment*, WSRC-RP-2004-00593, Revision 0, Westinghouse Savannah River Company, Aiken, SC, September 30, 2004.

[13] D. I. Kaplan, et al, *Plutonium Oxidation State Transformations and Their Consequence on Plutonium Transport through Sediment During an 11-year Field Study (U)*,WSRC-TR-2004-00493, Revision 0, Westinghouse Savannah River Company, Aiken, SC, September 20, 2004.

[14] D. I. Kaplan, *Recommended Geochemical Input Values for the Special Analyses of the Slit/Engineered Trenches and Intermediate Level Vault*, WSRC-RP-2004-00267, Revision 0,.Westinghouse Savannah River Company, Aiken, SC, July 23, 2004.

[15] K. P. Crapse, Composite Analysis Monitoring Plan for the E-Area Low-Level Waste Facility and the Z-Area Saltstone Disposal Facility, WSRC-RP-2000-00326 Rev 2, February 24, 2005.

[16] R. A. Hiergesell and E. L. Wilhite, *Special Analysis: Evaluation of the Proposed Disposal of the Initial TEF-TPBAR Waste Container Within the E-Area Low-Level Waste Facility Intermediate Level Vault*, WSRC-TR-2004-00498, Revision 0, Westinghouse Savannah River Company, Aiken, SC., November 2004.

[17] R. A. Hiergesell, “Special Analysis: Production TPBAR Waste Container Disposal Within the Intermediate Level Vault,” WSRC-TR-2005-00531, Revision 0, December 2005.

[18] K. H. Subramanian, *Corrosion Analysis for Tritium Extraction Facility Disposal in Pre-Disposal Configuration (U)*, WSRC-TR-2005-00220, Revision 0, Westinghouse Savannah River Company, June 2005.

[19] D. W. Vinson, *Thermal Analysis of the Tritium Extraction Facility Disposal Container in Pre-Disposal Configuration*, WSRC-TR-2005-00087, Westinghouse Savannah River Company, Aiken, SC, February 2005.

[20] J. R. Cook, M. A. Phifer, E. L. Wilhite, K. E. Young and W. E. Jones, *Closure Plan for the E-Area Low – Level Waste Facility*, WSRC-RP-2000-00425, Revision 4, Westinghouse Savannah River Company, Aiken, SC., May 2004.

[21] E. L. Wilhite, *DOE Performance Assessment Process*, WSRC-RP-2005-01284, Revision 0, Westinghouse Savannah River Company, Aiken, SC., January 28, 2005.

[22] L. B. Collard, *Special Analysis: Implementation of Sum-of-Fractions for Multiple Pathways Including Select Groundwater Pathway Time Intervals*, WSRC-TR-2003-00438, Revision 0, Westinghouse Savannah River Company, Aiken, SC, September 15, 2003.

[23] R. F. Swingle, *Unreviewed Disposal Question Evaluation: Linatron X-Ray Machine in Low Activity Waste Vault*, WSRC-TR-2005-00173, Revision 0, Westinghouse Savannah River Company, Aiken, SC., April 21, 2005.

[24] G. P. Flach and R. A. Hiergesell, *Special Analysis: Revision of Intermediate Level Vault Disposal Limits*, WSRC-TR-2004-00346, Revision 0, Westinghouse Savannah River Company, Aiken, SC, July 20, 2004.

[25] D. I. Kaplan, *Estimate of Gaseous ^{14}Carbon Concentrations Emanating from the Intermediate Level Vault Disposal Facility (U),* WSRC-TR-2005-00222, Revision 0, Westinghouse Savannah River Company, Aiken, SC.

[26] E. L. Wilhite and G. P. Flach, *Evaluation of Proposed New LLW Disposal Activity: In-Place Disposal of Naval Reactor Components at the 643-7E Naval Reactor Component Storage Area*, WSRC-RP-2004-00443, Revision 0, Westinghouse Savannah River Company, Aiken, SC., June 29, 2004.

[27] J. R. Cook, *Special Analysis: Interim Disposal Limits for Previously Unanalyzed Radionuclides*, WSRC-TR-2004-00428, Revision0, Westinghouse Savannah River Company, Aiken, SC, August 26, 2004.

[28] R.F. Swingle, *Unreviewed Disposal Question Evaluation: Incorrect Components-in-Grout Intruder Limits*, WSRC-TR-2004-00610, Revision 0, Westinghouse Savannah River Company, Aiken, SC., December 14, 2004.

[29] L. D. Koffman, *An Automated Intruder Analysis Application*, WSRC-TR-2004-00293, Revision 0, Westinghouse Savannah River Company, Aiken, SC., July 16, 2004.

[30] W. E. Jones, M. A. Phifer and J. Kukreja, *Unreviewed Disposal Question Evaluation: Components-In-Grout Options for Structural Stability – Component Filling, Component Stability or Concrete Mat Cover*, WSRC-RP-2004-00039, Revision 0, Westinghouse Savannah River Company, Aiken, SC, February 2004.

[31] M. A. Phifer, *Unreviewed Disposal Question Evaluation: Low Strength Containers with Compressible Waste in Component-In-Grout Trenches*, WSRC-TR-2004-00475, Revision 0,Westinghouse Savannah River Company, Aiken, SC., September 21, 2004.

[32] L. B. Collard and R. A. Hiergesell, *Special Analysis: 2004 General Revision of Slit and Engineered Trench Limits*, WSRC-TR-2004-00300, Revision 0., Westinghouse Savannah River Company, Aiken, SC., June 14, 2004.

[33] Personal Communication, Don Sink to Rob Swingle, *Compensatory Measures*, August 25, 2005, (attachment # 4).

[34] *WITS Radionuclide Screening Criteria for Tritium in Trenches*, SWI-BUL-2004-007, Revision 0, August 3, 2004 (attachment # 3).

[35] T. Hang, L. B. Collard and M. A. Phifer, *Unreviewed Disposal Question Evaluation: Subsidence Study for Non-Crushable Containers in Slit Trenches (U)*, WSRC-TR-2005-00104, Revision 0, Westinghouse Savannah River Company, Aiken, SC., March 15, 2005.

[36] M.E. Stallings, *Interim Measures Design Check for Report WSRC-RP-2005-01783*, SRNL-WPT-2005-00123, Revision 0, September 30, 2005.

11.0 APPENDIX ELLWF LIMITS (2005)

Table A-1. 2005 Disposal Limits for Low Activity Waste Vault

Isotope	Intruder-Agricultural Limit (Ci)	Intruder-Residential Limit (Ci)	Intruder-Post-Drilling Limit (Ci)	Air Limit (Ci)	Radon Limit (Ci)	Groundwater Limit (Ci) 0-100 years	Groundwater Limit (Ci) 100 – 1000 years
Am241	8.8E+04	6.5E+07	1.6E+05			2.9E+10	2.9E+10
Am242m		1.6E+05	1.4E+03				
Am243	3.8E+01	5.4E+04	1.9E+03			2.4E+00	2.4E+00
Ba133		4.3E+09	8.2E+06				
C14	1.5E+03		4.6E+03	2.7E+00		7.3E+04	7.3E+04
Cd113m			3.0E+04				
Cf249	9.2E+02	6.2E+03	2.4E+04			8.5E+02	8.5E+02
Cf250	1.2E+05		1.1E+06				
Cf251	1.8E+03	2.1E+05	1.9E+04				
Cf252	5.9E+06		7.3E+07			5.0E+08	5.0E+08
Cl36			2.5E+01			4.7E-02	1.6E+01
Cm242		2.7E+09	7.1E+05			8.7E+04	1.9E+05
Cm243		4.1E+07	2.2E+04				
Cm244	9.4E+04		9.8E+05			1.6E+12	1.6E+12
Cm245	3.9E+01	1.2E+06	1.1E+03			3.6E+01	3.6E+01
Cm246	3.2E+02		3.0E+03			9.7E+11	9.7E+11
Cm247	1.1E+01	4.7E+03	1.5E+03			1.7E+00	1.7E+00
Cm248	4.4E+01	1.5E+09	5.5E+02			3.9E+03	3.9E+03
Co60		3.5E+07					
Cs135	6.7E+05		4.5E+04			3.5E+00	3.5E+00
Cs137		9.0E+03					
Eu152		3.7E+04					
Eu154		5.0E+05					
H3				6.4E+07		1.5E+11	1.1E+11
I129			9.0E+10			8.4E-02	8.4E-02
K40		6.8E+01	5.2E+02			5.5E+01	5.4E-01
Kr85		9.7E+10	1.1E+09				
Mo93			4.8E+05			2.3E+03	9.7E+00
Nb93m			1.3E+08				
Nb94	4.8E+02	2.3E+02	5.1E+03			2.2E+00	2.2E+00
Ni59	2.5E+06		7.4E+05			6.0E+04	6.0E+04
Ni63	3.5E+19		2.7E+14				

