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## TRU Waste-Sampling Program

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## TRU WASTE-SAMPLING PROGRAM

by

John L. Warren and Al Zerwekh

### ABSTRACT

As part of a TRU waste-sampling program, Los Alamos National Laboratory retrieved and examined 44 drums of  $^{238}\text{Pu}$ - and  $^{239}\text{Pu}$ -contaminated waste. The drums ranged in age from 8 months to 9 years.

The majority of drums were tested for pressure, and gas samples withdrawn from the drums were analyzed by a mass spectrometer. Real-time radiography and visual examination were used to determine both void volumes and waste content. Drum walls were measured for deterioration, and selected drum contents were reassayed for comparison with original assays and WIPP criteria.

Each drum tested at atmospheric pressure. Mass spectrometry revealed no problem with  $^{239}\text{Pu}$ -contaminated waste, but three 3-month-old drums of  $^{238}\text{Pu}$ -contaminated waste contained a potentially hazardous gas mixture. Void volumes fell within the 81-97% range. Measurements of drum walls showed no significant corrosion or deterioration. All re-assayed contents were within WIPP waste acceptance criteria.

Five of the drums opened and examined (15%) could not be certified as packaged. Three contained free liquids, one had corrosive materials, and one had too much unstabilized particulate. Eleven drums had the wrong (or not the most appropriate) waste code. In many cases, disposal volumes had been inefficiently used.

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## INTRODUCTION

Early in 1983 the Transuranic Waste Systems Office identified a TRU waste-sampling program for EG&G Idaho, Rocky Flats Plant, and Los Alamos National Laboratory, which would contribute to an overall national plan to certify radioactive waste for the Waste Isolation Pilot Plant.

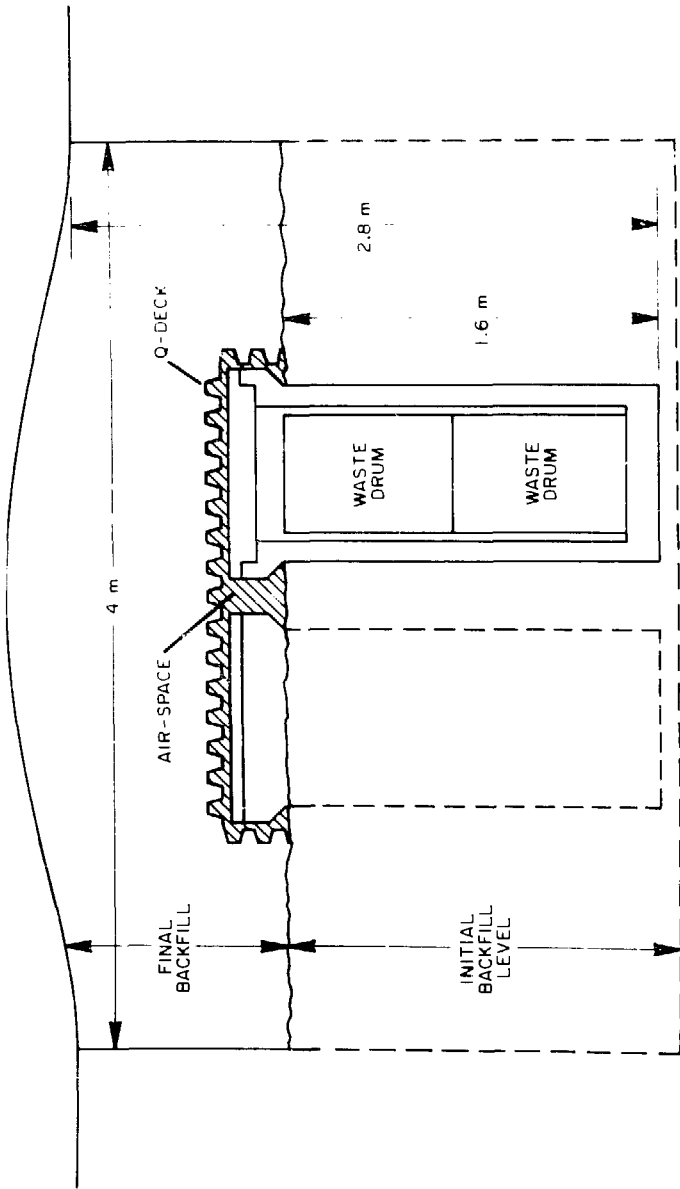
As its share of the work, Los Alamos was asked to retrieve and examine a minimum of 32 drums of  $^{238}\text{Pu}$ - and  $^{239}\text{Pu}$ -contaminated waste, perform nondestructive examinations of the drums containing the waste, measure gas pressure in the drums and analyze the gaseous contents of each drum, determine the drum void volumes, and examine and characterize the drums' contents for compliance with the WIPP waste acceptance criteria (WAC). The last objective required opening many of the drums in the Los Alamos Size Reduction Facility (SRF).

## RETRIEVING THE WASTE

### The 30-gallon Drums -- $^{238}\text{Pu}$ -contaminated Waste

The first step was the retrieval of eighteen 30-gallon drums containing  $^{238}\text{Pu}$ -contaminated waste. Six 30-gallon drums approximately 8 months old had been stored in a shed at the Los Alamos Waste Disposal Site (Area G) and were readily available

for study. A second group of six 30-gallon drums were retrieved from concrete casks in Trench "A" at Area G. These were approximately 9 years old. The third group of six 30-gallon drums were recovered from similar casks in Trench "C" at Area G. These were approximately 39 months old. To recover these last two groups, it was necessary to remove 1.5 m of crushed tuff overburden and the corrugated iron decking covering the casks (Figure 1), and then locate by number the casks containing the desired drums. Lids were sealed onto the casks with plastic cement. When this seal had been broken (Figure 2), the casks' lids were removed, and the inside of the casks and the exposed drums carefully monitored for alpha surface contamination and beta-gamma radiation (Figure 3). No contamination was found, and external radiation did not exceed a few mr at contact with the drums' walls. The Bobcat power shovel was then used to hoist the desired drums out of the casks, and each was monitored again, examined for container integrity, and photographed (Figure 4). When the six drums for each trench had been recovered as described, they were hauled to a storage shed at Area G to await further examination and testing. The drums shown in the pickup truck (Figure 5) are the 39-month-old drums that had just been removed from Trench "C." Note their clean, dry condition. All tags and stenciled labels were in excellent condition and completely legible. Note the contrast with the 9-year-old drums (Figure 6) that had been retrieved from Trench "A" and stored in the shed. Several of these drums had water standing on the lids when the casks were opened. It is believed that wet weather caused rain to puddle on the cask lids before the decking and tuff overburden had been put in place, and the water was able to saturate the lids and trickle through. However, in spite of their apparent rusted condition, there was no serious corrosive damage. The integrity of the containers was maintained as shown by later examination and wall-thickness measurement, and the labels and identifying marks generally were intact and legible.



TYPICAL CASK BURIAL

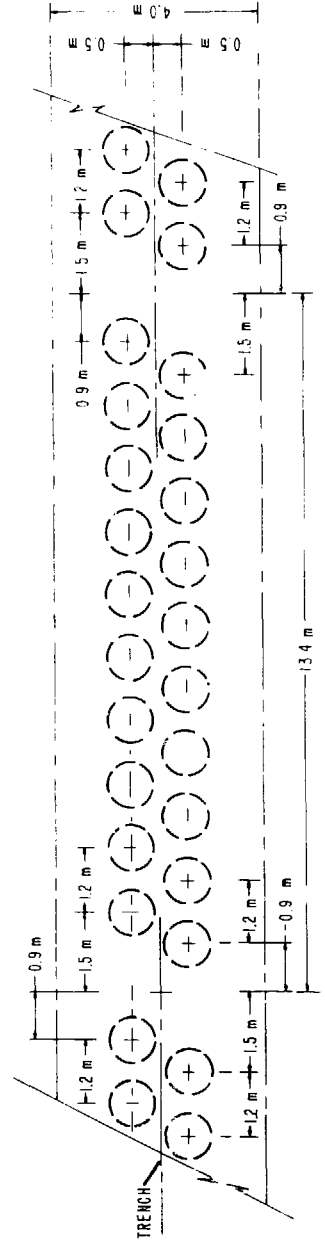


Fig. 1. Typical cask storage detail.



Fig. 2. Breaking the seal on the cask lid.



Fig. 3. With the lid removed, the inside of the cask and the drum are carefully monitored.



Fig. 4. The drum is removed from the cask, monitored, examined, and photographed.

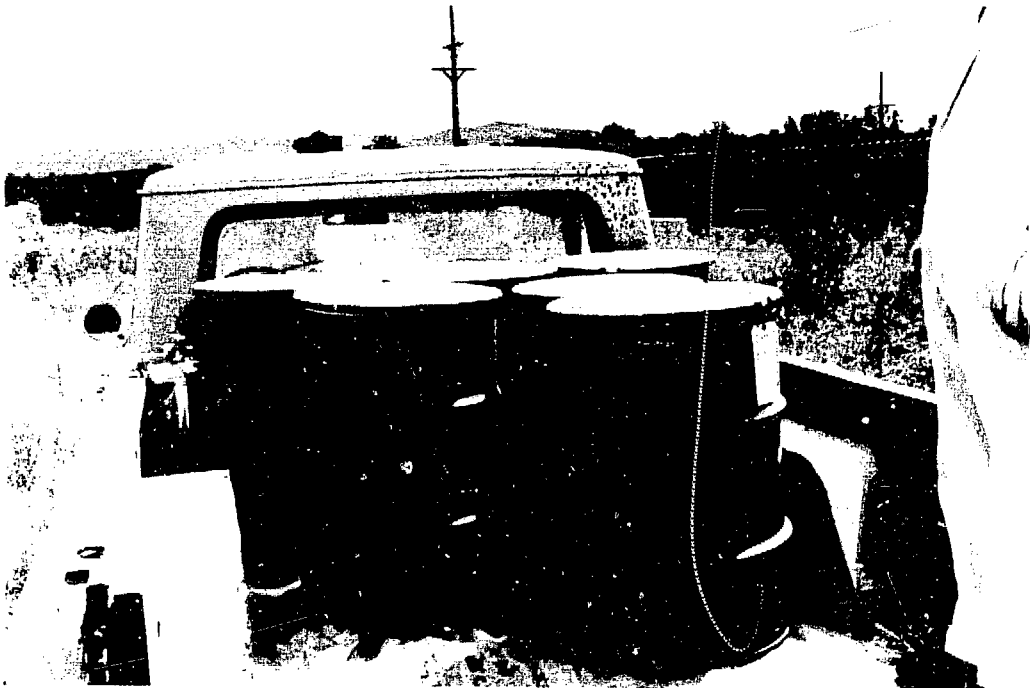


Fig. 5. Thirty-nine-month-old 30-gallon drums being moved to the storage shed at Area G.



## The 55-gallon Drums -- $^{239}\text{Pu}$ -contaminated Waste

To obtain the 8-month-old  $^{239}\text{Pu}$ -contaminated waste, twenty-two 55-gallon drums were removed from above-ground TRU Storage Pad No. 2 (Figure 7) and moved inside the storage shed at Area G. Four additional 55-gallon drums 26 months old were recovered from Cell 2, Pit 9 (Figure 8), the first retrievable storage facility used at Los Alamos for TRU waste. Except for periodic monitoring of air in this cell, it had been closed from the summer of 1977 until June 1981, when the decision was made to enter it and determine the condition of the 48 drums adjacent to the access shaft. In preparation for entering the cell, a 24-hour sample of the gaseous contents was drawn through the filter of a continuous air monitor (CAM) to check for possible airborne contamination. Only natural radon was detected. In addition, a sample of the gaseous mixture in the cell was analyzed by mass spectrometry. The results are presented in Table I.

TABLE I  
RESULTS OF ANALYSES OF GASEOUS MIXTURE IN CELL 2, PIT 9, AREA G

<u>COMPONENT</u>	<u>JUNE 1981</u> (mol%)	<u>AUGUST 1983</u> (mol%)
Hydrogen	0.7	2
Helium	<0.1	<0.1
Carbon Monoxide	<0.1	<0.1
Nitrogen	79	78
Methane	<0.1	<0.1
Oxygen	16	19
Argon	0.9	0.9
Carbon Dioxide	3	0.1



Fig. 6. Nine-year-old drums in shed awaiting sampling.  
Note the gas-sampling device at right.

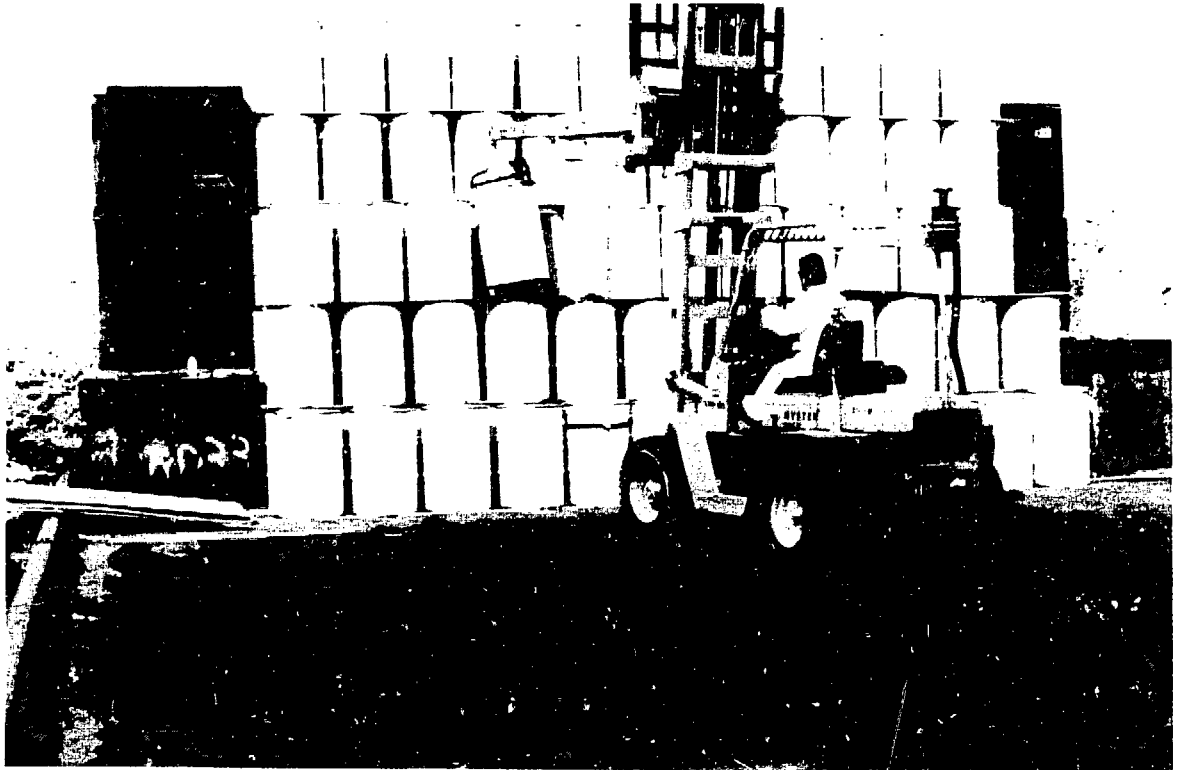


Fig. 7. Los Alamos TRU Storage Pad No. 2.

A flexible 6-inch tube attached to a blower was then lowered into the shaft, and the cell purged until normal atmosphere existed in the cell. Los Alamos personnel then entered the cell to determine the condition of the storage drums. They were dusty from finely divided tuff, and there were a few small areas of light rust but no significant corrosion. Three-eighths-inch fire-retardant plywood had been used between the layers of drums to stabilize the stacks. Fire-retardant chemicals had bled from the plywood and were encrusted on the surface of the wood, and also on the bolt and ring closures of some drums. Chemical analysis verified the suspected identity of the encrustation; however, much of the material analyzed was finely divided tuff. The drums generally were in excellent condition, as seen in Figures 9, 10, and 11. Usually all stored drums were (and are) coated with a corrosion inhibitor (Texaco Compound L); however, the 48 drums emplaced around the access shaft in Cell 2 had several different coatings and were different types of drums. These variations were used for a comparison study of the corrosion resistance of various materials under the storage conditions in the closed storage cell. While access to the shaft was available, four 55-gallon drums were placed on the bottom, two coated with Compound L, and two left uncoated. The cell was then resealed.

When the TRU Waste-Sampling Program was initiated in 1983, it was decided to include the four drums from the bottom of the shaft in the group of drums to be evaluated. In reopening the cell, similar procedures were followed to those described for the 1981 operation. A tube attached to a CAM was lowered through one of the 4-inch access pipes into Cell 2, and a 24-hour air sample was pumped through the filter paper. The filter was assayed with an alpha counter and found to have 20,000 counts per minute. This radiation was judged to be radon-thoron; the filter was therefore allowed to decay for 24 hours. At the end of this time, the recount showed no activity. A sample of the gaseous mixture in Cell 2 was obtained

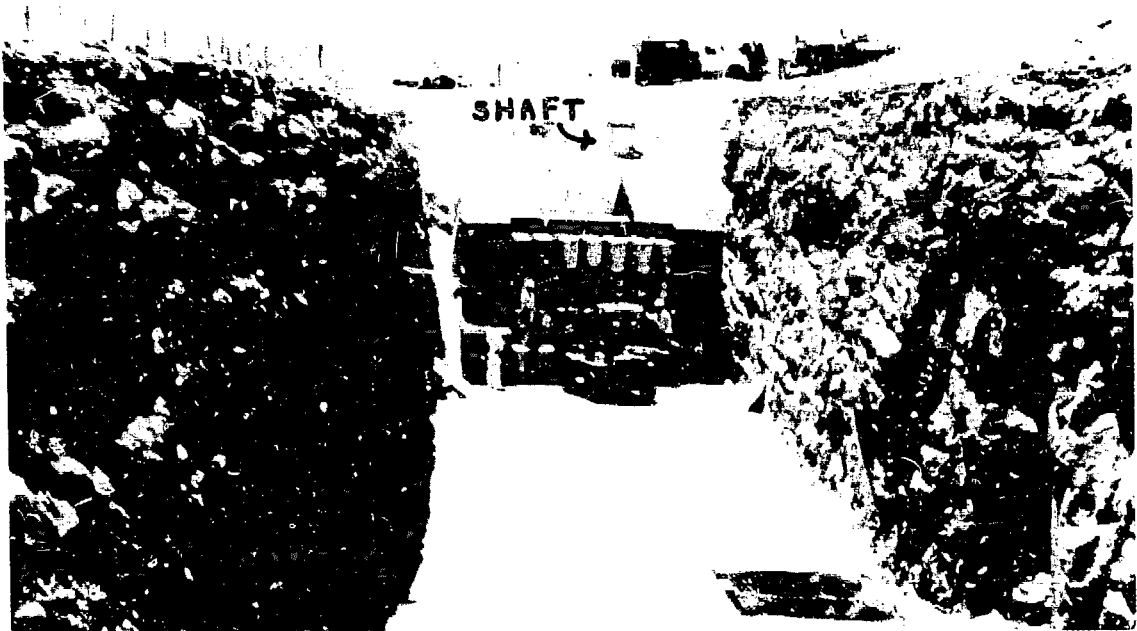


Fig. 8. Cell 2 of Pit 9, Los Alamos TRU Waste Storage Facility, showing shaft access to cell.

