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Department of Energy
Richland Operations Office
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Richland, Washington 99352

14-AMRP-0169

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Ms. J. A. Hedges, Program Manager
Nuclear Waste Program
State of Washington
Department of Ecology
3100 Port of Benton
Richland, Washington 99354

Dear Ms. Hedges:

RESPONSE TO STATE OF WASHINGTON DEPARTMENT OF ECOLOGY CONTAINER INTEGRITY CONCERNS

On April 15, 2014, the State of Washington Department of Ecology (Ecology) met with the U.S. Department of Energy Richland Operations Office (RL) to discuss concerns regarding containers currently stored at the Central Waste Complex (CWC). The concerns focused mainly on retrievably stored waste (RSW) containers associated with the Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement) M-091 milestone series. Ecology indicated that during an inspection of CWC on April 1, 2014, visual examination of drums in storage showed signs of deterioration, which are potential non-compliances with the Agreed Order and Stipulated Penalty No. DE 10156 (AO), Exhibit A, Section 1.9.2. Specifically, Ecology indicated that the containers at CWC are not being maintained in "[g]ood condition" and were not "free of excessive dents and corrosion."

RL has discussed Ecology's concerns with CH2M HILL Plateau Remediation Company (CHPRC), the contractor responsible, and RL believes that a comprehensive container management program is being implemented at CWC consistent with Washington Administrative Code 173-303-630, Use and Management of Containers. Elements of this program include thorough container inspections prior to receipt for storage, performance of weekly inspections while in storage, and an ongoing evaluation and action program to address container integrity issues. The program includes identification of potential and actual container integrity issues and implementation of measures that are protective of human health and the environment. RL is in compliance with all conditions of the Agreed order. The attachment from CHPRC summarizes the container management program, with specifics related to the RSW program and response to specific RSW drums in the 2402-WB Storage Building that were noted by Ecology.

If you have any questions, please contact me, or your staff may contact Doug Shoop, RL Deputy Manager, on (509) 376-7395.

Sincerely,

Matt McCormick
Manager

AMRP:MSC

Attachment

cc w/attach
Administrative Record
Ecology NWP Library
Environmental Portal
HF Operating Record (J. K. Perry, MSA, H7-28)

cc w/o attach:
D. B. Bartus, EPA
L. T. Blackford, CHPRC
G. Bohnee, NPT
J. L. Boller, EPA
R. Buck, Wanapum
A. E. Cawrse, CHPRC
S. L. Dahl-Crumpler, Ecology
L. M. Dittmer, CHPRC
B. J. Dixon, CHPRC
D. A. Faulk, EPA
J. C. Fulton, CHPRC
P. M. Gent, Ecology
S. Harris, CTUIR
S. Hudson, HAB
M. N. Jaraysi, CHPRC
R. Jim, YN
R. A. Kaldor, MSA
K. Niles, ODOE
R. E. Piippo, MSA
J. B. Price, Ecology
A. L. Prignano, Ecology
A. J. Ramirez, CHPRC
D. Rowland, YN
J. R. Seaver, CHPRC
D. G. Singleton, Ecology
E. R. Skinnarland, Ecology

SUMMARY DESCRIPTION OF CONTAINER MANAGEMENT AT THE CENTRAL WASTE COMPLEX

April 2014

EXECUTIVE SUMMARY

DOE/CHPRC has a comprehensive container management program to ensure compliance with all safety basis and applicable environmental regulations and requirements at treatment/storage/disposal units (TSDs) that they operate. Elements of this program include thorough container inspections to ascertain container integrity prior to storage receipt, performance of weekly inspections at the storage units, and on-going evaluation and action programs. This White Paper is written in response to concerns regarding degrading drums raised by the Washington State Department of Ecology during discussions held with DOE on April 15, 2014. This paper summarizes the container management programs, with emphasis on the drums and the Retrievably Stored Waste (RSW) drums containing 216-Z-9 Crib soils, which are representative of the population exhibiting the most extensive external corrosion. There is no regulatory definition of what constitutes excessive corrosion. However, DOE/CHPRC considers that corrosion is excessive when the container no longer has structural integrity or when the container can no longer perform its containment function.

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this White Paper is to provide background on the drum inventory currently in storage, identify programs that are currently used for management of containers in the Central Waste Complex (CWC), and to provide information regarding a specific population of drums that have been the subject of recent discussions, namely those containing 216-Z-9 Crib soils.

1.2 BACKGROUND

CWC currently stores 7617 drums in 17 prefabricated metal buildings and 30 side-loading metal cargo-containers. None of the buildings are temperature/climate controlled. There are also two other similarly sized metal buildings at the Waste Receiving and Processing facility (WRAP). One of these two buildings, 2404WC, is temperature/climate controlled. It currently stores only two transuranic mixed waste containers.

The drums are awaiting characterization and/or certification for shipment offsite to a disposal site, though in many cases they will need to be repacked before this can occur. They are stored in stacks up to three high with aisle space to allow weekly Resource Conservation and Recovery Act of 1979 (RCRA) inspections. Funding that would enable processing of the drums for disposal has been delayed for the foreseeable future placing greater emphasis on monitoring their integrity. Nearly 7500 of the drums contain Transuranic Waste (TRU/M); the others are Mixed Low-Level Waste (M/LLW).

The drums are from various sources: retrieved from the burial grounds (either overpacked or not), daughter drums from repackaging activities, or generated by operations and/or deactivation/decommissioning (D&D) activities since placement in the burial grounds ceased in 1988. Table 1 provides a breakdown of the drum population by container size.