Table A-1 (cont'd). 2005 Disposal Limits for Low Activity Waste Vault

Isotope	Intruder- Agricultural Limit (Ci)	Intruder- Residential Limit (Ci)	Intruder- Post-Drilling Limit (Ci)	Air Limit (Ci)	Radon Limit (Ci)	Groundwater Limit (Ci) 0-100 years	Groundwater Limit (Ci) 100 – 1000 years
Np237	2.4E+01	1.3E+04	2.0E+02			5.9E+06	5.9E+06
Pb210		1.4E+11	2.1E+03				
Pd107	2.9E+09		2.8E+06			2.5E+01	2.5E+01
Pu238	1.5E+06		1.9E+07			2.8E+09	2.8E+09
Pu239	1.8E+02		2.2E+03			1.3E+10	1.3E+10
Pu240	2.6E+02		2.7E+03			4.4E+09	4.4E+09
Pu241	2.6E+06		4.8E+06			8.8E+11	8.8E+11
Pu242	1.6E+02		2.1E+03			1.9E+11	1.9E+11
Pu244	1.2E+01	1.1E+03	1.9E+03			4.1E+13	4.1E+13
Rb87	1.5E+09		7.9E+04			1.9E-01	1.9E-01
Ra226		9.2E+00	7.2E+01		2.8E+00	1.0E+19	9.0E+00
Ra228		1.3E+08	2.5E+07				
Sb125		5.0E+16	7.4E+14				
Se79	3.3E+06		5.5E+04			1.1E+02	1.1E+02
Sm151			5.6E+16				
Sn121m			1.2E+06				
Sn126	1.6E+02	2.8E+02	3.6E+03			2.4E+01	2.4E+01
Sr90						4.6E+18	4.6E+18
Tc99			4.6E+03			6.0E+00	6.0E+00
Th228		6.7E+18	3.5E+18				
Th229		9.1E+01	5.0E+02				9.5E+03
Th230		1.9E+01	1.9E+02		7.5E+00		1.9E+01
Th232	4.8E+00	5.3E+01	8.1E+02			3.8E+08	3.8E+08
U232	1.9E+16	1.7E+02	8.1E+11				
U233	4.5E+01	2.5E+05	3.4E+03			1.8E+09	1.8E+09
U234	3.6E+02	5.2E+06	4.8E+03		1.2E+02	9.0E+04	9.0E+04
U235	2.6E+01	1.5E+05	2.4E+03			5.8E+04	5.8E+04
U236	5.8E+02		7.0E+03			2.9E+11	2.9E+11
U238	1.3E+02	2.0E+04	7.2E+03			1.9E+09	1.9E+09
Zr93	1.2E+05		1.5E+06			3.9E+02	3.9E+02

Table A-2. 2005 Disposal Limits for Naval Reactor Pads

	Air	Radon	Groundwater Limit (Ci)	
Isotope	Limit (Ci)	Limit (Ci)	0-100 years	100 - 1000 years
Am241			6.6E+04	6.6E+04
Am243			7.5E+02	7.5E+02
C14	6.3E+04		7.7E+02	7.7E+02
Cf249			1.4E+05	1.4E+05
Cl36			4.7E-02	1.6E+01
Cm242			8.7E+04	1.9E+05
Cm244			7.6E+16	7.6E+16
Cm245			5.7E+03	5.7E+03
Cm247			2.7E+03	2.7E+03
Cm248			1.7E+06	1.7E+06
Cs135			2.8E+07	2.8E+07
H3	2.9E+05			
I129			9.0E-04	9.0E-04
K40			8.3E+01	8.1E-01
Mo93			1.7E+09	1.7E+09
Ni59			1.2E+09	1.2E+09
Nb94			8.7E+03	8.7E+03
Np237			6.8E+03	6.8E+03
Pu238			2.4E+07	2.4E+07
Pu239			5.9E+02	5.9E+02
Pu240			1.3E+03	1.3E+03
Pu241			1.1E+10	1.1E+10
Pu242			4.6E+02	4.6E+02
Pu244			4.5E+02	4.5E+02
Ra226		2.8E+00		9.0E+01
Se79			3.5E+05	3.5E+05
Sn126			3.2E+02	3.2E+02
Sr90			3.0E+15	3.0E+15
Tc99			8.8E+01	8.8E+01
Th229				9.5E+03
Th230		7.5E+00		1.9E+01
U232			2.5E+12	2.5E+12
U233				4.8E+03
U234			1.7E+03	1.7E+03
U235			8.1E+02	8.1E+02
U236			1.8E+03	1.8E+03
U238			1.2E+02	1.2E+02
Zr93			8.8E+12	8.8E+12

Table A-3. 2005 Disposal Limits for Components-in-Grout Trenches

Isotope	Intruder-Agricultural Limit (Ci)	Intruder-Residential Limit (Ci)	Intruder-Post-Drilling Limit (Ci)	Air Limit (Ci)	Radon Limit (Ci)	Groundwater Limit (Ci) 0-100 years	Groundwater Limit (Ci) 100 - 1000 years
Am241	2.7E+02	8.6E+10	1.5E+03				7.0E+03
Am242m	2.1E+03	1.6E+05	3.8E+03				
Am243	2.1E+01	1.2E+08	9.2E+02				3.9E+11
Ba133		4.3E+09	8.2E+06				
Bk249	1.6E+04	2.2E+09	7.3E+05				5.7E+15
C14	4.3E+02		2.0E+03	7.0E+01		1.7E+18	5.7E+01
C14 K&L Basin	3.9E+02		2.0E+03	7.0E+01			6.2E+01
Cd113m	1.0E+16		3.5E+08				
Cf249	4.0E+01	5.6E+06	1.8E+03				1.4E+06
Cf250	6.8E+05		1.5E+07				
Cf251	5.2E+01		1.4E+03				
Cf252	4.7E+06		4.5E+07				
Cl36			2.5E+01			4.7E-02	1.6E+01
Cm242	6.6E+06	2.7E+09	2.8E+06				4.9E+10
Cm243	7.8E+08	2.7E+09	2.5E+06				
Cm244	4.8E+04		4.4E+05				
Cm245	3.3E+01	1.0E+13	8.0E+02				2.1E+04
Cm246	1.3E+02		1.2E+03				
Cm247	1.1E+01	3.8E+06	1.1E+03				2.1E+13
Cm248	3.4E+01	1.4E+11	3.3E+02				1.3E+15
Co60		2.1E+09					
Cs135	7.9E+03		2.4E+04				7.2E+18
Cs137	6.0E+07	2.2E+06	2.3E+06				
Eu152	1.6E+16	2.4E+06	2.0E+10				
Eu154		3.6E+07	6.2E+13				
H3			2.3E+13	4.1E+05		2.3E+10	8.6E+07
I129			4.5E+02			1.8E+08	6.1E-04
I129 ETF GT-73	5.7E+01		3.6E+02			3.4E+11	9.4E-02
I129 ETF Carbon	5.7E+01		3.6E+02			1.8E-02	1.7E-02
I129 K&L Basin	6.0E+01		3.6E+02			7.6E+11	1.1E-01
I129 F CG-8	5.7E+01		3.6E+02			3.6E+08	6.2E-04
I129 H CG-8	5.7E+01		3.6E+02			1.1E+10	2.9E-03
I129 F Dowex 21K	5.7E+01		3.6E+02			3.1E+11	8.5E-02
I129 H Dowex 21K	5.7E+01		3.6E+02			2.2E+11	5.9E-02
I129 F Filtercake	5.7E+01		3.6E+02			1.4E+09	7.4E-04
I129 H Filtercake	5.7E+01		3.6E+02			6.9E+10	1.8E-02
I129 F Carbon	5.7E+01		3.6E+02			9.6E+10	2.5E-02
I129 H Carbon	5.7E+01		3.6E+02			3.5E+10	9.2E-03

Table A-3 (cont'd). 2005 Disposal Limits for Components-in-Grout Trenches

Isotope	Intruder-Agricultural Limit (Ci)	Intruder-Residential Limit (Ci)	Intruder-Post-Drilling Limit (Ci)	Air Limit (Ci)	Radon Limit (Ci)	Groundwater Limit (Ci) 0-100 years	Groundwater Limit (Ci) 100 - 1000 years
I129 SIR 1200	5.7E+01		3.6E+02			1.7E-01	1.7E-01
K-40		6.8E+01	5.2E+02			5.5E+01	5.4E-01
Kr-85		9.7E+10	1.1E+09				
Mo93	6.3E+06		4.0E+08			2.3E+03	9.7E+00
Nb93m			1.3E+08				
Nb94	2.3E+00	3.4E+04	2.7E+03				1.2E+12
Ni59	8.1E+04		4.3E+05				
Ni53	3.3E+06		1.3E+06				
Np237	9.9E+00	1.7E+07	1.2E+02				1.4E+00
Pb210		1.4E+11	2.1E+03				
Pd107	7.8E+08		9.2E+05				4.1E+06
Pu238	3.4E+04		1.4E+04				2.5E+08
Pu239	1.3E+02		1.2E+03				
Pu240	1.3E+02		1.2E+03				2.4E+09
Pu241	8.0E+03	2.6E+12	4.5E+04				2.1E+05
Pu242	1.3E+02		1.2E+03				3.9E+09
Pu244	9.8E+00	9.8E+04	1.2E+03				4.3E+09
Ra226		9.2E+00	7.2E+01		2.8E+00	1.0E+19	9.0E+00
Ra228		1.3E+08	2.5E+07				
Rb87	4.5E+10		1.5E+04				2.2E+04
Sb125		5.0E+16	7.4E+14				
Se79	3.7E+04		2.4E+04				6.8E+11
Sm151	1.0E+08		3.1E+07				
Sn121m	6.0E+06		8.4E+06				
Sn126	4.6E+00	5.7E+04	2.0E+03				7.5E+10
Sr90	2.8E+19		2.5E+05				1.6E+05
Tc99			4.6E+03			1.2E+10	3.8E-01
Tc99 K&L Basin	5.6E+02		2.7E+03			1.5E+13	2.1E+01
Th228	4.6E+02	6.7E+18	3.5E+18				
Th229		9.1E+01	5.0E+02				9.5E+03
Th230		1.9E+01	1.9E+02		7.5E+00		1.9E+01
Th232	1.4E+00	1.2E+03	4.8E+02				
U232	1.7E+03	3.2E+03	9.3E+03				2.9E+08
U233	1.3E+02	1.5E+07	3.5E+03				1.2E+05
U234	4.2E+02	1.9E+08	4.0E+03		4.9E+01		1.6E+05
U235	2.7E+01	6.4E+08	3.2E+03				8.5E+04
U236	4.6E+02		4.2E+03				9.9E+04
U238	1.2E+02	1.9E+06	4.4E+03				
Zr93	1.2E+05		9.2E+05				