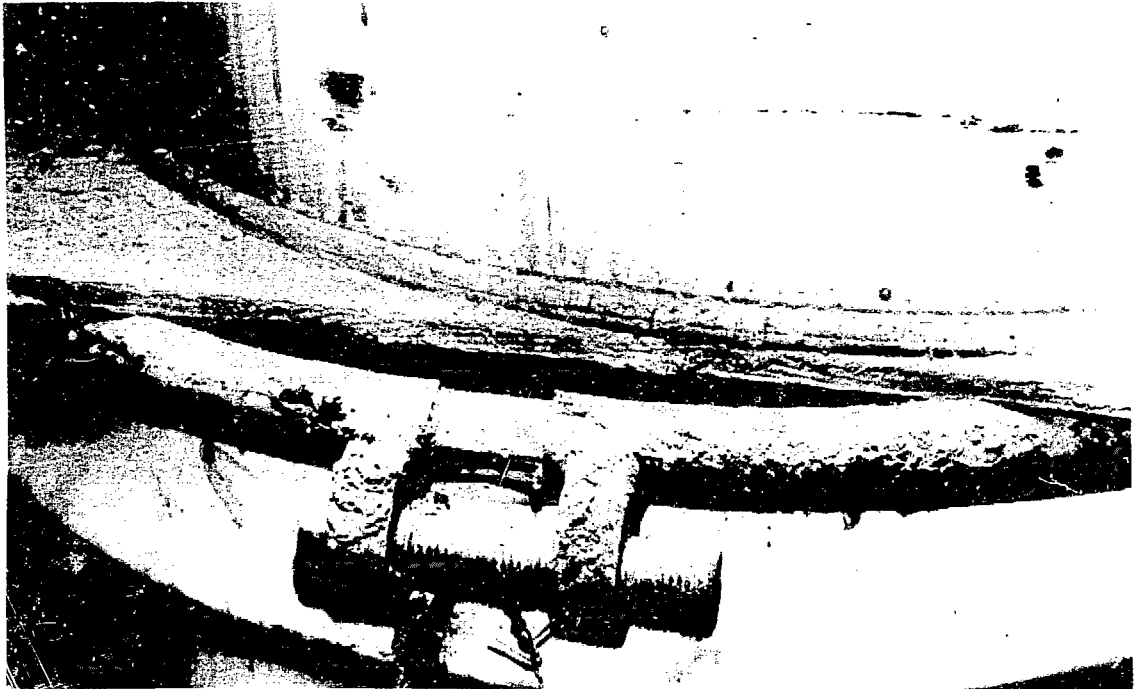


Fig. 9. Close-up showing finely divided tuff and some fire-retardant chemicals that have bled from treated plywood and are collected on the sealing ring of a drum.



Fig. 10. A galvanized drum adjacent to the shaft in Cell 2 (June 1981).



Fig. 11. Drums adjacent to shaft, coated with rust inhibitor Texaco CPD L. Note fire-retardant bleeding out of plywood.

and analyzed by mass spectroscopy. The results are shown in Table I for comparison with the earlier data. The detection of an elevated level of hydrogen, while not constituting a hazard, clearly indicates both the generation and diffusion of the gas from the waste containers. Over 3000 waste drums and 100 fiber-glass-reinforced polyester-coated plywood crates are stored in this pit. The air in the cell was purged, and the atmosphere checked with a Gas Tech Model 1641 Oxygen Detector. The oxygen had increased to 21 mol%, and there were no combustible gases. Los Alamos staff members then entered the cell and examined the containers. All drums adjacent to the shaft were still in excellent condition, showing no deterioration. The four drums from the bottom of the shaft were removed, monitored, and placed in the storage shed at Area G (Figures 12 and 13). There was no discernable difference in condition between coated and uncoated drums.

#### GAS SAMPLING AND ANALYSIS

Gas pressure was measured and a sample withdrawn for analysis from each drum by a sampling device developed at Los Alamos by Al Zerwekh (Figure 14).<sup>1</sup> In all, eighteen 30-gallon drums containing  $^{238}\text{Pu}$ -contaminated waste and twenty 55-gallon drums containing  $^{239}\text{Pu}$ -contaminated waste were sampled, and the samples were analyzed by the Los Alamos Analytical Chemistry (CHM-1) Mass Spectrometry Section. The device is sealed onto the side of the drum near the top with a gas-tight seal, and a small hole is drilled through the drum wall. A pressure gauge on the sample immediately registers the pressure, if any, in the drum. All of the Los Alamos drums were at atmospheric pressure. This pressure was expected because the drums are sealed with a sponge-rubber gasket that renders them liquid- and particle-tight, but allows gas in excess of atmospheric pressure to diffuse out of the container. Next, an evacuated 1-liter sample bulb was attached to the sampler and the valve



Fig. 12. Uncoated  $^{239}\text{Pu}$ -contaminated waste drum being retrieved from bottom of shaft, Cell 2.



Fig. 13. Compound-L-coated drum has been monitored, was found uncontaminated, and is on its way to the shed for gas sampling.



opened. Withdrawing this sample purges the equipment with a portion of the gaseous contents of the drum. This sample is discarded, and a second evacuated sample bulb is employed immediately to collect the sample to be analyzed by the mass spectrometer (Figure 15).

After the gas samples had been removed from the drum, the hole was sealed with silicone cement, a fiber washer, and a sheet-metal screw.

Each day, before any samples were analyzed, a new instrument sensitivity factor was determined for each gas of interest. This factor was determined by measuring the electrical response of the instrument to a known amount of each gas. Daily determination of the sensitivity factors is standard procedure for Los Alamos mass spectrometric work and avoids reliance on a secondary standard. The gases included in the daily calibration and the approximate sensitivity factor for each were: hydrogen, 41 mV/ $\mu$ m; helium, 15 mV/ $\mu$ m; carbon monoxide, 2 mV/ $\mu$ m; nitrogen, 7 mV/ $\mu$ m; methane, 82 mV/ $\mu$ m; oxygen, 68 mV/ $\mu$ m; argon 95 mV/ $\mu$ m; and carbon dioxide, 74 mV/ $\mu$ m.

A certified gas sample was supplied to Los Alamos by EG&G Idaho. After the daily sensitivity factors were determined, the sample was analyzed and results reported by telephone to Tom Clements at EG&G Idaho. (Figure 16 is a copy of the analytical report.) The results of the analysis were pronounced acceptable, and Los Alamos proceeded with the analyses of the gaseous contents of the waste drums. Table II contains results of the analyses of the standard gas sample as determined throughout the experimental period.

Gas-sampling analytical results are shown in Tables III and IV. The results indicate that there should be no problem with



Fig. 14. Checking a 30-gallon drum for gas pressure, and preparing to remove a gas sample.



Fig. 15. Withdrawing a gas sample into a 1-liter bulb.

the shipment of  $^{239}\text{Pu}$ -contaminated waste; the maximum  $\text{H}_2$  content of these drums was 1.4 mol%. However, three of the six  $^{238}\text{Pu}$  drums of 8-month-old waste contained a potentially hazardous gas mixture that could explode if exposed to a spark or flame.

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Analytical Chemistry Report

Sample No.: 28126

Date Reported: 19-MAR-84

Submitting Group: HSE-7    Submitter: VANCE    Form B Code: A411

Sample Identification: DCV EGGL    Date Submitted: 1-AUG-83

Sample Description: STANDARD GAS FOR EG&G DECOMPOS

Analyses Requested:  $\text{H}_2$  , CC ,  $\text{CO}_2$  ,  $\text{CH}_4$  ,  $\text{O}_2$  ,  $\text{N}_2$  ,  $\text{NO}_x$

Submitter's Comments:

ANALYTICAL RESULTS

<u>Analytical Results</u>	<u>Analyst(s)</u>	<u>Notebook</u>	<u>Page(s)</u>
2.5 MOL% $\text{H}_2$	ARCHULETA, NK	19964	62
1.2 MOL% CO	same	same	"
12.0 MOL% $\text{CO}_2$	same	same	"
<0.1 MOL% $\text{CH}_4$	same	same	"
18.0 MOL% $\text{O}_2$	same	same	"
66.3 MOL% $\text{N}_2$	same	same	"

(\* ) % = G/100 G Sample and PPM =  $\mu\text{G}/\text{G}$  Sample

COMMENTS: NO OTHER SIGNIFICANT GASEOUS COMPONENTS DETECTED.

Certified by P. T. Cunningham

Figure 16. Certified gas sample.

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TABLE II  
ANALYSES OF STANDARD GAS SAMPLE  
MOL% OF CONSTITUENTS

<u>DATE</u>	<u>H<sub>2</sub></u>	<u>He</u>	<u>CO</u>	<u>N<sub>2</sub></u>	<u>CH<sub>4</sub></u>	<u>O<sub>2</sub></u>	<u>Ar</u>	<u>CO<sub>2</sub></u>
12-29-83	2.6	<0.1	1.6	65.9	<0.1	18.5	<0.1	11.4
1-20-84	Cancelled							
2-21-84	3.0	<0.1	1.4	65.3	<0.1	18.7	<0.1	11.7
3-27-84	3.0	<0.1	1.0	65.8	<0.1	18.6	<0.1	11.6
3-30-84	2.3	<0.1	0.4	66.7	<0.1	18.8	<0.1	11.8
4-10-84	3.6	<0.1	1.4	65.0	<0.1	18.6	<0.1	11.4
5-4-84	2.7	<0.1	1.0	65.6	<0.1	19.0	<0.1	11.7
5-30-84	1.9	<0.1	1.1	66.3	<0.1	19.0	<0.1	11.7
6-14-84	2.4	<0.1	0.9	65.9	<0.1	19.0	<0.1	11.8
7-10-84	2.5	<0.1	0.5	66.1	<0.1	19.1	<0.1	11.8
8-3-84	<u>2.5</u>	<u>&lt;0.1</u>	<u>2.9*</u>	<u>64.9</u>	<u>&lt;0.1</u>	<u>18.4</u>	<u>&lt;0.1</u>	<u>11.3</u>
	x 2.65		1.03	65.7		18.8		11.6
	o <u>+ .46</u>		<u>+ .40</u>	<u>+ .57</u>		<u>+ .25</u>		<u>+ .19</u>

\* Outlier not included in calculation.

TABLE III  
<sup>238</sup>Pu DRUMS SAMPLED FOR GAS ANALYSIS

<u>Drum Ident.</u>	<u>Waste Form Code**</u>	<u>Date Filled</u>	<u>Quantity <sup>238</sup>Pu (grams)</u>	<u>Gas Analysis</u>						
				<u>H<sub>2</sub></u>	<u>CO</u>	<u>CO<sub>2</sub></u>	<u>CH<sub>4</sub></u>	<u>Ar</u>	<u>N<sub>2</sub></u>	<u>O<sub>2</sub></u>
BFB 92	A-19	01/24/83	7.7	1.0	0.7	3.9	0.1	0.0	77.5	15.8
BFB 96*	A-19	01/03/83	10.2	6.6	2.4	3.8	0.4	0.9	69.7	16.2
BFB 97*	A-19	01/03/83	9.4	18.6	4.0	11.7	0.9	0.0	54.8	9.4
BFB 101*	A-18	01/12/83	11.6	7.1	2.9	4.8	0.3	0.5	68.7	15.4
BFB 102	A-19	01/27/83	3.4	1.6	1.0	1.9	0.1	0.9	76.5	18.0
BFB 103	A-19	01/26/83	6.8	3.4	1.8	3.3	0.2	0.9	74.0	16.3
BFB 12	A-19	05/30/80	6.6	0.1	0.5	5.2	0.0	1.0	80.0	13.2
BFB 14	A-14	09/25/80	1.3	0.0	0.4	4.6	0.0	1.0	79.3	14.7
BFB 19	A-61	07/25/80	5.6	0.1	0.0	1.1	0.0	1.0	79.8	18.0
BFB 20	A-16	09/25/80	2.2	0.1	0.2	0.6	0.0	1.0	79.3	18.9
BFB 26	A-19	09/26/80	1.05	0.0	0.6	10.5	0.0	1.0	79.2	8.7
BFB 27	A-18	09/12/80	1.18	0.0	0.4	10.1	0.0	1.0	79.2	9.3
BFB 234	A-19	10/29/74	18.2	0.0	0.1	1.5	0.0	2.0	79.6	17.8
BFB 235	A-61	10/29/74	1.9	0.1	0.0	0.3	0.0	1.0	80.5	18.1
BFB 237	A-61	10/29/74	4.2	0.0	0.0	1.3	0.0	1.0	83.4	14.2
BFB 238	A-61	10/29/74	0.5	0.0	0.0	0.3	0.0	1.0	81.5	17.1
BFB 239	A-61	10/29/74	1.4	0.0	0.0	0.3	0.0	1.0	79.2	19.5
BFB 240	A-61	10/29/74	1.7	0.0	0.0	0.5	0.0	1.0	80.2	18.2

\*These drums are probably potentially explosive if gaseous contents are exposed to spark source.

\*\*See Appendix 1 for identification of Waste Form Codes.

Table IV

 $^{239}\text{Pu}$  DRUMS SAMPLED FOR GAS ANALYSIS

Drum Ident.	Waste Form Code**	Date Filled	Quantity $^{239}\text{Pu}$ (grams)	Gas Analysis						
				H <sub>2</sub>	CO	CO <sub>2</sub>	CH <sub>4</sub>	Ar	N <sub>2</sub>	O <sub>2</sub>
0007060	A-18	02/14/83	3.3	0.8	0.9	4.0	0.0	1.0	79.2	14.1
0007226	A-18	02/14/83	0.4	0.1	1.0	2.9	0.0	1.0	78.8	16.2
0010108*	A-25	07/02/81	80 <sup>a</sup>	0.0	0.3	0.5	0.0	1.0	78.6	19.8
0010362	A-18	01/19/83	26.2	0.2	0.0	0.5	0.0	1.0	78.9	17.6
0010405	A-47	01/25/83	191	0.1	0.0	0.3	0.0	1.0	78.4	20.1
0010411	A-25	01/27/83	186	0.1	0.0	0.3	0.0	1.0	78.6	19.9
0010435	A-61	01/20/83	38	0.2	0.0	0.5	0.0	1.0	78.8	19.5
0010494	A-47	01/19/83	198	0.1	0.2	0.6	0.0	1.0	78.7	19.5
0010605	A-18	01/25/83	122	1.4	0.0	3.6	0.0	0.9	77.4	16.7
0010645	A-61	01/26/83	108.3	0.1	0.1	0.7	0.0	1.0	78.6	19.4
0010753	A-16	01/26/83	46	0.1	0.0	2.1	0.0	2.0	82.4	14.4
0010756*	A-19	06/15/81	Note <sup>b</sup>	0.0	0.2	0.7	0.0	1.0	78.2	19.9
0010761	A-14	01/26/83	0.47	0.0	0.2	1.6	0.0	1.0	78.9	18.3
0010773	A-19	01/26/83	0.1	0.0	0.1	0.8	0.0	1.0	78.6	19.4
0010775*	A-60	06/02/81	27.9	0.0	0.0	0.7	0.0	1.0	78.7	19.6
0010925*	A-25	06/24/81	32.4	0.5	0.1	0.3	0.0	1.0	76.9	21.2
0012223	A-16	01/27/83	63	1.2	0.3	6.3	0.0	1.0	79.0	12.2
0012395	A-25	01/19/83	185	0.2	0.0	4.9	0.0	0.9	80.1	13.7
0012432	A-27	01/27/83	75.95	0.1	0.0	12.3	0.0	0.8	73.8	12.9
0012433	A-27	01/27/83	7.93	0.3	0.3	0.8	0.0	1.0	80.9	17.0

\*Drums removed from shaft in Cell 2, Pit 9.

\*\*See Appendix 1 for identification of Waste Form Codes.

<sup>a</sup>This drum also contains 0.3 gram  $^{238}\text{Pu}$ .

<sup>b</sup>This drum contains  $^{244}\text{Am}$ ,  $^{248}\text{Cf}$ , and  $^{249}\text{Bk}$ ; no gram amounts specified.

## VOID VOLUMES AND G VALUES

It was not possible to measure void volumes by pressure and volume relationships nor meaningful to calculate G values in Los Alamos waste drums because the drums are not required to be sealed gas-tight. They are sealed with 0.5-inch sponge-rubber gaskets, and the closure rings torqued to approximately 40 ft-lbs, which renders them liquid- and particulate-tight but not gas-tight. The gaseous contents of the drums are therefore at atmospheric pressure. Any gases generated in excess of approximately 580 torr diffuse harmlessly into the atmosphere. The escaping gases have never been found to be radioactive. For this reason, the void volumes were estimated by radiography and by visual examination when the drums were opened. The estimated void volumes obtained by these two methods and reported on the summary sheets (Appendix 2) are actually estimates of filling efficiency. Because many of these drums are filled with organic materials, it was suspected that the void volumes would actually be considerably higher. Using the weights and densities of the waste materials, the void volumes for 10 drums were computed to be in the range of 81% to 97%, with the majority over 90%. The calculated volumes are recorded on the summary sheets.

Earlier studies in the laboratory and field have shown that gas generation in the waste drums depends on (1) the quantity of radionuclide, (2) the size and distribution of the radionuclide particles, and (3) the identity of the hydrogenous substrate. The effective contact of the contaminant with the waste is very important in determining the rate of gas formation. As the waste ages and begins to decompose, the radioactive particles are in less efficient contact with the substrate and therefore less gas is generated. It was shown in the Laboratory's cylinders that agitation of the container can temporarily reverse this process, but the reversal is short-lived, and the rate of gas formation continues to decrease with time.<sup>2</sup> The tabulated

results of the gas analyses from the  $^{238}\text{Pu}$  waste drums illustrate this point. The drums that contain a potentially explosive gas mixture are all in the group of "new" (8-month-old) drums. The 3- and 9-year-old drums contain amounts of  $\text{CO}_2$  that suggest that there has been significant radiolytic gas generation earlier, but the very low  $\text{H}_2$  mole percentages indicate that current  $\text{H}_2$  production is minimal, and that  $\text{H}_2$  produced earlier has long since diffused from the containers.

#### REAL-TIME RADIOGRAPHY

Most of the drums selected for this program were examined by real-time radiography (RTR) and recorded on a video tape. The primary purpose for this effort was to verify, to the extent possible, that the contents of the drums did not pose any significant hazard in subsequent handling and sampling operations. It also was of interest to see, however, if adequate information could be determined through this observation to certify the waste contents.

