Department of Energy
Carlsbad Field Office
P. O. Box 3090
Carlsbad, New Mexico 88221

FEB - 8 2013

RECEIVED
FEB 2013
NMED Hazardous Waste Bureau

Mr. John Kieling, Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303

Subject: CBFO Response to NMED Follow-up to Observer Inquiry Regarding Real-Time-Radiography

Dear Mr. Kieling:

Enclosed are the National Transuranic Program (NTP) responses to an Observer Inquiry dated November 28, 2012. The concern identified a potential for compromised independence while reviewing Real-Time-Radiography (RTR) videos, based on the actions of the original observer. We have received the responses from the Advanced Mixed Waste Treatment Project (AMWTP) in Idaho (Attachment 1) and the Central Characterization Program (CCP) (Attachment 2) providing the requested recommendations to their program.

We believe these actions have satisfied the concern expressed in your inquiry. If you have any questions, please contact Tom Morgan at (575) 234-7462, or myself at (575) 234-7313.

Sincerely,

J.R. Stroble

J.R. Stroble, Director
Office of the National TRU Program

Attachments

130207

CBFO:NTP:JRS:PG:13-0426:UFC 5900.00

cc:w/attachments

J. Franco, CBFO	* ED
N.Castaneda, CBFO	ED
C. Fesmire, CBFO	ED
T. Morgan, CBFO	ED
M. Pinzel, CBFO	ED
R. Maestas, NMED	ED
S. Holmes, NMED	ED
D. Haar, ITG	ED
S. Peterman, ITG	ED
B. Roberts, DOE-ID	ED
V. Cannon, NWP	ED
J. Carter, NWP	ED
A.J. Fisher, NWP	ED
E. Gulbransen, NWP	ED
M. Pearcy, NWP	ED
T. Reynolds, NWP	ED
R. Reeves, NWP	ED
A. Stallings, NWP	ED
P. Gilbert, LANL-CO	ED
G. Lyshik, LANL-CO	ED
RCRA Chronology Record	ED
WIPP Operating Record	ED
CBFO M&RC	

*ED denotes electronic distribution

Attachment 1

AMWTP Response

Idaho Treatment Group

February 4, 2013

C-2013-0039

Transmitting Electronically
J.R.Stroble@wipp.ws

Carlsbad Field Office
Department of Energy
Attn: J.R. Stroble, Manager
National TRU Program
4021 National Parks Highway
Carlsbad, NM 88220

Subject: Contract No. DE-EM0001467, Observer Inquiry Identified During Recertification Audit A-13-02- DHH-03-13

Reference: Courtland Fesmire letter to J. R. Stroble, Observer Inquiry Identified During Recertification Audits A-13-01 and A-13-02, CBFO:OQA:CF:CC-12-1590, dated December 4, 2012

Dear Mr. Stroble:

The recommendation for this observer inquiry on cursor usage (Att. 1) required that a training presentation be prepared (Att. 2) and that training be conducted for Real Time Radiography (RTR) personnel (Att. 3).

This completes the AMWTP actions for briefing RTR personnel.

If you have any questions or concerns, please contact me at (208)557-6718 or Ms. Sue Peterman of my staff at (208)557-6383.

Sincerely,
IDAHO TREAMENT GROUP, LLC

Dave H. Haar
Waste Programs Manager

SMP/skc

Attachments

cc: ***Transmitting Electronically***

Court Fesmire, CBFO	Sue Peterman, ITG	Jerry Wells, DOE-ID
Joe Franco, CBFO	Ben Roberts, DOE-ID	WIPP Site Documents
Priscilla Hinojos, CTAC	Steve Tallman, ITG	AMWTP Correspondence Control
Porf Martinez, CTAC	Gina Tedford, ITG	
Priscilla Martinez, CTAC	Randy Unger, CBFO	