Table A-4. 2005 Disposal Limits for Intermediate Level Vault

Isotope	Intruder-Resident Limit (Ci)	Air Limit (Ci)	Radon Limit (Ci)	Groundwater Limit (Ci) 0 - 100 years	Groundwater Limit (Ci) 100 - 1350 years
Ac227	1.2E+07				
Ag108m	3.9E+04				
Al26	6.6E+02				
Am241	4.1E+10				7.6E+09
Am242m	5.7E+06				
Am243	4.4E+07				
Ba133	1.7E+09				
Bi207	4.3E+04				
Bk249	8.1E+08				
C14					9.1E+07
C14 K&L Basin Resin					2.6E+06
Cf249	2.1E+06				1.9E+11
Cf250	2.1E+18				
Cf251	3.7E+08				
Cf252	6.3E+14				
Cm242	5.5E+11				
Cm243	9.7E+08				
Cm244	2.5E+17				
Cm245	8.2E+09				4.8E+09
Cm246	5.7E+15				
Cm247	1.4E+06				6.8E+18
Cm248	4.6E+09				
Co60	8.0E+08				
Cs137	8.3E+05				
Eu152	8.9E+05				
Eu154	1.6E+07				
Eu155	1.6E+18				
H3		1.3E+09		5.3E+09	5.5E+09
I129				4.3E+10	4.6E-04
I129 Activated Carbon				1.2E+13	9.7E-02
I129 K&L Basin Resin					6.2E+03
K40	1.5E+04			2.3E+19	2.0E-01
Kr85	3.8E+10				
Na22	1.1E+15				
Nb94	1.3E+04				
Np237	6.4E+06				1.5E+06
Pa231	5.1E+05				
Pb210	5.5E+10				

Table A-4 (cont'd). 2005 Disposal Limits for Intermediate Level Vault

Isotope	Intruder-Resident Limit (Ci)	Air Limit (Ci)	Radon Limit (Ci)	Groundwater Limit (Ci) 0 - 100 years	Groundwater Limit (Ci) 100 - 1350 years
Pu238	2.8E+09		4.2E+06		
Pu239	3.3E+13				
Pu240	6.4E+14				
Pu241	1.2E+12				2.3E+11
Pu242	5.0E+12				
Pu244	3.7E+04				
Ra226	1.4E+03		2.6E+00		
Ra228	5.2E+07				
Sb125	2.0E+16				
Se79					1.2E+06
Sn126	2.1E+04				
Sr90					6.1E+11
Tc99	7.7E+17			4.0E+19	1.3E+02
Tc99 K&L Basin Resin	7.7E+17				2.4E+04
Th228	2.6E+18				
Th229	5.3E+04				
Th230	3.9E+03		6.8E+00		
Th232	4.4E+02				
U232	1.3E+03				
U233	5.8E+05				
U234	7.9E+05		1.2E+03		
U235	2.4E+07				
U236	9.1E+09				
U238	7.7E+05		1.1E+06		

Table A-5. 2005 Disposal Limits for Engineered and Slit Trenches

	Intruder-	Intruder-					
	Resident	Post Drilling	Air	Radon	Groundwater Limit (Ci)		
Isotope	Limit (Ci)	Limit (Ci)	Limit (Ci)	Limit (Ci)	0 – 12 years	12 – 100 years	100 – 1000 years
Ag108m	3.9E+01	2.3E+03					
Al26	4.0E+00	1.6E+03			7.8E+03	3.5E+01	4.7E+00
Am241	6.3E+05	1.4E+03			8.2E+13	1.8E+05	8.9E+01
Am242m	1.6E+05	1.4E+03					
Am243	4.0E+02	1.2E+03			1.3E+06	1.4E+05	5.4E+02
Ba133	4.3E+09	8.2E+06					
Bi207	1.1E+05	2.6E+04					
Bk249	1.4E+05	4.9E+05			2.4E+10	2.8E+08	2.5E+05
C14		2.0E+03	7.0E+01		2.9E+08	4.5E+01	4.7E+00
Cd113m		3.0E+04					
Cf249	3.7E+02	1.3E+03			6.0E+07	7.0E+05	6.3E+02
Cf250	3.8E+13	2.6E+05					8.7E+07
Cf251	1.4E+03	1.2E+03					
Cf252	7.6E+11	5.4E+07			5.8E+14	6.5E+13	7.4E+09
Cl36		2.5E+01			4.7E-02	2.3E-01	1.6E+01
Cm242	2.7E+09	7.1E+05			8.7E+04	9.6E+04	1.9E+05
Cm243	4.1E+07	2.2E+04					
Cm244	4.4E+11	1.0E+05			1.5E+05	1.5E+05	1.5E+05
Cm245	2.4E+03	7.7E+02			2.6E+04	2.7E+03	2.7E+02
Cm246	1.0E+11	1.5E+03					2.4E+05
Cm247	7.9E+01	1.3E+03			2.5E+09	3.0E+07	8.2E+03
Cm248	5.6E+06	4.0E+02			4.5E+09	5.0E+08	5.8E+04
Co60	2.0E+09	8.4E+08					
Cs135		2.5E+04				1.3E+12	5.3E+00
Cs137	2.1E+06	2.4E+04					
Eu152	2.3E+06	6.5E+05					
Eu154	4.1E+07	1.1E+07					
Eu155	4.0E+18	2.3E+11					
H3		2.1E+06	4.1E+05		2.0E+00	1.3E+01	1.2E+05
H3_ETF-Carbon		2.1E+06	4.1E+05			4.6E+04	2.9E+03
I129	7.4E+09	3.8E+02			1.9E-02	2.8E-04	9.2E-03
I129 F-WTU Dowex 21K	7.4E+09	3.8E+02			4.2E+02	6.1E-01	8.3E-02
I129 H Area Dowex 21K	7.4E+09	3.8E+02			9.7E+02	1.4E+00	1.9E-01
I129 F Area CG-8	7.4E+09	3.8E+02			3.1E+00	4.5E-03	2.8E-03
I129 H Area CG-8	7.4E+09	3.8E+02			2.4E+01	3.4E-02	6.8E-03
I129 ETF GT-73	7.4E+09	3.8E+02			6.2E+02	9.0E-01	1.2E-01
I129 F Filtercake	7.4E+09	3.8E+02			3.5E+00	5.1E-03	2.7E-03
I129 10*	7.4E+09	3.8E+02			6.4E-01	9.2E-04	2.5E-03

***I129 10** represents I129 in a waste form with a K_d of 10 ml/g. There is currently no waste in the trenches with this K_d value. The limit is provided as a representative value and may be used to determine disposal limits for I129 under new waste forms.

Table A-5 (cont'd). 2005 Disposal Limits for Engineered and Slit Trenches

Isotope	Intruder-Resident Limit (Ci)	Intruder-Post Drilling Limit (Ci)	Air Limit (Ci)	Radon Limit (Ci)	Groundwater Limit (Ci) 0 – 12 years	12 – 100 years	100 – 1000 years
I129 ETF-Carbon	7.4E+09	3.8E+02				4.9E+08	9.0E-02
I129 F-Carbon	7.4E+09	3.8E+02			8.3E+03	1.2E+01	1.6E+00
I129 H-Carbon	7.4E+09	3.8E+02			3.6E+03	5.2E+00	7.0E-01
I129 H Filtercake	7.4E+09	3.8E+02			4.1E+01	5.8E-02	9.2E-03
K40	6.8E+01	5.2E+02			7.4E+09	8.3E+01	8.1E-01
Kr85	9.7E+10	1.1E+09					
Mo93		4.8E+05			3.8E+11	2.3E+03	9.7E+00
Na22	2.8E+15	6.0E+14					
Nb93M		1.3E+08					
Nb94	9.7E+00	2.8E+03					1.2E+12
Ni59		4.2E+05					1.9E+03
Ni63		3.0E+05					
Np237	1.7E+02	1.1E+02			1.7E+10	3.7E+01	1.8E-02
Pb210	1.4E+11	2.1E+03					
Pd107		8.8E+05				8.4E+18	6.3E+02
Pu238	1.4E+07	3.6E+03		4.6E+06	4.4E+02	4.9E+02	9.8E+02
Pu239	3.8E+06	1.5E+03			4.0E+02	4.0E+02	4.0E+02
Pu240	1.2E+09	1.5E+03			4.0E+02	4.0E+02	4.1E+02
Pu241	1.9E+07	4.1E+04			1.3E+04	1.2E+04	4.0E+03
Pu242	7.0E+08	1.6E+03			4.1E+02	4.1E+02	4.1E+02
Pu244	4.4E+01	1.3E+03			4.3E+02	4.3E+02	4.3E+02
Ra226	9.2E+00	7.2E+01		2.8E+00			9.0E+01
Ra228	1.3E+08	2.5E+07					
Rb87		1.5E+04				1.2E+17	4.7E+00
Sb125	5.0E+16	7.4E+14					
Se79		2.4E+04					1.8E+02
Sm151		6.0E+06					
Sn121m		1.2E+06					
Sn126	8.8E+00	2.1E+03					3.9E+01
Sr90		1.7E+03			1.9E+13	1.9E+05	8.9E+02
Tc99	1.0E+09	2.4E+03			6.9E-01	1.7E-01	4.8E+01
Th228	6.7E+18	3.5E+18					
Th229	9.1E+01	5.0E+02					9.5E+03
Th230	1.9E+01	1.9E+02		7.5E+00			1.9E+01
Th232	4.4E+00	1.5E+02					3.1E+03
U232	3.2E+03	9.5E+02					3.2E+06
U233	9.4E+02	2.2E+03					4.8E+03
U234	3.8E+03	3.4E+03		1.3E+03			2.7E+03
U234 M-Glass	3.8E+03	3.4E+03		1.3E+03			2.3E+06
U235	5.1E+02	2.2E+03					4.1E+02