Table 1

CWC DRUM INVENTORY	
Total number of drums	7617
55-gallon drums	5749
85-gallon drums	1588
100/110-gallon drums	274

1.2.1 Drums from Waste Retrieval (RSW)

Retrieved drums stored in CWC were originally placed in the burial grounds during the 1970s and 1980s. While the vast majority originated at Hanford, there were significant populations that were sent from offsite generators. This waste originated from a variety of government functions, responsibilities, processes and programs such as laboratory wastes, basic research, fuels fabrication facilities, reactor studies, and cleanup and restoration projects. Offsite generators that sent at least 100 TRU drums were Babcock and Wilcox (Parks Township, PA), Kerr-McGee Nuclear Corporation (Cimarron, OK), Westinghouse Advanced Reactor Division (Cheswick, PA), Energy Technology Engineering Division (Los Angeles, CA), Rocky Flats Environmental Technology Site, (Golden, CO) and General Electric-Vallecitos Nuclear Center (Alameda County, CA). Waste forms, radionuclides, hazardous constituents and packaging configurations are therefore extremely variable. Table 2 indicates the number of retrieved drums that are currently stored in CWC. These account for approximately 33 percent of the CWC drum population.

Table 2

RETRIEVED DRUMS CURRENTLY STORED AT CWC	
Retrieved 55-gallon drums that have not been repacked or overpacked	1040
Retrieved 55-gallon drums that have been overpacked into 85-gallon drums	1457

Over 95 percent of the retrieved drums currently in storage have been subjected to Non-destructive Examination (NDE) or visual inspection to ascertain their contents. The waste is nearly all in debris form. Containerized and free liquids have been observed in both debris and homogenous solids waste matrices. Figure 1 in Attachment 5 is an example of a NDE scan.

1.2.2 Non-Retrieved Drums

Drums generated by site operations, decommissioning activities and repack of retrieved drums have been packaged and/or received to meet current standards. Their contents are known and protection has been afforded to the inner surfaces of the drums. For example, homogenous solids and sludge within this population are contained within 90-mil liners or internal plastic containers.

While internal corrosion of the drums is heavily dependent on the contents and the packaging, NDE and processing experience have demonstrated that older drums are at a much greater risk of degradation due to inconsistent packaging practices and requirements. External corrosion clearly is a function of the way drums have been stored since they were generated; many retrieved drums are 30 to 40 years old, having been stored in the burial grounds for most of that time.

1.2.3 Container Integrity

Attachment 5 provides a comprehensive assessment of the container integrity of a subset of drums retrieved from the burial grounds. These drums, while all containing 216-Z- 9 (Z9) Crib soils, are representative of the population exhibiting the most extensive external corrosion that have not been overpacked.

Attachment 6 provides a crosswalk between Agreed Order Exhibit A text concerning container integrity versus the implementation reference called out in Section 1.3 of this document.

1.3 CURRENT CONTAINER MANAGEMENT PROCESSES/PROGRAMS

1.3.1 Inspections of Container Integrity Prior to Receipt at CWC

1.3.1.1 Waste Acceptance Criteria

Newly Generated Waste

In accordance with HNF-EP-0063 *Hanford Site Solid Waste Acceptance Criteria*, Section 2.13.2 *Condition of Containers* newly generated waste containers are required to meet the following:

Outer containers shall be in good condition, with no visible cracks, holes, dents, bulges, pit or scale corrosion, or other damage that could compromise container integrity (WAC 173-303-630). Minor external surface rust that can be sanded or brushed off will be acceptable. Containers having some pit or scale corrosion could be acceptable for storage, provided the integrity of the container is confirmed.

Retrieved Waste

Waste retrieved from the burial grounds was accepted into the TSD at the time of placement into the trenches and will have complied with the waste acceptance criteria in force at that time. Generators have been provided written criteria for the acceptance of solid waste in the Hanford burial grounds since 1967.

1.3.1.2 Inspections Prior to Transportation of Containers to CWC

Newly Generated Waste

Regardless of origination (e.g., Operations, D&D), the general process is as follows:

Prior to loading containers for transport, the Authorized Shipper visually inspects the container for the following:

- Excessive rust, paint chipping, discoloration, or other surface defects
- Excessive dirt, soil, or rocks
- Corrosion
- Breaches, bulges, and large dents
- Drum closure ring and bolt assembly for signs of deterioration
- Verify the drum lid and lock ring are secure and the lock nut is not loose

These items are assessed, regardless of the shipping authorization (Department of Transport [DOT] or DOE Transportation Safety Document), and documented on the general shipment checklist and the authorization specific shipment checklist. If the Authorized Shipper discovers a problem, or has any question concerning the container's integrity, the container will not be shipped, and the Package Design Authority will be notified for further evaluation.

Retrieved Waste

As noted in Section 1.3.1.1, waste that had been placed in the burial grounds was accepted into the TSD at that time. Prior to removal of a container from the unearthed storage array, an evaluation of its structural integrity was made, determining whether or not overpacking (generally for handling purposes) was necessary. Container integrity is the ability of the drum to withstand failure that could cause the contents to fall or spill out of the drum under anticipated handling loads.

The exposed containers in the retrieval trenches were visually inspected by Operations for general integrity in accordance with the Abnormal Container Management Program (ACMP) criteria (Attachment 3). The containers were then surveyed and smeared to measure dose and identify potential contamination. Contamination on drums was fixed, wrapped, and/or overpacked, as needed. If a container appeared to be severely corroded to the point that the ability of the container to withstand normal stresses of movement was questionable, additional inspection by engineering (ACMP evaluator) specified whether the container was entered into the ACMP and overpacked.

