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of Am-241 Inventory for Nitrate Salt Waste at Area G

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Special Analysis: 2016-001
Analysis of the Potential Under-Reporting of Am-241
Inventory for Nitrate Salt Waste at Area G

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Acronyms and Abbreviations

CCP	Central Characterization Program
DOE	Department of Energy
MT	Material types
WCATS	Waste Compliance and Tracking System
LANL	Los Alamos National Laboratory
TRU	Transuranic
LLW	Low-level radioactive waste
TA-54	Technical Area 54
CIN	Cemented TRU Waste
MIN	Absorbed Liquid, Salt, or Inorganic Solid Waste
MHD	Heterogeneous Debris Waste
PA	Performance Assessment
CA	Composite Analysis

1.0 Introduction

The Los Alamos National Laboratory (LANL) generates radioactive waste as a result of various activities. Operational waste is generated from a wide variety of research and development activities including nuclear weapons development, energy production, and medical research. Environmental restoration (ER), and decontamination and decommissioning (D&D) waste is generated as contaminated sites and facilities at LANL undergo cleanup or remediation. The majority of this waste is low-level radioactive waste (LLW) and is disposed of at the Technical Area 54 (TA-54), Area G disposal facility.

U.S. Department of Energy (DOE) Order 435.1 (DOE, 2001) requires that radioactive waste be managed in a manner that protects public health and safety, and the environment. To comply with this order, DOE field sites must prepare site-specific radiological performance assessments for LLW disposal facilities that accept waste after September 26, 1988. Furthermore, sites are required to conduct composite analyses that account for the cumulative impacts of all waste that has been (or will be) disposed of at the facilities and other sources of radioactive material that may interact with the facilities.

Revision 4 of the Area G performance assessment and composite analysis (PA/CA) was issued in 2008 (LANL, 2008). The analyses in that document estimate radionuclide release rates from the waste disposed of at the facility, simulate the movement of radionuclides through the environment, and project potential radiation doses to humans for several onsite and offsite exposure scenarios. The assessments were based on existing site and disposal facility data, and assumptions about future rates and methods of waste disposal. Several model updates have been conducted since the Revision 4 results were published in 2008 (LANL, 2008), including inventory updates to reflect annual disposal receipt reviews as published in the site annual reports, and in special analyses (SAs) that were performed in response to unreviewed disposal question evaluations (UDQE); the most recent example is SA 2016-003 (Chu et al., 2017).

The estimated Area G inventory is a key input for projecting potential radiation doses for onsite and offsite exposure scenarios. Unreviewed Disposal Question Evaluation (UDQE) 1601 (Appendix A) identified a positive unreviewed disposal question related to the potential for systematic under-reporting of the americium (Am)-241 disposed of at Area G for remediated nitrate salt waste streams that went through an evaporation process at TA-55 during the time period from the late-1970s to the mid-1980s. This special analysis (SA) 2016-001 documents the potential Am-241 under-reporting issue and reviews relevant data from the Waste Compliance and Tracking System (WCATS) database along with pre-1971 waste information to determine the potential impact with respect to the Am-241 inventory for waste disposed of at Area G. The special analysis found no evidence for under-reporting of Am-241 for wastes disposed in the pits and shafts at Area G.

Therefore, no adjustments to the Am-241 inventory included in the PA/CA inventory database or model are necessary.

2.0 Background

Potential under-reporting of Am-241 in LANL-generated remediate nitrate salt waste streams was discovered while reviewing inventory records, specifically by comparing waste generator inventory estimates with certified assays using LANL-approved gamma spectral analysis equipment. This potential under-reporting was discovered during a review of transuranic (TRU) waste that is proposed for off-site disposal. However, because similar waste streams may have been disposed at Area G, this SA reviews records to determine if under-reporting of the Am-241 inventory at Area G has occurred and to correct the problem if it occurs.

As described in LANL Conduct of Engineering Calculation Document (Am-241 Under Reporting, CAL-54-MULT-01247) (LANL 2013),

“in the late 70’s and 80’s the radionuclide content for the majority of waste containers received at TA-54 Area G were reported as grams of Material Type XX (e.g., MT52 1 gram). This “Material Type” nomenclature was used to describe a common set of plutonium mixtures that were undergoing processing and analysis by TRU waste generators at LANL. During this period other radionuclides were not required to be reported by the generator. Radionuclide assays were not reported on the individual waste containers by the generator.”

“In recent years it was determined that the processes used at the Plutonium Facility to refine and purify the product, plutonium, consolidated unwanted isotopes such as Am-241 in the waste stream. In these cases, the ratio of plutonium isotopes remained the same for Pu-238, 239, 240, 241 and 242 but the ratio of Am-241, because of the consolidation, changed considerably. In this case the use of a material type nomenclature adequately describes the plutonium content in the waste matrix, but can significantly under-report the amount of Am-241 in the waste matrix.”

Document CAL-54-MULT-02147 (LANL 2013) calculated Am-241 correction factors (>1) by waste stream, which can be applied to individual waste containers to estimate their actual material-at-risk (MAR) inventory. The document/calculation applies to TRU waste containers at TA-54 Area G that are intended to be shipped off site and that have only generator assay information. However, because the under-reporting problem was identified for waste streams that have a common source to waste that is disposed underground at Area G, this SA reviews disposal records for waste that is intended to remain disposed at Area G to ensure that the PA/CA inventory estimates are correct.

3.0 Methods

The search and identification of potential under-reporting of the Am-241 inventory for nitrate salt waste at Area G were conducted using four approaches. The approaches are described in the following subsections.

We worked directly with the Waste Disposition, Waste Process Engineering Group (WD-WPE), to develop these approaches to identify containers for which the Am-241 may have been under reported. The guidance was to search the WCATS database and identify any nitrate salt waste generated during the evaporation process at TA-55 for which the Central Characterization Project (CCP) waste stream name contains “CIN” (i.e., cemented inorganic), “MIN” (i.e., mixed inorganic), and “MHD” (i.e., mixed heterogeneous debris). This waste stream would be dominated by Material Type PU52 (also known as MT52). The wastes should be non-retrievable TRU waste permanently stored below grade at TA-54 Area G. WD-WPE recommended including TA-50 waste in the search for completeness because TA-55 wastes could have been treated at the TA-50 radioactive liquid waste treatment facility. If any were found, conversion factors calculated by CAL-54-MULT-02147 (LANL 2013) would be applied to these waste stream inventories in PA/CA model updates.

3.1 TRU waste search in WCATS database

Steps were taken to search the WCATS database to find any nitrate salt waste stream that meets the following criteria:

1. CCP Waste Stream name of *CIN*, or *MIN*, or *MHD* for waste that was buried underground in either pits, shafts or trenches in TA 54 Area G.
2. Waste type: TRU
3. Waste pick up location: either TA-55 or TA-50 (TA-50 is included because liquid waste generated at TA-55 may have been treated at the TA-50 Radioactive Liquid Waste Treatment Facility)
4. Time frame for this analysis (late-1970s to mid-1980s)
(Note: The search conducted here was broadened and is not limited to this time frame.)