The equipment utilized was that available at Los Alamos. It was state-of-the-art circa 1974 and was not procured especially for the purpose of TRU waste certification. A radiography equipment setup identical to the one used for this work is shown in Figure 17. It consists of a 2-MeV x-ray source, the 55-gallon drum to be radiographed, and a 36-by-36-inch fluorescent screen in front of a bellows. Behind the bellows is a silicon-electron-tube image intensifier that feeds the signal into a digital video processor. The image will appear on a cathode-ray tube where it can be viewed and/or photographed, or the signal can be fed to a video recorder where a tape of the drum can be recorded as the drum is moved around in a circular motion as well as up and down to obtain the best possible identification of the contents. For containers involving difficult or extremely dense contents, x-ray film can be exposed directly



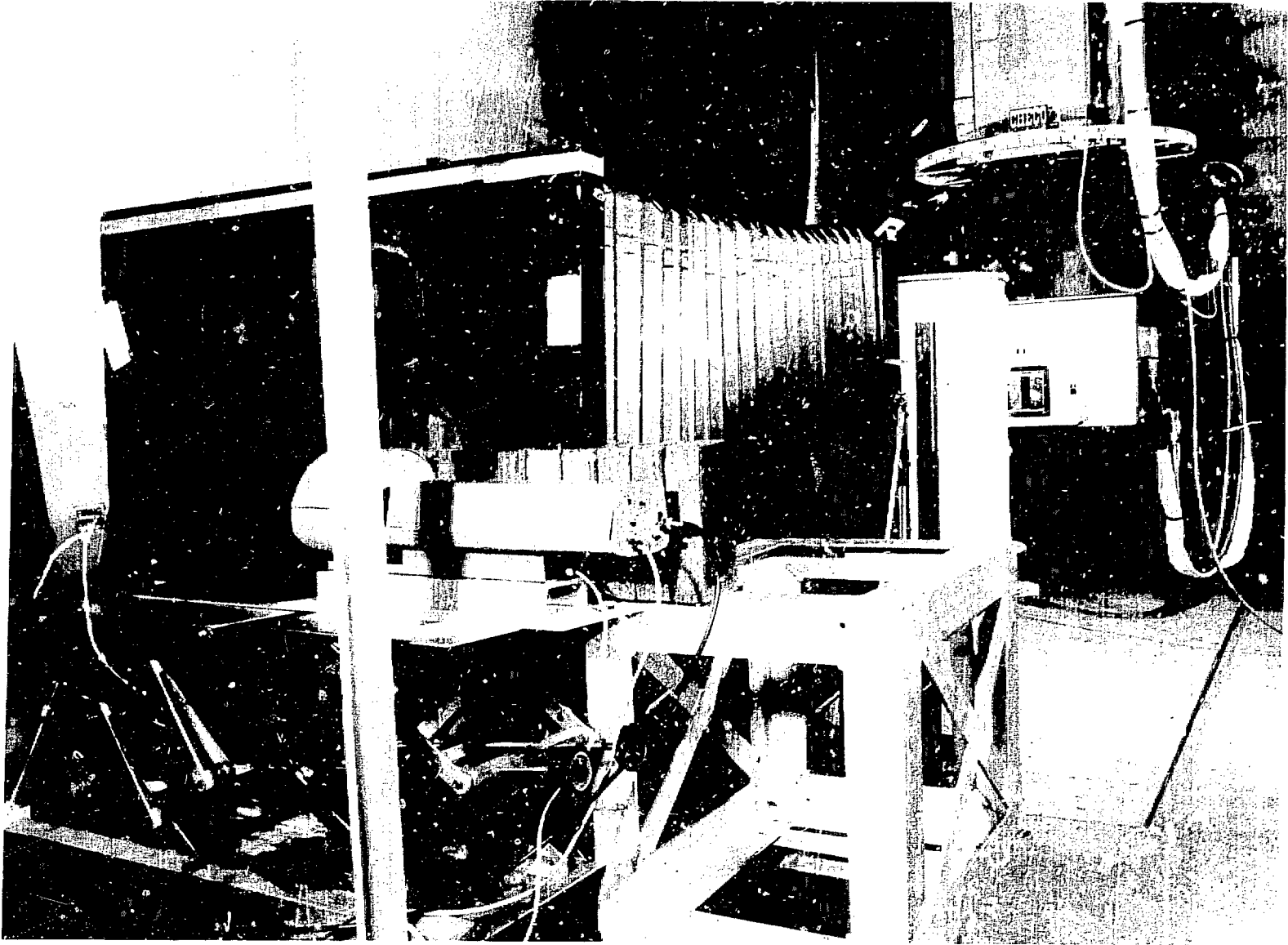


Fig. 17. Real-Time Radiography setup.

behind the drum, allowing long exposures that will penetrate the substrate to improve resolution and definition. Current state-of-the-art equipment designed specifically for examination and certification of waste containers would have much better resolution and provide a more satisfactory examination of the contents of the drums. A few of the drums could not be radiographed in the equipment available because of their excessive weight. The RTR was performed by John M. Bieri of the Los Alamos Advanced Nuclear Technology Group Q-2.

Two persons (not radiologists) independently reviewed the video tapes that were recorded on the equipment described above. Their descriptions are recorded on the summary sheets (Appendix 2). At the time the tapes were reviewed, the drums had not been opened, and no descriptions of the contents were available to the viewers. It was felt that this examination would probably be satisfactory for certification in most but not all cases. As noted in the attached summary sheets, three drums subsequently were found to contain small quantities of free liquids, one drum contained a quantity of particulate, and one drum had corrosive material that was not adequately contained. None of these were detected by the RTR.

#### WALL THICKNESS OF DRUMS

The wall thickness of drums was measured with a NOVA Model 201 Ultrasonic Thickness Gauge. Following calibrations with coupons of known thickness, we took measurements in at least three wide-ranging locations on drum lids, side walls, and bottoms. Readings were averaged so that a single value could be reported, but they were found to be remarkably uniform. These results are presented in Table V.

TABLE V  
 ULTRASONIC THICKNESS GAUGE MEASUREMENTS  
 (1/1000 inch)

<u>Drum No.</u>	<u>Year Filled</u>	<u>Size (gal)</u>	<u>Top</u>	<u>Side Wall</u>	<u>Bottom</u>	<u>Apparent Gauge</u>
10755	1983	55	0557	0583	0531	16
10756	1983	55	0561	0605	0553	16
10108	1983	55	0495	0577	0511	16
BFB 96	1983	30	030	035	033	20
BFB 97	1983	30	030	036	033	20
BFB 92	1983	30	028	029	032	20
BFB 101	1983	30	030	029	031	20
BFB 27	1980	30	032	039		20
BFB 234	1974	30	033	044		20
BFB 235	1974	30	044	048	040	18
BFB 237	1974	30	035	035	035	20
BFB 238	1974	30	040	047		18
BFB 239	1974	30	035	035		20
BFB 240	1974	30	049	048		18

Later visual inspection of the inner surfaces of the drums verified that there had been no significant corrosive deterioration of any drum. The worst case was the lid of drum BFB-240. When the cask where it was stored was opened, we found rust and standing water on the lid; however, the thickness of the lid was still 0.049 inch (within specs for 18 gauge) so the container integrity had not been reduced significantly at this time. When this drum was opened, it was found to be rusted inside, but the side-wall thickness was still 0.048 inch. The drum contained a leverpak that was severely water damaged. It was double-bagged with plastic, and there were approximately 150 ml of water in the space between the two plastic bags. The metal cans and other metal objects inside the leverpak were very rusty. The rust was in large bundles of scale, not dust. Because the two plastic bags around the leverpak were still sealed and had not been penetrated, it is not clear whether there was a causative relationship between the conditions inside the leverpak and outside the drum. Table IV shows the results of thickness measurements of several drums chosen at random. More of the 30-gallon drums were measured because they were older and contained  $^{238}\text{Pu}$ -contaminated waste, which was felt to be a potentially more corrosive environment. However, the differences in thickness of these drums appear to be only differences in manufacturing lots rather than the effects of corrosion.

It should be noted, however, that the equipment utilized in these thickness measurements is not capable of detecting small pitting corrosion. As noted, there was no significant corrosion observed on subsequent opening and inspections in most of the drums. All of the 30-gallon drums of  $^{238}\text{Pu}$  waste also will require being overpacked before shipment to WIPP, and thus the drum specification is not important to certification of these packages.

## ASSAY OF TRU CONTENT

The reassays of the waste drums were done by Ron Blankenship of MST-10, the Nuclear Materials Management Group, using either segmented gamma scan or thermal coincidence neutron (TCN) counter, whichever was more appropriate according to recorded contents. The summary sheets (Appendix 2) show that the original assay and reassay values are not always in good agreement. In all cases, the original values for these drums were determined as the sum of separate measurements of the individual item in the drum. These individual item measurements were by either TCN or segmented gamma assay (SGA) techniques, depending upon the nature of the item. All of the reassays, on the other hand, were conducted on entire drums of waste. Because the contents of the drums are a mixture of items best measured by either TCN or SGA, a portion of the contents of each drum, therefore, is not best measured by the technique applied to the drum as a whole. Thus, when items are individually assayed and then placed into a drum and assayed collectively, the problems of assay geometry and matrix effects often can cause significant differences, and the total assay is not equal to the sum of the individual assays. All of the drums reassayed were found still to be within the limits of the WIPP-WAC for TRU content.

## DRUM OPENING, WASTE INSPECTION, AND SAMPLING

When all other measurements had been completed, the drums were delivered to the Los Alamos SRF for examination and verification of the contents. All of the 30-gallon drums (18) containing  $^{238}\text{Pu}$ -contaminated waste, and 11 representative 55-gallon drums containing  $^{239}\text{Pu}$ -contaminated waste, were opened. A special glovebox and drum-handling rack (Figure 18) were constructed and placed inside the large enclosure usually used for TRU waste-size reduction. Each drum was weighed (Figure 19)

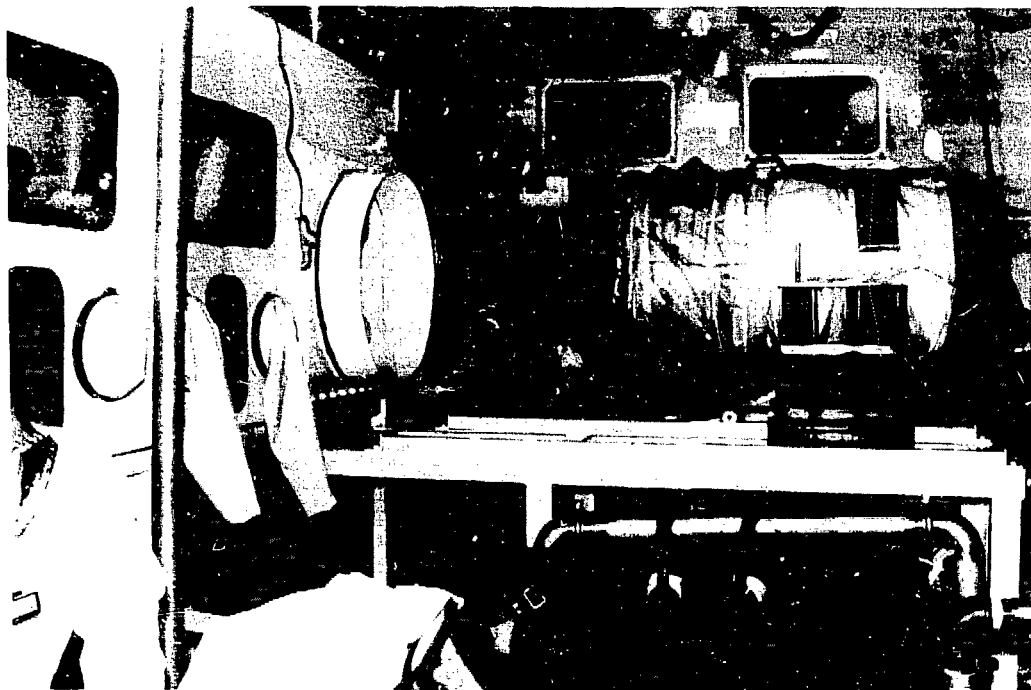


Fig. 18. Waste drum in place on rack in SRF. Preparing to slide drum into drybox and remove lid.



Fig. 19. Each drum examined in the SRF was weighed.

and had the top and upper part of the exterior side walls taped with plastic to expedite later decontamination. Each drum in turn was then clamped horizontally on the rack, and the top of the drum pushed through a circular port (Figure 20) into the special glovebox. The annular space between the drum and the port was sealed with plastic. The locking ring, lid, and contents of the drum were then removed and examined (Figures 21 and 22). The various fractions of waste were separated and weighed (Appendix 3). The materials were categorized to see if they matched the description given on the original disposal record, and if they were in compliance with WIPP-WAC (Appendix 4). Samples were taken of materials if it appeared that more work might be indicated to categorize or identify them. Particulate was collected and measured where there was sufficient material available. Sieves used to categorize particle size were 212 and 75 micrometers. Johnny Harper and Bruce Reich of the Waste Management Group HSE-7 were instrumental in directing the accomplishment of this portion of the work.

#### SLUDGE CORE ANALYSES

Four 55-gallon drums containing vacuum-filtered chemical treatment sludge were chosen for a special study. These drums were opened in the SRF and core samples withdrawn. Visual inspection indicated no free liquid, droplets, or other forms of moisture. Meaningful core samples for moisture content were not obtained, however, due to nonavailability of suitable equipment. By the time the difficulties were discovered, it was too late to correct the problem. The core samples for each drum were carefully mixed, and a representative sample taken to be analyzed for  $^{238}\text{Pu}$ ,  $^{239}\text{Pu}$ , and  $^{241}\text{Am}$  content. The results of the analyses reported in Table VI show that the levels of contamination in sludge are so low that no gas generation problem would be expected to exist. These values are in reasonable agreement except for the  $^{239}\text{Pu}$  analyses. The counts for these



Fig. 20. Removing the drum locking ring and lid.



Fig. 21. Examining the waste contents of a drum.





Fig. 22. This 55-gallon drum had a 30-gallon drum inside.

analyses were checked and no errors were found in the computations, but they appear to be low by a factor of 10. Comparisons with a number of sludge samples analyzed before and since these four indicate that the  $^{239}\text{Pu}$  radioassay should be in the  $10^{-1}$  range, as the original batch samples were. The agreement of the values for  $^{238}\text{Pu}$  and  $^{241}\text{Am}$  give credence to the practice of radioassaying thoroughly mixed batches rather than individual drums.

TABLE VI  
ANALYSES OF VACUUM-FILTERED CHEMICAL TREATMENT SLUDGE  
(Values in curies per drum)

<u>DRUM/Isotope</u>	<u>Original Batch</u>	<u>Core Sample</u>
<u>012124</u>		
$^{238}\text{Pu}$	$1.67(\overline{+} \ .1) \times 10^{-2}$	$1.55(\overline{+} \ .20) \times 10^{-2}$
$^{239}\text{Pu}$	$1.74(\overline{+} \ .1) \times 10^{-1}$	$1.48(\overline{+} \ .19) \times 10^{-2}$
$^{241}\text{Am}$	$3.56(\overline{+} \ .25) \times 10^{-1}$	$2.32(\overline{+} \ .09) \times 10^{-1}$
<u>012307</u>		
$^{238}\text{Pu}$	$1.67(\overline{+} \ .1) \times 10^{-2}$	$2.71(\overline{+} \ .46) \times 10^{-2}$
$^{239}\text{Pu}$	$1.74(\overline{+} \ .1) \times 10^{-1}$	$1.57(\overline{+} \ .19) \times 10^{-2}$
$^{241}\text{Am}$	$3.56(\overline{+} \ .35) \times 10^{-1}$	$2.37(\overline{+} \ .07) \times 10^{-1}$
<u>012327</u>		
$^{238}\text{Pu}$	$1.67(\overline{+} \ .1) \times 10^{-2}$	$1.53(\overline{+} \ .20) \times 10^{-2}$
$^{239}\text{Pu}$	$1.74(\overline{+} \ .1) \times 10^{-1}$	$1.72(\overline{+} \ .22) \times 10^{-2}$
$^{241}\text{Am}$	$3.56(\overline{+} \ .25) \times 10^{-1}$	$2.42(\overline{+} \ .24) \times 10^{-1}$
<u>012535</u>		
$^{238}\text{Pu}$	$1.67(\overline{+} \ .1) \times 10^{-2}$	$6.05(\overline{+} \ .79) \times 10^{-3}$
$^{239}\text{Pu}$	$1.74(\overline{+} \ .1) \times 10^{-1}$	$2.18(\overline{+} \ .24) \times 10^{-2}$
$^{241}\text{Am}$	$3.56(\overline{+} \ .25) \times 10^{-1}$	$2.90(\overline{+} \ .23) \times 10^{-1}$

As a further study, three drums of cemented sludge were sampled for gas content after they had been sealed from 20 to 70 days; they were found to be at atmospheric pressure. Analyses of gas samples withdrawn from each verified the conclusion drawn earlier from the cored sludge: no significant gas volumes are being generated. Table VII shows these gas values.

TABLE VII

ANALYSES OF GAS FROM DRUMS OF CHEMICAL TREATMENT SLUDGE

<u>Drum #</u>	<u>Age (days)</u>	<u>Gas Analysis (mol%)</u>							
		<u>H<sub>2</sub></u>	<u>O<sub>2</sub></u>	<u>CO<sub>2</sub></u>	<u>CO</u>	<u>CH<sub>4</sub></u>	<u>N<sub>2</sub></u>	<u>Ar</u>	<u>He</u>
50011	20	<0.1	19.1	0.1	<0.1	0.1	79.8	0.9	<0.1
50016	20	0.1	18.1	0.2	<0.1	0.2	80.4	1.0	<0.1
50048	70	0.1	20.2	0.2	<0.1	0.2	78.3	0.9	<0.1

## DISCUSSION OF STUDIES

Perusal of the visual examination data collected on the summary sheets indicates that 5 of the 33 drums opened and examined (14%) definitely could not be certified as packaged. Three contained free liquids, one contained corrosive materials, and one had too much unstabilized particulate. The one with particulate, a process residue waste, was not expected to be certifiable. Drum BFB-234, one of the 30-gallon drums of  $^{238}\text{Pu}$  waste, contained a bag with several small cans. Wet material (not free liquid) had corroded through the wall of one of the cans and had started to corrode two other cans from the outside. A sample of this material showed it to be acidic  $^{238}\text{Pu}$  oxide, with a pH of 3. Container 010435, a 55-gallon drum of  $^{239}\text{Pu}$ -contaminated waste, was another drum that appeared to be certifiable when examined by RTR. Visual examination revealed a container of filtering aid in this drum that was 35.4% of the total contents' weight. One hundred percent of this particulate material was smaller than 75 micrometers. Without stabilization, this material is not certifiable. The three drums that contained free liquids were as follows:

- o Drum 010761, a 55-gallon drum of  $^{239}\text{Pu}$ -contaminated, combustible, room-decontamination waste that contained a plastic hand-lotion bottle still holding approximately 60 ml of hand lotion.
- o Drum 010925, a 55-gallon drum of  $^{239}\text{Pu}$ -contaminated, leached process residues packaged in multiple cans, each of which contained 100 to 150 ml of free liquid, for an aggregate of 2 liters to 3 liters. Clearly this material is not certifiable until the liquids have been solidified.

- o Drum BFB-240, a 30-gallon drum of  $^{238}\text{Pu}$ -contaminated waste. Inside was a double-bagged leverpak, and between the two bags was approximately 150 ml of water. Because the leverpak was saturated, it seems probable that the water came from the inside; however, this is the drum that was found to have standing water on the lid when the concrete storage cask was opened. Figure 23 is a print of the radiograph of this drum, showing that the water cannot be seen.