ATTACHMENT 1

DOE F 1325.8

United States Government | Department of Energy

memorandum

Carlsbad Field Office
Carlsbad, New Mexico 88221

DATE: DEC - 4 2012

REPLY TO ATTN OF: CBFO:OQA:CF:CC:12-1590:UFC 2300.00

SUBJECT: Observer Inquiry Identified During Recertification Audits A-13-01 and A-13-02

TO: J.R. Stroble, Director, National TRU Program

Attached, in accordance with Carlsbad Field Office (CBFO) Management Procedure 10.3, *Audits*, is a completed Observer Inquiry submitted by the New Mexico Environment Department (NMED). This Observer Inquiry was discussed during CBFO Recertification Audits A-13-01 of the Advanced Mixed Waste Treatment Project and A-13-02 of the Savannah River Site Central Characterization Project. A written response to the Observer Inquiry is required from the Office of the National TRU Program to the NMED within thirty days of the inquiry submission dated November 28, 2012.

If you have any questions or concerns, please contact me at (575) 234-7065.

Courtland G. Fesmire, P.E.
Quality Assurance Engineer

Attachment

cc: w/attachment

J. Franco, CBFO	*ED
R. Unger, CBFO	ED
T. Kliphuis, NMED	ED
R. Maestas, NMED	ED
S. Holmes, NMED	ED
P. Martinez, CTAC	ED
P. Y. Martinez, CTAC	ED
P. Hinojos, CTAC	ED
WIPP Operating Record	ED
CBFO QA File	
CBFO M&RC	

*ED denotes electronic distribution

Observer Inquiry Form

Observer: Ricardo Maestas/TLK **Tracking No._____** **Date: November 28, 2012**

Discussion of Request:

During the AMWTP A-13-01 audit NMED observed an operations technician performing on site Real Time Radiography (RTR) as well as review of audio/video records as part of the audit process. NMED observed practices that may affect the RTR independence as required by the WIPP Permit.

NMED and the Audit team were informed of new computer software (VJ Technologies) being utilized for RTR. NMED first observed the use of this software with the High Energy (HE) RTR Unit at the Hanford Site during CBFO WIPP Audit A-11-10 in April of 2011.

When audio/video records are created during RTR scans of waste containers using this new software the cursor (arrow that is controlled by a computer mouse) also shows up in the recorded scan. During the Hanford A-11-10 audit a recommendation (Recommendation 3) was issued by the audit team and reads, "The audit team identified a concern while reviewing the audio/video records generated by the operator while using the HERTR system. The RTR operator was not using the curser for its intended purpose, which is to make adjustments to the image contrast. The audit team observed the RTR operator identifying container contents using the cursor. This practice could influence the person performing independent observations. The audit team recommended that the cursor not be used to indentify container contents." NMED supported this recommendation.

During Audit A-13-01 NMED observed practices that may affect the independence of the independent observer. NMED understands that AMWTP does not utilize a High Energy RTR unit to characterize waste but the same software is currently being utilized by the existing RTR units.

During the field observation of an RTR scan the operations technician used the cursor to point out a couple of container contents. NMED concurs that the operator did so for the benefit of the audit team to see what the technician was calling out. NMED is aware that the container that was being scanned was not a WIPP bound container. The concern is that there does not appear to be sufficient training and guidance on how to use this new software so that independence is assured. NMED believes that if the technician had appropriate guidance, he would not have pointed out container contents to the audit team unless it is made clear that it is not part of the formal RTR process and was being used for demonstration only.

During the review of audio/video records, NMED and the audit team also identified an RTR operations technician using the cursor to point out a horsetail in one of the containers. In addition, NMED has a copy of a container scan in which the cursor is used to point out several items (container 10311408). AMWTP personnel provided NMED with a copy of four scanned containers so that NMED could review and discuss internally. It must be noted that the audit team did not have these scan copies to take into consideration.

The audit team concluded that upon reviewing all the objective evidence that was requested plus additional audio/video records, there was no evidence of using the cursor to point items out. NMED understands this conclusion but is still very concerned that the lack of guidance may risk RTR operations technicians to continue to point out items in waste containers leading to deficiencies with Permit required RTR independence.