The initial inspection of the containers primarily demonstrated that the drums were identified and had sufficient integrity to meet their principal functions of providing containment and structural integrity for movement of the waste. Containers that were assessed as being sound and without excessive corrosion, holes or large damaging dents were deemed fit for retrieval and transferred to the CWC for interim storage.

1.3.1.2 Inspection of Containers upon receipt at CWC

Operating procedure SWSD-PRO-OP-51637, *Management of Solid Waste in CWC*, provides instructions to receive and accept waste for storage and includes loading, unloading, and moving solid waste packages in the CWC. Waste packages are surveyed and inspected to determine if they meet receipt requirements. When waste packages meet these requirements, they are received, offloaded, and stored.

Section 4.3 of SWSD-PRO-OP-51637, provides direction to the workers to perform several actions prior to offloading waste packages. These steps include (but are not limited to), a review of incoming records, confirming the appropriate records have been provided (off-site or on-site), verifying any special instructions for waste package receipt, and ensuring the initial radiological survey of waste packages has been completed with acceptable results. Procedure direction then provides for offloading and physically inspecting waste packages prior to moving them to the appropriate storage location. Workers inspect each waste package for the following conditions to ensure container integrity:

- Bulges
- Severe dents
- Punctures
- Loose lids or locknuts
- Excessive corrosion
- Loose vents
- Signs of containment breach
- Pressurization

Containers that are not accepted are returned to the generator.

If a waste package is in good condition, then each waste package is inspected to ensure the Solid Waste Information and Tracking System (SWITS) 356 receipt report matches in the following areas, as applicable, prior to being moved into storage:

- CIN/PIN numbers
- Size
- Vent (clip or NucFil)
- Gross Weight
- EPA label
- Waste codes
- Dose rate
- Proper shipping name

- NFPA Container
- Storage location
- Major Risk

Workers will then ensure the waste packages have been barcode scanned and uploaded into SWITS at the end of the shipment; and then verify the storage location is correct in SWITS. A copy of the SWITS report is then provided to the field work supervisor.

1.3.2 Management of Containers at CWC

1.3.2.1 RCRA Inspections of the Storage Buildings

Operating procedure SWSD-PRO-OP-51714, *Inspect CWC & Miscellaneous Buildings*, provides instructions for inspecting CWC facilities and associated equipment. Surveillances of waste packages and material storage facilities are performed to identify malfunctions and deterioration, or packaging problems that may cause or lead to release of radioactive or hazardous waste constituents to the environment or pose a threat to human health. This procedure is designed to implement, at a minimum, WAC 173-303, Dangerous Waste Regulations.

Prior to performance of an inspection, Section 2.0 Precautions and Limitations, provides numerous warnings, cautions, and limitations that include:

- If containers show signs of leaks or other abnormal condition(s) exist, CWC/LLBG management must be notified immediately after exiting to a safe location.
- If an emergency should occur or abnormal condition(s) exists, CWC /LLBG management must be notified immediately.
- Prior to moving a waste container, the accessible surfaces of the container shall be examined, per established ACMP criteria within the procedure. Waste containers that meet the entry criteria shall be entered into the ACMP.

Section 4.3, Weekly Inspections, provides workers with direction to obtain a current Weekly CWC RCRA/Non-RCRA Inspection Checklist for each of the CWC Facilities. After completing an Open-Item List review per procedure, the inspection is completed by entering a check mark in the appropriate column on the checklist. Further direction is provided to document problem conditions or deficiencies in the comment section and to notify the field work supervisor. The inspector then records their name (print/sign), date, and time the inspection was completed. All surveillance records are submitted to the field work supervisor for review, signature, notifications (as needed), and disposition.

An extract of the weekly RCRA and Non-RCRA inspections pertaining to container storage is provided in Attachment 1. Identified issues requiring additional attention and/or remedial action are placed on the Open Items list. Issues involving containers may also cause these to be placed into the Discrepant Container Management Program (DCMP), the ACMP, and/or the Watch List. The criteria for placement of the drums into these programs are attached as Attachments 2, 3, and 4 respectively.

1.3.2.2 RCRA Open Items List

RCRA Permit compliance issues identified during inspections, surveillances, and management walkthroughs requiring attention and/or remedial action are placed on the RCRA Open Items list. Currently there are 15 items on the list, highlighting minor issues with floor finishes, walls, and access/egress doors.

1.3.2.3 Discrepant Container Management Program

Administrative Procedure PRC-PRO-EP-52328, *SWOC Discrepant Container Management Program*, demonstrates one of the proactive approaches used to managing containers in storage by providing measures to control and monitor containers of wastes identified that do not meet all of the requirements in the following, as applicable:

- The Treatment, Storage, and/or Disposal (TSD) unit Dangerous Waste Permit (Waste Analysis Plan or interim status regulatory requirements in WAC 173-303).
- Facility waste acceptance criteria (HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*) related to newly generated waste handled under normal operating procedures [TSR 5.7.9].
- Waste Isolation Pilot Plant (WIPP) liquid waste acceptance criteria issues that overlap with the Environmental compliance Permit requirements.

Identification of a discrepant container relates to the criteria in Attachment 2, "Criteria for Entry into the DCMP". Currently there are over 440 containers in the program. The majority contain small amounts of containerized liquids or liquids in the folds of plastic packaging. Funding restrictions have caused management of these to be limited to placement of the containers into secondary containment, maintenance of the integrity of that secondary containment, and monitoring the integrity of the containers. About 20 percent of the DCMP drums are included because of an identified inconsistency within the inventory information. Many of these can be addressed administratively.