Eleven drums had the wrong (or at least not the most appropriate) Los Alamos waste code assigned. All of these contained significant portions of combustible material, so this inappropriate coding would not have been a problem for certification.

The packaging efficiencies seem poorer than desirable: 93% of the drums were 50% to 95% filled, while only 66% were 75% to 95% filled. One drum (3%) was only 25% full, and another 35%. There is probably some settling of the contents of the waste material with time, but it does appear that a more efficient use of the disposal volume could be made with a reasonable effort on the part of the waste generators. The calculated void volumes were around 90%; this percentage was expected, especially for organic waste. No pyrophoric materials, explosives, toxic materials, or compressed gases were found in any of the drums examined. Except for drum BFB-234, corrosive materials if present were properly packaged to meet WIPP-WAC criteria. Details of these categories may be found in Appendix 4.

Descriptions of several of the  $^{238}\text{Pu}$  waste drums mention a red or brown dust that was observed (e.g., BFB-19, BFB-238). Usually the observers made the statement that "there was not enough to collect." Some of this material probably was rust. However, a portion of it may have been a degradation product



Fig. 23. Radiograph of drum BFB-240. RTR does not show water.

from the alpha-attack of  $^{238}\text{Pu}$  on cellulose. This product has been previously observed in laboratory experiments (Ref. 2, pp. 10, 11, 14, and Figure 19). These particles are low density, extremely fine, easily rendered airborne, and generally highly contaminated. Clearly this material could be a potential for spreading contamination if containers of contaminated waste have to be opened. This degradation product is rarely observed in drums of  $^{239}\text{Pu}$ -contaminated waste. Drum 010753 is the only instance of the brown powder in  $^{239}\text{Pu}$  waste seen to this time; it is definitely an exception. In all of these instances, however, the quantity of particulate was not sufficient to render the drum noncertifiable. Obviously the particulate is not present when the drums are originally filled, but its potential presence in older drums must not be forgotten.

The waste-process solids, waste codes A-25 through A-29, are always in a doubtful category for certification because of the possibilities of free liquids, too many fines in the particulates, or corrosive attack on the containers. Some might be certifiable, but most probably will have to be processed. Among the  $^{239}\text{Pu}$  drums examined, the following are examples:

- o Drum 010108. There is no practical way to know whether the damp particulate wastes meet particle-size criteria. Clearly it would be desirable and less expensive to solidify the materials before they are packaged.
- o Drum 010925. This drum was not certifiable because of the free liquid, but even if it had been dry, the problem of particle size would still make it suspect.

## SUMMARY

- ° Most waste was found to be certifiable; five drums were not, and one of these was not expected to be. Two of these were not certifiable because of free liquid, one because of improperly contained corrosive, and one (suspected in advance) because of free liquid and potential particulate.
- ° Most drums were in good condition when recovered from storage; all were structurally sound and contamination-free on all exterior surfaces.
- ° Radiography was not able to identify unacceptable wastes. However, the system available was not designed specifically to perform this task.
- ° There was some deterioration of cellulosic and plastic waste in  $^{238}\text{Pu}$  drums as a result of radiolysis. However, all drums were still certifiable, even the 9-year-old waste.
- ° No drums had gas pressure in excess of atmospheric pressure; all had vented radiolytically generated gases through the porous gasket.
- ° Three and 9-year-old  $^{238}\text{Pu}$  waste drums all showed negligible mole percentages of  $\text{H}_2$ , although they did contain significant quantities of other radiolytically generated gases, especially  $\text{CO}_2$ .  $\text{H}_2$  generation had almost stopped; any significant quantity of this gas had long since diffused out of the container. However, the 8-month-old drums still contained significant levels of  $\text{H}_2$ .
- ° No  $^{239}\text{Pu}$  drums contained any potential gas hazard.



#### ACKNOWLEDGMENTS

The authors appreciate the cooperation of Los Alamos National Laboratory personnel in the following groups: Analytical Chemistry (CHM-1), Advanced Nuclear Technology (Q-2), Waste Management (HSE-7), Industrial Hygiene (HSE-5), and Health Physics (HSE-1). Without their supporting efforts this work could not have been performed.

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2. Al Zerwekh, "Gas Generation from Radiolytic Attack of TRU-Contaminated Hydrogenous Waste," Los Alamos Scientific Laboratory report LA-7674-MS (June 1979).

APPENDIX 1

LOS ALAMOS WASTE FORM CODES

Los Alamos National Laboratory

VALID WASTE CODES

<u>CODE</u>	<u>WASTE MATERIAL DESCRIPTION</u>	<u>CODE</u>	<u>WASTE MATERIAL DESCRIPTION</u>
A-10	Graphite	A-50	Metal Crucibles, Scrap, Dies
A-14	Combustible Room Decon. Waste	A-51	Precious Metals
A-15	Mixed Cellulosics	A-52	Other Scrap Metals
A-16	Plastic Materials	A-55	Filter Media
A-17	Rubber Materials	A-56	Filter Media Residue
A-18	Mixed Paper, Plastic, Rubber, etc.	A-60	Other Combustibles
A-19	Mixed Combustible/Noncombustible Trash	A-61	Other Noncombustibles
A-20	Hydrocarbon Oils	A-65	Animal Tissue
A-21	Silicon Base Oils	A-70	Chemical Waste
A-25	Leached Process Residues	A-71	Be
A-26	Evaporator Bottoms (Salts)	A-72	Hg
A-27	Nitrate Salts	A-73	Counting Vials and Solution
A-28	Chloride Salts	A-74	Ion Exchange Resin
A-29	Hydroxide Cake	A-75	Chemical Treatment Sludge
A-30	PN Equipment	A-76	Cement Paste
A-31	Non-PN Equipment	A-77	Vermiculite
A-32	PN Size Reduced Equipment (SRF Only)	A-80	Sources
A-33	Non-PN Size Reduced Equipment (SRF Only)	A-85	Firing Point Residues
A-35	Combustible Building Debris	A-90	Contaminated Soil
A-36	Noncombustible Building Debris	A-95	Glass
A-40	Combustible Hot-Cell Waste	A-99	Unidentified Material (TA-54 personnel use only)
A-41	Noncombustible Hot-Cell Waste		
A-45	Uranium Chips and/or Turnings		
A-46	Skull and Oxide		
A-47	Slag and Porcelain Crucibles		

APPENDIX 2

WASTE DRUM SUMMARY SHEETS

**SUMMARY SHEET**

Waste Form Category: Other Combustibles

Age When Opened: 39 months

Container ID: BFB-12  
Content Code: A-60  
Container Wt. (Kg): 18.6  
Original Assay (g): 6.6  
Packaging Location: CMB-11, TA-55  
Radionuclide:  $^{238}\text{Pu}$

Container Type: 30-gal drum  
Code Description: Other Combustibles  
Surface Dose Rate: 80 mr  
Reassay (g): 4.85  
Date Packaged: 5-30-80

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
Liner Type: None  
Lead-Lined?: No  
Packaging  
Description: Several plastic bags inside drum.  
Can inside top bag.

Waste Form  
Description: Large cylindrical container at  
angle on top, more dense objects, probably  
tools, near bottom.

Absorbent?:  
Free Liquids: No.  
Compressed  
Gasses: No.  
Particulates: No.  
Packaging  
Efficiency: Approx. 3/4 full.  
Volume %  
Combustible:  
Correct Content Code: Perhaps A-19 might be better.

WIPP  
Certifiable?: Yes.  
Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: 1-84  
Container Good. Slight rust film, not  
Condition: enough to collect particulate.  
Lead-Lined?: No.  
Liner Type: None.  
Packaging

Description: Double-plastic-bagged metal can.  
There were zones where rust had penetrated the  
can, creating pinholes.

Waste Form  
Description: Cheesecloth and filter paper  
contents of can were partially burned. Second  
plastic bag contained rags, cheesecloth, drill  
Absorbent: No. bits, wrenches, paper,  
Physical State gloves, broken glass. No  
of Waste: Dry. deterioration in this bag.

Component Wt. (Kg): 6.5  
WIPP-WAC Compliance  
Information: Apparently in compliance\*  
Packaging Efficiency: 15% void.  
Volume % Combustible: 50-60%  
Correct Content  
Code: A-19 more appropriate.  
WIPP Certifiable?: Yes.  
Miscellaneous: \*Portions of partly char-  
red cheesecloth and filter paper were removed  
as a sample from one of the bags, but there  
appeared no reason to do an analysis.

**SUMMARY SHEET**

Waste Form Category: Other Combustibles

Container ID: BFB-14  
 Content Code: A-60  
 Container Wt. (Kg): 27.3  
 Original Assay (g): 1.3  
 Packaging Location: CMB-11, TA-55  
 Radionuclide:  $^{238}\text{Pu}$

Age When Opened: 36 months

Container Type: 30-gal drum  
 Code Description: Other Combustibles  
 Surface Dose Rate: 2 mr  
 Reassay (g): 0.17  
 Date Packaged: 7-23-80

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
 Liner Type: None  
 Lead-Lined?: No  
 Packaging  
 Description: Bagged, low-density trash.

Waste Form  
 Description: Smaller containers inside bags.  
 All low density.

Absorbent?: None.  
 Free Liquids: None.  
 Compressed  
 Gasses: None.  
 Particulates: None.  
 Packaging  
 Efficiency: Approx. 1/2 full.  
 Volume %  
 Combustible: 95%  
 Correct Content Code: Perhaps A-14 might be better.  
 WIPP  
 Certifiable?: Yes.  
 Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: 1-84  
 Container: Exterior very good. Interior  
 Condition: bright and shiny.  
 Lead-Lined?: No.  
 Liner Type: None.  
 Packaging  
 Description: Double-plastic-bagged trash from  
 room cleanup.

Waste Form  
 Description: Empty alcohol bottle, HF bottle,  
 gloves, rags, cheesecloth.

Absorbent: None.  
 Physical State  
 of Waste: Dry & clean. Not deteriorated.

Component Wt. (Kg): 9.9  
 WIPP-WAC Compliance  
 Information: Apparently in compliance.  
 Packaging Efficiency: 50% void (computed void  
 Volume % Combustible: 95% volume 94%)  
 Correct Content  
 Code: A-14 more specific.  
 WIPP Certifiable?: Yes.  
 Miscellaneous:

**SUMMARY SHEET**

Waste Form Category: Other Noncombustibles

Age When Opened: 37 months

Container ID: BFB-19  
Content Code: A-61  
Container Wt. (Kg): 31.8  
Original Assay (g): 5.6  
Packaging Location: CMB-11, TA-55  
Radionuclide: <sup>238</sup>Pu

Container Type: 30-gal drum  
Code Description: Other Noncombustibles  
Surface Dose Rate: 15 mr  
Reassay (g): 0.52  
Date Packaged: 7-29-80

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
Liner Type: None  
Lead-Lined?: No  
Packaging  
Description: Bagged, cylindrical containers.

Waste Form  
Description: Appeared to be glassware in cylindrical containers. Some small, dense objects.

Absorbent?: None.  
Free Liquids: None.  
Compressed Gasses: None.  
Particulates: None detected.  
Packaging Efficiency: Approx. 80% full.

Volume % Combustible: 5%  
Correct Content Code: Yes.

WIPP  
Certifiable?: Yes.

Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: 1-84  
Container Condition: Exterior very good. Interior clean and dry.  
Lead-Lined?: No.  
Liner Type: None.  
Packaging  
Description: Bagged metal cans.

Waste Form Inside can, bagged metal can containing alundum. 2nd can, gas-kets. 3rd can, hot pressing dies. 4th can, glassware & some red dust, couldn't collect.

Absorbent: None.

Physical State  
of Waste: Dry & clean.

Component Wt. (Kg): 14.9

WIPP-WAC Compliance

Information: Apparently in compliance.

Packaging Efficiency: 15% void.

Volume % Combustible: 5%

Correct Content

Code: Yes.

WIPP Certifiable?: Yes.

Miscellaneous:

**SUMMARY SHEET**

Waste Form Category: Other Combustibles

Age When Opened: 36 months

Container ID: BFB-20  
 Content Code: A-60  
 Container Wt. (Kg): 24.1  
 Original Assay (g): 2.2  
 Packaging Location: CMB-11, TA-55  
 Radionuclide: <sup>238</sup>Pu

Container Type: 30-gal drum  
 Code Description: Other Combustibles  
 Surface Dose Rate: Background  
 Reassay (g): 0.0  
 Date Packaged: 7-29-80

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
 Liner Type: None  
 Lead-Lined?: No  
 Packaging  
 Description: Plastic bag, smaller more dense  
 areas inside. Possibly several smaller bags?  
 Waste Form  
 Description: Nothing specifically identified.

Absorbent?: None.  
 Free Liquids: None.  
 Compressed  
 Gasses: None.  
 Particulates: None.  
 Packaging  
 Efficiency: Approx. 50% full.  
 Volume %  
 Combustible: Probably 100%.  
 Correct Con-  
 tent Code: A-16 would be more specific.  
 WIPP  
 Certifiable?: Yes.  
 Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: 1-84  
 Container Exterior very good. Interior  
 Condition: clean and dry.  
 Lead-Lined?: No.  
 Liner Type: None.  
 Packaging  
 Description: Plastic bags in 30-gal. drum.

**Waste Form**

Description: Two bag-out bags, each filled  
 with plastic sleeves.

Absorbent: None.  
 Physical State  
 of Waste: Dry & clean.

Component Wt. (Kg): 14.0  
 WIPP-WAC Compliance  
 Information: Apparently in compliance.  
 Packaging Efficiency: 50% void (computed void  
 Volume % Combustible: 100% volume 80.6%)  
 Correct Content  
 Code: A-16 is more specific.  
 WIPP Certifiable?: Yes.  
 Miscellaneous:



**SUMMARY SHEET**

Waste Form Category: Other Combustibles

Age When Opened: 35 months

Container ID: BFB-26  
Content Code: A-60  
Container Wt. (Kg): 25.4  
Original Assay (g): 1.05  
Packaging Location: CMB-11, TA-55  
Radionuclide: <sup>238</sup>Pu

Container Type: 30-gal drum  
Code Description: Other Combustibles  
Surface Dose Rate: 0.2 mr  
Reassay (g): 0.0  
Date Packaged: 9-16-80

RADIOGRAPHIC EXAMINATION

Exam. Date: 9-83  
Liner Type: None  
Lead-Lined?: No  
Packaging  
Description: Bagged trash inside drum.  
  
Waste Form  
Description: Forceps, wide-mouth bottle,  
2-liter acid bottle, less dense material near  
bottom.  
Absorbent?: None.  
Free Liquids: None.  
Compressed  
Gasses: None.  
Particulates: None.  
Packaging  
Efficiency: Approx. 2/3 full.  
Volume %  
Combustible: Probably 50%.  
Correct Con-  
tent Code: No. Should be A-19.  
WIPP  
Certifiable?: Yes.  
Miscellaneous:

VISUAL EXAMINATION

Exam. Date: 1-84  
Container Exterior very good. Interior  
Condition: clean and dry, tinge of rust.  
Lead-Lined?: No.  
Liner Type: None.  
Packaging  
Description: Plastic bagged trash.  
  
Waste Form  
Description: Empty nitric acid and HF bottle.  
Al foil, gloves, plastics, empty gallon jar,  
and cheesecloth.  
Absorbent\*: None.  
Physical State  
of Waste: Dry, slightly decomposed.  
  
Component Wt. (Kg): 14.8  
WIPP-WAC Compliance  
Information: Apparently in compliance.  
Packaging Efficiency: 35% void (computed void  
Volume % Combustible: 50% volume 90.0%).  
Correct Content  
Code: Should be A-19.  
WIPP Certifiable?: Yes.  
Miscellaneous:

**SUMMARY SHEET**

Waste Form Category: Other Combustibles

Container ID: BFB-27  
 Content Code: A-60  
 Container Wt. (Kg): 25.1  
 Original Assay (g): 1.18  
 Packaging Location: CMB-11, TA-55  
 Radionuclide: <sup>238</sup>Pu

Age When Opened: 35 months

Container Type: 30-gal drum  
 Code Description: Other Combustibles  
 Surface Dose Rate: Background  
 Reassay (g): 0.42  
 Date Packaged: 9-12-80

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
 Liner Type: None  
 Lead-Lined?: No  
 Packaging  
 Description: Plastic bag inside drum.

Waste Form  
 Description: Appeared to be several plastic bags inside one larger bag. Small circular dense spot near bottom, one dense object.

Absorbent?: None.  
 Free Liquids: None.  
 Compressed  
 Gasses: None.  
 Particulates: None.  
 Packaging  
 Efficiency: Approx. 2/3 full.  
 Volume %  
 Combustible: 100% of contents.  
 Correct Content Code: A-18 is more specific.  
 WIPP  
 Certifiable?: Yes.  
 Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: 1-84  
 Container  
 Condition: Exterior very good. Interior clean and dry.  
 Lead-Lined?: No.  
 Liner Type: None.  
 Packaging  
 Description: A single plastic bag of waste.

Waste Form  
 Description: A single plastic bag of paper, surgeon's gloves, cheesecloth, plastic. No dust, liquid, or deterioration.

Absorbent: None.  
 Physical State  
 of Waste: Dry, in good condition.

Component Wt. (Kg): 14.7  
 WIPP-WAC Compliance  
 Information: Apparently in compliance.  
 Packaging Efficiency: 30% void (computed void  
 Volume % Combustible: 100% volume 91.7%).  
 Correct Content  
 Code: A-18 would be better.  
 WIPP Certifiable?: Yes.  
 Miscellaneous:

**SUMMARY SHEET**

Waste Form Category: Mixed paper, plastics,  
rubbers, etc.

Age When Opened: 7 months

Container ID: BFB-92  
Content Code: A-18  
Container Wt. (Kg): 23.6  
Original Assay (g): 7.7  
Packaging Location: MST-DO, TA-55  
Radionuclide:  $^{238}\text{Pu}$

Container Type: 30-gal drum  
Code Description: Mixed paper, plastics,  
rubber, etc.  
Surface Dose Rate: 7 mr  
Reassay (g): 4.4  
Date Packaged: 1-24-83

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
Liner Type: None  
Lead-Lined?: No  
Packaging  
Description: Cylindrical containers in drum.  
Low, uniform density. No clue as to specific  
contents.

Waste Form  
Description:

Absorbent?: None.  
Free Liquids: None.  
Compressed  
Gasses: None.  
Particulates: None observed.  
Packaging  
Efficiency: About 1/2 full.  
Volume %  
Combustible: Could not estimate.  
Correct Con-  
tent Code: No. A-19 more appropriate.  
WIPP  
Certifiable?: Yes.  
Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: 1-84  
Container Very good externally, clean  
Condition: inside with some rust color.  
Lead-Lined?: No.  
Liner Type: None.  
Packaging  
Description: Ice cream carton within a metal  
can inside a metal can. Carton in a plastic  
bag-out bag.

Waste Form  
Description: Inside one ice cream carton was  
 $\text{Al}_2\text{O}_3$ . Others contained cheesecloth, lead-  
wrapped vials, graphite solids.  
Absorbent: None.  
Physical State  
of Waste: Dry, clean, some rust color.

Component Wt. (Kg): 7.7  
WIPP-WAC Compliance  
Information: Apparently in compliance\*  
Packaging Efficiency: 40% void.  
Volume % Combustible: 25%  
Correct Content  
Code: No. A-19 more appropriate.  
WIPP Certifiable?: Yes.  
Miscellaneous: \*Assign new waste code.