Permit Attachment C1, Section C1-3 Radiography, states, "Independent replicate scans and replicate observations of the video output of the radiography process shall be performed under uniform conditions and procedures. Independent replicate scans shall be performed... by a qualified radiography operator that was not involved in the original scan of the waste container. Independent observations of one scan (not the replicate scan) shall also be made... by a qualified radiography operator that was not involved in the original scan of the waste container."

Permit Attachment C3-10a(1) Independent Technical Review, states, "One hundred percent of the Batch Data Reports must receive an independent technical review by a trained and qualified individual who was not involved in the generation or recording of the data under review. This review shall be performed by an individual other than the data generator who is qualified to have performed the initial work."

AMWTP procedure INST-OI-12, Rev. 49, Real-Time Radiography Operations (Drum), section 4.10.13 states, "Ensure that a qualified RTR OT who was not involved in the original scan performs the replicate scan." Section 4.10.15 states, "Ensure that a qualified RTR OT who was not involved in the original scan of the waste performs the independent observation." The NOTE between these two sections reads, "The independent observation is performed by reviewing the recording from a waste container (not the replicate scan), and documenting the results on a radiography analysis sheet in WTS. The independent observation is performed without reference to the original radiography analysis sheet in WTS." In the interest of ensuring RTR independence one could also interpret this last sentence to be more inclusive and to mean without reference to the original radiography cursor as well.

NMED believes that when performing the replicate scan, independent observation and/or independent technical review and seeing the previous operator's cursor pointing out waste items from the original scan, RTR independence may not be met per the Permit requirements in Attachment C1, Section C1-3. This is similar in nature to the instructions for the second operator to turn off the volume on the audio/video records and using a separate analysis sheet.

NMED also noticed that the cursor, when not being used to adjust window leveling would on many occasions be left over the container that was being scanned. NMED is concerned that this cursor, left in the middle of the screen may also effect the replicate scan, independent observation and/or independent technical review and suggests that training and/or guidance be established so that RTR operators do not use the cursor to point out container contents and to move the cursor away from the container scan when it is not being used to adjust window leveling. Another possible solution would be to format the software so that the cursor does not show up in the recordings.

Finally, during the Savannah River Site (SRS)/CCP Audit A-13-02 on November 6-8, 2012, the auditors documented concern #9 which reads, "While observing the video for RTR scan of container #MDL0500775 (Large Box) in BDR# SRLBR0057, the audit team observed the operator using the VJ Technology software feature of "Window Leveling", which enhances the screen contrast. At 3:19 (minutes/seconds) into the video, the operator was observed using the cursor and pointing to an area of the box and is heard verbally stating *"You can see the bottom of a plastic container"*. This practice could potentially influence the results of the independent observation (OI) if the container was selected for IO from the batch."

NMED takes RTR independence very serious, as documented in two previous observer inquiries from January and May of 2009. These previous concerns were dealt with satisfactorily. NMED looks forward to discussing these new concerns with the Permittees.

ATL Response: Inquiry will be forwarded to the appropriate CBFO Manager/Office Director for Resolution.

Observer: Accept Response* V. Rivera Martinez 11/30/12 Do Not Accept Response _____

Inquiry Closed: P. Nelson Date: 11/30/12

*NMED accepts this response with the understanding that this inquiry will only be closed in regards to the responsiblities of CTAC per procedure CBFO MP 10.3 Rev. 7.

Per ATL Responce, NMED Acknowledges that this Inquiry will be fawarded to the Appropriate CBFO manager / office Director for resolution and that DOE shall be responsible for submitting A written response to NMED within 30 days of the inquiry submission, as required in section C6-4 of the WIPP Permit.

ATTACHMENT 2

Edit Tailgate

You are using the Production Database Server

Return to Main Page

This Tailgate has been APPROVED and as the Approving Manager you may make changes.