1.3.2.4 Abnormal Container Management Program

Administrative Procedure PRC-PRO-NS-52318, *SWOC Abnormal Container Management Program*, affords another proactive approach to container management by providing special tracking to specific containers that require management and handling in accordance with HNF-14741, *Master Documented Safety Analysis (MDSA) for the Solid Waste Operations Complex (SWOC)*, and HNF-15280, *Technical Safety Requirements [TSR] for the Solid Waste Operations Complex*. Waste containers meeting the criteria of Attachment 3 are required to be managed under the ACMP.

The ACMP provides increased attention to containers that may present an elevated risk, and as indicated in Attachment 3, is not limited to those exhibiting extensive corrosion. Containers meeting criteria for entry into the ACMP as established in Technical Safety Requirements (TSR) Specific Administrative Control (SAC) 5.6.4 (Container Management), TSR Administrative

Control (AC) 5.7.8 (ACMP), and TSR AC 5.7.9 (Waste Acceptance Program) are evaluated for actions needed to prevent or minimize occurrence of waste container related accidents. Immediate, mitigative, and corrective actions are developed as required and taken based on evaluation results. Containers in the ACMP are systematically tracked to ensure required actions are taken to provide safe management of the waste. Currently there are 41 containers in the program.

Containers are evaluated by Nuclear Chemical Operators (NCOs) in the field. If a container is determined to have become damaged or excessively corroded, as a minimum, a Field Work Supervisor is contacted and, as appropriate, an ACMP Evaluator. Waste containers that meet these criteria (see also Attachment 3) are evaluated to determine if they can be handled, moved, and disposed without likely spread of contamination.

Containers that cannot be handled, moved, or disposed of without the spread of contamination, are entered into the ACMP. Similarly, if the waste container is contaminated, possibly indicating a loss of containment capability, and if it cannot be handled using normal work practices and the Safety Management Programs, then the container is entered into the ACMP so that formal remediation plans can be developed prior to initiating handling operations. Installment of containers into the ACMP ensures their status is reviewed on a regular basis (typically monthly) as prescribed.

<u>ACMP Evaluator Qualifications</u>

To become an ACMP Evaluator, the following requirements of a Qualification Card is required:

- Site required courses related to this qualification as identified by management, e.g.
  - WMP-200, Section 4.12, *SWOC Abnormal Container Management Program*
  - HNF-15280, *SWOC Technical Safety Requirements*
  - HNF-14741, *SWOC Master Documented Safety Analysis*
- Facility specific courses related to this qualification as identified by management, e.g.
  - SW-100-095, *Overpack Containers*
  - SW-100-163, *Retrieval of TRU Waste Containers*
- On-the Job training.
- On-the Job evaluation.

In addition, requalification is required every two years. Personnel authorized to perform ACMP evaluations are documented in Interoffice Memorandum 14-WFMP-NSL-001.

1.3.2.5 Watch List of Containers with a Higher Potential for Corrosion

The need for a process to identify the drums that have a higher potential for degradation has been demonstrated by the frequency of incidents in which changes in corrosion have been observed since August 2013. While corrosion is evident on nearly all of the drums that were retrieved from the burial grounds, it is those drums showing evidence of changes in corrosion or have problematic waste characteristics and configurations that require extra attention.

The Watch List process is a proactive approach to the management of the drums in storage, as demonstrated by Criteria 2 and 3 in Attachment 4.

These criteria use process knowledge to highlight drums with similar waste characteristics and configuration to containers that have exhibited a change in corrosion. Criterion 3 targets those drums in the DCMP that contain free liquids and/or wet sludge material that are in direct contact with the container wall and base. The process and associated list complement the lists of drums in the Discrepant and Abnormal Container Management Programs by highlighting those that may be exhibiting an indicator of future degradation within a 3 to 12 months timeframe, particularly now that disposition paths are extremely limited due to funding constraints.

Containers identified to CWC Operations Management with a higher potential for corrosion are evaluated for entry onto the Watch List, in accordance with procedure SWSD-PRO-OP-52802, *Management of The List of SWOC Containers With a Higher Potential for Corrosion (Watch List)*. Entry criteria of containers onto the Watch List are provided in Attachment 4. The procedure describes the criteria for prioritizing each container on the Watch List. Priority 1 and 2 containers are labeled immediately and segregated as soon as possible to enhance the weekly inspections. These drums are overpacked as soon as resources can be allocated. Currently there are 168 drums on the Watch List. 25 of these are Priority 1, and 29 are Priority 2. Upon overpack, these are recategorized into Priority 3.

2.0 DRUMS CONTAINING 216-Z-9 CRIB SOILS

There are currently 336 RSW 55-gallon drums containing 216-Z-9 Crib soil that have not been repacked or overpacked stored at CWC. These have all been subjected to the inspections and evaluations described in Section 1.3 and have been found compliant with environmental and safety basis requirements. These have been the subject of recent discussions with regulators and are described in detail in Attachment 5. Routine surveys performed by Radiological Control Technicians (RCT) have not identified any radiological contamination issues associated with these drum; an additional survey of 12 randomly selected drums performed on April 21, 2014, did not detect contamination either. These drums exhibit varying degrees of corrosion, and are consequently monitored closely. In addition, 89 RSW 55-gallon drums containing 216-Z-9 Crib soil that were overpacked into 85-gallon drums immediately upon retrieval (2006 – 2007) remain in the storage facilities. Table 3 summarizes the status of the drums as they pertain to the container management programs discussed in Section 1.3. All other RSW 216-Z-9 drums have been repacked.