Table A-5 (cont'd). 2005 Disposal Limits for Engineered and Slit Trenches

	Intruder-	Intruder-					
	Resident	Post Drilling	Air	Radon	Groundwater Limit (Ci)		
Isotope	Limit (Ci)	Limit (Ci)	Limit (Ci)	Limit (Ci)	0 – 12 years	12 – 100 years	100 – 1000 years
U235 M-Glass	5.1E+02	2.2E+03					3.9E+05
U236	2.8E+07	4.0E+03					6.5E+03
U236 M-Glass	2.8E+07	4.0E+03					2.7E+06
U238	9.8E+02	4.0E+03		1.2E+06			4.6E+02
U238 M-Glass	9.8E+02	4.0E+03		1.2E+06			2.9E+05
Zr93		9.6E+05					3.6E+03

ATTACHMENT 1. E-MAIL FROM DON SINK 2005 INVENTORIES

Don Sink/BSRI/Srs
06/23/2005 10:09 AM

To Rob Swingle/SRNL/Srs@Srs
cc Mary Stallings/SRNL/Srs@Srs, Tom Butcher/SRNL/Srs@Srs
bcc
Subject Re: E Area Inventory for 2005 Interim Measures Report

Here is the data you requested. The EAV Inventories are current through June 21.

EAV Inventories.xls

Rob Swingle/SRNL/Srs

Rob Swingle/SRNL/Srs
06/15/2005 12:18 PM

To Don Sink/BSRI/Srs@Srs
cc Mary Stallings/SRNL/Srs@Srs, Tom Butcher/SRNL/Srs@Srs
Subject Re: E Area Inventory for 2005 Interim Measures Report

Thanks Don,

Next week will be fine. Have a good vacation.

Rob

Rob Swingle
Savannah River National Laboratory
Waste Processing Technology Section
Phone 5-2369

Don Sink/BSRI/Srs

Don Sink/BSRI/Srs
06/15/2005 11:58 AM

To Rob Swingle/SRNL/Srs@Srs
cc Mary Stallings/SRNL/Srs@Srs, Tom Butcher/SRNL/Srs@Srs
Subject Re: E Area Inventory for 2005 Interim Measures Report

The areas in question are TSA Areas (Temporary Storage Areas). These areas can store waste until the eventual disposal area is open or in operation.

In the interest of understanding the data in the E Area inventories better than most, let me send you the inventories for each facility. I will be leaving the site early today for vacation for the rest of the week. I can provide this data to you by early next week.

Rob Swingle/SRNL/Srs

Low Activity Waste Vault Inventory 6-21-05

ISOTOPE	Total LAWV Activity(Ci)
Other Alpha	3.73E-02
AC225	1.74E-04
AC228	1.46E-03
AM241	6.37E-01
AM242M	5.29E-03
AM243	1.75E-03
AM217	1.74E-04
Other Beta / Gamma	1.72E+00
BA133	6.55E-02
BA137M	4.34E+01
BI211	1.10E-04
BI212	6.78E-03
BI213	1.74E-04
BI214	7.30E-07
C14	1.46E-01
CD109	1.20E-05
CE139	4.23E-07
CE144	8.78E-01
CF249	1.50E-05
CF250	9.61E-04
CF251	6.05E-05
CF252	5.80E-03
CL36	7.96E-04
CM242	2.44E-05
CM243	2.28E-05
CM244	1.11E+00
CM245	2.29E-03
CM246	4.07E-03
CM247	2.35E-12
CM248	1.43E-11
CO57	8.44E-05
CO58	5.00E-01
CO60	3.06E+00
CR51	2.77E-03
CS134	2.00E+00
CS135	1.47E-07
CS137	4.86E+01
EU152	2.42E+00
EU154	1.86E+00
EU155	1.18E-03
FE55	5.30E+00
FE59	1.43E-02
H3	2.07E+05
HF181	3.84E-03
HG203	8.54E-07
I129	1.13E-04
I129 H-Area CG-8	3.38E-05
I129 F Area Filtercake	3.55E-05
IN113M	6.49E-06
K40	9.40E-06
KR85	1.51E+00
MN54	9.00E-02
NA22	2.59E-07
NB93M	8.93E-03
NB94	7.55E-04
NB95	2.31E-02
NB95M	7.30E-06
NI59	7.24E-02
NI63	2.97E+00
NP237	2.83E-02
PA233	2.70E-05
PA234	1.47E-03
PA234M	9.55E-01
PB209	1.74E-04
PB210	8.64E-12
PB212	6.87E-03
PB214	6.33E-07
PM147	8.03E+00
PO210	1.51E-15
PO212	7.56E-04
PO213	1.67E-04
PO216	6.85E-03
PR144	7.98E-01
PR144M	1.07E-03
PU238	3.79E+00
PU239	1.62E+00
PU240	4.61E-01
PU241	1.49E+01
PU242	3.07E-03
PU244	5.21E-16
RA224	5.38E-03
RA225	1.74E-04
RA226	2.55E-07
RA228	1.82E-03
RH103M	5.21E-06
RH106	2.26E-02
RN220	6.85E-03
RU103	5.21E-06
RU106	1.02E-01
SB125	2.30E-01
SB126M	6.50E-06
SE79	9.30E-02
SM151	3.28E-04
SN113	7.22E-06
SN126	3.71E-04
SR85	1.55E-03
SR89	1.69E-07
SR90	2.19E+02
TA182	9.43E-06
TC99	1.01E-01
TE125M	1.79E-03
TH228	6.85E-03
TH229	1.74E-04
TH230	6.44E-05
TH231	1.02E-01
TH232	3.52E-04
TH234	1.09E+00
TL208	4.21E-04
TL209	7.03E-06
U232	8.18E-03
U233	4.45E-01
U234	3.58E+00
U235	1.19E-01
U236	6.76E-02
U238	9.70E-01
Y90	2.17E+02
ZN65	7.89E-02
ZR93	6.01E-06
ZR95	9.29E-03

Intermediate Level Vault Inventory 6-21-05

ISOTOPE	Total ILV Activity(Ci)
Other Alpha	1.50E-02
AC228	1.79E-05
AG110M	3.00E-09
AM241	3.56E-01
AM242M	4.05E-04
AM243	4.29E-04
Other Beta / Gamma	1.58E+00
BA137M	1.57E+02
BI210	6.10E-07
BI211	3.17E-07
BI212	1.28E-04
BI214	7.67E-01
C14	3.77E-01
C14 K&L Basin Resin	6.05E-02
CE144	4.39E-01
CF249	5.58E-07
CF251	1.70E-06
CM242	1.50E-05
CM243	7.13E-03
CM244	5.93E-01
CM245	7.77E-06
CM246	8.47E-06
CM247	1.96E-10
CM248	3.06E-15
CO57	5.07E-05
CO58	2.30E+00
CO60	7.53E+01
CR51	8.44E-03
CS134	8.08E-01
CS137	2.25E+02
EU152	4.14E-05
EU154	1.81E-01
EU155	1.25E-02
FE55	8.51E+01
FE59	1.59E-02
H3	5.77E+05
HF175	1.87E-05
HF181	6.11E-03
I129	5.23E-05
I129 Activated Carbon	1.99E-03
I129 K&L Basin Resin	6.03E-06
IN113M	5.01E-06
K40	7.76E-07
KR85	2.02E+01
MN54	4.20E-01
NB93M	2.68E-03
NB94	1.24E-03
NB95	2.46E-02
NB95M	9.69E-05
NI59	6.08E-02
NI63	1.30E+01
NP237	1.94E-03
PA234	1.30E-01
PA234M	1.77E-01
PB210	7.67E-01
PB212	1.28E-04
PB214	7.67E-01
PM147	2.89E+00
PO210	6.10E-07
PO212	5.26E-07
PO214	7.67E-01
PO216	1.28E-04
PR144	3.76E-01
PR144M	3.38E-03
PU238	1.35E+00
PU239	3.58E-01
PU240	4.85E-02
PU241	1.48E+00
PU242	3.07E-03
PU244	1.16E-02
RA224	1.28E-04
RA226	7.67E-01
RA228	1.79E-05
RH103M	6.85E-05
RH106	4.32E-02
RN220	1.28E-04
RN222	7.67E-01
RU103	6.85E-05
RU106	1.09E-01
SB125	1.00E-01
SE79	1.01E-04
SN113	5.01E-06
SN126	4.85E-04
SR90	2.18E+01
TA182	3.44E-05
TC99	6.26E-02
TC99 K&L Basin Resin	2.04E-02
TE125M	3.01E-03
TH228	1.28E-04
TH230	1.82E-05
TH231	1.94E-03
TH232	4.92E-05
TH234	3.07E-01
U232	1.06E-04
U233	1.23E-01
U234	2.41E-01
U235	8.54E-03
U236	1.68E-03
U238	5.75E-01
Y90	1.71E+01
ZN65	3.57E-01
ZR93	6.41E-06
ZR95	1.14E-02