Details | Attachments | Class Attendees | Presenters/Dates

Tailgate Number: TGRTR0000040
Tailgate Type: RTR
Approval Manager: PETESM
Approval Date: 1/17/2013 12:00:00 AM
Date of the Tailgate: 1/17/2013
Tailgate Status: Open — If you close the Tailgate you cannot make changes.
Title of the Tailgate: RTR Operator/ITR brief
Purpose of the Tailgate: detail observation noted during recertification audit and corrective actions
Audience of the Tailgate: RTR operators/ITR's
Objective of the Tailgate: inform RTR operators of observation and correct actions
Content of the Tailgate: briefing presentation
Justification for deviation from guidelines: n/a

Update Tailgate

Cursor Usage During RTR Scans

1/17/13- 1/21/13

Steve Tallman- RTR SME

Purpose

- This briefing is part of a response required to address multiple observations and recommendations by NMED on the use of cursors during RTR scans.
- This briefing is intended to give guidance to RTR Operators and ITRs on the usage of the computer's cursor during certified RTR scans performed under OI-12 and OI-81.

Background

- During several audits at multiple sites, NMED observed the use of the computer cursor being used in a way they feel jeopardizes the independence, required by sections C1 and C3 of WIPP's HWFP, of Independent Observations (IOs).
- During the scans observed, the operator used the cursor to point out items in the waste container.

When to use the Cursor

- The cursor can and should be used to adjust the contrast on units that utilize the upgraded Vi3 software.

When Not to use the Cursor

- The cursor should not be used to point to, trace, outline or in any way identify an item on the screen.

ITR Guidance

- The ITR operator will monitor the use of the cursor via the ITR process.
- There are 42 RTR batches currently in ITR; 25% have been reviewed
- After training has been completed, and implemented, if the cursor is found to have been used inappropriately, specifically on those containers selected for independent observation, the ITR will contact the RTR SME/ITR Lead to evaluate whether independence has been compromised.

Additional Information

- To ensure this guidance is passed on to any new operators this briefing will be incorporated into QPOT3A, the qualification package for qualification/re-qualification of RTR operators.

Any Questions????

ATTACHMENT 3

Edit Tailgate

You are using the Production Database Server

Return to Main Page

This Tailgate has been APPROVED and as the Approving Manager you may make changes.

Details | Attachments | Class Attendees | Presenters/Dates

Scan Employees to Record Attendance

Employee ID	Last Name	First Name	Attend Date	Status Description	Edit	Delete	Training History
000107622	ATWELL	AARON	1/21/2013	COMPLETE	Edit	Delete	View
000101606	BEEBE	CONLEY	1/22/2013	COMPLETE	Edit	Delete	View
000100170	BUCKSKIN	AARON	1/21/2013	COMPLETE	Edit	Delete	View
000063597	CUMMINGS	JOHN	1/17/2013	COMPLETE	Edit	Delete	View
000104511	DUKE	JACE	1/17/2013	COMPLETE	Edit	Delete	View
000107612	GREEN	DANNY	1/21/2013	COMPLETE	Edit	Delete	View
000107618	HUGGINS	WILLIAM	1/21/2013	COMPLETE	Edit	Delete	View
000045287	HUGHES	KRISANN	1/22/2013	COMPLETE	Edit	Delete	View
000075393	JORDAN	SHAWN	1/17/2013	COMPLETE	Edit	Delete	View
000101528	KEARN	KENT	1/21/2013	COMPLETE	Edit	Delete	View
000085521	KUCK	FRANK	1/21/2013	COMPLETE	Edit	Delete	View
000061645	LEE	DENISE	1/21/2013	COMPLETE	Edit	Delete	View
000070621	MASSEY	WARREN	1/21/2013	COMPLETE	Edit	Delete	View
000073436	MOORE	DIANNA	1/17/2013	COMPLETE	Edit	Delete	View
000065893	OLDHAM	EDWIN	1/21/2013	COMPLETE	Edit	Delete	View
000101603	PHILLIPS	SAMUEL	1/21/2013	COMPLETE	Edit	Delete	View
000042424	RICKS	MICHAEL	1/17/2013	COMPLETE	Edit	Delete	View
000058429	SIMMONS	CRAIG	1/21/2013	COMPLETE	Edit	Delete	View
000087632	SIMONSON	JAY	1/17/2013	COMPLETE	Edit	Delete	View
000087631	SUMNERS	DAVEY	1/22/2013	COMPLETE	Edit	Delete	View
000103095	THOMPSON	ROELONT	1/21/2013	COMPLETE	Edit	Delete	View
000044554	TIEGS	CINDY	1/22/2013	COMPLETE	Edit	Delete	View