Table 3

SUMMARY OF 216-Z-9 RSW DRUMS					
Drum Size	**Total**	**ACMP**	**Watch List**		
			Priority 1	**Priority 2**	**Priority 3**
55-gal Drums	336	0	3	1	0
85-gal Drums	89	0	0	2	0

Reason on Watch List: NDE identified that all 6 drums have liquid inside the 55-gal drum (ranging from 1 to 5 liters). These 6 drums are also in the DCMP.

3.0 REFERENCES

SWSD-PRO-OP-51637 (SW-100-143), *Management of Solid Waste in CWC*

SWSD-PRO-OP-51714 (SW-040-043), *Inspect CWC and Miscellaneous Buildings*

SWSD-PRO-NS-52318, *SWOC Abnormal Container Management Program*

PRC-PRO-EP-52328, *SWOC Discrepant Container Management Program*

SWSD-PRO-OP-52802, *Management of the List of SWOC Containers with a Higher Potential for Corrosion (Watch List)*

PRC-PRO-TP-156, *Onsite Hazardous Material Shipments*

DOE/RL-2001-36, *Hanford Site Transportation Safety Document*

HNF-EP-0063 *Hanford Site Solid Waste Acceptance Criteria,*

WHC-EP-0912, Volumes 1 and 2, *The History of the 200 Area Burial Ground Facilities,* Anderson, J. D., 1996

ATTACHMENT 1

Extract of the Weekly RCRA and Non-RCRA Inspection Checks on Containers and the Storage Arrays

Containment curbing and flooring is free of scratches that penetrate to the concrete, cracks, or gaps and is sufficiently impervious to contain leaks, spills, and accumulated rainfall?

Area is generally dry and free of accumulated water. There is no standing and/or unexpected water or snow accumulation in or around area?

Secondary containment system is free of liquid?

Spill pallets that are in use are free of liquids and in good condition.

Container integrity is not compromised by puncture, dents, penetrating scratches, loose lids, bulging, excessive corrosion or other physical damage/deterioration

Containers are closed, are stored in a manner which will not rupture the containers or cause them to leak, and show no evidence of spillage or leakage, such as moisture on the sides or underneath

Container top does not have excessive buildup of dirt/debris that would possibly interfere with the proper operation of the drum's ventilation system (such as clogging of NucFils)

Container marking/labeling is intact, unobscured, legible and in good condition?

Dangerous/hazardous waste containers are marked as "hazardous" or "dangerous" and have major risk label, as applicable?

Aisle space between rows of containers appears to be at least 36 inches?

Containers are stored in rows no more than 2 wide?

Containers are elevated (palletized)?

ATTACHMENT 2

Criteria for Entry into the DCMP

Indications of bulging

Container with unknown contents

Newly Generated Waste container that does not fully meet the waste acceptance criteria (HNF-EP-0063) and cannot be resolved using normal operating procedures.

Damaged or corroded (degraded) containers.

Inconsistent inventory.

Unexpected containerized liquids.

Unexpected free liquids.

Others as directed by the Environmental Compliance Officer (ECO) or management.

ATTACHMENT 3

Criteria for Entry into the ACMP

Indications of bulging

Non-standard containers stored outside

Containers with unknown contents. Information is obtained that causes the characterization to be questioned and a technical evaluation determines that insufficient information is available to ensure proper management of the container (e.g., ignitable, corrosive, explosive, or incompatible contents).

Unvented containers that require venting

Unvented, non-drum containers identified in the Low-Level Burial Ground (LLBG) that require venting.

Container exceeds the LFL (Lower Flammability Level)

Waste containers with waste acceptance (HNF-EP-0063) discrepancies that cannot be resolved using normal operating procedures or that involve one of the preceding ACMP entry criteria.

Damaged or corroded (degraded) containers that cannot be safely handled using approved operating methods and/or procedures without a likely spread of contamination.

ATTACHMENT 4

Criteria for Entry into the Watch List

1. Changes in corrosion observed during surveillances, inspections or walkthroughs. These will be brought to the attention of the Shift Duty Officer (SDO) who will direct the placement of the container on the Watch List, if appropriate.

2. Containers are in the same or similar waste streams as those identified in item 1 above and have been discovered via Acceptable Knowledge (AK), Process Knowledge (PK) and/or Non Destructive Examination (NDE) to exhibit the same waste characteristics and configuration.

3. Containers in either the ACMP or the DCMP discovered via AK and/or NDE to exhibit free liquids and/or wet sludge material that are in direct contact with the container wall and base.

ATTACHMENT 5

Drums containing 216-Z-9 Crib soils

Waste Description

In the early 1950s, Hanford scientists developed a solvent extraction plutonium recovery process to produce pure plutonium solution in concentrations suitable as feed to the Plutonium Finishing Plant (PFP) operation. This process produced waste solutions which were contaminated with plutonium, americium, organics, and partially neutralized acid waste. From July 1955 through June 1962, these solutions were discharged via piping to the 216-Z-9 enclosed crib; an underground excavation located east of PFP.