Naval Reactor Pad 643-26E Inventory 6-21-05

ISOTOPE	Total NR Activity(Ci)
Other Alpha	5.73E+00
AG108	1.15 E-07
AG108M	1.32E-06
AG109M	2.11E-02
AG110	1.48E-04
AG110M	3.90E-02
AM241	1.00E-01
AM242	4.53E-04
AM242M	1.71E-03
AM243	2.06E-03
Other Beta / Gamma	6.29E+03
BA133	2.09E-03
BA137M	5.19E+00
BA140	4.90E-08
BE10	2.16E-05
BI212	2.60E-08
BK249	2.07E-08
C14	8.10E+01
CA45	4.96E-03
CD109	2.15E-02
CD113M	6.62E-03
CE141	2.99E-03
CE144	4.73E+00
CF249	1.95E-10
CF251	4.34E-12
CL36	1.27E-02
CM242	1.16E+00
CM243	1.59E-03
CM244	1.75E-01
CM245	1.14E-05
CM246	5.76E-06
CM247	8.31E-12
CM248	2.59E-11
CO58	3.74E+03
CO60	5.89E+04
CR51	3.12E+01
CS134	8.72E+00
CS135	5.26E-05
CS137	5.51E+00
EU152	6.23E-04
EU154	3.83E-01
EU155	9.00E-02
FE55	5.55E+04

ISOTOPE	Total NR Activity(Ci)
FE59	4.18E+00
H3	3.36E+01
HF175	2.48E+00
HF181	5.50E+01
I129	6.65E-06
IN113M	8.66E+02
IN114	2.02E+00
IN114M	2.12E+00
IR192	5.98E-03
IR192M	2.47E-07
KR85	2.07E-01
LA140	5.65E-08
MN54	3.69E+02
MO93	5.51E-01
NB93M	6.25E+01
NB94	4.70E+00
NB95	2.28E+04
NB95M	1.23E+02
NI59	1.31E+03
NI63	1.53E+05
NP237	2.56E-06
NP239	5.47E-04
PA234M	2.61E-06
PB205	5.68E-08
PB212	2.60E-08
PD107	3.99E-06
PM147	3.42E+00
PO210	1.39E-03
PO212	1.66E-08
PO216	2.60E-08
PR144	4.73E+00
PR144M	6.60E-02
PT193	1.14E-04
PU238	1.93E-01
PU239	7.67E-02
PU240	5.10E-02
PU241	1.32E+01
PU242	2.48E-04
PU244	1.57E-11
RA224	2.60E-08
RH103M	3.95E-02
RH106	6.64E+00
RN220	2.60E-08
RU103	3.95E-02
RU106	6.66E+00
S35	7.61E-02

ISOTOPE	Total NR Activity(Ci)
SB124	1.04E+00
SB125	1.78E+04
SB126	2.37E-06
SB126M	1.68E-05
SC46	1.63E-01
SE75	1.37E-01
SE79	2.12E-04
SM151	7.23E-02
SN113	8.66E+02
SN119M	3.16E+04
SN121	6.41E+00
SN121M	8.25E+00
SN123	2.94E+02
SN126	6.32E-05
SR89	4.34E-01
SR90	2.74E+00
TA182	4.20E+03
TC99	1.54E-01
TE123M	4.01E-07
TE125M	2.92E+03
TH228	2.59E-08
TH231	2.81E-08
TH232	3.51E-08
TH234	2.61E-06
U232	1.78E-06
U233	7.85E-06
U234	1.43E-05
U235	3.14E-07
U236	6.58E-05
U238	1.47E-05
W181	1.84E+00
Y90	2.74E+00
Y91	2.11E+00
ZN65	5.23E+00
ZR93	9.78E+00
ZR95	1.07E+04

Naval Reactor Pad 643 7E Inventory 6-21-05

ISOTOPE	Total NR Activity(Ci)
AM241	3.52E-01
AM242M	8.03E-06
AM243	2.41E-03
BA137M	5.28E+00
C14	1.39E+02
CA45	1.34E-04
CE144	5.14E+00
CF249	1.25E-10
CF251	2.70E-12
CL36	1.80E-05
CM242	5.22E+00
CM243	7.90E-06
CM244	1.92E-01
CM245	1.02E-05
CM246	3.95E-06
CM247	7.96E-12
CM248	1.89E-11
CO58	2.07E+04
CO60	9.85E+04
CR51	7.47E+03
CS134	5.33E-02
CS135	3.45E-05
CS137	5.29E+00
EU154	6.72E-02
EU155	3.83E-02
FE55	9.03E+04
FE59	7.48E+03
H3	1.34E+02
HF181	7.46E+03
I129	1.48E-05
IN113M	4.87E+03
KR85	5.71E-03
MN54	1.39E+03
MO93	1.43E+00
NB93M	7.46E+03
NB94	6.54E+00
NB95	1.31E+05
NB95M	1.31E+03
NI59	1.55E+03
NI63	1.80E+05
NP237	4.03.E-06
PM147	3.05E+00
PR144	2.20E-01
PU238	2.69E-01
PU239	1.23E-01
PU240	1.11E-01
PU241	3.40E+01
PU242	4.07E-04
PU244	2.77E-11
RU106	6.60E-01
S35	3.09E-03
SB125	4.07E+04
SC46	3.26E-03
SE79	1.22E-03
SM151	5.38E-02
SN113	4.87E+03
SN119M	8.08E+04
SN123	2.35E+03
SN126	8.59E-06
SR90	5.39E+00
TA182	1.76E+04
TC99	1.46E-01
TE125M	2.54E+04
TH232	3.02E-10
U232	4.77E-06
U233	7.83E-07
U234	3.64E-06
U235	2.06E-07
U236	4.21E-06
U238	2.32E-05
Y90	5.39E+00
ZN65	1.13E+01
ZR93	7.46E+03
ZR95	6.16E+04

Components in Grout Trench Inventory 6-21-05

ISOTOPE	Total CIG Activity(Ci)
Other Alpha	8.08E-03
AC228	2.32E-08
AM241	4.01E-02
AM242M	5.02E-07
AM243	7.50E-04
Other Beta / Gamma	1.47E-01
BA137M	1.95E+03
BI212	3.92E-03
C14	4.12E-02
C14 K&L Basin Resin	6.61E-02
CE144	7.28E-03
CF249	8.77E-05
CF250	2.96E-07
CF251	8.84E-05
CF252	9.01E-05
CM243	1.47E-04
CM244	1.96E-01
CM245	1.54E-05
CM246	8.76E-05
CM247	8.76E-05
CM248	8.76E-05
CO60	1.11E-01
CS134	3.81E-03
CS135	4.34E-06
CS137	2.06E+03
EU152	3.78E-02
EU154	2.10E-02
EU155	3.50E-03
FE55	1.29E-01
H3	4.15E+03
I129	1.21E-05
I129 K&L Basin Resin	7.51E-05
KR85	1.43E-02
NI59	9.76E-04
NI63	8.67E-02
NP237	9.02E-04
PA233	5.42E-06
PA234	3.42E-05
PA234M	8.35E-02
PB212	3.92E-03
PD107	6.76E-06

ISOTOPE	Total CIG Activity(Ci)
PM147	6.84E-02
PO216	3.92E-03
PR144	7.18E-03
PR144M	7.78E-07
PU238	1.94E-01
PU239	2.69E-01
PU240	2.64E-02
PU241	8.10E-01
PU242	3.38E-05
RA224	3.92E-03
RB87	5.25E-12
RH106	1.78E-03
RN220	3.92E-03
RU106	1.79E-03
SB125	5.42E-03
SB126	1.08E-05
SB126M	1.08E-05
SE79	3.41E-04
SM151	7.59E-03
SN126	1.82E-05
SR85	1.28E-06
SR90	7.54E+00
TC99	6.28E-03
TC99 K&L Basin Resin	9.28E-03
TH228	3.92E-03
TH231	4.94E-05
TH234	8.35E-02
TL208	6.99E-09
U232	3.92E-03
U233	2.52E-01
U234	3.38E-02
U235	8.76E-04
U236	5.28E-04
U238	1.39E-01
Y90	7.31E+00
ZN65	1.66E-07
ZR93	1.02E-03

Engineered Trench #1 Inventory 6-21-05

ISOTOPE	Total ET#1 Activity(Ci)
Other Alpha	2.38E-02
AC225	1.85E-03
AC228	4.02E-03
AG109M	4.20E-05
AG110M	2.40E-06
AL26	4.97E-11
AM241	5.14E-01
AM242	1.19E-08
AM242M	3.76E-03
AM243	1.16E-03
AT217	1.85E-03
Other Beta / Gamma	1.97E-01
BA133	5.01E-06
BA137M	2.28E+01
BE7	4.38E-06
BI207	7.82E-06
BI210	9.66E-04
BI211	4.67E-07
BI212	1.47E-02
BI213	1.85E-03
BI214	1.34E-03
C14	1.04E-01
CD109	5.52E-05
CE139	5.63E-11
CE144	4.60E-02
CF249	7.59E-06
CF250	1.14E-04
CF251	4.53E-05
CF252	6.00E-04
CL36	7.00E-05
CM242	3.13E-05
CM243	6.09E-05
CM244	3.61E-01
CM245	2.68E-04
CM246	4.51E-04
CM247	3.06E-11
CM248	7.82E-15
CO57	4.66E+00
CO58	8.73E-01
CO60	1.03E+01
CR51	7.80E-03
CS134	4.45E-02
CS135	1.32E-11