Total Employee(s) attending the Tailgate: 22

Attachment 2

CCP Response

COPY

CCP ATTENDANCE SHEET

COURSE NAME: Cursor Usage During Certified RTR Scans DATE: 12/5/12

LOCATION: Telecon

	NAME (PRINT NAME)	TITLE/POSITION	SIGNATURE
1.	Sway Andrews	RTR	Sway Andrews
2.	Chris G. Davis	RTR	[illegible]
3.	Lashell Alade	RTR	Lashell Alade
4.	Tyson Christensen	RTR	Tyson Christensen
5.	GREG SMITH	RH VPM	Greg Smith
6.			
7.			
8.			
9.		N/A	
10.			
11.			
12.			

Andrew O. Stallings
Instructor Name (Print)

Signature

12/5/12
Date

COPY

CCP ATTENDANCE SHEET

COURSE NAME: Cursor Usage During Certified RTR Scans DATE: 12/5/12

LOCATION: Telecon

	NAME (PRINT NAME)	TITLE/POSITION	SIGNATURE
1.	THAD HASSELTROM	NDE/RTR	Thad Hasselt
2.	BENITO MAESTAS	NDE/RTR	[illegible]
3.	AARON ELLIOTT	NDE/RTR	[illegible]
4.	Michael Simmons	NDE/RTR	[illegible]
5.	ERIC Cytes	NDE/RTR	[illegible]
6.	Kenneth Simpson	NDE/RTR	Ken Simpson
7.			
8.			
9.		N/A	
10.			
11.			
12.			

Andrew O. Stallings
Instructor Name (Print)

Signature

12/5/12
Date

COPY

CCP ATTENDANCE SHEET

COURSE NAME: Cursor Usage During Certified RTR Scans DATE: 12/5/12

LOCATION: Telecon

	NAME (PRINT NAME)	TITLE/POSITION	SIGNATURE
1.	John Brookshire	RTR Operator	John Brookshire
2.	Byron Gelderman	RTR Operator	[illegible]
3.	Steve Redmond	RTR operator	[illegible]
4.	Georgia N. Karis	RTR/Lead	Georgia N. Karis
5.			
6.			
7.			
8.		N/A	
9.			
10.			
11.			
12.			

Andrew O. Stallings
Instructor Name (Print)

[illegible]
Signature

12/5/12
Date

Stallings, Andrew - NWP

From: fred oney [fredtm29@yahoo.com]
Sent: Wednesday, December 05, 2012 1:15 PM
To: Stallings, Andrew - NWP
Subject: Re: Briefing

COPY

Hi Andrew,

I hope your doing well. I read and understand the CCP Briefing on Cursor Usage During Certified RTR Scans.

Thanks,

Fred Oney

From: "Stallings, Andrew - NWP" <andrew.stallings@wipp.ws>
To: "fredtm29@yahoo.com" <fredtm29@yahoo.com>
Sent: Wednesday, December 5, 2012 2:13 PM
Subject: Briefing

Fred,

Attached is a briefing for CCP operators. I know you technically aren't working for us right now, but since you are maintaining your qualification with us please read and send me an email saying you read and understand it. Let me know if you have any questions.