**SUMMARY SHEET**

Waste Form Category: Mixed combustible/  
noncombustible

Container ID: BFB-96  
Content Code: A-19  
Container Wt. (Kg): 32.2  
Original Assay (g): 10.2  
Packaging Location: MST-DO, TA-55  
Radionuclide:  $^{238}\text{Pu}$

Age When Opened: 8 months

Container Type: 30-gal drum  
Code Description: Mixed combustible/  
noncombustible  
Surface Dose Rate: 13 mr  
Reassay (g): 10.1  
Date Packaged: 1-03-83

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
Liner Type: None.  
Lead-Lined?: No.  
Packaging  
Description: Top bag contains more dense ma-  
terial in cylindrical container.  
Waste Form  
Description: Several cylinders in bottom,  
probably in low-density overpack. Some circular  
dense spots.

Absorbent?: None.  
Free Liquids: None.  
Compressed  
Gasses: None.  
Particulates: None.  
Packaging  
Efficiency: 3/4 full.  
Volume %  
Combustible: Perhaps 50%  
Correct Con-  
tent Code: Yes.  
WIPP  
Certifiable?: Yes.  
Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: 1-84  
Container: External, very good. Internal,  
Condition: clean and dry.  
Lead-Lined?: No.  
Liner Type: None.  
Packaging  
Description: A bucket and 3 metal containers,  
all in plastic bags.

Waste Form  
Description: Lead-lined gloves, cheesecloth,  
plastic bag-outs.

Absorbent: None.  
Physical State  
of Waste: Dry, clean.

Component Wt. (Kg): 16.9  
WIPP-WAC Compliance  
Information: Appears to be in compliance.  
Packaging Efficiency: 20% void.  
Volume % Combustible: 50%  
Correct Content  
Code: Yes.  
WIPP Certifiable?: Yes.  
Miscellaneous:

**SUMMARY SHEET**

Waste Form Category: Mixed combustible/  
noncombustible

Age When Opened: 8 months

Container ID: BFB-97  
Content Code: A-19  
Container Wt. (Kg): 51.5  
Original Assay (g): 9.4  
Packaging Location: MST-DO, TA-55  
Radionuclide: <sup>238</sup>Pu  
Radionuclide: <sup>238</sup>Pu

Container Type: 30-gal drum  
Code Description: Mixed combustible/  
noncombustible  
Surface Dose Rate: 15 mr  
Reassay (g): No record  
Date Packaged: 1-03-83

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
Liner Type: None.  
Lead-Lined?: No.  
Packaging: Several containers; one lying on  
Description: its side on top. Cylindrical dark  
blobs--probably metallic vials or cannisters--  
all in a larger, less dense container.  
Waste Form  
Description:

Absorbent?: No.  
Free Liquids: None.  
Compressed  
Gasses: None.  
Particulates: None.  
Packaging  
Efficiency: Probably 90% full.  
Volume %  
Combustible: Probably 50%.  
Correct Content Code: Yes.  
WIPP  
Certifiable?: Yes.  
Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: 1-84  
Container: Very good exterior--some handling  
Condition: scratches around one rolling hoop.  
Lead-Lined?: No.  
Liner Type: None.  
Packaging  
Description: Metal containers holding bagged-  
out metal containers.

Waste Form: Wire and plastic bottles (empty)  
Description: inside bagged-out cans, deter-  
iorated cheesecloth, Ziploc containers, Al  
foil, rusty cans, hacksaw blade, small pres-  
sure vessel, paint brushes, pliers.  
Absorbent: None.  
Physical State  
of Waste: Dry, rust colored.

Component Wt. (Kg): 20.07  
WIPP-WAC Compliance  
Information: Apparently in compliance.  
Packaging Efficiency: 5% void.  
Volume % Combustible: 35%  
Correct Content  
Code: Yes.  
WIPP Certifiable?: Yes.  
Miscellaneous:

**SUMMARY SHEET**

Waste Form Category: Mixed paper, plastic,  
rubber, etc.

Age When Opened: 8 months

Container ID: BFB-101  
Content Code: A-18  
Container Wt. (Kg): 24.5  
Original Assay (g): 11.6  
Packaging Location: MST-DO, TA-55  
Radionuclide: <sup>238</sup>Pu

Container Type: 30-gal drum  
Code Description: Mixed paper, plastic,  
rubber, etc.  
Surface Dose Rate: 15 mr  
Reassay (g): 12.1  
Date Packaged: 1-12-83

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
Liner Type: None.  
Lead-Lined?: No.  
Packaging  
Description: 5 or 6 plastic or thin steel con-  
tainers; one horizontal lying on top of verti-  
cal ones in bottom.

Waste Form  
Description: Not possible to discern contents.

Absorbent?: None.  
Free Liquids: None.  
Compressed  
Gasses: None.  
Particulates: None.  
Packaging  
Efficiency: Probably 90% filled.  
Volume %  
Combustible: Probably 50%  
Correct Con-  
tent Code: Yes.  
WIPP  
Certifiable?: Yes.  
Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: 1-84  
Container External, very good. Internal,  
Condition: slight rust-colored film.  
Lead-Lined?: No.  
Liner Type: Double plastic bag, but no liner.  
Packaging  
Description: Metal cans holding inner bagged-  
out metal cans.

Waste Form  
Description: Plastic Ziplocs, sample vials,  
gaskets, cheesecloth, sandpaper.

Absorbent: None.  
Physical State  
of Waste: Dry, slight rust-colored film.

Component Wt. (kg): 10.2  
WIPP-WAC Compliance  
Information: Apparently in compliance\*  
Packaging Efficiency: 8% void (computed void  
Volume % Combustible: 80% volume 93.9%)  
Correct Content  
Code: Yes.  
WIPP Certifiable?: Yes.

Miscellaneous: \*A sample of partially  
deteriorated cheesecloth was taken from one of  
the bags, but there appeared to be no reason  
to analyze it.

**SUMMARY SHEET**

Waste Form Category: Mixed combustible/  
noncombustible

Age When Opened: 7 months

Container ID: BFB-102  
Content Code: A-19  
Container Wt. (Kg): 32  
Original Assay (g): 3.4  
Packaging Location: MST-DO, TA-55  
Radionuclide: <sup>238</sup>Pu

Container Type: 30-gal drum  
Code Description: Mixed combustible/  
noncombustible  
Surface Dose Rate: 7 mr  
Reassay (g): 2.4  
Date Packaged: 1-27-83

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
Liner Type: None.  
Lead-Lined?: No.  
Packaging  
Description: Plastic bags in drum.

**VISUAL EXAMINATION**

Exam. Date: 1-84  
Container External, very good. Internal,  
Condition: clean, dry, and shiny.  
Lead-Lined?: No.  
Liner Type: None.  
Packaging  
Description: Double-plastic-wrapped metal cans  
containing bagged-out metal cans.

Waste Form  
Description: Appeared to be hydraulic jack,  
several plastic containers and a Boston round  
bottle.

Absorbent?: None.  
Free Liquids: None.  
Compressed  
Gasses: None.  
Particulates: None.  
Packaging  
Efficiency: Probably 3/4 filled.  
Volume %  
Combustible: Could not tell; maybe 30%?  
Correct Content Code: Yes.  
WIPP  
Certifiable?: Yes.  
Miscellaneous:

Waste Form  
Description: Punctured WD-40 can, another  
empty metal can, cheesecloth, pieces of  
metal, crushed Al foil.

Absorbent: None.  
Physical State  
of Waste: Dry, clean, and shiny.

Component Wt. (Kg): 14.9  
WIPP-WAC Compliance  
Information: Apparently in compliance.  
Packaging Efficiency: 15% void  
Volume % Combustible: 20%  
Correct Content  
Code: Yes.  
WIPP Certifiable?: Yes.  
Miscellaneous:

**SUMMARY SHEET**

Waste Form Category: Mixed combustible/  
noncombustible

Age When Opened: 7 months

Container ID: BFB-103  
Content Code: A-19  
Container Wt. (Kg): 29  
Original Assay (g): 6.8  
Packaging Location: MST-DO, TA-55  
Radionuclide: <sup>238</sup>Pu

Container Type: 30-gal drum  
Code Description: Mixed combustible/  
noncombustible  
Surface Dose Rate: 5 mr  
Reassay (g): 6.1  
Date Packaged: 1-26-83

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
Liner Type: None.  
Lead-Lined?: No.  
Packaging  
Description: Cans in plastic bags, one hori-  
zontal on top, 4 vertical on bottom.

Waste Form  
Description: One small can (4 x 4) on bottom.  
No indication of contents.

Absorbent?: None.  
Free Liquids: None.  
Compressed  
Gasses: None.  
Particulates: None.  
Packaging  
Efficiency: About 2/3 full.  
Volume %  
Combustible: Could not tell.  
Correct Con-  
tent Code: Probably.  
WIPP  
Certifiable?: Yes.  
Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: 1-84  
Container External, very good. Internal,  
Condition: clean and dry.  
Lead-Lined?: No.  
Liner Type: None.  
Packaging  
Description: Double-plastic-wrapped metal  
containers.

Waste Form  
Description: Bagged-out cans containing vials,  
glass jars, cheesecloth, Ziploc bags. Some  
cans had corroded interiors.  
Absorbent: None.  
Physical State  
of Waste: Dry, not deteriorated.

Component Wt. (Kg): 12.3  
WIPP-WAC Compliance  
Information: Apparently in compliance\*  
Packaging Efficiency: 30% void.  
Volume % Combustible: About 50%.  
Correct Content  
Code: Yes.  
WIPP Certifiable?: Yes.  
Miscellaneous: \*A sample of partially  
decomposed cheesecloth was taken from one of  
the bags, but there appeared to be no reason  
to analyze it.



**SUMMARY SHEET**

Waste Form Category: Mixed paper, plastic,  
rubber, etc.

Age When Opened: 9 years, 3 months

Container ID: BFB-234  
Content Code: A-18  
Container Wt. (Kg): 22.7  
Original Assay (g): 18.2  
Packaging Location: CMB-11, TA-21  
Radionuclide:  $^{238}\text{Pu}$

Container Type: 30-gal drum  
Code Description: Mixed paper, plastic,  
rubber, etc.  
Surface Dose Rate: 120 mr  
Reassay (g): 13.0  
Date Packaged: 10-29-74

RADIOGRAPHIC EXAMINATION

Exam. Date: 9-83  
Liner Type: None.  
Lead-Lined?: No.  
Packaging  
Description: Drum appeared more dense than  
some of the others. 2 cylindrical objects,  
which were not clear.

Waste Form  
Description: Some more dense areas which  
might be discarded equipment.

Absorbent?: None.  
Free Liquids: None.  
Compressed  
Gasses: None.  
Particulates: None.  
Packaging  
Efficiency: About 2/3 full.  
Volume %  
Combustible: Could not tell.  
Correct Con-  
tent Code: Not sure.  
WIPP  
Certifiable?: Probably.  
Miscellaneous:

VISUAL EXAMINATION

Exam. Date: 1-84  
Container Exterior, very good. Interior,  
Condition: drum rusty on bottom.  
Lead-Lined?: No.  
Liner Type: None.  
Packaging  
Description: 4 plastic-bagged metal containers.

Waste Form  
Description: Bag-out full of small sealed  
cans. Can of wet material which reacted out  
of the can and involved two other cans. This  
was a  $^{238}\text{Pu}$  material with a pH of 3.

Absorbent: None.  
Physical State  
of Waste: 3 containers dry, one wet.

Component Wt. (Kg): 6.6  
WIPP-WAC Compliance  
Information: Noncompliance.\*  
Packaging Efficiency: 8% void.  
Volume % Combustible: 10%  
Correct Content  
Code: No. Should be A-19.  
WIPP Certifiable?: No. (see below)  
Miscellaneous: \*For certification, the  
wet, corrosive material must be neutralized.

**SUMMARY SHEET**

Waste Form Category:	Mixed paper, plastic, rubber, etc.	Age When Opened:	9 years, 3 months
Container ID:	BFB-235	Container Type:	30-gal drum
Content Code:	A-18	Code Description:	Mixed paper, plastic, rubber, etc.
Container Wt. (Kg):	22.7	Surface Dose Rate:	9 mr
Original Assay (g):	18.2	Reassay (g):	2.1
Packaging Location:	CMB-11, TA-21	Date Packaged:	10-29-74
Radionuclide:	$^{238}\text{Pu}$		

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
 Liner Type: None.  
 Lead-Lined?: No.  
 Packaging  
 Description: Some small 2R containers; several short, one longer. Larger cylindrical.

Waste Form  
 Description: Some plastic

Absorbent?: None.  
 Free Liquids: None.  
 Compressed  
 Gasses: None.  
 Particulates: None.  
 Packaging  
 Efficiency: About 1/2 full.  
 Volume %  
 Combustible:  
 Correct Content Code: Doubtful, probably should be A-61.  
 Certifiable?: Yes, after code change.  
 Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: 1-84  
 Container Exterior, very good, a little rust  
 Condition: on one lid. Internal clean, dry  
 Lead-Lined?: No. with a trace of rust  
 Liner Type: None. film.  
 Packaging  
 Description: A leverpak inside the drum.

Waste Form  
 Description: 28 crushed, rusty cans. 26 crushed one-gallon cans. Some Al foil. Two 2" pipe nipples, capped on both ends. A one-gallon can filled with empty cans.  
 Absorbent: None.  
 Physical State  
 of Waste: Clean and dry.  
 Component Wt. (Kg): 29.5  
 WIPP-WAC Compl' n e  
 Information: In compliance after code change.  
 Packaging Efficiency: 50% in leverpak. WIPP  
 Volume % Combustible: 10%  
 Correct Content  
 Code: No. Should be A-61.  
 WIPP Certifiable?: Yes  
 Miscellaneous:

**SUMMARY SHEET**

Waste Form Category: Mixed paper, plastic,  
rubber, etc.

Age When Opened: 9 years, 3 months

Container ID: BFB-237  
Content Code: A-18  
Container Wt. (Kg): 54.5  
Original Assay (g): 4.2  
Packaging Location: GMB-11, TA-21  
Radionuclide: <sup>238</sup>Pu

Container Type: 30-gal drum  
Code Description: Mixed paper, plastic,  
rubber, etc.  
Surface Dose Rate: 9 mr  
Reassay (g): 3.5  
Date Packaged: 10-29-74

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
Liner Type: None.  
Lead-Lined?: No.  
Packaging  
Description: Several pieces of dense apparatus  
in an array indicating several bags.

Waste Form  
Description: Some cylindrical objects.

Absorbent?: None.  
Free Liquids: None.  
Compressed  
Gasses: None.  
Particulates: None.  
Packaging  
Efficiency: About 3/4 full.  
Volume %  
Combustible: Could not tell.  
Correct Con-  
tent Code: No, should be A-61.  
WIPP  
Certifiable?: Probably.  
Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: 1-84  
Container External, very good. Some rust  
Condition: on lid. Internal, little rust.  
Lead-Lined?: No.  
Liner Type: None.  
Packaging  
Description: Plastic-wrapped leverpak inside  
drum.

Waste Form  
Description: Rusty vises, sieves, pipe, rods,  
hammers, screwdrivers, cans, hand tools, gar-  
den hose. No loose rust.  
Absorbent: None  
Physical State  
of Waste: Dry. No free rust.

Component Wt. (Kg): 38.6  
WIPP-WAC Compliance  
Information: In compliance with new code.  
Packaging Efficiency: 20% void.  
Volume % Combustible: 10%  
Correct Content  
Code: No, should be A-61.  
WIPP Certifiable?: Yes.  
Miscellaneous:

**SUMMARY SHEET**

Waste Form Category:	Mixed paper, plastic, rubber, etc.	Age When Opened:	9 years, 3 months
Container ID:	BFB-238	Container Type:	30-gal drum
Content Code:	A-18	Code Description:	Mixed paper, plastic, rubber, etc.
Container Wt. (Kg):	45.5	Surface Dose Rate:	3.5 mr
Original Assay (g):	0.5	Reassay (g):	0.0
Packaging Location:	CMB-11, TA-21	Date Packaged:	10-29-74
Radionuclide:	$^{238}\text{Pu}$		

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
 Liner Type: None.  
 Lead-Lined?: No.  
 Packaging

Lead-Lined?: No.  
 Description: Cylindrical container, appears to be nearly full.

Waste Form  
 Description: Appears to be tubing and apparatus.

Absorbent?: None.  
 Free Liquids: None.  
 Compressed Gasses: None.  
 Particulates: None.  
 Packaging  
 Efficiency: About 90% full.  
 Volume %  
 Combustible: Could not tell.  
 Correct Content Code: Doubtful, probably should be A-61.  
 WIPP  
 Certifiable?: Yes.  
 Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: 1-84  
 Container  
 Condition: External, some rust on lid and drum, but still good. Internal, rusty inside both drum and leverpak.

Liner Type: None.  
 Packaging  
 Description: Leverpak inside a plastic bag-out.

Waste Form  
 Description: 10 rusty containers, 5 pressure vessels, stainless door frame and gasket, 2 halves of a plastic window port, empty plastic bag-out stubs, 8 transfer cans, misc. pieces of rusty metal. (Continued below).

Absorbent: None.  
 Physical State  
 of Waste: Dry, very rusty.  
 Component Wt. (Kg): 29.5  
 WIPP-WAC Compliance  
 Information: In compliance with new code.  
 Packaging Efficiency: 30% void in leverpak.  
 Volume % Combustible: 10%  
 Correct Content  
 Code: No, should be A-61.  
 WIPP Certifiable?: Yes.  
 Miscellaneous: Waste Form Description  
 Continued: After shaking and banging, 0.98 g of rust was collected. Only 4% was smaller than 200 micrometers, so it would meet WIPP-WAC criteria.

**SUMMARY SHEET**

Waste Form Category: Mixed paper, plastic,  
rubber, etc.

Age When Opened: 9 years, 3 months

Container ID: BFB-239  
Content Code: A-18  
Container Wt. (Kg): 61.8  
Original Assay (g): 1.4  
Packaging Location: CMB-11, TA-21  
Radionuclide:  $^{238}\text{Pu}$

Container Type: 30-gal drum  
Code Description: Mixed paper, plastic,  
rubber, etc.  
Surface Dose Rate: 6 mr  
Reassay (g): 0.65  
Date Packaged: 10-29-74

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
Liner Type: None.  
Lead-Lined?: No.  
Packaging  
Description: Plastic-bagged containers of  
more dense materials.

Waste Form  
Description: 2R containers? Small drill-press  
vise? Larger cylindrical containers.

Absorbent?: None.  
Free Liquids: None.  
Compressed  
Gasses: None.  
Particulates: None.  
Packaging  
Efficiency: About 3/4 filled.  
Volume %  
Combustible: Appears to be low--10%?  
Correct Con-  
tent Code: No, should probably be A-61.  
WIPP  
Certifiable?: Yes, with code change.  
Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: 1-84  
Container External, very good. Internal,  
Condition: clean and dry.  
Lead-Lined?: No.  
Liner Type: None.  
Packaging  
Description: Plastic-wrapped metal cans  
containing a variety of wastes.