ISOTOPE	Total ET#1 Activity(Ci)
CS137	4.26E+01
EU152	1.86E-01
EU154	1.16E-01
EU155	1.34E-03
FE55	3.34E+01
FE59	2.33E-02
FR221	1.85E-03
H3	1.69E+00
HF175	4.93E-06
HF181	8.45E-03
HG203	1.29E-05
I129	5.87E-05
I129 F-WTU Dowex 21K	1.33E-03
I129 H Area Dowex 21K	9.04E-04
I129 F Area CG-8	1.56E-06
I129 H Area CG-8	9.57E-06
I129 ETF GT-73	7.43E-07
I129 F Area Filtercake	3.60E-05
IN113M	1.44E-06
K40	1.29E-04
KR85	3.85E-02
MN54	1.98E-01
MO93	2.08E-03
NA22	3.46E-07
NB93M	5.96E-02
NB94	2.11E-03
NB95	4.30E-02
NB95M	1.09E-05
NI59	6.67E-02
NI63	6.22E+00
NP237	3.37E-03
NP239	5.87E-05
PA233	3.46E-04
PA234	1.45E-01
PA234M	1.79E-01
PB209	1.85E-03
PB210	9.73E-04
PB212	1.45E-02
PB214	1.34E-03
PM147	3.29E-01
PO210	9.72E-04
PO212	8.03E-03
PO213	1.79E-03
PO214	1.33E-03
PO216	1.47E-02

ISOTOPE	Total ET#1 Activity(Ci)
PO218	1.33E-03
PR144	3.00E-02
PR144M	6.56E-05
PU238	1.66E+00
PU239	1.18E+00
PU240	3.21E-01
PU241	7.28E+00
PU242	4.82E-03
PU244	3.93E-15
RA224	1.47E-02
RA225	1.85E-03
RA226	1.38E-03
RA228	3.51E-03
RB86	4.65E-05
RH103M	2.66E-09
RH106	8.90E-03
RN220	1.47E-02
RN222	1.33E-03
RU103	2.66E-09
RU106	1.97E-02
SB125	9.56E-02
SB126M	1.01E-05
SE75	3.74E-04
SE79	7.39E-03
SM151	1.56E-04
SN113	1.44E-06
SN119M	6.34E-07
SN126	4.91E-05
SR85	1.54E-03
SR90	1.26E+01
TA182	1.56E-06
TC99	3.03E-02
TE125M	3.00E-03
TH228	1.47E-02
TH229	1.85E-03
TH230	3.44E-03
TH231	5.70E-03
TH232	3.70E-03
TH234	3.23E-01
TL208	4.50E-03
TL209	6.73E-05
U232	1.09E-02
U233	8.05E-01
U234	3.64E-01
U235	1.25E-02
U236	2.29E-02

ISOTOPE	Total ET#1 Activity(Ci)
U238	3.33E-01
Y90	1.23E+01
ZN65	2.40E-02
ZR93	1.68E-05
ZR95	1.72E-02

Engineered Trench #2 Inventory 6-21-05

ISOTOPE	Total ET#2 Activity(Ci)
Other alpha	1.03E-02
AC225	4.36E-04
AC228	1.33E-04
AG108	7.84E-10
AG108M	8.43E-09
AM241	3.42E-01
AM242M	3.28E-04
AM243	5.37E-03
AT217	4.36E-04
Other Beta/Gamma	1.36E-02
BA133	2.25E-05
BA137M	3.50E+00
BI212	2.53E-03
BI213	4.36E-04
C14	2.45E-03
CE144	1.21E-03
CF249	4.56E-09
CF251	3.80E-08
CF252	9.69E-11
CM242	1.58E-08
CM243	3.07E-05
CM244	4.41E-01
CM245	7.92E-05
CM246	7.80E-05
CM247	3.59E-10
CM248	7.07E-16
CO58	8.88E-06
CO60	7.11E-02
CR51	1.52E-10
CS134	8.44E-04
CS137	3.70E+00
EU152	7.12E-04
EU154	3.07E-02
EU155	2.13E-05
FE55	5.91E-04
FE59	4.91E-09
FR221	4.36E-04
H3	7.74E-02
HF181	1.47E-09
I129	4.43E-06
IN113M	3.14E-09
K40	1.11E-05
KR85	5.17E-06

ISOTOPE	Total ET#2 Activity(Ci)
MN54	1.44E-05
NB93M	2.53E-06
NB94	2.18E-06
NB95	2.22E-06
NB95M	8.55E-09
NI59	3.06E-05
NI63	3.56E-04
NP237	5.15E-04
PA233	1.25E-05
PA234	2.78E-05
PA234M	1.48E-02
PB209	4.36E-04
PB212	2.54E-03
PM147	1.51E-01
PO212	1.62E-03
PO213	4.18E-04
PO216	2.53E-03
PR144	1.21E-03
PR144M	1.73E-05
PU238	5.43E-01
PU239	1.67E+00
PU240	3.88E-01
PU241	6.69E+00
PU242	1.13E-02
PU244	8.62E-20
RA244	2.53E-03
RA225	4.36E-04
RA226	1.32E-05
RA228	1.32E-04
RH106	1.75E-04
RN220	2.53E-03
RU106	1.75E-04
SB125	5.43E-04
SB126	4.88E-15
SB126M	4.81E-06
SE79	9.57E-06
SM151	5.25E-06
SN113	3.14E-09
SN126	1.02E-05
SR90	8.47E+00
TC99	7.32E-03
TE125M	3.24E-05
TH228	2.53E-03
TH229	4.36E-04
TH230	1.10E-04
TH231	8.58E-04

ISOTOPE	Total ET#2 Activity(Ci)
TH232	1.33E-04
TH234	1.48E-02
TL208	9.10E-04
TL209	1.87E-05
U232	2.40E-03
U233	1.53E-01
U234	5.75E-02
U235	8.98E-04
U236	1.88E-05
U238	2.80E-02
Y90	8.47E+00
ZN65	2.75E-06
ZR93	6.32E-10
ZR95	1.01E-06

Slit Trenches #1 Inventory 6-21-05

ISOTOPE	Total SLIT1 Activity(Ci)
Other Alpha	8.10E-04
AC228	3.06E-03
AM241	3.71E-02
AM242M	7.36E-03
AM243	6.13E-05
Other Beta / Gamma	1.13E-01
BA137M	5.26E+00
BI211	2.47E-05
BI212	2.40E-03
BI214	7.04E-05
C14	6.11E-02
CD109	2.47E-04
CE144	2.86E-03
CF249	6.66E-06
CF251	6.60E-05
CF252	1.43E-06
CM242	6.06E-05
CM243	6.92E-06
CM244	3.84E-02
CM245	2.74E-07
CM246	1.53E-06
CM247	1.43E-06
CM248	1.43E-06
CO58	2.88E-01
CO60	4.69E+00
CR51	7.11E-05
CS134	4.19E-04
CS135	7.09E-08
CS137	7.09E+00
EU152	2.96E-04
EU154	1.00E-03
EU155	2.04E-05
FE55	7.80E+00
FE59	1.58E-03
H3	4.72E+00
HF181	4.65E-04
I129	1.99E-05
I129 H Area Filtercake	2.77E-07
I129 F Area Filtercake	8.14E-05
K40	4.12E-03
KR85	7.76E-05
MN54	1.94E-01
MO93	1.15E-05
NA22	7.92E-07
NB93M	7.45E-02
NB94	1.08E-03
NB95	9.92E-03
NI59	2.24E-02
NI63	1.58E+00
NP237	1.10E-03
PA233	7.67E-06
PA234	3.98E-03
PA234M	1.41E-01
PB212	2.62E-03
PB214	7.42E-05
PD107	1.10E-07
PM147	5.91E-02
PO212	1.50E-03
PO216	2.34E-03
PR144	3.08E-03
PR144M	6.19E-07
PU238	2.40E-01
PU239	2.48E-02
PU240	6.82E-03
PU241	2.12E-01
PU242	1.11E-04
PU244	2.35E-15
RA224	2.34E-03
RA226	3.18E-03
RA228	2.34E-03
RB87	8.59E-14
RH106	6.33E-05
RN220	2.34E-03
RU106	2.34E-03
SB125	4.62E-02
SB126	1.76E-07
SB126M	1.76E-07
SE79	2.00E-04
SM151	1.32E-04
SN126	1.82E-04
SR85	9.23E-06
SR90	3.24E+00
TA182	1.59E-07
TC99	5.31E-03
TE125M	8.85E-03
TH228	2.34E-03
TH230	2.87E-04
TH231	1.74E-03
TH232	2.34E-03
TH234	1.45E-01
TL208	8.57E-04
U232	1.18E-06
U233	6.22E-03
U234	7.69E-02
U235	6.14E-03
U236	3.27E-03
U238	1.49E-01
Y90	3.19E+00
ZN65	4.78E-02
ZR93	2.71E-05
ZR95	4.54E-03