Thanks,

Andrew Stallings
Site Project Manager/ Cognizant Engineer for NDE
Nuclear Waste Partnership LLC
Contractor to the U.S. Department of Energy
Phone: 575 234 7082

COPY

Cursor Usage During Certified RTR Scans

Prepared By: Andrew Stallings

CCP Cognizant Engineer for NDE

12/3/12

Purpose

- This briefing is part of a response required to address multiple observations and recommendations by NMED on the use of cursors during RTR scans.
- This briefing is intended to give guidance to RTR Operators and ITRs on the usage of the computer's cursor during certified RTR scans performed under CCP-TP-053 and CCP-TP-508.

Background

- During several audits at multiple sites, NMED observed the use of the computer cursor being used in a way they feel jeopardizes the independence, required by sections C1 and C3 of WIPP's HWFP, of Independent Observations (IOs).
- During the scans observed, the operator used the cursor to point out items in the waste container.

When to use the Cursor

- The cursor can and should be used to adjust the contrast on units that utilize the upgraded Vi3 software.

When Not to use the Cursor

- The cursor should not be used to point to, trace, outline or in any way identify an item on the screen.
- Additionally, the cursor should be kept out of view or off the screen unless being used to adjust contrast levels.

ITR Guidance

- The ITR operator will monitor the use of the cursor via the ITR process.
- If the cursor is found to have been used the ITR will contact the CCP Cognizant Engineer for RTR to evaluate whether independence has been compromised.

Additional Information

- To ensure this guidance is passed on to any new operators this briefing will be incorporated into the RTR-101 briefing required for qualification of RTR operators.
- Questions regarding this process modification should be addressed with the CCP Cognizant Engineer for NDE.

CCP-RTR-101
Real-Time Radiography (RTR)
TRU Waste Characterization Briefing
for Contact-Handled (CH) & Remote-Handled (RH) Waste

Approved for Applicability & Technical Content:	Andrew Stallings (Approval on File) NDE Cognizant Engineer (CE)	12/10/2012 Date
Approved for Technical Content, Format, & Use:	Richard Kantrowitz (Approval on File) CH Site Project Manager (SPM)	12/10/2012 Date
Approved for Technical Content, Format, & Use:	Irene Joo (Approval on File) RH Site Project Manager (SPM)	12/10/2012 Date
Approved for Applicability, Technical Content, Format, & Use:	A.J. Fisher (Approval on File) Manager Responsible for Training	12/10/2012 Date

REAL-TIME RADIOGRAPHY (RTR) TRU WASTE CHARACTERIZATION BRIEFING

FOR CONTACT-HANDLED (CH) & REMOTE-HANDLED (RH) WASTE

CCP-RTR-101
Rev. 4

December 10, 2012

Items to be Covered:

- Waste Characterization – Specific to RTR
- RTR & Acceptable Knowledge (AK)
- Prohibited Items
  - Incompatibles
  - Impenetrable Items/Conditions
- RTR Briefing Summary
- Appendix A: Homogeneous Waste & Absorbent
- Appendix B: Volume Calculation Guidelines
- Appendix C: PCB Bulk Product Waste Streams & Liquid
- Appendix D: Cursor Usage During Certified RTR Scans
- Certificate

4

Waste Characterization Specific to RTR

Radiography Systems

Data Quality Objectives (DQOs)

Quality Assurance Objectives (QAOs)

-Replicate Scans & Independent Observations

RTR Objectives

Waste Material Parameters

Internal Container Definition

Observable Liquid Definition

Waste Characterization Specific to RTR: Radiography Systems

Radiography systems usually consists of the following components:

- X-ray-producing device;
- Imaging System;
- An enclosure for radiation protection;
- A waste container handling system;
- An audio/visual recording system; and
- An operator control and data acquisition station.

Radiography equipment has controls allowing the operator to control image quality for materials of varying density. On most radiography systems, it is possible to vary the voltage to provide an optimum degree of penetration through the waste.