Using a FileMaker Pro database application connected with the LANL WCATS, search results show that for *CIN*, there is a total of 132 containers that meets the criteria listed above. The containers are currently located either in Pit 9 (119 containers) or in Trenches A-D (13 containers). Radioassay dates shown are from 1979 to 1986. Tables 3-1 and 3-2 show the Am-241 activities for the containers that are located in Pit 9 and Trenches A-D, respectively.

No CCP waste stream name for *MIN* was found that fits the criteria listed above.

Table 3-1 Identified TRU CCP waste stream *CIN* stored below grade in Area G Pit 9

Labeled ID	Current location LANL54-G-DISP	Pickup location	Waste description	Waste type	CCP waste stream ID	Am-241 activity (Ci)	Radioassay date
S793250	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	5.48	07/23/1979
S793194	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.18	07/23/1979
S793180	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.01	07/23/1979
S793596	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	11/07/1979
S791950	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.08	11/07/1979
S793475	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.88	11/07/1979
S793300	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	09/25/1979
S793302	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	09/25/1979
S791737	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.01	11/07/1979
S793514	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	09/25/1979
S793601	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	11/07/1979
S793063	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	5.93	05/21/1979
S790087	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	13.19	03/26/1979
S794251	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	11/07/1979
S793336	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	08/27/1979
S793593	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	11/07/1979
S791923	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.00	11/07/1979
S791927	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.15	11/07/1979
S793276	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	3.63	07/23/1979

S794244	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	11/07/1979
S790013	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.52	03/26/1979
S793451	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.53	11/07/1979
S793333	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	08/27/1979
S793600	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	11/07/1979
S793159	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	6.17	07/23/1979
S794246	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	11/07/1979
S793212	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.39	07/23/1979
S793113	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	1.26	05/21/1979
S791751	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	24.97	09/25/1979
S793292	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.37	07/23/1979
S791924	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.43	11/07/1979
S793312	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	09/25/1979
S790618	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	09/25/1979
S791926	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.12	11/07/1979
S791752	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.16	09/25/1979
S793331	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	08/27/1979
S793306	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	09/25/1979
S793308	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	09/25/1979
S793125	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	6.24	07/23/1979
S793429	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	11.88	09/25/1979
S793196	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	48.23	07/23/1979
S793599	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	11/07/1979
S794247	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	11/07/1979

S793515	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	09/25/1979
S790007	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.67	03/26/1979
S790619	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	09/25/1979
S793244	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	4.03	07/23/1979
S793303	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	09/25/1979
S793335	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	08/27/1979
S793216	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	6.87	07/23/1979
S790039	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	1.32	03/26/1979
S790008	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	1.24	03/26/1979
S790070	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	72.47	03/26/1979
S793490	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.39	11/07/1979
S791925	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.79	11/07/1979
S793309	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	09/25/1979
S790071	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.43	03/26/1979
S793110	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.25	05/21/1979
S793310	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	08/27/1979
S793404	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	12.87	09/25/1979
S790012	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.13	03/26/1979
S794252	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	11/07/1979
S793518	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	09/25/1979
S791934	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.20	11/07/1979
S793314	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	09/25/1979
S790098	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	2.34	03/26/1979
S794248	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	11/07/1979

S793410	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.95	09/25/1979
S790061	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.42	03/26/1979
S790010	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	1.10	03/26/1979
S793443	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	2.04	11/07/1979
S793516	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	09/25/1979
S793204	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.76	07/23/1979
S791736	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	1.30	11/07/1979
S794250	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	11/07/1979
S793330	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	08/27/1979
S790011	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.12	03/26/1979
S793520	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	09/25/1979
S793307	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	08/27/1979
S794249	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	11/07/1979
S793517	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	09/25/1979
S793311	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	09/25/1979
S793190	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	11.91	07/23/1979
S793178	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	5.46	07/23/1979
S793455	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	14.74	11/07/1979
S793706	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.49	11/07/1979
S793513	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	09/25/1979
S790085	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.51	03/26/1979
S791947	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.29	11/07/1979
S793313	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	08/27/1979
S793304	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	09/25/1979

S791754	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.36	09/25/1979
S793220	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	26.21	07/23/1979
S793597	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	11/07/1979
S794245	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	11/07/1979
S793332	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	08/27/1979
S793594	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	11/07/1979
S793598	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	11/07/1979
S791944	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.22	11/07/1979
S793172	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	1.62	07/23/1979
S793328	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	08/27/1979
S793707	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.13	11/07/1979
S793279	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	1.95	07/23/1979
S793305	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	09/25/1979
S793519	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	09/25/1979
S793143	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.43	05/21/1979
S793334	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	08/27/1979
S793152	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.03	07/23/1979
S790009	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.59	03/26/1979
S793512	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	09/25/1979
S793219	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.50	07/23/1979
S791948	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.05	11/07/1979
S793411	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.24	09/25/1979
S793329	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	08/27/1979
S793315	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	08/27/1979

S793595	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	11/07/1979
S791952	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	1.28	11/07/1979
S793025	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	1.33	03/26/1979
S793301	PIT09	TA50-000001	GENERATED AT 50-00001	TRU	LA-CIN02.001	0.00	09/25/1979

Table 3-2 Identified TRU CCP waste stream *CIN* stored below grade in Area G Trenches A-D

Labeled ID	Current location LANL54-G-DISP	Pickup location	Waste description	Waste type	CCP waste stream ID	Am-241 activity (Ci)	Radioassay date
S846104	TRENCH0A	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-CIN01.001	0.11	12/30/1984
S832274	TRENCH0A	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-CIN01.001	0.07	09/12/1983
S793768	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.10	12/12/1979
S802571	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.09	09/24/1980
S793769	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.03	12/12/1979
S816426	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-CIN01.001	0.10	09/15/1981
S803091	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-CIN01.001	0.02	09/24/1980
S846105	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-CIN01.001	0.13	12/30/1984
S845076	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-CIN01.001	0.17	07/29/1984
S822560	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-CIN01.001	0.16	07/25/1982
S842188	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-CIN01.001	0.18	04/04/1984
S824154	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-CIN01.001	0.14	07/25/1982
S844290	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-CIN01.001	0.04	04/04/1984

For the CCP Waste Stream *MHD*, there are 191 containers that meet the criteria listed above. The containers are currently located either in Pit 9 (17 containers) or in Trenches A-D (174

containers). Radioassay dates are from 1972 to 1985. Tables 3-3 and 3-4 show the Am-241 activities for the containers that are located in Pit 9 and Trenches A-D, respectively.

It is assumed that all TRU waste that is retrievably placed in Pit 9 and Trenches A-D will be removed from Area G and shipped for off-site disposal. Therefore, the containers identified in Tables 3-1 through 3-4 are not relevant for this special analysis, because they are not permanently-stored LLW that will remain in Area G. The identification of containers may, however, be relevant when considering the Am-241 inventory of the retrievable TRU waste as these containers are disposed elsewhere.

In addition to the four search criteria listed at the beginning of Section 3.1, we performed a similar search of the WCATS database using criteria 1, 3, and 4, and searched for “Waste type: LLW.” No waste in the database fit that full set of criteria. Therefore, it does not appear that LLW from TA-55 with the appropriate vintage and material type is disposed of at Area G, and therefore the under-reporting of Am-241 is not believed to be a concern.