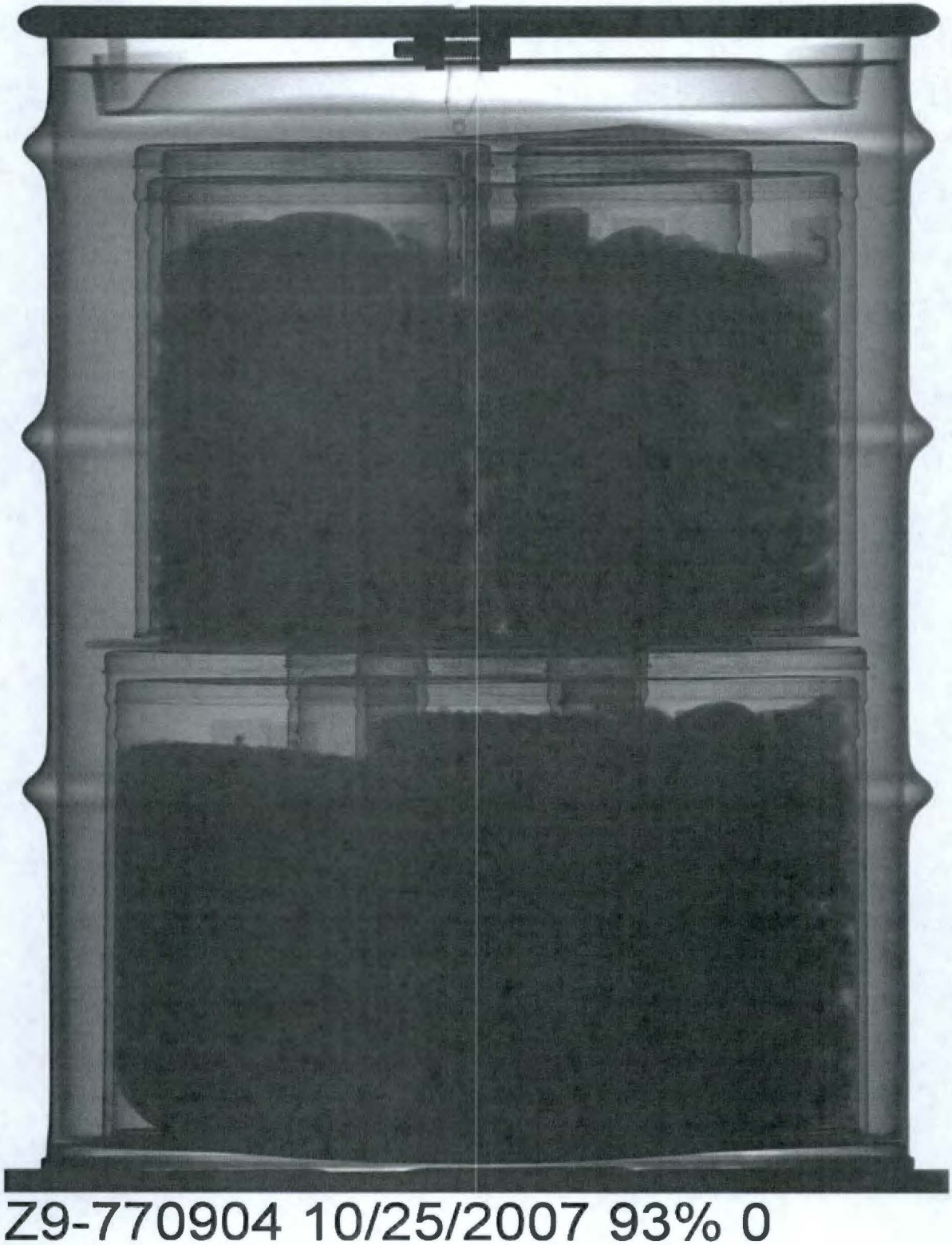
Due to criticality and environmental concerns, the top 12 inches (in.) of contaminated soil was removed from the crib (1976 through 1978). The moisture content and organic content of this material averaged approximately 5 and 7.1 weight percent, respectively.

The mined soil was packaged by placing approximately 9 liters (L) of soil into a 10-L slip-lid can. Most of these cans were lined with a polyethylene bag which was taped or "horse-tailed" closed. The can lids were taped around the circumference, and then bagged out of the glovebox into a polyethylene bag which was heat sealed. These cans ("inner" cans) were then placed into slightly larger slip-lid cans ("outer" cans) which were also taped around the lid circumference. Two equidistantly spaced loops or "ears" are attached to the upper sides of each outer can, used to attach a mechanical hoist for ease of manipulation during packaging.

These "can-pairs" were assayed and loaded into 55-gallon drums, lined with rigid 90-mil liners with snap-on lids. Liners were used to prevent drum corrosion. Though it was physically possible to load eight cans into a single drum, the drums were administratively limited to 185 grams (g) of plutonium (based on assay results) to assure that the 200-g burial ground limit was not exceeded. Thus, some drums were loaded with fewer than eight cans, depending on assay results for individual cans. Up to four cans were placed in the bottom of a drum and void space was filled with vermiculite. A plywood spacer was placed on top of the cans and up to four more cans were loaded as the second layer. Vermiculite was added to fill any remaining voids in the drum. The drum lid was then sealed in place with a metal ring closure.

To reduce pressure inside each drum that may have been generated from radiolytic decomposition of moisture and organics, vent clips were attached to the drum lip. Also, a packet of hydrogen-oxide recombination catalyst (platinum and palladium on alumina) was placed on top of the vermiculite packaging inside the 90-mil rigid liner before closing the drum liner. Figure 1 provides an internal view of a typical drum. The vermiculite is the lighter gray material that surrounds the "can-pairs".

Figure 1. X-ray scan showing the typical packaging configuration.