- For example, high-density material is examined with the X-ray device set on the maximum voltage.

Waste Characterization Specific to RTR: Data Quality Objectives (DQOs)

"To determine the physical waste form, the absence of prohibited items, and additional waste characterization techniques that may be used based on the Summary Category Groups (i.e., S3000, S4000, S5000.)"

- CCP-PO-001

- These DQO's are satisfied through CCP-PO-001.

Waste Characterization Specific to RTR:
QAOs – Replicate Scans & Independent Observations

"Independent replicate scans are performed on one waste container per day or once per testing batch, whichever is less frequent by a qualified radiography operator that was not involved in the original scan of the waste container."

"Independent observations of one scan (not the replicate scan) are made once per day or once per testing batch, whichever is less frequent, by a qualified radiography operator that was not involved in the original scan of the waste container."

- CCP-PO-001

Waste Characterization Specific to RTR: RTR Objectives

As a RTR operator, you will:

- Verify the physical waste form, the waste matrix code, and the waste matches the waste stream description from the applicable AK.
- Detect and report prohibited items.
- Ensure prohibited items are absent from waste containers.
- Generate complete, accurate, and auditable records.

Waste Characterization Specific to RTR
RTR Objectives…cont.

- Provide a detailed inventory and weight by Waste Material Parameter in each waste container. (e.g., cellulosics, plastics, rubber).
  - This data is then reported in WDS/WWIS which keeps a running total of the required materials to stay in compliance with the EPA requirements.
- Comply with the other required parameter ($\leq$ 1684 m^3 free liquid) with CCP-PO-002 criteria in Section 3.4.1 (CH) and Section 4.9.1 (RH) which requires the liquid in the payload container be < 1 percent.

Waste Characterization Specific to RTR: Waste Material Parameters

WIPP TRU-mixed waste is described in terms of ten Waste Material Parameters for the waste and two Waste Material Parameters for the packaging. These Waste Material Parameters are grouped by chemical and physical properties.

Table 2. Waste Material Parameters

	Waste Material Parameter	Description
S5000	Iron-based metals/alloys (IM)	Iron and steel alloys in the waste; does not include the waste container materials
S5000	Aluminum-based metals/alloys (AM)	Aluminum or aluminum-based alloys in the waste materials
S5000	Other metals (OM)	All other metals found in the waste materials
S5000	Other inorganic materials (OI)	Nonmetallic inorganic waste, including concrete, glass, firebrick, ceramics, sand, and inorganic sorbents
S5000	Cellulosics (C)	Materials generally derived from high polymer plant carbohydrates (e.g., paper, cardboard, wood, cloth)
S5000	Rubber (R)	Natural or man-made elastic Latex materials (e.g., surgeon's gloves, leaded rubber gloves)
S5000	Plastics (waste materials) (XPM)	Generally man-made materials, often derived from petroleum feedstock (e.g., polyethylene, polyvinylchloride)
S3000	Organic matrix (OR)	Cemented organic resins, solidified organic liquids, and sludges
S3000	Inorganic matrix (IN)	Any homogeneous materials consisting of sludge, or aqueous-based liquids which are solidified with cement, calcium silicate, or other solidification agents (e.g., waste water treatment sludge, cemented aqueous liquids, and inorganic particulate)
S4000	Soils (S)	Generally consists of naturally occurring soils which have been contaminated with inorganic waste materials
	Steel (packaging materials) (ST)	Steel Drums (55- and 85- Gallon)
	Plastics (packaging materials) (PP)	90-mil polyethylene drum liner and plastic bags

Waste Characterization Specific to RTR: Internal Container Definition

"...a container inside the outermost container examined during radiography or visual examination (VE). Drum liners, liner bags, plastic bags used for contamination control, capillary-type labware, and debris not designed to hold liquid at the time of original waste packaging are ***not*** *[emphasis added] internal containers."*

- WIPP Hazardous Waste Facility Permit

Waste Characterization Specific to RTR: Internal Container Definition, cont.