Table 3-3 Identified TRU CCP waste stream *MHD* stored belowgrade at Area G Pit 9

Labeled ID	Current location LANL 54-G-DISP	Pickup location	Waste description	Waste type	CCP waste stream ID	Am-241 activity (Ci)	Radioassay date
S791740	PIT09	TA55-GEN-AREAS	GENERATED AT 55-00000	TRU	LA-MHD01.001	0.048076044	11/26/1979
S791742	PIT09	TA55-GEN-AREAS	GENERATED AT 55-00000	TRU	LA-MHD01.001	0.024038022	11/26/1979
S790093	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	1.284317173	03/26/1979
S783589	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.001373601	12/19/1978
S791932	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	1.044555074	11/07/1979
S793032	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0	03/26/1979
S793084	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.114661365	05/21/1979
S784383	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.042787679	12/19/1978
S791930	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00000	TRU	LA-MHD01.001	0.113322104	11/07/1979
S793483	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0	11/07/1979
S793102	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0	05/21/1979

S793091	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.000961521	05/21/1979
S784241	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.001717002	12/19/1978
S791935	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.001586509	11/07/1979
S783599	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	7.074046463	12/19/1978
S783597	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	7.142726525	12/19/1978
S783587	PIT09	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.002266442	12/19/1978

Table 3-4 Identified TRU CCP waste stream *MHD* stored belowgrade at Area G Trenches A-D

Labeled ID	Current location LANL54-G-DISP	Pickup location	Waste description	Waste type	CCP waste stream ID	Am-241 activity (Ci)	Radioassay date
S833927	TRENCH0A	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.09	09/12/1983
S846033	TRENCH0A	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	12/30/1984
S832210	TRENCH0A	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.04	09/12/1983
S832134	TRENCH0A	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	09/12/1983
S846030	TRENCH0A	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.01	12/30/1984
S832135	TRENCH0A	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	09/12/1983
S841631	TRENCH0A	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.07	12/30/1984
S832543	TRENCH0A	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	09/12/1983
S784359	TRENCH0C	TA55-PF4-BASEMENT	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.02	11/05/1978
S784347	TRENCH0C	TA55-PF4-BASEMENT	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.03	11/05/1978
S784349	TRENCH0C	TA55-PF4-BASEMENT	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.01	11/05/1978
S784344	TRENCH0C	TA55-PF4-BASEMENT	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.02	11/05/1978
S784362	TRENCH0C	TA55-PF4-BASEMENT	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.02	11/05/1978
S784350	TRENCH0C	TA55-PF4-BASEMENT	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.02	11/05/1978

S784244	TRENCH0C	TA55-PF4-BASEMENT	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.04	11/05/1978
S784351	TRENCH0C	TA55-PF4-BASEMENT	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.02	11/05/1978
S784357	TRENCH0C	TA55-PF4-BASEMENT	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.13	11/05/1978
S784354	TRENCH0C	TA55-PF4-BASEMENT	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.06	11/05/1978
S784358	TRENCH0C	TA55-PF4-BASEMENT	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.02	11/05/1978
S784247	TRENCH0C	TA55-PF4-BASEMENT	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.02	11/05/1978
S784342	TRENCH0C	TA55-PF4-BASEMENT	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.06	11/05/1978
S784360	TRENCH0C	TA55-PF4-BASEMENT	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.04	11/05/1978
S784245	TRENCH0C	TA55-PF4-BASEMENT	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.07	11/05/1978
S784355	TRENCH0C	TA55-PF4-BASEMENT	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.05	11/05/1978
S784356	TRENCH0C	TA55-PF4-BASEMENT	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.01	11/05/1978
S784345	TRENCH0C	TA55-PF4-BASEMENT	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.04	11/05/1978
S784248	TRENCH0C	TA55-PF4-BASEMENT	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.02	11/05/1978
S784343	TRENCH0C	TA55-PF4-BASEMENT	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.03	11/05/1978
S784246	TRENCH0C	TA55-PF4-BASEMENT	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.07	11/05/1978
S784346	TRENCH0C	TA55-PF4-BASEMENT	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.04	11/05/1978
S784348	TRENCH0C	TA55-PF4-BASEMENT	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.01	11/05/1978
S784352	TRENCH0C	TA55-PF4-BASEMENT	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.01	11/05/1978
S784363	TRENCH0C	TA55-PF4-BASEMENT	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.07	11/05/1978
S784353	TRENCH0C	TA55-PF4-BASEMENT	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.01	11/05/1978
S803087	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.02	09/24/1980
S793464	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.40	12/12/1979
S802591	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.02	09/24/1980
S793776	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.05	12/12/1979

S794402	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.01	12/12/1979
S793689	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.07	12/12/1979
S802643	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.06	09/24/1980
S816221	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.06	09/15/1981
S802590	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.05	09/24/1980
S802927	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.05	09/24/1980
S802593	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.02	09/24/1980
S793692	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.01	12/12/1979
S793695	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.09	12/12/1979
S846182	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.03	12/30/1984
S793766	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.06	12/12/1979
S793694	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.03	12/12/1979
S816225	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	09/15/1981
S802926	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.03	09/24/1980
S813534	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	09/15/1981
S816226	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	09/15/1981
S793696	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.02	12/12/1979
S793775	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.05	12/12/1979
S793693	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.28	12/12/1979
S793687	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.05	12/12/1979
S793688	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.03	12/12/1979
S816472	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.04	09/15/1981
S793697	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.04	12/12/1979
S793746	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.03	12/12/1979

S793781	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.01	12/12/1979
S803067	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.25	09/24/1980
S846183	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	12/30/1984
S811649	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.03	09/15/1981
S793698	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.22	12/12/1979
S802586	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.05	09/24/1980
S816216	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	09/15/1981
S802588	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.29	09/24/1980
S794451	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.03	12/12/1979
S833934	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.01	09/12/1983
S802924	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.05	09/24/1980
S813529	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	09/15/1981
S813527	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.14	09/15/1981
S816348	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	09/15/1981
S816220	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.01	09/15/1981
S832544	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	09/12/1983
S833349	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.07	09/12/1983
S813336	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.08	09/15/1981
S811794	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.09	09/15/1981
S833520	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.13	09/12/1983
S802572	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.04	09/24/1980
S794403	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.01	12/12/1979
S813528	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	09/15/1981
S816349	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	09/15/1981

S793745	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.06	12/12/1979
S793467	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.40	12/12/1979
S846180	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.01	12/30/1984
S793701	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.25	12/12/1979
S811710	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.03	09/15/1981
S803095	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.07	09/24/1980
S813526	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.03	09/15/1981
S816217	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.14	09/15/1981
S811713	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.19	09/15/1981
S816223	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.19	09/15/1981
S803096	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.11	09/24/1980
S832132	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.01	09/12/1983
S793462	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.02	12/12/1979
S793721	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.06	12/12/1979
S811711	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.05	09/15/1981
S832545	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.07	09/12/1983
S843669	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.01	12/30/1984
S793463	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.02	12/12/1979
S793691	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.01	12/12/1979
S793699	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.10	12/12/1979
S803089	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.03	09/24/1980
S813628	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.03	09/15/1981
S793690	TRENCH0C	TA55-PF4-400-AREA	GENERATED AT 55-00004	TRU	LA-MHD01.001	0.02	12/12/1979
S816224	TRENCH0C	TA55-PF4-200-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.04	09/15/1981