698 drums containing this waste were placed in the 218-4C burial ground in 1979 and 1980. Retrieval of these drums occurred in late 2006 and early 2007. Following the process described in Section 1.3.1.2, approximately 50 percent were evaluated to require 85-gallon overpacks for handling purposes.

WRAP Repack Pilot Project.

To better understand the waste material and its packaging configuration, a Pilot Project to open 5 drums was performed in the TRU Glovebox in WRAP in December 2007. The 216-Z-9 drums all contain WIPP-prohibited items (sealed containers greater than 4 liters) and consequently there is a need to repack all of them. The project assessed the difficulties that may be encountered in handling and opening the drums, as well as working the waste materials inside. The 5 drums were selected and subjected to non-destructive examination (x-ray) to confirm the acceptable knowledge (AK) and to provide operators with a 'photograph' of the packaging configuration of the waste. Figures 2 and 3 show the state of the drums immediately prior to repackaging. While some exhibit significant surface corrosion, all were determined to have sound structural integrity. Figure 3 shows one of the drums being transported by a drum handler, providing further evidence of their integrity. Note that a "parrot beak" was used to lift the drum. All of the drums withstood the point loading applied by this lifting technique without any problem.

Figure 2. 216-Z-9 Drums staged prior to repack.

Figure 3. 216-Z-9 Drum being transported to the Repack Glovebox Entry Port

Packaging AK was verified. The contents of each investigated drum included a rigid 90-mil liner with lid, vermiculite, a circular 1/4-in. plywood spacer disk with a hole in the middle, a catalyst packet, and six to eight can-pairs (four on the bottom row and two, three, or four on the top row with rows separated by the plywood spacer).

All drums were identically packaged except for the number of cans per drum; three drums contained eight cans, one drum contained seven cans, and one drum contained six cans. All of the waste was double-bagged (i.e., inner can liner bag and heat-sealed bag between inner and outer can) and packaged in two slip-lid cans. All cans were circumferentially taped and placed in 55-gallon drums lined with a rigid 90-mil liner. A plywood spacer was used to separate rows of cans inside the drums. Liner lids were firmly affixed but not glued. Void spaces within the drums were filled with vermiculite. A catalyst packet and vent clip was present in all drums.

There was a wide variability in the condition (i.e., degree of degradation) of the inner and outer cans. This variability ranged from cans that appeared nearly new to cans that showed extreme corrosion, especially along the bottoms.

There was little variability in the condition of the heat-sealed bags between the inner and outer cans, regardless of associated can condition. All of these bags appeared discolored but were

supple and intact; none were brittle, deteriorated or degraded. In all cases the 90-mil liner was intact and in sound condition.

No WIPP-prohibited items were observed during the campaign except sealed containers greater than four liters in volume.

Operationally, the large amount of vermiculite contained within the drums created nuisance dust inside the glovebox which could create problems with ventilation and visibility. Figures 4 and 5 are photographs taken of the repack operation and demonstrate the dryness of the soil and vermiculite. This was consistent, regardless of the external appearance of the drum.

Each parent drum generated two daughter drums.

Figure 4. 216-Z-9 Drum Repack Operations: Outer slip-lid cans and vermiculite.

Figure 5. 216-Z-9 Drum Repack Operations: Removal of Inner Can from Outer Can.

Repack of Drums Containing 216-Z-9 Crib Soils at T-Plant

Of the 698 retrieved drums, 272 were repacked at T-Plant in 2010 and 2011. Virtually all of these were those that had been overpacked into 85-gallon drums upon retrieval.

Repack operations at T-Plant were performed in glovebags. The drums had to be lifted and tipped so that operators could gain access to the waste inside (Figure 6). Similar to the experience of the WRAP Pilot Project, the vermiculite was extremely dry and caused the glovebags to be changed twice as often as normal because of a gradual loss of visibility for the operators. No containers were observed to have container integrity issues. The 90-mil liners were all in sound condition.

Figure 6. Repack Operations at T-Plant: Drum Tipper used to present drum to Glovebag

RSW 216-Z-9 Container Integrity

On April 17, 2014, a walkdown of the non-overpacked 216-Z-9 (Z9) drums in storage at the CWC was performed. The reason for the walkdown was to assess the physical condition of the drums due to effects of external corrosion and the container's ability to safely contain the waste material inside. The assessment was limited to only using visual observation of the container's external surfaces. No specialized equipment (e.g., ultrasonic thickness) was utilized during performance of this assessment. The assessment team had significant metallurgical, corrosion and mechanical engineering experience, with over 30 years of combined experience with managing waste packages at the Hanford Site.

There are 336 non-overpacked 55-gallon RSW Z9 drums currently in storage at the CWC. The drums are being stored in the 2402-WB (~300 drums) and 2403-WC Buildings (~30 drums). The drums were received at the CWC in the 2006/2007 time frame, and came from Burial Ground 218-W-4C as part of the TRU retrieval project.

The assessment team entered the two storage buildings and performed a walkdown of the Z9 drums in each building. All of the drums were white in color (this is the original paint color).

Most of the containers have a rust band around the base that starts at the base chime and goes up for approximately two to three inches (Figure 7).

Figure 7: Rust Band Around the Bottom Chime (April 17, 2014)

The rust band was caused when the drums were underground in 218-W-4C. When placed in the burial ground the drums were placed on an asphalt pad or on plywood sheets that were used to separate the drum tiers. Water moisture from the soil would concentrate near the asphalt and plywood surfaces, therefore, exposing the lower part of the drums to a consistently moist environment. This moisture eventually caused the drum paint to soften and peel off exposing the unprotected steel to the moisture. The moisture then began to slowly corrode the drum steel to the state observed on April 17, 2014.