Slit Trenches #2 Inventory 6-21-05

ISOTOPE	Total SLIT2 Activity(Ci)
Other Alpha	2.52E-03
AC228	2.37E-06
AM241	1.59E-01
AM242M	3.11E-02
AM243	1.69E-03
Other Beta / Gamma	7.05E-01
BA133	8.29E-06
BA137M	2.03E+01
BI210	1.30E-06
BI212	1.42E-06
BI214	6.49E-06
C14	1.22E-01
CE141	1.59E-08
CE144	1.88E-02
CF249	1.57E-04
CF250	6.73E-03
CF251	2.99E-04
CF252	3.37E-04
CL36	1.06E-05
CM242	1.65E-04
CM243	3.90E-06
CM244	1.11E-01
CM245	2.92E-06
CM246	2.19E-05
CM247	2.48E-09
CM248	2.37E-09
CO58	5.04E+00
CO60	1.96E+01
CR51	1.23E-02
CS134	2.98E-04
CS135	1.18E-10
CS137	2.22E+01
EU152	8.08E-03
EU154	3.98E-02
EU155	9.25E-03
FE55	3.37E+01
FE59	3.60E-02
H3	1.12E+00
HF181	1.16E-02
I129	1.97E-05
I129 F-WTU Dowex 21K	4.41E-03
I129 F Area CG-8	5.15E-05
I129 H Area CG-8	1.18E-04
I129 ETF GT-73	8.64E-05
I129 F Area Filtercake	3.45E-04
K40	3.22E-06
KR85	2.18E-03
MN54	9.98E-01
MO93	3.40E-07
NB93M	1.62E-01
NB94	2.26E-03
NB95	9.14E-02
NB95M	3.00E-10
NI59	3.65E-02
NI63	6.51E+00
NP237	2.01E-03
PA233	1.06E-05
PA234	1.41E-02
PA234M	1.19E+01
PB212	1.85E-06
PB214	6.49E-06
PD107	1.83E-10
PM147	8.82E-02
PO210	1.30E-06
PO214	6.49E-06
PO218	6.49E-06
PR144	1.81E-02
PR144M	7.21E-07
PU238	5.89E-01
PU239	1.98E-01
PU240	7.65E-02
PU241	2.23E+00
PU242	1.03E-03
PU244	5.10E-15
RA226	6.49E-06
RB87	1.42E-16
RH106	1.89E-04
RN222	6.49E-06
RU106	1.32E-02
S35	2.96E-03
SB125	1.35E-01
SB126	2.92E-10
SB126M	2.92E-10
SE79	5.36E-04
SM151	2.12E-07
SN126	2.14E-06
SR85	2.47E-04
SR90	4.70E+00
TA182	5.10E-03
TC99	2.02E-02
TE125M	2.00E-02
TH228	3.10E-06
TH231	5.63E-03
TH232	3.53E-06
TH234	1.19E+01
TL208	1.09E-07
U232	1.68E-07
U233	2.71E-02
U234	3.59E-01
U234 M Area Glass	2.80E+00
U235	3.16E-02
U235 M Area Glass	1.87E-01
U236	1.15E-02
U236 M Area Glass	1.42E-01
U238	1.38E+00
U238 M Area Glass	1.05E+01
Y90	4.61E+00
ZN65	1.33E-02
ZR93	2.26E-05
ZR95	4.23E-02

Slit Trenches #3 Inventory 6-21-05

ISOTOPE	Total SLIT3 Activity(Ci)
Other Alpha	8.23E-03
AC228	3.48E-05
AM241	1.17E-01
AM242M	1.24E-03
AM243	2.10E-03
Other Beta / Gamma	1.24E-02
BA137M	1.29E+01
BI210	2.25E-05
BI212	1.51E-04
C14	1.91E-02
CD113M	2.24E-09
CE144	1.06E-01
CF249	1.67E-04
CF250	5.09E-03
CF251	2.07E-04
CF252	2.51E-04
CM242	1.69E-05
CM243	8.09E-04
CM244	1.46E-01
CM245	1.72E-04
CM246	7.37E-05
CM247	4.97E-05
CM248	4.97E-05
CO58	2.46E-01
CO60	8.91E-01
CR51	5.19E-04
CS134	1.90E-01
CS137	1.37E+01
EU152	3.76E-03
EU154	4.81E-02
EU155	7.93E-03
FE55	1.59E+00
FE59	4.17E-03
H3	4.81E-01
H3 ETF-Activated Carbon	2.77E-01
HF181	1.40E-03
I129	1.20E-05
I129 ETF-Activated Carbon	1.64E-02
I129 ETF G-73	4.03E-05
I129 F Area Filtercake	1.17E-05
KR85	4.01E-04
MN54	3.57E-02
NB93M	1.01E-02

ISOTOPE	Total SLIT3 Activity(Ci)
NB94	6.10E-04
NB95	1.16E-02
NB95M	3.68E-06
NI59	6.68E-03
NI63	4.73E-01
NP237	8.03E-03
PA233	1.29E-04
PA234	1.97E-03
PA234M	1.32E+00
PB210	2.25E-05
PB212	1.51E-04
PB214	2.25E-05
PM147	4.07E-01
PO210	2.25E-05
PO212	2.19E-05
PO216	1.50E-04
PO218	2.25E-05
PR144	1.06E-01
PR144M	1.51E-03
PU238	1.79E+00
PU239	4.62E-01
PU240	1.35E-01
PU241	5.26E+00
PU242	1.45E-03
PU244	2.62E-16
RA224	1.50E-04
RA226	2.25E-05
RA228	3.42E-05
RH106	1.60E-02
RN220	1.50E-04
RN222	2.25E-05
RU106	2.63E-02
SB125	1.03E-02
SB126M	6.50E-08
SE79	1.29E-04
SM151	4.31E-03
SN126	1.13E-04
SR85	2.96E-04
SR90	1.20E+01
TC99	2.85E-02
TE125M	2.31E-03
TH228	1.51E-04
TH230	2.25E-05
TH231	1.88E-02
TH232	3.42E-05
TH234	1.32E+00
TL208	1.24E-05
U232	3.76E-02

ISOTOPE	Total SLIT3 Activity(Ci)
U233	2.22E-02
U234	1.09E+00
U235	3.64E-02
U236	2.48E-02
U238	1.33E+00
Y90	1.20E+01
ZN65	1.50E-02
ZR93	1.16E-06
ZR95	5.28E-03

Slit Trenches #4 Inventory 6-21-05

ISOTOPE	Total SLIT4 Activity(Ci)
AC225	9.01E-08
AC228	1.09E-06
AM241	4.77E-02
AM242M	6.26E-05
AM243	5.41E-04
AT217	9.01E-08
BA137M	1.55E+00
BI212	1.49E-06
BI213	9.01E-08
C14	3.12E-02
CE144	8.78E-04
CF249	1.41E-05
CF250	6.15E-04
CF251	2.86E-05
CF252	3.04E-05
CM242	2.98E-05
CM243	8.80E-07
CM244	2.78E-02
CM245	2.79E-06
CM246	6.38E-06
CM247	2.77E-11
CM248	2.32E-15
CO58	2.60E-01
CO60	2.16E+00
CR51	3.21E-04
CS134	3.83E-04
CS137	1.65E+00
EU152	4.82E-05
EU154	8.62E-03
EU155	8.87E-04
FE55	3.71E+00
FE59	2.87E-03
FR221	9.01E-08
H3	2.36E-01
HF181	9.38E-04
I129	6.15E-06
K40	6.54E-06
KR85	4.55E-05
MN54	1.02E-01
NB93M	3.48E-02
NB94	4.88E-04
NB95	1.01E-02
NI59	7.36E-03
NI63	7.28E-01
NP237	1.52E-03
PA233	4.45E-05
PA234	1.07E-02
PA234M	1.97E-01
PB209	9.01E-08
PB212	1.49E-06
PM147	1.68E-02
PO212	9.49E-07
PO213	8.82E-08
PO216	1.61E-06
PR144	8.78E-04
PU238	9.32E-01
PU239	1.64E-01
PU240	3.90E-02
PU241	6.98E-01
PU242	1.85E-03
PU244	1.10E-15
RA224	1.61E-06
RA225	9.01E-08
RA226	7.74E-06
RA228	1.09E-06
RN220	1.61E-06
RU106	1.15E-03
SB125	1.95E-02
SE79	6.55E-06
SM151	2.83E-06
SN126	2.05E-08
SR90	1.50E+00
TC99	1.80E-02
TE125M	4.24E-03
TH228	1.61E-06
TH229	9.01E-08
TH230	2.59E-08
TH231	2.87E-02
TH232	1.09E-06
TH234	2.08E-01
TL208	1.91E-07
TL209	1.99E-09
U232	5.47E-07
U233	4.94E-04
U234	1.50E+00
U235	3.14E-02
U236	8.65E-03
U238	2.08E-01
Y90	1.50E+00
ZN65	4.05E-02
ZR93	4.88E-06
ZR95	4.57E-03

Slit Trenches #5 Inventory 6-21-05

ISOTOPE	Total SLIT5 Activity(Ci)
AC228	3.14E-08
AG109M	1.04E-02
AM241	8.99E-03
AM242M	1.74E-05
AM243	4.94E-04
Other Beta/Gamma	2.67E-06
BA137M	9.87E-01
BI212	3.14E-08
C14	1.14E-03
CD109	1.04E-02
CE144	2.29E-05
CF249	1.14E-07
CF251	9.58E-05
CL36	2.26E-06
CM242	9.44E-07
CM243	6.28E-07
CM244	2.61E-03
CM245	7.39E-07
CM246	8.61E-07
CM247	1.87E-12
CM248	4.50E-17
CO58	1.25E-02
CO60	1.27E+05
CR51	1.13E-05
CS134	2.02E-05
CS137	1.04E+00
EU152	9.09E-05
EU154	3.23E-06
FE55	7.81E-02
FE59	1.57E-04
H3	7.24E-02
HF181	5.05E-05
I129	1.41E-06
KR85	1.69E-06
MN54	2.56E-03
NB93M	6.91E-04
NB94	9.48E-06
NB95	5.15E-04
NI59	3.16E-04
NI63	1.41E-02
NP237	2.33E-03
PA233	8.36E-05
PA234M	9.43E-03
PB212	3.14E-08
PM147	1.74E-03