S816222	TRENCH0C	TA55-PF4-200-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.08	09/15/1981
S844633	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.09	07/29/1984
S822741	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.07	07/25/1982
S845081	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	07/29/1984
S841257	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.04	12/30/1984
S842185	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.03	04/04/1984
S825662	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.01	12/15/1982
S851732	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.07	12/02/1985
S816350	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.01	09/15/1981
S824672	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	12/15/1982
S824452	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.04	12/15/1982
S824696	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.20	12/15/1982
S842184	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.37	04/04/1984
S824995	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.04	12/15/1982
S824608	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	12/15/1982
S842547	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	04/04/1984
S842186	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.01	04/04/1984
S825798	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.04	12/15/1982
S824453	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	12/15/1982
S845084	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.05	07/29/1984
S822563	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.01	07/25/1982
S822689	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.10	07/25/1982
S824157	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.05	07/25/1982
S853621	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.13	12/02/1985

S813338	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	09/15/1981
S853622	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.12	12/02/1985
S813347	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	09/15/1981
S845214	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.03	12/30/1984
S824603	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.04	12/15/1982
S851578	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.06	12/02/1985
S824673	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.07	12/15/1982
S822691	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.05	07/25/1982
S844632	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.05	07/29/1984
S841259	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	12/30/1984
S822742	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.01	07/25/1982
S844246	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-00002	TRU	LA-MHD01.001	0.06	04/04/1984
S823077	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.01	07/25/1982
S845215	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.03	07/29/1984
S852512	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	12/02/1985
S822562	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	07/25/1982
S842352	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.03	04/04/1984
S822656	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.01	07/25/1982
S844566	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	07/29/1984
S851428	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.08	12/02/1985
S853066	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.05	12/02/1985
S842392	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	04/04/1984
S844266	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.08	04/04/1984
S853064	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	12/02/1985

S822568	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.01	07/25/1982
S822688	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.05	07/25/1982
S851731	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.03	12/02/1985
S824162	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	07/25/1982
S844190	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	04/04/1984
S824695	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.03	12/15/1982
S816218	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.01	09/15/1981
S824158	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.05	07/25/1982
S851733	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.01	12/02/1985
S824992	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	12/15/1982
S824156	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	07/25/1982
S851429	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.03	12/02/1985
S844634	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF5	TRU	LA-MHD01.001	0.01	07/29/1984
S842391	TRENCH0D	TA55-PF4-400-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.01	04/04/1984
S816219	TRENCH0D	TA55-PF4-200-AREA	GENERATED AT 55-PF4	TRU	LA-MHD01.001	0.02	09/15/1981
S822564	TRENCH0D	TA55-GEN-AREAS	GENERATED AT 55-00029	TRU	LA-MHD01.001	0.12	07/25/1982

3.2 *Identify waste that was generated as TRU and that assayed as LLW*

In order to ensure that all the potential TRU waste containers of concern for this analysis are counted, we also performed a search for the population of CIN, MIN, and MHD containers that were initially classified as TRU waste but later reclassified as LLW. The intent of this search was to determine if some waste coming from a TRU waste stream may have been reclassified as LLW following assay. The search found no containers that were initially classified as TRU that were later assayed as LLW. Therefore this search criterion did not identify any waste packages that might have a potential for Am-241 under-reporting.

3.3 *Pre-1971 inventory*

The Area G Pre-1971 waste inventory consists of all the waste buried underground in Area G pits and shafts. This waste inventory is not documented in WCATS, but is reported on in the Performance Assessment and Composite Analysis (LANL 2008) and, more recently, in the report “Radioactive Waste Inventory for Los Alamos National Laboratory Technical Area 54, Area G, Revision 2,” (French and Shuman, 2015), hereafter, “The Revision 2 Inventory Report.” The waste is not characterized by container as these data were not documented during the time period when the waste was generated and disposed. The Pre-1971 inventory is evaluated in this current analysis to determine if Am-241 is under-reported and to quantify the types of materials present. The information in Tables 9, 31, and 32 of the Revision 2 Inventory Report (French and Shuman, 2015) forms the basis of this analysis. Table 9 summarizes the volumes and activities of the Pre-1971 waste. Tables 31 and 32 summarize, by material type and/or nuclide activity or mass, the contents of the disposal pits and shafts, respectively.

The material types (MT) reported include the plutonium material types (PUxx), uranium material types (Uxx), thorium material type 88 (TH88), mixed fission products (MFP), and mixed activation products (MAP). The weight percent distributions for the material types are documented in NucDataR02B (2009), and these distributions permit the conversion from material type to isotopic values.

Table 3-5 summarizes the inventory by nuclide for the pits and shafts, as given in Tables 31 and 32 of French and Shuman (2015). The table also incorporates additional inventory by nuclide originating from the material type (MT) inventories, documented in Tables 31 and 32 (French and Shuman 2015), to obtain the total mass of Pre-1971 inventory for each nuclide. The total Pu mass, total activity, and TRU alpha activity are calculated along with the mass weight percent to the total Pu mass (wt% to Pu), and the weight percents for typical weapons grade plutonium, Material Type PU52. The results of this evaluation suggest that the inventory is similar to PU52 with an abundance of Am-241 (2.33% vs 0.2%) as well as abundances of U-234, U-235, and U-238. Decay correcting the plutonium and Am-241 further increases the wt% of Am-241 to 2.40%. Consequently, we conclude that Am-241 is not under-reported in the pre-1971 inventory.

The total TRU isotope alpha activity is 9.45×10^4 Ci (Table 3-5). Table 9 of French and Shuman (2015) reports a total volume of waste for the pre-1971 inventory as 5.4×10^4 m³. Assuming the density of this waste can be represented by combinations of cement, gypsum, limestone, and sandstone, the waste mass can be determined with a density ranging from 2.14 to 3 g/cm³. Consequently, the TRU isotope alpha concentration ranges from 58.3 to 81.8 nCi/g, confirming that, on average, the waste is LLW (≤ 100 nCi/g). Because the uncertainty ranges near 20%, a two sigma (2σ) uncertainty means that the waste concentration could range up to 81.8 ± 32.7 nCi/g for individual packages within this waste.

The plutonium and Am-241 waste was decay corrected from 1976 (from whence the inventory was determined) to the present day (Sep 2016).