The team closely inspected the rust band area on many of the drums to determine the corrosion extent (i.e., relative depth and area of corrosion). Pitting was observed on the rolled bottom chime which appeared to be primarily in the 5 to 10-mils (0.005" to 0.010") in depth range. The drums used for the Z9 waste were the heavier walled DOT 17C type containers. These drums were made from low carbon steel with a 16-gauge body, bottom and lid thickness (i.e., nominally 0.060"). The corrosion pitting became progressively less significant the further from the base until only minor surface rust was encountered and finally barely non-rusted drum steel (see Figure 8) near the top of the drums. Only minor amounts of small rust flakes had exfoliated from the drum surfaces and collected around the base of the drums.

Figure 8: Close-up of Rust Band Around the Bottom Chime (April 17, 2014)

Since the drums were sitting on pallets, observation of the drum bottoms of the second and third tiers was limited by the pallet slats. Other than fairly large areas where the paint had peeled off the bottoms, no significant corrosion areas were noted.

The body section of the drums was inspected and many had large areas where the paint had peeled off. Other than the unsightly appearance, the drum steel only had minor surface rusting with no appreciable thinning of the steel apparent (Figures 9 - 11). No significant dents in the body were noted in the drums observed. The paint on the drums had many loose areas; small paint chips and rust flakes on the floor around the drums were observed.

Figure 9: Area of Paint Peeling in the Drum Body Section (April 17, 2014)

Figure 10: Close-up of Paint Peeling Area in the Drum Body Section (April 17, 2014)

Figure 11: Paint Peeling Area in the Drum Body Section (April 17, 2014)

Many of the drum lids exhibited paint peeling and surface rusting (Figure 12). There was some heavier pitting and corrosion product build-up on the closure ring and around the bolt on several of the drums. Since the closure ring is significantly thicker than the drum body steel, this corrosion does not detract from the function of the closure ring. Based on experience with opening drums with corrosion on the closure bolt, the bolts are very difficult to loosen and are typically cut with a saw to remove.

Figure 12: Typical Drum Lid and Closure Ring (April 17, 2014)

One area of concern that was brought to the assessment team's attention by CWC Operations is that six of the Z9 drums are on the CWC Watch List due to having free liquids in the annulus between the inner 90-mil poly liner and the 55-gal drum. This liquid was identified when the drums underwent real time radiography (RTR) several years ago. The liquid is most likely water that entered these particular drums through the vent clip while they were buried. These six drums are expected to be overpacked in the near future.

Conclusions

Based on the physical condition assessment, the non-overpacked Z9 drums are structurally sound to perform their intended function of containing the waste material within them. This is especially true when taking into account the robust internal packaging arrangement the waste material is packaged in (i.e., dry soil waste material packaged in multiple confinement layers). With the exception of the six drums that contain liquid in the drum annulus, the Z9 drums do not require overpacking.

The assessment team's findings are:

- There are areas of corrosion on the Z9 drums:
  - The corrosion is primarily confined to the drums' bottom chime area.
  - The corrosion is mainly shallow pitting caused by long-periods of exposure to water moisture in the soil during the time the containers were buried in the retrieval trench.
  - The corrosion pits are no more than 5-mils to -10-mils deep (note: the drum body steel is nominally 60-mils thick).
  - The current and expected future corrosion rate is much less than that incurred during the buried storage period and much less than 1 mil (0.001") per year.
- There are large areas where the paint has peeled off the drums:
  - This may be unsightly; however, the paint is not a structural component of the drum.
  - In the areas where the paint has peeled, there is some surface rusting (i.e., iron oxide film)
  - There are no large areas of heavy scaling rust that has thinned the drum steel; however, small rust flakes do come off the drums if rubbed or brushed
  - Bare steel does exist on many of the drums which could be damaging to the drums if they were stored outside in the weather.

ATTACHMENT 6

Agreed Order Exhibit A Text Container Integrity Crosswalk

Agreed Order Exhibit A Text	Implementation Reference
1.9.1 USDOE and CHPRC will immediately take the following steps to care for and maintain containers of dangerous waste or MLLW at all of the SWOC DWMUs: 1.9.2 USDOE and CHPRC must maintain containers of dangerous waste in good condition. "Good condition" means: 1) Containers must be free of excessive dents and corrosion. 2) Containers must not have appearance of other deterioration or excessive pressure (bulging or swelling) 3) Containers must have no structural defects	§1.3.1.1, containers must meet CWC Waste Acceptance Criteria §1.3.1.2, Containers are inspected prior to being transported to CWC §1.3.1.3, Containers are inspected upon receipt at CWC §1.3.2.1 Containers undergo weekly RCRA inspections while in storage at CWC
4) Where containers are equipped with seals, gaskets, or other closure sealing devices, they must be in good condition, and sufficient to prevent both spills/leaks of the container contents, and prevent the intrusion of precipitation.	§1.3.1.2, Containers are inspected prior to being transported to CWC §1.3.1.3, Containers are inspected upon receipt at CWC
If any container is found not to be in good condition, the waste must be transferred from that container to a container in good condition, or the container placed in a suitable overpack container.	§1.3.2.1 Containers undergo weekly RCRA inspections while in storage at CWC §1.3.2.2 Items that cannot be corrected immediately are tracked on the Open Item List §1.3.2.3 DCMP containers are overpacked if needed §1.3.2.4 ACMP containers are overpacked if needed §1.3.2.5 Watch List containers are overpacked if needed