ISOTOPE	Total SLIT5 Activity(Ci)
PO212	2.01E-08
PO216	3.14E-08
PR144	2.29E-05
PR144M	6.84E-13
PU238	1.77E-01
PU239	5.03E-02
PU240	9.55E-02
PU241	1.19E+00
PU242	3.02E-04
PU244	2.13E-17
RA224	3.14E-08
RA228	3.14E-08
RH106	1.33E-11
RN220	3.14E-08
RU106	2.80E-05
SB125	4.15E-04
SB126M	3.13E-05
SE79	6.09E-06
SN126	3.13E-05
SR85	1.37E-07
SR90	8.27E-02
TC99	8.44E-03
TE125M	9.00E-05
TH228	3.14E-08
TH230	3.14E-08
TH231	1.34E-02
TH232	3.14E-08
TH234	9.43E-03
TL208	1.12E-08
U232	7.05E-10
U233	5.95E-03
U234	6.60E-01
U235	4.06E-01
U236	9.03E-04
U238	3.06E+00
Y90	8.27E-02
ZN65	1.08E-03
ZR93	9.48E-08
ZR95	2.34E-04

ATTACHMENT 2. EAV PA VA VOLUME STATUS 2005

Capacity

EAV Facility	Capacity Volume (m3)	Volume Status (m3) (7/29/05)	Percent Filled (7/29/05)
LAWV	30,600	13,252.3	43.3%
ILTV	610	366.6	60.1%
ILNTV	4,000	1,361.1	34.0%
ET #1	39,800	28,083.6	70.6%
ET #2	39,800	2,895.7	7.3%
SLIT1	16,464	14,264.2	86.6%
SLIT2	16,464	15,560.3	94.5%
SLIT3	16,464	13,358.0	81.1%
SLIT4	16,464	8,525.5	51.8%
SLIT5	16,464	6,583.6	40.0%
NR0 - 643-7E	701	701.2	100.0%
NR1- 643-26E	1,500	255.7	17.0%
CIG	6,500	1,346.3	20.7%

ATTACHMENT 3: WASTE MANAGEMENT AREA PROJECT BULLETIN

Solid Waste & Infrastructure Bulletin

2004

August 3, 2004

SWI-BUL-2004-007

Information Update from Solid Waste and Infrastructure - Generator Services Department

"WITS Radionuclide Screening Criteria for Tritium in Trenches"

This bulletin works with Solid Waste Bulletin 2003-013, issued on September 9, 2003.

Solid Waste and Infrastructure (SW&I) has developed new Waste Information Tracking System (WITS) screening criteria for Tritium designated for disposal into either Slit Trenches or Engineered Trench. These new limits will be:

Location	Radionuclide	Screening Limit (Ci/m3)
Slit Trenches	H-3	6.7E-04
Engineered Trench	H-3	4.3E-04

SW&I was notified by Savannah River National Laboratory (SRNL) last week that the new remodeling effort for these trenches was near completion. This effort will establish new disposal limits for these types of trenches. In most cases, the limits for several key radionuclides have increased. However, the Tritium inventory limit has decreased substantially (from 6.3 curies to 2.0 curies per trench unit). These new screening limits are created to protect these facilities from excessive Tritium concentrations until WAC 3.17 can be revised later this year.

There will be cases where a specific waste container meets the WAC limit, yet fails this screening limit. SW&I will review the specific container's radionuclide inventory as well as the projected waste stream inventory to determine if there are going to be any impacts to the trenches. SW&I will provide an acceptance letter to the generator for disposal, if appropriate. The document number from this letter should be recorded in the deviation field on the WITS package creation screen. For those cases where there will be impacts to the trenches, SW&I will provide alternate disposal options to the generator.

Questions can be directed to Don Sink, Shawn Reed or Kevin Tempel or your Solid Waste Point of Contact.

DISTRIBUTION:

SWI Records Management (Original), 642-E
Solid Waste and Infrastructure Bulletin Distribution: (Distributed Electronically)
Solid Waste Management Council Distribution: (Distributed Electronically)
Facility Managers Committee Distribution: (Distributed Electronically)
Facility Training Managers: (Distributed Electronically)
Qualified GCO Distribution: (Distributed Electronically)

ATTACHMENT 4: E-MAIL FROM DON SINK COMPENSATORY MEASURES

Don Sink/BSRI/Srs
08/25/2005 06:39 AM

To Rob Swingle/SRNL/Srs@Srs
cc Kevin Tempel/WSRC/Srs@Srs, Mary Stallings/SRNL/Srs@Srs, Shawn Reed/WSRC/Srs@Srs, Tom Butcher/SRNL/Srs@Srs
bcc
Subject Re: Compensatory Measures

Rather than fix every package in WITS (large amount of work), we proportionally raised the H-3 PA limit to account for the decay.

Rob Swingle/SRNL/Srs

Rob Swingle/SRNL/Srs
08/24/2005 04:01 PM

To Don Sink/BSRI/Srs@Srs
cc Kevin Tempel/WSRC/Srs@Srs, Mary Stallings/SRNL/Srs@Srs, Shawn Reed/WSRC/Srs@Srs, Tom Butcher/SRNL/Srs@Srs
Subject Re: Compensatory Measures

Don,

I am curious as to how you implemented the tritium decay. Based on the inventory you provided to us as of June 21, 2005, there is 1.69 Ci of tritium in ET#1, and according to the latest limits I am aware of (the 2004, General Revision of Slit and Engineered Trench limits, WSRC-TR-2004-00300) the GW1 limit for tritium is 2.00 Ci. This gives a fraction of limits of 0.84 for tritium alone. Was this change implemented internally to WITS so that it would not show up in the external inventory, or am I missing something else? If implemented internally, we will need to mention it in the Interim Measures report to avoid future confusion.

Thanks for your help,

Rob

Rob Swingle
Savannah River National Laboratory
Waste Processing Technology Section
Phone 5-2369

Don Sink/BSRI/Srs

Don Sink/BSRI/Srs
08/24/2005 12:44 PM

To Rob Swingle/SRNL/Srs@Srs
cc Mary Stallings/SRNL/Srs@Srs, Tom Butcher/SRNL/Srs@Srs, Shawn Reed/WSRC/Srs@Srs, Kevin Tempel/WSRC/Srs@Srs
Subject Re: Compensatory Measures

My comments are in RED:

Rob Swingle/SRNL/Srs

Rob Swingle/SRNL/Srs
08/24/2005 10:39 AM

To Don Sink/BSRI/Srs@Srs
cc Mary Stallings/SRNL/Srs@Srs, Tom Butcher/SRNL/Srs@Srs
Subject Compensatory Measures

Don,

Mary and I are now in the last stages of putting together this year's Interim Measures report. Looking at Engineered Trench #1, it still looks as if the SOFs are high compared to the volume fraction filled. Last year, Solid Waste had temporarily closed ET #1 until completion imposed three compensatory measures:

- Consideration of decay of tritium from the time of waste generation to the time of emplacement in ET #1. (Some waste had been stored for 7 years prior to emplacement.)
- Reassessing the 5% set-aside for controlled clean soil.
- Establishing guidelines in WITS for ET #1 to focus on waste packages that do not impact the GW1 or GW2 limits.

I seem to recall that Solid Waste has re-opened ET#1. I assume the tritium inventory has been modified to account for tritium decay. The tritium decay, using WITS receipt data and an engineering calc note, accounted for a net decrease in GW1 (which was the most limiting PA pathway) for ET#1 from 0.898 to 0.777. WITS was adjusted prior to re-opening ET#1.

What was the outcome of reassessing the 5% set-aside for controlled clean soil? An engineering calc note determined the controlled clean soil impact was less than 0.1% for ET#1, thus allowing the ET#1 PA limit to be raised in WITS from 0.90 to 0.95.

Also, I assume that WITS guidelines have been put in place to focus on waste packages that do not impact the GW1 and GW2 limits. That is correct. Two package screening limits were developed in WITS for GW1 and GW2 in ET#1 only. This limits, using the remaining volume space and the remaining PA margin space for GW1 and GW2 for an average container, is used for packages at time of receipt in the ET#1 first. If these limits are failed in WITS, then operations checks ET#2 for disposal. Since these limits were put in place in 10/2004 for re-opening ET#1, this practice has allowed the volume to increase in the ET#1 from 65.6% to 70.6%. The most limiting PA pathway for ET#1 is GW1. The GW1 PA space in ET#1 since 10/2004 has increased from 0.777 to 0.779 (very small). Thus, the ET#1 is being managed very effectively with these screening limits and the use of ET#2.

Have any other compensatory measures been put in place for ET #1? No.

Thanks,
Rob

Rob Swingle
Savannah River National Laboratory
Waste Processing Technology Section
Phone 5-2369

Distribution

B. T. Butcher	773-43A, Rm. 216
L. B. Collard	773-43A, Rm. 207
J. R. Cook	773-43A, Rm. 209
R. A. Hiergesell	773-43A, Rm. 229
M. E. Stallings	773-A, Rm. B-117
R. F. Swingle	773-42A, Rm. 122
G. A. Taylor	773-43A, Rm. 230
E. L. Wilhite	773-43A, Rm. 214
EA&PM File	773-43A, Rm. 213
STI File	703-43A