Table 3-5 Pre-1971 Inventory by Isotope

Nuclide	Pits - Table 31 (French and Shuman, 2015)		Shafts - Table 32 (French and Shuman, 2015)		MT	Total Mass	Total Pu Mass	TRU Alpha	wt% to Pu	wt% PU52	wt% in Sep 2016
	Ci	g	Ci	g	g	g	g	Ci	%		%
Ac227	0.12	1.0E-02			0	1.16E-02		0.00E+00	0.00%		a
Am241	2.30E+03	35	2.0E-08		74.7304	7.73E+02		2.68E+03	2.33%	0.20%	2.40%
Am243				0.1	0	1.00E-01		2.02E-02	0.00%		a
Be7					3.76E-23	3.76E-23		0.00E+00	0.00%		a
Ce144					0.001411	1.41E-03		0.00E+00	0.00%		a
Cf249	7.00E-04	4.2E-04			0	5.89E-04		2.44E-03	0.00%		a
Cf251		1.7E-03			0	1.70E-03		2.72E-03	0.00%		a
Cf252	1.50E-02			7.50E-03	0	7.53E-03		0.00E+00	0.00%		a
Cm244		2.1E-05		2.90E-06	0	2.39E-05		0.00E+00	0.00%		a
Co57					5.8E-06	5.80E-06		0.00E+00	0.00%		a
Co60			18		0.063461	7.93E-02		0.00E+00	0.00%		a
Co60					0.063461	6.35E-02		0.00E+00	0.00%		a
Cs137	2.50E-01		0.63		19.86324	1.99E+01		0.00E+00	0.06%	0.00%	a
Eu152			0.12		0	6.74E-04		0.00E+00	0.00%		a
Eu154					0.000329	3.29E-04		0.00E+00	0.00%		a
Eu155					0.001293	1.29E-03		0.00E+00	0.00%		a
H3	2.7		6.1E+04		0	6.25E+00		0.00E+00	0.02%		a
Kr85	1.70E-03				1.749043	1.75E+00		0.00E+00	0.01%		a
Kr85					1.749043	1.75E+00		0.00E+00	0.01%		a
Mn54					2.91E-05	2.91E-05		0.00E+00	0.00%		a
Na22					0.003743	3.74E-03		0.00E+00	0.00%		a
Np237		5.6		0.21	0	5.81E+00		4.14E-03	0.02%		a
Pu238	720	180	7.8E-08	0.33	30.96681	2.53E+02	2.53E+02	4.38E+03	0.76%	0.01%	0.55%
Pu239	120	810	9.8E-08	332	27733.68	3.08E+04	3.08E+04	1.94E+03	92.94%	93.78%	93.33%
Pu240	4.5			0.15	1976.38	2.00E+03	2.00E+03	4.59E+02	6.03%	6.00%	6.04%
Pu241	8.3			5.20E-05	78.21526	7.83E+01	7.83E+01	0.00E+00	0.24%	0.20%	0.04%
Pu242	3.10E-05			3.00E-02	12.45784	1.25E+01	1.25E+01	4.96E-02	0.04%	0.02%	0.04%
Ra226			0.1		0	1.00E-01		0.00E+00	0.00%		a
Ru106					0.005854	5.85E-03		0.00E+00	0.00%		a

Sb125				0.000525	5.25E-04	0.00E+00	0.00%		a
Sm151				0.000964	9.64E-04	0.00E+00	0.00%		a
Sn121m				0.014818	1.48E-02	0.00E+00	0.00%		a
Sn126				5.083462	5.08E+00	0.00E+00	0.02%		a
Sr90	0.29		1.1	8.921583	8.93E+00	0.00E+00	0.03%		a
Th230	17		5.7E-04	0	8.33E+02	0.00E+00	2.52%		a
Th232	1.90E-10			150	0	1.50E+02	0.00E+00	0.45%	a
U233	6.1			150	0	7.75E+02	0.00E+00	2.34%	a
U234	5.00E-06			1.30E-03	614.6979	6.15E+02	0.00E+00	1.86%	0.00% 2.07%
U235	0.38	130		6.00E+03	64838.05	2.44E+05	0.00E+00	738.10%	0.10% 741.24%
U236				1.80E-03	50.96802	5.10E+01	0.00E+00	0.15%	0.18%
U238	4.40E+00			4.00E+00	26560668	3.95E+07	0.00E+00	119257%	119979%
Zn65				2.19E-06	2.19E-06	0.00E+00	0.00%		a
TOTALS					3.98E+07	3.31E+04	9.45E+03		

3.4 *Underground inventory subsequent to 1971*

The inventory data for the TRU and LLW containers disposed underground at Area G subsequent to 1971 are included in the WCATS and are identified by the appropriate LANL waste stream. Some of the TRU waste, but none of the LLW, has been evaluated by the CCP for shipment to WIPP and also has appropriate CCP waste stream identification. Of the aboveground TRU waste already shipped to WIPP containing the CCP CIN, MIN, and MHD, waste streams originating from either TA-50 or TA-55 have been identified as having under-reported the amount of Am-241. By correlating the CCP CIN, MIN, and MHD waste streams already shipped, the associated LANL waste stream can be identified and used to further evaluate the underground inventory of both LLW and TRU waste generated subsequent to 1971. Only the non-retrievable waste is of interest in this evaluation.

3.4.1 *CIN, MIN, and MHD Containers Shipped to WIPP*

Table 3-6 depicts the CIN CCP waste stream and the associated LANL waste stream ID (WS_ID) for containers that have been shipped to WIPP. A total of 1072 containers has been shipped. For example, LANL WS_ID 197 has 3 containers in CCP waste stream LA-CIN01.001. A container is usually a 55- or 85-gal drum, or a standard waste box.

Table 3-6 CCP CIN Waste Streams Shipped to WIPP

Count of WS_ID	CCP Waste Stream		Grand Total
WS_ID	LA-CIN01.001	LA-CIN02.001	
197	3		3
516	7		7
563	54		54
8332		7	7
12244		10	10
13944	631	33	664
15588		17	17
17664		11	11
21832		12	12
22223		9	9
23241	1		1
28588	30		30
34011	1		1
37017	153	93	246
Grand Total	880	192	1072

The CCP MIN waste streams and associated LANL waste streams for containers that have been shipped to WIPP are shown in Table 3-7.

Table 3-7 CCP MIN Waste Stream shipped to WIPP

Count of WS_ID	CCP Waste Stream			Grand Total
WS_ID	LA-MIN02-V.001	LA-MIN03-NC.001	LA-MIN04-S.001	Grand Total
396	2		1	3
397			1	1
406	2			2
407	3			3
463	1			1
576			1	1
579	1			1
13944	333	404	50	787
37017	3	3311	1	3315
Grand Total	345	3715	54	4114

Table 3-8 depicts the CCP MHD waste streams and the associated LANL waste stream (WS_ID) for containers that have been shipped to WIPP. The MHD waste streams include: LA-MHD01.001, LA-MHD01.001, LA-MHD02-PTX.001, LA-MHD03.001, LA-MHD04.001, LA-MHD05-ITRI.001, LA-MHD08.001, LA-MHD09.001, and LA-MHD10.001.