Waste Form  
Description: Plastics, metals, glass tubes,  
metal tubes, scrap metal desicator, heat lamp,  
glass bottles, broken glass, metal tools.  
Absorbent: None.  
Physical State  
of Waste: Clean and dry.  
Component Wt. (Kg): 45.9  
WIPP-WAC Compliance  
Information: In compliance after code change.  
Packaging Efficiency: 5% void.  
Volume % Combustible: 10%  
Correct Content  
Code: No, should be A-61.  
WIPP Certifiable?: Yes.  
Miscellaneous:

**SUMMARY SHEET**

Waste Form Category: Mixed paper, plastic,  
rubber, etc.

Age When Opened: 9 years, 3 months

Container ID: BFB-240  
Content Code: A-18  
Container Wt. (Kg): 50  
Original Assay (g): 1.7  
Packaging Location: CMB-11, TA-21  
Radionuclide:  $^{238}\text{Pu}$

Container Type: 30-gal drum  
Code Description: Mixed paper, plastic,  
rubber, etc.  
Surface Dose Rate: 13 mr  
Reassay (g): 1.1  
Date Packaged: 10-29-74

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
Liner Type: None.  
Lead-Lined?: No.  
Packaging  
Description: Plastic bags in drum.

Waste Form  
Description: Appears to be tools and labora-  
tory apparatus.

Absorbent?: None.  
Free Liquids: None seen.  
Compressed  
Gases: None.  
Particulates: None.  
Packaging  
Efficiency: 2/3 filled.  
Volume %  
Combustible: Could not tell.  
Correct Con-  
tent Code: No, should be A-61.  
WIPP  
Certifiable?: Probably, could not tell.  
Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: 1-84  
Container Exterior, lid rusty; water  
Condition: standing on lid when cask opened.  
Lead-Lined?: No.  
Liner Type: None.  
Packaging  
Description: Double-bagged leverpak. Approx-  
imately 150 ml  $\text{H}_2\text{O}$  between bags. Leverpak was  
saturated.

Waste Form  
Description: Die, desicator, empty glass  
containers, power hose for furnace, rusty  
cans and metal objects.  
Absorbent: None  
Physical State  
of Waste: Wet and rusty.

Component Wt. (Kg): 29.5  
WIPP-WAC Compliance  
Information: Noncompliance due to free liquid.  
Packaging Efficiency: 30% void.  
Volume % Combustible: Maybe 10%  
Correct Content  
Code: No, should be A-61.  
WIPP Certifiable?: No. Free liquids.  
(150 ml  $\text{H}_2\text{O}$ ).

Miscellaneous:

**SUMMARY SHEET**

Waste Form Category: Mixed paper, plastic,  
rubber, etc.

Age When Opened: 11 months

Container ID: 007060  
Content Code: A-18  
Container Wt. (Kg): 47.2  
Original Assay (g): 7.3  
Packaging Location: CHM-1, SM-29  
Radionuclide:  $^{239}\text{Pu}$ , MFP,  $^{241}\text{Am}$

Container Type: 55-gal drum  
Code Description: Mixed paper, plastic,  
rubber, etc.  
Reassay (g): 3.56  
Date Packaged: 2-14-83

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
Liner Type: None.  
Lead-Lined?: No.  
Packaging  
Description: This drum was not radiographed.

Waste Form  
Description:

Absorbent?:  
Free Liquids:  
Compressed  
Gasses:  
Particulates:  
Packaging  
Efficiency:  
Volume %  
Combustible:  
Correct Con-  
tent Code:  
WIPP  
Certifiable?:  
Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: 1-84  
Container External, very good. Internal,  
Condition: clean and dry, no dents, no dust.  
Lead-Lined?: No.  
Liner Type: None.  
Packaging  
Description: Large 5-mil plastic bag contained  
the waste inside the drum.

Waste Form  
Description: Gloves, rags, empty plastic vial,  
shoe covers, empty ice cream containers, or-  
ganic room trash.

Absorbent: None.  
Physical State  
of Waste: Dry and clean.

Component Wt. (Kg): 19.7  
WIPP-WAC Compliance  
Information: Appears to be in compliance.  
Computed Void Volume: 91.1%  
Packaging Efficiency: 5% void.  
Volume % Combustible: 100%  
Correct Content  
Code: Yes.  
WIPP Certifiable?: Yes.  
Miscellaneous:

**SUMMARY SHEET**

Waste Form Category: Mixed paper, plastic,  
rubber, etc.

Age When Opened: 11 months

Container ID: 007226  
Content Code: A-18  
Container Wt. (Kg): 48.1  
Original Assay (g): 0.4  
Packaging Location: CHM-1, SM-29  
Radionuclide:  $^{239}\text{Pu}$ , MFP,  $^{241}\text{Am}$

Container Type: 55-gal drum  
Code Description: Mixed paper, plastic,  
rubber, etc.  
Surface Dose Rate: 2 mr  
Reassay (g): 0.43  
Date Packaged: 2-14-83

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
Liner Type: None.  
Lead-Lined?: No.  
Packaging  
Description: Variable density suggesting  
multiple bags of trash.

**Waste Form**

Description: Organic trash, plus pipes or  
tubes about 30 inches long.

Absorbent?: None.  
Free Liquids: None.  
Compressed  
Gasses: None.  
Particulates: None.  
Packaging  
Efficiency: Appeared almost full.  
Volume %  
Combustible: Probably 80%.  
Correct Content Code: Yes.  
WIPP  
Certifiable?: Yes.  
Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: 1-84  
Container External, very good. Internal,  
Condition: clean and dry.  
Lead-Lined?: No.  
Liner Type: None.  
Packaging  
Description: Plastic-bagged drybox trash.

**Waste Form**

Description: Empty ice cream cartons, glass  
vials, squeeze bottles, paper and rubber,  
bagged-out in several separate plastic bags.  
Absorbent: None.  
Physical State  
of Waste: Dry.

Component Wt. (Kg): 21.9  
WIPP-WAC Compliance  
Information: Apparently in compliance.  
Packaging Efficiency: 5% void (computed void  
Volume % Combustible: 100% volume 92.6%)  
Correct Content  
Code: Yes.  
WIPP Certifiable?: Yes.  
Miscellaneous:



**SUMMARY SHEET**

Waste Form Category: Leached process residues  
Container ID: 010108  
Content Code: A-25  
Container Wt. (Kg): 56.8  
Original Assay (g): 80 (<sup>239</sup>Pu), 0.3 (<sup>238</sup>Pu)  
Packaging Location: CMB-11, TA-55  
Radionuclide: Mixed as shown

Age When Opened: 25 months  
Container Type: 55-gal drum  
Code Description: Leached process residues  
Surface Dose Rate: 13 mr  
Reassay (g): 53 (<sup>239</sup>Pu), 0.0 (<sup>238</sup>Pu)  
Date Packaged: 7-02-81

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
Liner Type: Double 0.005" plastic, taped.  
Lead-Lined?: No.  
Packaging  
Description: Numerous cylindrical containers  
within containers. Some dense material.

Waste Form  
Description: Probably process solids.

Absorbent?: None.  
Free Liquids: None.  
Compressed  
Gasses: None.  
Particulates: None.  
Packaging  
Efficiency: Probably 4/5 filled.  
Volume %  
Combustible: Low--perhaps 5%.  
Correct Content Code: Yes.  
WIPP  
Certifiable?: Yes.  
Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: 1-84  
Container: External, very good; internal,  
Condition: clean and dry.  
Lead-Lined?: No.  
Liner Type: Double 0.005" plastic, taped.  
Packaging  
Description: 14 units - either can in bag, or  
can in can, or double-plastic-bagged.

Waste Form  
Description: Solids such as CaCl<sub>2</sub>, hydroxide  
cake, ceramic chips, 1 double-bagged "damp"  
dark powder.  
Absorbent: None.  
Physical State  
of Waste: Dry, except for damp powder.

Component Wt. (Kg): 33.44  
WIPP-WAC Compliance  
Information: Apparently in compliance.  
Packaging Efficiency: 25% void.  
Volume % Combustible: 5 - 10%  
Correct Content  
Code: Yes.  
WIPP Certifiable?: Possibly.  
Miscellaneous:

**SUMMARY SHEET**

Waste Form Category: Mixed paper, plastic,  
rubber, etc.

Age When Opened: 12 months

Container ID: 010362  
Content Code: A-18  
Container Wt. (Kg): 56.1  
Original Assay (g): 26.2  
Packaging Location: MST-DO, TA-55  
Radionuclide:  $^{239}\text{Pu}$

Container Type: 55-gal drum  
Code Description: Mixed paper, plastic,  
rubber, etc.  
Surface Dose Rate: 5 mr  
Reassay (g): 38.8  
Date Packaged: 1-19-83

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
Liner Type: None.  
Lead-Lined?: No.  
Packaging  
Description: Multiple bag-outs of trash.

Waste Form  
Description: Variable density material.  
A 6- or 8-inch ring near the bottom.

Absorbent?: Probably none.  
Free Liquids: None observed.  
Compressed  
Gasses: None.  
Particulates: None.  
Packaging  
Efficiency: About 4/5 filled.  
Volume %  
Combustible: Must assume 80% or more.  
Correct Content Code: Probably.  
WIPP  
Certifiable?: Yes.  
Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: Not opened in SRF.  
Container  
Condition: External, very good.  
Lead-Lined?:  
Liner Type:  
Packaging  
Description:

Waste Form  
Description:

Absorbent:  
Physical State  
of Waste:

Component Wt. (Kg):  
WIPP-WAC Compliance  
Information:  
Packaging Efficiency:  
Volume % Combustible:  
Correct Content  
Code:  
WIPP Certifiable?:  
Miscellaneous:

**SUMMARY SHEET**

Waste Form Category: Slag and porcelain crucibles

Age When Opened: 12 months

Container ID: 010405  
Content Code: A-47  
Container Wt. (Kg): 95  
Original Assay (g): 191  
Packaging Location: MST-DO, TA-55  
Radionuclide: <sup>239</sup>Pu

Container Type: 55-gal drum  
Code Description: Slag & porcelain crucibles  
Surface Dose Rate: 7 mr  
Reassay (g): Not done  
Date Packaged: 1-25-83

**RADIOGRAPHIC EXAMINATION**

Exam. Date: Radiograph not done.  
Liner Type:  
Lead-Lined?:  
Packaging  
Description:

Waste Form  
Description:

Absorbent?:  
Free Liquids:  
Compressed  
Gasses:  
Particulates:  
Packaging  
Efficiency:  
Volume %  
Combustible:  
Correct Content Code:  
WIPP  
Certifiable?:  
Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: Not opened in SRF.  
Container  
Condition: External, very good.  
Lead-Lined?:  
Liner Type:  
Packaging  
Description:

Waste Form  
Description:

Absorbent:  
Physical State  
of Waste:

Component Wt. (Kg):  
WIPP-WAC Compliance  
Information:  
Packaging Efficiency:  
Volume % Combustible:  
Correct Content  
Code: Probably.  
WIPP Certifiable?: Probably.  
Miscellaneous:

**SUMMARY SHEET**

Waste Form Category:	Leached process residues	Age When Opened:	12 months
Container ID:	010411	Container Type:	55-gal drum
Content Code:	A-25	Code Description:	Leached process residues
Container Wt. (Kg):	58.5	Surface Dose Rate:	24 mr
Original Assay (g):	186	Reassay (g):	132
Packaging Location:	MST-DO, TA-55	Date Packaged:	1-27-83
Radionuclide:	$^{239}\text{Pu}$		

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
 Liner Type: Probably .005" plastic.  
 Lead-Lined?: No.  
 Packaging  
 Description: Cylindrical containers (6).  
 Smaller one on bottom more dense.

Waste Form  
 Description: Believed to be process solids.

Absorbent?: None.  
 Free Liquids: None.  
 Compressed  
 Gasses: None.  
 Particulates: None.  
 Packaging  
 Efficiency: About 80% full.  
 Volume %  
 Combustible: Low  
 Correct Content Code: Yes.  
 WIPP  
 Certifiable?: Yes.  
 Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: Not opened in SRF  
 Container  
 Condition: External, very good.  
 Lead-Lined?:  
 Liner Type:  
 Packaging  
 Description:

Waste Form  
 Description:

Absorbent:  
 Physical State  
 of Waste:  
 Component Wt. (Kg):  
 WIPP-WAC Compliance  
 Information:  
 Packaging Efficiency:  
 Volume % Combustible:  
 Correct Content  
 Code:  
 WIPP Certifiable?:  
 Miscellaneous:

**SUMMARY SHEET**

Waste Form Category: Other scrap metals

Container ID: 010435  
Content Code: A-52  
Container Wt. (Kg): 84.9  
Original Assay (g): 38  
Packaging Location: MST-DO, TA-55  
Radionuclide: <sup>239</sup>Pu

Age When Opened: 12 months  
Container Type: 55-gal drum  
Code Description: Other scrap metals  
Surface Dose Rate: 26 mr  
Reassay (g): 39  
Date Packaged: 1-20-83

RADIOGRAPHIC EXAMINATION

Exam. Date: 9-83  
Liner Type: Two .005" plastic bags  
Lead-Lined?: No.  
Packaging  
Description: Multiple bags and cans.

Waste Form

Description: Bag of dense material near top.  
6 or 8 tubes in a cylindrical container. Large  
mashed can on bottom.  
Absorbent?: None.  
Free Liquids: None.  
Compressed  
Gasses: None.  
Particulates: None.  
Packaging  
Efficiency: About 4/5 filled.  
Volume %  
Combustible: Quite low.  
Correct Con-  
tent Code: Probably.  
WIPP  
Certifiable?: Yes.  
Miscellaneous:

VISUAL EXAMINATION

Exam. Date: 1-84  
Container: External, very good. Internal,  
Condition: clean and dry.  
Lead-Lined?: No.  
Liner Type: Double plastic bags.  
Packaging  
Description: Multiple bags in a drum.

Waste Form

Description: Smashed, rusty cans, 2 pieces of  
pipe, moist filter cake (no free liquid).  
Fine filtering aid.  
Absorbent: None.  
Physical State  
of Waste: Dry. The filtering aid was 35.4%  
of total weight; it was all <70 micrometers.  
Component Wt. (Kg): 72.4  
WIPP-WAC Compliance  
Information: Does not comply.  
Packaging Efficiency: 15% void.  
Volume % Combustible: 5% or less.  
Correct Content  
Code: No, should be A-52, A-55, & A-61.  
WIPP Certifiable?: No.\*  
Miscellaneous: \*Fine filtering aid  
would have to be stabilized.

**SUMMARY SHEET**

Waste Form Category: Slag and porcelain crucibles

Age When Opened: 12 months

Container ID: 010494  
 Content Code: A-47  
 Container Wt. (Kg): 69.8  
 Original Assay (g): 198  
 Packaging Location: MST-DO, TA-55  
 Radionuclide: <sup>239</sup>Pu

Container Type: 55-gal drum  
 Code Description: Slag & porcelain crucibles.  
 Surface Dose Rate: 7 mr  
 Reassay (g): Not done  
 Date Packaged: 1-19-83

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
 Liner Type: Probably .005" plastic  
 Lead-Lined?: No.  
 Packaging  
 Description: Cylindrical containers within cylindrical containers.

**Waste Form**

Description: 4 containers, quite dense.  
 Would not be able to identify slag & crucibles without prior knowledge of contents.

Absorbent?: None.

Free Liquids: None.

Compressed

Gasses: None.

Particulates: None.

Packaging

Efficiency: About 2/3 filled.

Volume %

Combustible: Probably very low (<10%).

Correct Con-

tent Code: Yes.

WIPP

Certifiable?: Yes.

Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: Not opened in SRF  
 Container  
 Condition: Exterior, very good.  
 Lead-Lined?:  
 Liner Type:  
 Packaging  
 Description:

**Waste Form**

Description:

Absorbent:

Physical State  
 of Waste:

Component Wt. (Kg):

WIPP-WAC Compliance

Information:

Packaging Efficiency:

Volume % Combustible:

Correct Content

Code:

WIPP Certifiable?:

Miscellaneous:

**SUMMARY SHEET**

Waste Form Category: Mixed paper, plastic,  
rubber, etc.

Age When Opened: 11 months

Container ID: 010605  
Content Code: A-18  
Container Wt. (Kg): 64.7  
Original Assay (g): 122  
Packaging Location: MST-DO, TA-55  
Radionuclide: <sup>239</sup>Pu

Container Type: 55-gal drum  
Code Description: Mixed paper, plastic,  
rubber, etc.  
Surface Dose Rate: 15 mr  
Reassay (g): 111  
Date Packaged: 1-25-83

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
Liner Type: .005" plastic bag.  
Lead-Lined?: No.  
Packaging  
Description: No record of radiograph.

**VISUAL EXAMINATION**

Exam. Date: 1-84  
Container: External, very good. Internal,  
Condition: clean and dry.  
Lead-Lined?: No.  
Liner Type: .005" plastic.  
Packaging  
Description: Bagged-out 30-gal drum inside a  
55-gal drum.

Waste Form  
Description:

Waste Form  
Description: Rags in four cylindrical metal  
containers, packed in 30-gallon drum.

Absorbent?:  
Free Liquids:  
Compressed  
Gasses:  
Particulates:  
Packaging  
Efficiency:  
Volume %  
Combustible:  
Correct Content Code:  
WIPP  
Certifiable?:  
Miscellaneous:

Absorbent: None.  
Physical State  
of Waste: Clean and dry.  
Component Wt. (Kg): 7.9  
WIPP-WAC Compliance  
Information: Apparently in compliance.  
Packaging Efficiency: 80% void (computed void  
Volume % Combustible: 100% volume 97.1%)  
Correct Content  
Code: OK, but could be A-15.  
WIPP Certifiable?: Yes.  
Miscellaneous:

**SUMMARY SHEET**

Waste Form Category: Other Noncombustibles

Age When Opened: 11 months

Container ID: 010645

Container Type: 55-gal drum

Content Code: A-61

Code Description: Other Noncombustibles

Container Wt. (Kg): 88.1

Surface Dose Rate: 3 mr

Original Assay (g): 108.3

Reassay (g): 116.8

Packaging Location: MST-DO, TA-55

Date Packaged: 1-26-83

Radionuclide:  $^{239}\text{Pu}$ **RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83

Liner Type: None.

Lead-Lined?: No.

**Packaging**

Description: Multiple plastic bags of non-combustibles. Bottom third contains more dense objects.

**Waste Form**

Description: No recognizable shapes.

Absorbent?: None.

Free Liquids: None.

**Compressed**

Gasses: None.

Particulates: None.

**Packaging**

Efficiency: About 90% filled.

**Volume %**

Combustible: Probably low.

**Correct Con-**

tent Code: Yes.

**WIPP**

Certifiable?: Yes.

**Miscellaneous:****VISUAL EXAMINATION**

Exam. Date: Not opened in SRF.

**Container**

Condition: External, very good.