Table 3-8 CCP MHD Waste Stream shipped to WIPP

WS_ID	Count of MHD Containers	WS_ID	Count of MHD Containers	WS_ID	Count of MHD Containers
186	1	312	1	419	1
187	2	315	2	421	1
189	1	318	8	427	1
194	1	322	4	428	1
199	2	323	2	429	1
200	3	325	1	432	6
208	1	326	5	433	1
211	1	327	2	435	1
213	1	330	10	436	1
219	1	331	1	437	1
234	2	333	2	443	1
235	6	334	1	444	2
240	6	337	1	445	2
242	10	339	1	448	2
243	11	340	11	452	3
245	1	341	6	453	31
248	4	344	1	458	4
252	1	345	1	464	66
254	4	346	1	471	2
255	1	350	2	477	10
257	1	354	1	478	3
258	12	359	1	479	36
260	1	363	1	480	22
261	3	365	3	481	32
263	1	368	6	483	3
266	2	372	2	484	61
267	4	373	1	485	1
269	2	374	2	492	1
271	5	375	1	494	8
272	1	378	8	500	59
278	1	380	20	502	37
279	1	381	2	513	3
281	2	382	1	517	2
285	1	383	1	526	2
286	2	384	1	544	53
287	3	387	1	547	2
289	1	389	1	549	2
290	1	391	1	551	3
291	1	396	380	552	3
292	1	397	164	553	3
294	1	398	8	554	38
295	1	400	21	555	8
299	8	406	316	556	7
300	2	408	1	557	45
302	1	411	1	558	21
303	1	413	1	559	3
304	1	416	1	560	1
305	1	417	1	561	6
309	1	418	6	562	1

Table 3-8 CCP MHD Waste Stream shipped to WIPP (cont)

WS_ID	Count of MHD Containers	WS_ID	Count of MHD Containers
567	2	32178	24
576	414	32247	2
583	584	32248	1
585	1	32531	1
590	3	32634	3
595	6	32638	4
596	4	32639	2
602	7	32710	45
604	35	32979	3
605	3	33005	2
607	5	33193	8
608	1	33222	1
609	1	33227	1
612	1	33510	1
614	1	33539	15
618	1	33540	19
623	3	33541	7
625	1	33542	1
629	1	33543	1
636	9	34152	19
639	50	34153	4
640	8	34170	1
644	1	34171	1
645	4	34329	2
652	137	34330	15
653	29	34331	2
654	1	34332	5
657	10	34334	29
658	12	34348	4
664	190	37017	2013
2973	3	37435	6
3307	7		
10939	27	Grand	
10942	2	Total	11537
13944	5915		
14876	1		
15284	1		
16584	2		
16627	2		
16813	12		
17505	5		
17506	1		
17959	2		
19637	1		
21872	1		
23241	41		
23295	1		
27354	1		
28870	1		

3.4.2 Underground LLW and TRU containers originating at TA50 or TA55

A search of all underground TRU and LLW originated at TA-50 or TA-55 that are in pits, trenches, or shafts identified 29,854 containers. Of these, 28,682 are LLW and 1172 are TRU waste. Table 3-9 depicts the TRU containers by LANL waste stream. Only WS_ID 37017 containers, Legacy TRU waste containers without a WPF (Waste Profile Form), have been shipped to WIPP as noted above. All of these containers are located in Pits 6, 7, 8, 9 and Trenches A, C, and D, as shown in Table 3-10. Out of these containers, those located in Pit 9 and Trenches A-D are retrievably placed TRU and will be removed from Area G and shipped for off-site disposal. That leaves only 13 containers in this TRU waste group, located in Pits 6, 7 and 8. Table 3-11 lists further information from WCATS for these 13 containers. It shows that all 13 containers originated from 1971 to 1974, which is before the nitrate salt evaporation processing developed date (late-1970s to mid-1980s). Therefore, there are no LANL TRU waste stream containers associated with nitrate salt waste disposed permanently at Area G and therefore, no under-reporting of Am-241.

Table 3-9 TRU Underground Waste Streams and Containers

WS_ID	Count of Containers
499	2
522	1
33416	2
37017	1167
Grand Total	1172

Table 3-10 TRU Underground Containers by Location

Count of WS_ID	WS_ID				Total
Current Location	499	522	33416	37017	
LANL 54-G-DISP PIT06				7	7
LANL 54-G-DISP PIT07				1	1
LANL 54-G-DISP PIT08				5	5
LANL 54-G-DISP PIT09				965	965
LANL 54-G-DISP SHAFT262	1				1
LANL 54-G-DISP SHAFT263			1		1
LANL 54-G-DISP SHAFT264			1		1
LANL 54-G-DISP SHAFT265	1				1
LANL 54-G-DISP SHAFT266		1			1
LANL 54-G-DISP TRENCH0A				10	10
LANL 54-G-DISP TRENCH0C				108	108
LANL 54-G-DISP TRENCH0D				71	71
Grand Totals	2	1	2	1167	1172

Table 3-11 Identified TRU Underground Waste Streams and Containers in Pit 6, 7 and 8

<i>Drum ID</i>	<i>Waste Type</i>	<i>Location LANL 54-G- DISP</i>	<i>Pickup Location</i>	<i>WS_ID</i>	<i>Originated date</i>	<i>Am-241 (g)</i>	<i>WIPP waste stream</i>
S730406	TRU	PIT08	TA50	37017	3/29/1973	0.0000	vacuum filter cake
S721135	TRU	PIT08	TA50	37017	10/30/1972	0.0019	vacuum filter cake
S710033	TRU	PIT06	TA50	37017	3/16/1971	0.0000	vacuum filter cake
S710031	TRU	PIT06	TA50	37017	3/2/1971	0.0000	vacuum filter cake
S710034	TRU	PIT06	TA50	37017	3/22/1971	0.0000	vacuum filter cake
S710030	TRU	PIT06	TA50	37017	3/11/1971	0.0000	vacuum filter cake
S721137	TRU	PIT08	TA50	37017	12/30/1972	0.0022	cemented caustic liquid waste
S720623	TRU	PIT08	TA50	37017	9/29/1972	0.0025	vacuum filter cake
S710035	TRU	PIT06	TA50	37017	3/28/1971	0.0000	vacuum filter cake
S720621	TRU	PIT08	TA50	37017	7/30/1972	0.2654	vacuum filter cake
S004105	TRU	PIT07	TA50	37017	10/21/1974	0.0000	vacuum filter cake
S710021	TRU	PIT06	TA50	37017	1/13/1971	0.0000	vacuum filter cake
S710032	TRU	PIT06	TA50	37017	3/9/1971	0.0000	vacuum filter cake

Note: Comment log contents for the 4 containers that show non-zero Am-241 quantities:

S721135: sludge -1 drum contained tritium organic solution

S721137: cement treatment sludge-1drum tritium organic solution

S720623: chemical treatment sludge-equiv Pu239 13.362 drums H3 organic solution

S720621: sludge drums with Pu239 equiv 14.03 1 drum H3 organic solution

Table 3-12 depicts the LANL waste streams associated with the underground LLW inventory that originated at TA-55, and Table 3-13 shows the same information for waste streams that originated at TA-50. These WS_IDs, when matched against the WS_IDs that were shipped to WIPP (Tables 3-6, 3-7, and 3-8), indicate that there is no overlap in the two sets of waste streams. Therefore, there are no LANL LLW waste streams buried in Area G that are associated with under-reporting of Am-241.