**Lead-Lined?:****Liner Type:****Packaging**

Description:

**Waste Form**

Description:

**Absorbent:**Physical State  
of Waste:

Component Wt. (Kg):

WIPP-WAC Compliance

Information:

Packaging Efficiency:

Volume % Combustible:

Correct Content

Code:

WIPP Certifiable?:

Miscellaneous:



### SUMMARY SHEET

Waste Form Category: Plastic Materials

Age When Opened: 11 months

Container ID: 010753  
Content Code: A-16  
Container Wt. (Kg): 70  
Original Assay (g): 46  
Packaging Location: MST-DO, TA-55  
Radionuclide: <sup>239</sup>Pu

Container Type: 55-gal drum  
Code Description: Plastic Materials  
Surface Dose Rate: 12 mr  
Reassay (g): 43  
Date Packaged: 1-26-83

#### RADIOGRAPHIC EXAMINATION

Exam. Date: 9-83  
Liner Type: .005" plastic, taped to drum.  
Lead-Lined?: No.  
Packaging  
Description: Bagged-out 30-gal drum inside a 55-gal drum.

#### Waste Form

Description: 30-gal drum containing separate bags of low-density material. Some cylindrical containers. Denser area in bottom.

Absorbent?: None.

Free Liquids: None.

Compressed

Gasses: None.

Particulates: None.

Packaging

Efficiency: 4/5 filled.

Volume %

Combustible: Probably 100%

Correct Con-

tent Code: Yes, but could be A-18.

WIPP

Certifiable?: Yes.

Miscellaneous:

#### VISUAL EXAMINATION

Exam. Date: 1-84  
Container External, very good. Internal,  
Condition: clean and dry.  
Lead-Lined?: No.  
Liner Type: .005" plastic.  
Packaging  
Description: Bagged-out 30-gal drum inside of a 55-gal drum.

#### Waste Form

Description: Plastic bag of empty plastic bottles, bag of paper filters. 30-gal drum contained about 1 liter of loose, fine brown  
Absorbent: None. dust.

Physical State

of Waste: Dry. 36 g (0.6%) of the brown powder is <200 micrometers, but waste is in  
Component Wt. (Kg): 6.3 compliance.

WIPP-WAC Compliance

Information:

Packaging Efficiency: 25% void (computed void

Volume % Combustible: 100% volume 96.7%)

Correct Content

Code: OK, could be A-18.

WIPP Certifiable?: Yes.

Miscellaneous:

**SUMMARY SHEET**

Waste Form Category: Other combustibles

Container ID: 010756  
 Content Code: A-60  
 Container Wt. (Kg): 40.5  
 Original Assay (g): 0.0  
 Packaging Location: CMB-11, TA-55  
 Radionuclide:  $^{44}\text{Am}$ ,  $^{48}\text{Cf}$ ,  $^{249}\text{Bk}$

Age When Opened: 30 months

Container Type: 55-gal drum  
 Code Description: Other combustibles  
 Surface Dose Rate: 5 mr  
 Reassay (g): 0.0  
 Date Packaged: 6-15-81

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
 Liner Type: .005" plastic.  
 Lead-Lined?: No.  
 Packaging  
 Description: Smaller drum (15-gal?) inside  
 a 55-gal drum.

**Waste Form**

Description: Dense ring in bottom of smaller drum.

Absorbent?: None.  
 Free Liquids: None.  
 Compressed  
 Gasses: None.  
 Particulates: None.  
 Packaging  
 Efficiency: 15-gal drum about 1/3 filled.  
 Volume %  
 Combustible: Probably at least 50%  
 Correct Content Code: Possibly code A-19 is better.  
 WIPP  
 Certifiable?: Yes.  
 Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: 1-84  
 Container Condition: Good, externally. Some scraped  
 paint. Internally, clean & dry.  
 Lead-Lined?: No.  
 Liner Type: .005" plastic.  
 Packaging

Description: 19-gal steel drum bagged-out inside a 55-gal drum. Numerous qt. and pt. ice cream containers inside smaller drum.

**Waste Form**

Description: Fluorescent bulb, roll of masking tape, empty vials, paper, metal and plastic scrap, foil, copper rings.

Absorbent: None.  
 Physical State  
 of Waste: Dry and clean.

Component Wt. (Kg): 15.24  
 WIPP-WAC Compliance  
 Information: In compliance after new code.  
 Packaging Efficiency: 65% void.  
 Volume % Combustible: 50%  
 Correct Content Code: No, should be A-19.  
 WIPP Certifiable?: Yes.  
 Miscellaneous:

**SUMMARY SHEET**

Waste Form Category: Combustible room decon waste

Age When Opened: 11 months

Container ID: 010761  
Content Code: A-14  
Container Wt. (Kg): 49  
Original Assay (g): 0.47  
Packaging Location: MST-DO, TA-55  
Radionuclide: <sup>239</sup>Pu

Container Type: 55-gal drum  
Code Description: Combustible room decon waste  
Surface Dose Rate: 1 mr  
Reassay (g): 0.0  
Date Packaged: 1-26-83

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
Liner Type: .005" plastic  
Lead-Lined?: No.  
Packaging Description: Bagged trash.

**Waste Form**

Description: Bags of low-density trash, tubes, some lab glassware, more dense bundle on the bottom of the drum.  
Absorbent?: None.  
Free Liquids: None.  
Compressed Gasses: None.  
Particulates: None.  
Packaging Efficiency: Probably 95% filled.  
Volume % Combustible: Probably 80%  
Correct Content Code: Yes.  
WIPP Certifiable?: Yes.  
Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: 1-84  
Container Condition: Good. Clean and dry with no serious dents or rust.  
Lead-Lined?: No.  
Liner Type: .005" plastic  
Packaging Description: Partially bagged, partially loose in liner.

**Waste Form**

Description: Plastic bucket with cleaning materials, plastic floor covering, coveralls, gloves, wood scrap, plastic hand-lotion bottle w/2 oz. lotion inside, glass jars in a plastic bag.  
Absorbent: None.  
Physical State of Waste: Dry except for damp coveralls and hand lotion.  
Component Wt. (Kg): 20.3  
WIPP-WAC Compliance Information: Not in compliance - free liquid.  
Packaging Efficiency: No significant void.  
Volume % Combustible: 90%  
Correct Content Code: Yes.  
WIPP Certifiable?: Yes, after solidifying  
Miscellaneous: hand-lotion.

**SUMMARY SHEET**

Waste Form Category: Mixed combustible/  
noncombustible

Container ID: 010773  
 Content Code: A-19  
 Container Wt. (Kg): 50.4  
 Original Assay (g): 0.1  
 Packaging Location: MST-DO, TA-55  
 Radionuclide: <sup>239</sup>Pu

Age When Opened: 11 months  
 Container Type: 55-gal drum  
 Code Description: Mixed combustible/  
noncombustible  
 Surface Dose Rate: 5 mr  
 Reassay (g): Apparently not done.  
 Date Packaged: 1-26-83

**RADIOGRAPHIC EXAMINATION**

Exam. Date: No record of radiograph.  
 Liner Type:  
 Lead-Lined?:  
 Packaging  
 Description:

Waste Form  
 Description:

Absorbent?:  
 Free Liquids:  
 Compressed  
 Gasses:  
 Particulates:  
 Packaging  
 Efficiency:  
 Volume %  
 Combustible:  
 Correct Con-  
 tent Code:  
 WIPP  
 Certifiable?:  
 Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: 1-84  
 Container: Outside, very good. Inside, rust-  
 colored, damp.  
 Condition:  
 Lead-Lined?: No.  
 Liner Type: .005" plastic.  
 Packaging  
 Description: Partially bagged in plastic,  
 partially loose in liner.

Waste Form  
 Description: 5"-30" pipe sections, taped.  
 Included valves, also taped. Wet paper, rags,  
 gloves, coveralls, but no free liquid.  
 Absorbent: None.  
 Physical State  
 of Waste: Wet, but no free liquid.

Component Wt. (Kg): 31.8  
 WIPP-WAC Compliance  
 Information: Apparently in compliance.  
 Packaging Efficiency: 20% void.  
 Volume % Combustible: 65%  
 Correct Content  
 Code: Yes.  
 WIPP Certifiable?: Yes.  
 Miscellaneous:

**SUMMARY SHEET**

Waste Form Category: Other combustibles

Age When Opened: 30 months

Container ID: 010775  
Content Code: A-60  
Container Wt. (Kg): 55.7  
Original Assay (g): 27.9  
Packaging Location: CMB-11, TA-55  
Radionuclide: <sup>239</sup>Pu

Container Type: 55-gal drum  
Code Description: Other combustibles  
Surface Dose Rate: 1 mr  
Reassay (g): 42.4  
Date Packaged: 6-02-81

RADIOGRAPHIC EXAMINATION

Exam. Date: No record of radiograph.  
Liner Type:  
Lead-Lined?:  
Packaging

Description:

Waste Form  
Description:

Absorbent?:  
Free Liquids:  
Compressed  
Gasses:  
Particulates:  
Packaging  
Efficiency:  
Volume %  
Combustible:  
Correct Content Code:  
WIPP  
Certifiable?:  
Miscellaneous:

VISUAL EXAMINATION

Exam. Date: 1-84  
Container Good, both outside and inside.  
Condition: Inner drum very dirty, but structurally sound.

Lead-Lined?: No.  
Liner Type: .005" plastic  
Packaging

Description: 30-gal drum bagged out in .012" plastic and put inside a 55-gal drum.

Waste Form  
Description: 9 separate bag-out sleeves containing glass & metal parts, gloves, paper, plastic, tape, rags, scrap plastic tubing. Also, loose brown dust in 30-gal drum.

Absorbent: None  
Physical State  
of Waste: Dry. Damp rags inside one bag-out sleeve, but no free liquid.

Component Wt. (Kg): 15.8

WIPP-WAC Compliance  
Information: In compliance\*.

Packaging Efficiency: 10% void

Volume % Combustible: 90%

Correct Content

Code: Yes.

WIPP Certifiable?: Yes.

Miscellaneous: \*Quantity of brown dust was insignificant.

**SUMMARY SHEET**

Waste Form Category:	Leached Process Residues	Age When Opened:	30 months
Container ID:	010925	Container Type:	55-gal drum
Content Code:	A-25	Code Description:	Leached Process Residues
Container Wt. (Kg):	227.3	Surface Dose Rate:	2 mr
Original Assay (g):	32.4	Reassay (g):	Not done. Too heavy for
Packaging Location:	CMB-11, TA-55	Date Packaged:	6-24-81 equipment.
Radionuclide:	$^{239}\text{Pu}$		

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
 Liner Type: Lead.  
 Lead-Lined?: Yes.  
 Packaging  
 Description: Multiple containers of process solids.

Waste Form  
 Description: Process solids, probably in 1/2-gal cans.

Absorbent?: None.  
 Free Liquids: None apparent.  
 Compressed Gasses: None.  
 Particulates: None.  
 Packaging  
 Efficiency: Appeared to be almost full.  
 Volume %  
 Combustible: None.  
 Correct Content Code: Yes. New Code:  
 WIPP  
 Certifiable?: Apparently yes.  
 Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: 1-84  
 Container  
 Condition: Good, wet inside, some rust.  
 Lead-Lined?: Yes.  
 Liner Type: Lead.  
 Packaging  
 Description: Multiple 1/2-gal cans of wet, red sludge, contained in plastic bags.

Waste Form  
 Description:

Absorbent: None.  
 Physical State  
 of Waste: Wet. Varying amounts of free-standing liquid in each can and, because cans were upside down, some liquid was leaking.  
 Component Wt. (Kg): 218  
 WIPP-WAC Compliance  
 Information: Not in compliance.  
 Packaging Efficiency: 1% void.  
 Volume % Combustible: None.  
 Correct Content Code: Yes.  
 WIPP Certifiable?: Not certifiable until free liquid in each can has been stabilized.  
 Miscellaneous: The liquid smelled strongly of  $\text{NH}_3$ , so there was no danger of acid corrosion.

**SUMMARY SHEET**

Waste Form Category: Plastic Materials

Age When Opened: 11 months

Container ID: 012223  
Content Code: A-16  
Container Wt. (Kg): 58.3  
Original Assay (g): 63  
Packaging Location: MST-DO, TA-55  
Radionuclide:  $^{239}\text{Pu}$ ,  $^{241}\text{Am}$

Container Type: 55-gal drum  
Code Description: Plastic Materials  
Surface Dose Rate: 18 mr  
Reassay (g): 65.1  
Date Packaged: 1-27-83

RADIOGRAPHIC EXAMINATION

Exam. Date: 9-83  
Liner Type: Appears to be .005" plastic.  
Lead-Lined?: No.  
Packaging Description: Multiple bag-outs of canned waste.

Waste Form Description: Low-density materials in bags and cans.

Absorbent?: None.  
Free Liquids: None.  
Compressed Gasses: None.  
Particulates: None.  
Packaging Efficiency: 4/5 full.  
Volume % Combustible: Probably 85%  
Correct Content Code: Yes.  
WIPP Certifiable?: Yes.  
Miscellaneous:

VISUAL EXAMINATION

Exam. Date: Drum not opened in SRF.  
Container Condition:  
Lead-Lined?:  
Liner Type:  
Packaging Description:

Waste Form Description:

Absorbent:  
Physical State of Waste:  
Component Wt. (Kg):  
WIPP-WAC Compliance Information:  
Packaging Efficiency:  
Volume % Combustible:  
Correct Content Code:  
WIPP Certifiable?:  
Miscellaneous:

**SUMMARY SHEET**

Waste Form Category:	Leached process residues	Age When Opened:	11 months
Container ID:	012395	Container Type:	55-gal drum
Content Code:	A-25	Code Description:	Leached process residues
Container Wt. (Kg):	81.3	Surface Dose Rate:	22 mr
Original Assay (g):	185	Reassay (g):	Not done.
Packaging Location:	MST-DO, TA-55	Date Packaged:	1-19-83
Radionuclide:	$^{239}\text{Pu}$ , $^{241}\text{Am}$		

**RADIOGRAPHIC EXAMINATION**

Exam. Date: Radiograph not done.  
 Liner Type:  
 Lead-Lined?:  
 Packaging  
 Description:

Waste Form  
 Description:

Absorbent?:  
 Free Liquids:  
 Compressed  
 Gasses:  
 Particulates:  
 Packaging  
 Efficiency:  
 Volume %  
 Combustible:  
 Correct Content Code:  
 WIPP  
 Certifiable?:  
 Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: Not opened in SRF.  
 Container  
 Condition:  
 Lead-Lined?:  
 Liner Type:  
 Packaging  
 Description:

Waste Form  
 Description:

Absorbent:  
 Physical State  
 of Waste:

Component Wt. (Kg): 58.6  
 WIPP-WAC Compliance  
 Information:  
 Packaging Efficiency:  
 Volume % Combustible:  
 Correct Content  
 Code:

WIPP Certifiable?: No way to tell.\*  
 Miscellaneous: \*In view of experience  
 with drum 010925, it probably would be necessary to open this drum and check for free liquids and particulates before it could be certified for WIPP.



Waste Form Category: Nitrate Salts

Container ID: 012432  
Content Code: A-27  
Container Wt. (Kg): 171.8  
Original Assay (g): 75.95  
Packaging Location: MST-DO, TA-55  
Radionuclide:  $^{239}\text{Pu}$

RADIOGRAPHIC EXAMINATION

Exam. Date: Not radiographed.  
Liner Type:  
Lead-Lined?:  
Packaging  
Description:

Waste Form  
Description:

Absorbent?:  
Free Liquids:  
Compressed  
Gasses:  
Particulates:  
Packaging  
Efficiency:  
Volume %  
Combustible:  
Correct Content Code:  
WIPP  
Certifiable?:  
Miscellaneous:

**SUMMARY SHEET**

Age When Opened: 11 months  
Container Type: 55-gal drum  
Code Description: Nitrate Salts  
Surface Dose Rate: 1 mr  
Reassay (g): Not done.  
Date Packaged: 1-27-83

VISUAL EXAMINATION

Exam. Date: Not opened in SRF.  
Container  
Condition: Exterior, very good.  
Lead-Lined?:  
Liner Type:  
Packaging  
Description:

Waste Form  
Description:

Absorbent:  
Physical State  
of Waste:

Component Wt. (Kg):  
WIPP-WAC Compliance  
Information:  
Packaging Efficiency:  
Volume % Combustible:  
Correct Content  
Code:  
WIPP Certifiable?: Possibly.  
Miscellaneous:

Waste Form Category: Nitrate Salts

Container ID: 012433  
 Content Code: A-27  
 Container Wt. (Kg): 224.5  
 Original Assay (g): 7.93  
 Packaging Location: MST-DO, TA-55  
 Radionuclide:  $^{239}\text{Pu}$

RADIOGRAPHIC EXAMINATION

Exam. Date: Not radiographed.  
 Liner Type:  
 Lead-Lined?:  
 Packaging  
 Description:

Waste Form  
 Description:

Absorbent?:  
 Free Liquids:  
 Compressed  
 Gases:  
 Particulates:  
 Packaging  
 Efficiency:  
 Volume %  
 Combustible:  
 Correct Content Code:  
 WIPP  
 Certifiable?:  
 Miscellaneous:

**SUMMARY SHEET**

Age When Opened: 11 months  
 Container Type: 55-gal drum  
 Code Description: Nitrate Salts  
 Surface Dose Rate: 4 mr  
 Reassay (g): Not done.  
 Date Packaged: 1-27-83

VISUAL EXAMINATION

Exam. Date: Not opened in SRF.  
 Container  
 Condition: Very good on exterior.  
 Lead-Lined?:  
 Liner Type:  
 Packaging  
 Description:

Waste Form  
 Description:

Absorbent:  
 Physical State  
 of Waste:

Component Wt. (Kg):  
 WIPP-WAC Compliance  
 Information:  
 Packaging Efficiency:  
 Volume % Combustible:  
 Correct Content  
 Code:  
 WIPP Certifiable?: Possibly.  
 Miscellaneous:

**SUMMARY SHEET**

Waste Form Category: Chemical treatment sludge      Age When Opened:      Approx. 1 year

Container ID:                    012124                    Container Type:            55-gal drum  
Content Code:                    A-75                      Code Description:        Chemical treatment sludge  
Container Wt. (Kg):            201.9                    Surface Dose Rate:      5 mr  
Original Assay (g):            0.017, 0.17, 0.35      Reassay (g):            Not done.  
Packaging Location:          TA-50                    Date Packaged:          01-26-83  
Radionuclide:                     $^{238}\text{Pu}$ ,  $^{239}\text{Pu}$ ,  $^{241}\text{Am}$

**RADIOGRAPHIC EXAMINATION**

Exam. Date:                    9-83  
Liner Type:                    90-mil  
Lead-Lined?:                  No.  
Packaging  
Description:                    90-mil HDPE liner.

Waste Form  
Description:                    Sludge.

Absorbent?:                    Portland cement  
Free Liquids:                  None.  
Compressed  
Gasses:                        None.  
Particulates:                  Meets criteria.  
Packaging  
Efficiency:                    Full.  
Volume %  
Combustible:                  None.  
Correct Content Code:        Yes.  
WIPP  
Certifiable?:                  Yes.  
Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date:                    1-84  
Container  
Condition:                    Very good.  
Lead-Lined?:                  No.  
Liner Type:                    90-mil high-density polyethylene  
Packaging  
Description:                    Sludge in above containers.

Waste Form  
Description:                    Sludge.

Absorbent:                    Portland cement.  
Physical State  
of Waste:                    Solid. No free liquid.