Table 3-12 LLW Waste Stream ID at TA-55

WS_ID	Count of C_ID	WS_ID	Count of C_ID
810	1	16109	1
841	1	16110	24
2288	5287	16499	1
2863	104	16708	1
3538	88	17418	2
3958	22	18056	1
5484	1	18092	21
5753	1	18992	1
8962	29	19392	1
10067	27	20475	7
10113	451	21830	19
10595	1	23840	1
10934	1	26973	13
10945	1	27231	1
11100	270	32050	1
11168	1	32514	14
11648	1	32515	5
11654	1	32581	60
11767	79	32630	1
11804	1	32647	77
11805	1	33174	1
11921	1	33387	1
11922	1	33639	1
12013	1	33681	11
12083	1	33713	1
12179	15	33714	1
12194	1	33732	1
12393	3	33758	1628
12395	1	33767	1
12621	1	33775	51
13242	7	33782	4
13432	4	33863	24
14070	72	33980	1
14331	15	34142	3
14426	428	34947	29
14682	3607	35716	2024
15023	1	35717	2
15102	1	35720	86
15393	3	Grand Total	14664
15394	1		
15464	2		
15662	1		
15780	5		
16023	1		

Table 3-13 LLW Waste Stream ID at TA-50

WS_ID	Count of C_ID	WS_ID	Count of C_ID	WS_ID	Count of C_ID	WS_ID	Count of C_ID
949	2	10895	5	19435	11	28026	1
1425	1	10904	1	19671	1	28089	1
1735	3	11189	1	19770	2	28090	1
1779	7	11654	1	20101	1	28209	245
2510	83	11664	1	20699	12	28318	1
2668	82	11711	25	20841	1	28435	2
2726	528	11712	1	21064	2	28567	58
2833	1411	11724	2	21406	1	28866	3
2912	36	11780	2	21541	1	28881	1
3101	74	11855	977	21880	3	28906	1
3246	589	11856	446	21907	1	28943	13
3272	367	11857	1	22133	1	28944	14
3289	766	11904	17	22134	5	29286	1
3295	36	12267	2	22212	2	29327	6
3455	101	12973	1	22318	1	29387	2
3468	36	13151	36	22319	4	29430	3
3523	15	13217	1	22731	17	29783	5
3572	1	13256	1	22775	8	29799	1
4126	1762	13400	56	23095	11	29803	2
4841	1	13490	1	23783	1	29806	2
4849	17	13568	23	24983	1	29807	2
4879	15	13591	1	25603	1	29888	1
4971	2	13838	6	25639	4	29936	5
5127	52	13936	2	25640	6	29944	1
5128	1	14002	5	25777	1	29953	1
5452	1	14018	1	25804	5	30017	5
5486	2	14194	1	25992	2	30255	2
5515	5	14426	5	26410	18	30456	10
5548	5	14445	2	26551	5	30457	212
5672	7	14920	4	26596	4	30483	63
5731	45	15071	1	26597	10	30487	2
6016	1	15194	1	26604	2	30916	1
6079	1	15656	5	26649	1	30974	3
6104	4	15680	3	26876	7	31352	10
6121	5	15733	6	26879	1	31440	3
6206	1	15866	1	26980	6	31554	1
6415	2	16020	23	27057	1	33123	4
6462	1	16549	32	27093	30	33361	1
7614	2	16705	991	27094	3	33733	12
7928	1	16865	1	27125	12	34041	1
8037	10	17179	8	27126	9	34696	1
8138	1	17434	91	27227	1	35716	2658
8251	1218	17980	17	27228	2	35717	13
8337	5	17998	1	27415	12	35720	97
8726	1	18011	9	27436	10	36699	1
8928	1	18419	1	27662	1	39777	1
9204	3	19177	4	27729	3	39795	1
9680	1	19282	11	27821	1	Grand Total	14018
10228	141	19341	5	27919	1		
10781	3	19353	2	28025	1		

4.0 Conclusion

In this special analysis, four approaches were used to address potential under-reporting of Am-241 in the Area G Inventory. These approaches combined together provided a thorough coverage of the potential waste stream of concern – below grade CCP TRU waste streams “CIN”, “MIN” and “MHD” generated at TA-55 or TA-50 during the time period between the late-1970s and the mid-1980s. This analysis also checked further into the pre-1971 non-retrievable waste inventory (before the time frame of concern for this analysis – the late-1970s to mid-1980s for this analysis) and by cross checking waste streams for TRU waste generated at TA-55 or TA-50 and shipped to WIPP against waste streams for LLW and TRU also generated at TA-55 or TA-50 and disposed at Area G.

The results of this Special Analysis are summarized as follow:

- 1) For the search for TRU waste associated with TA-55 or TA-50 in the WCATS database:

All TRU CCP waste streams of type CIN, MIN and MHD stored below grade in Area G that were generated at TA-55 or TA-50 are retrievably placed in either Pit 9 or trenches A-D.

CIN (132 containers): 119 containers in Pit 9 and 13 containers in trenches A-D,
radioassay dated from 1979 to 1986

MHD (191 containers): 17 containers in Pit 9 and 174 containers in trenches A-D,
radioassay dated from 1972 to 1985

MIN (0 containers)

It is assumed all TRU waste that is retrievably placed in Pit 9 and Trenches A-D will be removed from Area G and shipped for off-site disposal, therefore all the containers identified by this approach (Tables 3-1 through 3-4) are not relevant for this special analysis because they are not permanently-disposed LLW that will remain in Area G. These container listings may, however, be relevant when considering the Am-241 inventory of the retrievable TRU waste when that waste is transferred elsewhere for disposal.

No containers identified as LLW with these same search criteria were found in WCATS.

- 2) Search for the population of CIN, MIN, and MHD containers that were initially classified as TRU waste but later reclassified as LLW following a radio assay. No containers were found that fit this search criteria.

- 3) The overall isotopic distribution in pre-1971 waste is like material type PU52 but with an abundance of Am-241. There is also an abundance of U-235 and U-238 in this waste. Analysis concludes that Am-241 is NOT under-reported in the pre-1971 inventory.
- 4) Through correlating the CCP CIN, MIN and MHD waste streams already shipped to WIPP, the associated LANL waste streams were identified for evaluating the underground inventory of both LLW and TRU waste generated subsequent to 1971. Search results show that for non-retrievable wastes that were originated at either TA-55 or TA-50, there are no LANL waste streams that are associated with the under-reporting of Am-241 inventory for remediated nitrate salt waste streams that went through an evaporation process at TA-55 during the time period from the late-1970s to the mid-1980s.

This special analysis 2016-001 documents the potential Am-241 under-reporting issue and reviews relevant data from the WCATS database and for pre-1971 waste to determine the potential impact with respect to the Am-241 inventory for waste disposed of at Area G. The special analysis found no evidence for under-reporting of Am-241 for wastes disposed in the pits and shafts at Area G. Therefore, no adjustments to the Am-241 inventory included in the PA/CA inventory database or model are necessary.

5.0 References

Chu, S., K. Birdsell, P. Stauffer, and R. Shuman, 2017, *Special Analysis: 2016-003, Upgrade of Area G PA-CA Model to Updated Versions of GoldSim Software and to LANL Analysts*, Los Alamos National Laboratory Report LA-UR-17-20616, February.

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LANL, 2008, *Performance Assessment and Composite Analysis for Los Alamos National Laboratory Technical Area 54, Material Disposal Area G - Revision 4*, Los Alamos National Laboratory Report LA-UR-08-06764, October.

LANL, 2013, *Conduct of Engineering, Calculation Document: Am-241 Under Reporting*, CAL-54-MULT-01247, Form No. AP-341-605-FM02, Rev. 3, Effective Date 7/24/13.

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Software QA for NucDataR02B, WDP-DO-09-0233, Los Alamos National Laboratory Memorandum, Dec 15, 2009 and the associated Excel Utility (NucDataR02C.xlsx).

Veilleux, J.M., 2005, *Determination of Plutonium Mass Fractions and Uncertainties from Waste Assay Measurements*, Los Alamos National Laboratory Report LA-UR-05-8922, November.

Appendix A

Unreviewed Disposal Question Evaluation, UDQE 1601

**WDP Unreviewed Disposal Question
Evaluation (UDQE) and Special Analysis (SA) Process**

UET

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ATTACHMENT 1

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UNREVIEWED DISPOSAL QUESTION EVALUATION WORKSHEET

Unreviewed Disposal Question Evaluation Worksheet		
8.1[1] UDQE Number: 1601	8.1[2] Date: 03-Aug-2016	
Section 1: Proposed Activity		
8.1[3] Reconsidering the inventory for Am due to ingrowth in post-1988 LLW and pre-1988 CA waste.		
8.1[4] Section 1.1: Summary description of activity/change Under-reporting of Am ingrowth for Pu waste streams may have occurred because of the method for reporting accountable special nuclear material.		
8.1 [6] Section 1.2: Reference		
8.1[7] Section 1.3: Is the activity/change addressed by a previous UDQE or the LLW authorization basis documents?	☐ YES	☒ NO
8.1[8][A][a] UDQE No.:	Date of UDQE:	
8.1[8][A][b] Justification for not requiring a UDQE		

**WDP Unreviewed Disposal Question
Evaluation (UDQE) and Special Analysis (SA) Process**

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UNREVIEWED DISPOSAL QUESTION EVALUATION WORKSHEET

8.1[1] UDQE Number: 1601		8.1[2] Date: 03-Aug-2016	
8.1[10] Section 2: UDQE- Screening			
2.1 Waste Characteristics		☒ Not Applicable	
a.	Does the requested variance to the Area G WAC involve a technical issue (including radionuclide content, container specifications, amount of void space in containers, waste form, etc.)?	☐ YES	☐ NO
b.	Does disposal of radioactive waste within Area G which requires a variance to the LANL WAC, P 930-1?	☐ YES	☐ NO
c.	Does the proposed activity involve the retrieval of below ground waste?	☐ YES	☐ NO
2.2 Disposal Practices		☒ Not Applicable	
a.	Does the depth of waste placement exceed the depth of placement modeled in the PA/CA?	☐ YES	☐ NO
b.	Will the distance between the top of the disposed waste and the ground surface be less than the distance specified in the PA/CA?	☐ YES	☐ NO
2.3 Procedures /Documents/Systems		☐ Not Applicable	
a.	Does the procedure or process changes define, control or administer LLW characterization and/or disposal activities?	☐ YES	☒ NO
b.	Does the activity invoke changes to DAS?	☐ YES	☒ NO
c.	Does the activity change the Chem/LL database information that impacts LLW volume, activity, and or mass information, or the methods for calculating database quantities?	☒ YES	☐ NO
2.4 Site/Facility Construction		☒ Not Applicable	
a.	Does the proposed activity involve the addition/modification of structures, affect water runoff configurations, or impact the characterization/monitoring wells and/or equipment which are currently located at Area G?	☐ YES	☐ NO
b.	Does the proposed activity bring the facility/site back into compliance with current assumptions regarding site configurations and operations as defined within PA/CA and applicable Area G disposal authorization basis documents?	☐ YES	☐ NO
c.	Does the proposed activity involve the drilling of new boreholes or monitoring wells?	☐ YES	☐ NO
d.	Will the proposed activity require changes in site grading or storm waste runoff control provisions?	☐ YES	☐ NO
2.5 New Disposal Unit Construction		☒ Not Applicable	
a.	Do any design parameters differ from the PA/CA and applicable Area G disposal authorization basis documents? These parameters include, but are <u>not</u> limited to, disposal unit dimensions, distance of units from the mesa edge, and depth of disposal units.	☐ YES	☐ NO
b.	Is there construction of new site structures or facilities?	☐ YES	☐ NO
c.	Is there construction activities for removal of existing site structures or features?	☐ YES	☐ NO
d.	Is there construction activities for creation of new disposal units (pits and shafts)?	☐ YES	☐ NO
2.6 Interim/ Final Disposal Unit Closure		☒ Not Applicable	
a.	Will the minimum depth of cover between the top of the waste and the ground surface be less than that specified in the PA/CA and applicable DAB documents?	☐ YES	☐ NO
b.	Do any design parameters of the cover differ from the PA/CA and applicable Area G disposal authorization basis documents? These parameters include, but are <u>not</u> limited to, slope, material properties, performance characteristics, and depth.	☐ YES	☐ NO
c.	Does the proposed activity affect the closure of active disposal pits and shafts or installation of operational or final covers?	☐ YES	☐ NO

**WDP Unreviewed Disposal Question
Evaluation (UDQE) and Special Analysis (SA) Process**

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8.1[1] UDQE Number: 1601	8.1[2] Date: 03-Aug-2016	
If the answers to all applicable questions in Section 2 are "No", the activity/change does constitute a UDQ; proceed to Section 3: UDQ Evaluation Summary and Approval.		
Section 3: UDQ Evaluation Summary and Approval		
UDQ Number: 1601	Date: 03-Aug-2016	
8.1[11] ☐	This activity/change does <u>not</u> (all responses are "No") constitute a UDQ	
☒	This activity/change does (at least one response is "YES") constitute a UDQ and a Special Analysis is required prior to implementing the activity/change	
Under-reporting of Am inventory in the waste disposed at Area G may have occurred. The significance of this under-reporting has not been assessed. Changes to the inventory model and the subsequent dose projections calculated for both the PA and CA waste may result if this under-reporting is confirmed.		
8.1[12] UDQ Evaluator		
Name (Print) Kay Birdsell	Signature: <i>Kay Birdsell</i>	Date: 8/3/16
8.1[13] UDQE Reviewer		
Name (Print) Philip Stauffer	Signature: <i>P Stauffer</i>	Date: 8/3/16
ADC: ☒ Unclassified ☐ OUO ☐ UCNI ☐ Classified		
Derivative Classifier		
Name (Print) <i>Kay Birdsell</i>	Signature: <i>Kay Birdsell</i>	Date: 7/27/17
Section 4 FINAL APPROVAL		
8.1[19]/9.[7] LLW Operations Manager:		
Name (Print) Leslie Sonnenberg	Signature: <i>Leslie Sonnenberg</i>	Date: 9/28/2017