Component Wt. (Kg):            174.6  
WIPP-WAC Compliance  
Information:                    Should be possible to certify.  
Packaging Efficiency:          90%-95%  
Volume % Combustible:        None.  
Correct Content  
Code:                            Yes.  
WIPP Certifiable?:              Yes.  
Miscellaneous:

**SUMMARY SHEET**

Waste Form Category:	Chemical treatment sludge	Age When Opened:	Approx. 1 year
Container ID:	012307	Container Type:	55-gal drum
Content Code:	A-75	Code Description:	Chemical treatment sludge
Container Wt. (Kg):	201.9	Surface Dose Rate:	6 mr
Original Assay (g):	0.017, 0.17, 0.35	Reassay (g):	Not done
Packaging Location:	TA-50	Date Packaged:	01-24-83
Radionuclide:	$^{238}\text{Pu}$ , $^{239}\text{Pu}$ , $^{241}\text{Am}$		

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
 Liner Type: 90-mil  
 Lead-Lined?: No.  
 Packaging  
 Description: 90-mil HDPE liner.

Waste Form  
 Description: Sludge.

Absorbent?: Portland cement.  
 Free Liquids: None.  
 Compressed  
 Gases: None.  
 Particulates: Meets criteria.  
 Packaging  
 Efficiency: Full.  
 Volume %  
 Combustible:  
 Correct Content Code: Yes.  
 WIPP  
 Certifiable?: Yes.  
 Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: 1-84  
 Container  
 Condition: Very good.  
 Lead-Lined?: No.  
 Liner Type: 90-mil high-density polyethylene.  
 Packaging  
 Description: Sludge in above containers.

Waste Form  
 Description: Sludge.

Absorbent: None.  
 Physical State  
 of Waste: Solid. No free liquid.

Component Wt. (Kg): 179.2  
 WIPP-WAC Compliance  
 Information: Should be certifiable.  
 Packaging Efficiency: 95%  
 Volume % Combustible: None.  
 Correct Content  
 Code: Yes.  
 WIPP Certifiable?: Yes.  
 Miscellaneous:

**SUMMARY SHEET**

Waste Form Category: Chemical treatment sludge      Age When Opened:      Approx. 1 year

Container ID:                    012327                    Container Type:            55-gal drum  
Content Code:                    A-75                      Code Description:        Chemical treatment sludge  
Container Wt. (Kg):            201.9                    Surface Dose Rate:       6 mr  
Original Assay (g):            0.017, 0.17, 0.36      Reassay (g):              Not done  
Packaging Location:            TA-50                    Date Packaged:           01-27-83  
Radionuclide:                     $^{238}\text{Pu}$ ,  $^{239}\text{Pu}$ ,  $^{241}\text{Am}$

**RADIOGRAPHIC EXAMINATION**

Exam. Date:            9-83  
Liner Type:            90-mil  
Lead-Lined?:          No.  
Packaging  
Description:            90-mil HDPE liner.

Waste Form  
Description:            Sludge.

Absorbent?:            Portland cement.  
Free Liquids:          None.  
Compressed  
Gasses:                None.  
Particulates:          Meets criteria.  
Packaging  
Efficiency:            Full.  
Volume %  
Combustible:          None.  
Correct Con-  
tent Code:            Yes.  
WIPP  
Certifiable?:          Yes.  
Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date:            1-84  
Container  
Condition:            Very good.  
Lead-Lined?:          No.  
Liner Type:            90-mil high-density polyethylene.  
Packaging  
Description:            Sludge in above containers.

Waste Form  
Description:            Sludge.

Absorbent:            None.  
Physical State  
of Waste:            Solid. No free liquid.  
Component Wt. (Kg):      179.2  
WIPP-WAC Compliance  
Information:            Should be possible to certify.  
Packaging Efficiency:    95%  
Volume % Combustible:   None.  
Correct Content  
Code:                    Yes.  
WIPP Certifiable?:      Yes.  
Miscellaneous:

**SUMMARY SHEET**

Waste Form Category:	Chemical treatment sludge	Age When Opened:	Approx. 1 year
Container ID:	012535	Container Type:	55-gal drum
Content Code:	A-75	Code Description:	Chemical treatment sludge
Container Wt. (Kg):	201.9	Surface Dose Rate:	5 mr
Original Assay (g):	0.017, 0.17, 0.35	Reassay (g):	Not done.
Packaging Location:	TA-50	Date Packaged:	01-26-83
Radionuclide:	$^{238}\text{Pu}$ , $^{239}\text{Pu}$ , $^{241}\text{Am}$		

**RADIOGRAPHIC EXAMINATION**

Exam. Date: 9-83  
 Liner Type: 90-mil  
 Lead-Lined?: No.  
 Packaging  
 Description: 90-mil HDPE liner.

Waste Form  
 Description: Sludge.

Absorbent?: Portland cement.  
 Free Liquids: None.  
 Compressed  
 Gasses: None.  
 Particulates: Meets criteria.  
 Packaging  
 Efficiency: Full.  
 Volume %  
 Combustible: None.  
 Correct Content Code: Yes.  
 WIPP  
 Certifiable?: Yes.  
 Miscellaneous:

**VISUAL EXAMINATION**

Exam. Date: 1-84  
 Container  
 Condition: Very good.  
 Lead-Lined?: No.  
 Liner Type: 90-mil high-density polyethylene.  
 Packaging  
 Description: Sludge in above containers.

Waste Form  
 Description: Sludge.

Absorbent: Portland cement.  
 Physical State  
 of Waste: Solid. No free liquid.

Component Wt. (Kg): 179.2  
 WIPP-WAC Compliance  
 Information: Should be possible to certify.  
 Packaging Efficiency: 95%  
 Volume % Combustible: None.  
 Correct Content  
 Code: Yes.  
 WIPP Certifiable?: Yes.  
 Miscellaneous:

APPENDIX 3

WASTE CONTAINER COMPONENT WEIGHTS

TABLE VIII

## WASTE CONTAINER COMPONENT WEIGHTS (kg)

Waste Form Category: Combustibles

Isotope:  $^{238}\text{Pu}$ 

DRUM NUMBER	AGE	CONTENT CODE	PROPER <sup>a</sup> CONTENT CODE	COMBUSTIBLES							METALS			GLASS	MISCELLANEOUS		WEIGHTS		
				CHEESECLOTH	RAGS	PAPER	FILTER MEDIA	LATEX GLOVES	OTHER**	PLASTICS	HAND TOOLS	DIES	OTHER		LEADED GLOVES	GRAPHITE	DRY CH <sup>2</sup> M	AGGRE- GATE	GROSS
BFB-12	39 mo	A-60	A-19	*	*	*	*	*					*					14.23	50
BFB-14	36 mo	A-60		*	*			*										20.02	60
BFB-19	37 mo	A-61								*				13.3		9.21	8.58		70
BFB-20	36 mo	A-60									28.81								60
BFB-26	35 mo	A-60	A-19	*				*			*		*					30.26	60
BFB-27	35 mo	A-60		*		*		*			*							22.15	50
BFB-92	7 mo	A-18	A-19	15.4									*			*	1.46	16.86	50
BFB-96	8 mo	A-19		11.14							5.53					20.52			70
BFB-97	8 mo	A-19		5.51							*			32.65				5.98	80
BFB-101	8 mo	A-18		*		*				*	*					*		22.38	60
BFB-102	7 mo	A-19		*						*	*		*					32.8	60
BFB-103	7 mo	A-19		*						*	*					*		27.03	60
BFB-234	9y 3mo	A-18	A-19										*			*	*	14.58	50
BFB-235	9y 3mo	A-18	A-61											65					100
BFB-237	9y 3mo	A-18	A-61											85					120
BFB-238	9y 3mo	A-18	A-61											65					100
BFB-239	9y 3mo	A-18	A-61							*	*		*			*		101.04	136
BFB-240	9y 3mo	A-18	A-61							*	*		*	*		*		65	110

a. Proper content code indicated only if original is wrong or inappropriate.

\* Visual examination revealed that packages of waste within a drum were often not limited to one specific type of material; neither were they segregated into combustibles and noncombustibles. In these cases of mixed contents, an aggregate weight is given, and asterisks indicate which components are present.

\*\* Not leaded.



TABLE IX

WASTE CONTAINER COMPONENT WEIGHTS<sup>a</sup> (kg)

Waste Form Category: Combustibles

Isotope: <sup>233</sup>Pu

DRUM NUMBER	AGE	CONTENT CODE	PROPER <sup>b</sup> CONTENT CODE	COMBUSTIBLES								METALS			GLASS	MISCELLANEOUS		WEIGHTS	
				CHEESECLOTH	RAGS	PAPER	FILTER MEDIA	LATEX GLOVES	OTHER**	RUBBER	PLASTICS	HAND TOOLS	DIES	OTHER	LEADED GLOVES	GRAPHITE	DRY CHEM	AGGRE- GATE	GROSS
10761	11 mo	A-14			*										*			20.33	73
10753	11 mo	A-16	A-18			7.6							6.3						73
012223	11 mo	A-16																NOT	58
007060	11 mo	A-18			*				*									43.25	100
007226	11 mo	A-18				*									*			45.6	120
010362	12 mo	A-18																NOT	120
010605	11 mo	A-18		*														17.27	100
010756	30 mo	A-60	A-19			*									*		*	5.57	45
010775	30 mo	A-60			*	*			*						*		*	15.83	68
010773	11 mo	A-19			*	*			*						*		*	4.98	120

a. Data based on the results of visual examinations where performed.

b. Proper content code indicated only if original is wrong or inappropriate.

\* Visual examination revealed that packages of waste within a drum were often not limited to one specific type of material; neither were they segregated into combustibles and noncombustibles. In these cases of mixed contents an aggregate weight is given, and asterisks indicate which components are present.

\*\* Not leaded.

TABLE X

WASTE CONTAINER COMPONENT WEIGHTS<sup>a</sup> (kg)

Waste Form Category: Noncombustibles

Isotope: <sup>239</sup>Pu

<u>NUMBER</u>	<u>AGE</u>	<u>CONTENT CODE</u>	<u>PROCESS SOLIDS</u>	<u>NITRATE SALTS</u>	<u>SLAG AND CRUCIBLE</u>	<u>CHEMICAL TREATMENT SLUDGE</u>	<u>METALS</u>	<u>NON-COMBUSTIBLE (NOIBN)</u>	<u>ORGANICS</u>	<u>COMMENTS</u>	<u>GROSS WEIGHT</u>
010925	30 mo	A-25	* Basic wet red sludge, multiple containers, approx 10 lbs each								520
010411	12 mo	A-25	*								129
010108	25 mo	A-25	*		4.68	25.89 <sup>†</sup>	2.68		0.19	<sup>†</sup> Includes CaCl <sub>2</sub>	63.5
010494	12 mo	A-47			*					198 g <sup>239</sup> Pu	154.
010435	12 mo	A-52			*	56.45	100.36				220.
010645	11 mo	A-61						*144.			194.
012124	12 mo	A-75				*					444.
012307	12 mo	A-75				*					444.
012327	12 mo	A-75				*					444.
012535	12 mo	A-75				*					444.

a. Data based on the results of visual examinations where performed.

NOIBN = Not otherwise identified by name.

\* Visual examination revealed that packages of waste within a drum were often not limited to one specific type of material; neither were they segregated into combustibles and noncombustibles. In these cases of mixed contents, an aggregate weight is given, and asterisks indicate which components are present..

APPENDIX 4

WASTE FORM COMPLIANCE WITH THE WIPP-WAC

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TABLE XI

WASTE FORM COMPLIANCE WITH THE WIPP-WAC<sup>a</sup>

Waste Form Category: Combustibles

DRUM NUMBER	AGE	ISOTOPE	QUANTITY (GMS)	CONTENT CODE	PROPER <sup>b</sup>					EXPLOSIVES/ COMPRESSED GASES	TOXIC/ CORROSIVE MATERIALS	ORGANIC CONTENT (KG)	CERTIFIABLE	
					CONTENT CODE	IMMOBILIZED PARTICULATE	FREE LIQUID	SLUDGE	PYROPHORICS				RTRC <sup>c</sup>	WIPP
BFB-92	7 mo	<sup>238</sup> Pu	7.7	A-18	A-19	YES*	NO	NO	NO	NO	NO	1.93	YES	YES
BFB-101	8 mo	<sup>238</sup> Pu	11.6	A-18	A-18	NO	NO	NO	NO	NO	NO	8.2	YES	YES
BFB-234	9y 3mo	<sup>238</sup> Pu	22.7	A-18	A-19	NO	NO	NO	NO	NO	YES	0.7	YES	NO
BFB-235	9y 3mo	<sup>238</sup> Pu	1.9	A-18	A-61	NO	NO	NO	NO	NO	NO	2.95	YES	YES
BFB-237	9y 3mo	<sup>238</sup> Pu	4.2	A-18	A-61	NO	NO	NO	NO	NO	NO	3.86	YES	YES
BFB-238	9y 3mo	<sup>238</sup> Pu	0.5	A-18	A-61	NO	NO	NO	NO	NO	NO	2.95	YES	YES
BFB-239	9y 3mo	<sup>238</sup> Pu	1.4	A-18	A-61	NO	NO	NO	NO	NO	NO	4.59	YES	YES
BFB-240	9y 3mo	<sup>238</sup> Pu	1.7	A-18	A-61	NO	YES	NO	NO	NO	NO	2.95	YES	NO
BFB-12	39 mo	<sup>238</sup> Pu	6.6	A-60	A-19	NO	NO	NO	NO	NO	NO	3.2	YES	YES
BFB-14	36 mo	<sup>238</sup> Pu	1.3	A-60	A-14	NO	NO	NO	NO	NO	NO	9.4	YES	YES
BFB-20	36 mo	<sup>238</sup> Pu	2.2	A-60	A-16	NO	NO	NO	NO	NO	NO	14.0	YES	YES
BFB-26	35 mo	<sup>238</sup> Pu	1.05	A-60	A-19	NO	NO	NO	NO	NO	NO	7.4	YES	YES
BFB-27	35 mo	<sup>238</sup> Pu	1.18	A-60	A-18	NO	NO	NO	NO	NO	NO	14.7	YES	YES
BFB-96	8 mo	<sup>238</sup> Pu	10.2	A-19	A-19	NO	NO	NO	NO	NO	NO	8.4	YES	YES
BFB-97	8 mo	<sup>238</sup> Pu	9.4	A-19	A-19	NO	NO	NO	NO	NO	NO	7.02	YES	YES
BFB-102	7 mo	<sup>238</sup> Pu	3.4	A-19	A-19	NO	NO	NO	NO	NO	NO	2.98	YES	YES
BFB-103	7 mo	<sup>238</sup> Pu	6.8	A-19	A-19	NO	NO	NO	NO	NO	NO	6.1	YES	YES
BFB-19	37 mo	<sup>238</sup> Pu	5.6	A-61	A-61	NO	NO	NO	NO	NO	NO	0.75	YES	YES

a. Data based on the results from the visual examinations.

b. Proper content code indicated only if original is wrong or inappropriate.

c. Real-Time Radiography.

\* Yes, but within allowable limits or requirements.

TABLE XII

WASTE FORM COMPLIANCE WITH THE WIPP-WAC<sup>a</sup>

Waste Form Category: Combustibles

DRUM NUMBER	AGE	ISOTOPE	QUANTITY (GMS)	CONTENT CODE	PROPER <sup>b</sup> CONTENT CODE	IMMOBILIZED PARTICULATE	FREE LIQUID	SLUDGE	PYROPHORICS	EXPLOSIVES/ COMPRESSED GASES	TOXIC/ CORROSIVE MATERIALS	ORGANIC CONTENT (KG)	CERTIFIABLE	
													RTR <sup>c</sup>	WIPP
010761	11 mo	239Pu	0.47	A-14		NO	YES	NO	NO	NO	NO	18.3	YES	NO
010753	11 mo	239Pu	46	A-16	A-18	YES*	NO	NO	NO	NO	NO	6.3	YES	YES
012223	11 mo	239Pu	63	A-16		NO	NO	NO	NO	NO	NO	49.6	YES	XX
007060	11 mo	239Pu	3.3	A-18		NO	NO	NO	NO	NO	NO	19.7	NN	YES
007226	11 mo	239Pu	0.4	A-18		NO	NO	NO	NO	NO	NO	21.9	YES	YES
010362	12 mo	239Pu	26.2	A-18		NO	NO	NO	NO	NO	NO	26.7	YES	XX
010605	11 mo	239Pu	122	A-18	A-15	NO	NO	NO	NO	NO	NO	7.9	NN	YES
010756	30 mo	239Pu	0.0	A-60	A-19	NO	NO	NO	NO	NO	NO	7.6	YES	YES
010775	30 mo	239Pu	27.9	A-60		NO	NO	NO	NO	NO	NO	14.2	NN	YES
010773	11 mo	239Pu	0.1	A-19		NO	NO	NO	NO	NO	NO	20.7	NN	YES

a. Data based on the results of visual examinations where performed.

b. Proper content code indicated only if original is wrong or inappropriate.

c. Real-Time Radiography.

\* Yes, but within allowable limits or requirements.

XX Drum not opened for visual examination.

NN This drum was not radiographed.

TABLE XIII

WASTE FORM COMPLIANCE WITH THE WIPP-WAC<sup>3</sup>

Waste Form Category: Noncombustibles

DRUM NUMBER	AGE	ISOTOPE	QUANTITY (GMS)	CONTENT CODE	PROPER <sup>b</sup> CONTENT CODE	IMMOBILIZED PARTICULATE	FREE LIQUID	SLUDGE	PYROPHORICS	EXPLOSIVES/ COMPRESSED	TOXIC/ CORROSIVE	ORGANIC CONTENT	CERTIFIABLE	
										GASES	MATERIALS	(KG)	RTR <sup>c</sup>	WIPP
010925	30 mo	239Pu	22.4	A-25		NO <sup>d</sup>	YES	YES	NO	NO	NO	0	YES	NO
010411	12 mo	239Pu	186	A-25		NO <sup>d</sup>	NO	YES	NO	NO	NO	0	YES	XX
010108	25 mo	239Pu	80	A-25		NO <sup>d</sup>	NO	YES	NO	NO	NO	1.2	YES	YES
010494	12 mo	239Pu	198	A-47		NO	NO	NO	NO	NO	NO	0	YES	XX
010435	12 mo	239Pu	38	A-52		YES	NO	NO	NO	NO	NO	0	YES	NO
010645	11 mo	239Pu	108.3	A-61		NO	NO	NO	NO	NO	NO	0	YES	XX
012124	12 mo	Mixed	<1	A-75		YES*	NO	YES	NO	NO	NO	0	YES	YES
012307	12 mo	Mixed	<1	A-75		YES*	NO	YES	NO	NO	NO	0	YES	YES
012327	12 mo	Mixed	<1	A-75		YES*	NO	YES	NO	NO	NO	0	YES	YES
012535	12 mo	Mixed	<1	A-75		YES*	NO	YES	NO	NO	NO	0	YES	YES

- a. Data based on the results of visual examinations where performed.
- b. Proper content code indicated only if original is wrong or inappropriate.
- c. Real-Time Radiography.
- d. See note regarding waste process solids in Discussion of Studies section.
- XX Drum not opened for visual examination.
- NN This drum was not radiographed.
- \*Yes, but within allowable limits or requirements.