RTR personnel should not consider everything holding liquid as a container. Only items designed to hold liquids are considered containers. The key is to look at the INTENT of the item AT THE TIME OF PACKAGING.

- Some Examples of <u>internal containers</u> are:
  - Labware (except capillary-type labware)
  - Paint cans
  - Bottles

Waste Characterization Specific to RTR: Internal Container Definition, cont.

- Some items not considered Internal Containers:
  - Light bulbs
  - Flashlights
  - Folds in plastic
  - Small hollow labware pipettes
  - Hoses
- All liquid observed in a payload container, whether or not located within an internal container, will be considered in the overall 1% requirement.

Waste Characterization Specific to RTR: Observable Liquid Definition

- Liquid that is observable using radiography and VE as specified in the Waste Analysis Plan.

  - WIPP Hazardous Waste Facility Permit

Either the liquid is observable, or it doesn't exist.

RTR & AK

AK Definition

Summary Category Groups

What is Pertinent to RTR in the AK

TRUCON Codes

Layers of Confinement

RTR & AK:
AK Definition

"...detailed information on the wastes is obtained from existing published or documented waste analysis data or studies conducted on hazardous waste generated by processes similar to that which generated the waste; facility records of analysis performed before the effective date of RCRA; and waste analysis data obtained from generators of similar wastes that send their wastes off-site for treatment, storage, or disposal."

- WIPP Hazardous Waste Facility Permit

REMEMBER: Characterization results are to supplement AK.

RTR's function is to VERIFY the AK.

RTR & AK: Summary Category Groups

- TRU-mixed wastes in broad groups having **similar physical forms.**
- Each Summary Category Group must contain at **least 50%** of any given category by volume.

WIPP focuses on three (3) Summary Category Groups:

S3000 Homogeneous Solids –

- Solid process residues that do not classify as debris

S4000 Soil/Gravel –

- Waste streams that are a majority by volume of soil/gravel

S5000 Debris –

- Heterogeneous waste that are a majority by volume material that meet debris criteria
- Solid material exceeding a 2.36 inch (60-millimeter) particle size that is a manufactured, plant or animal matter, or natural geologic material;
- Particles smaller than 2.36 inches may be considered debris if not S3000 or S4000 material.

- One of the RTR Objectives is to verify the physical waste form: (S3000, S4000, S5000). See Appendix A in back.

RTR & AK:

What is Pertinent to RTR in the AK:

Required Waste Stream Information (beginning in Section 5) - Each waste stream will have a separate section in the AK:

- Description of the Waste Matrix Code (Material Input Related to Physical Form Section).
- Waste Material Parameters -List of items to be found in the waste, along with their estimated weight percentage (Material Input Related to Physical Form Section).
- Locate Hazardous Waste Materials specific to each waste stream.
- Prohibited Items
  - Ignitable, Reactive, and Corrosive (D001, D002, D003) – Know to look for these items.
  - PCBs – Prohibited without authorization
  - Other prohibited items.
- Waste Packaging (Configuration)

RTR & AK:
TRUCON Codes for TRUPACT II & TRUPACT III

Are found in the respective TRUCON Documents. This code is defined by the following components:

- The first two letters designates the physical location of the waste.
- A three-digit code designates waste generation relative to implementation of a formal certification program and the physical and chemical form of the waste.
  - 100 series are generated under a formal certification program (e.g., SQ 125).
  - 200 series were generated prior to a formal certification program (e.g., SQ 225).
  - 400 series are packaged into Standard Large Boxes (SLB2s), (e.g., SR 425).

RTR & AK:
RH TRUCON Codes

Are found in the RH-TRUCON Document, (DOE/WIPP-90-045). This code is defined by the following components:

- The first two letters designates the physical location of the waste.
- A three-digit code designates the physical and chemical form of the waste.
  - 300 series are RH waste (e.g., SR 325).

RTR & AK: Layers of Confinement

For the payload of TRU waste, a confinement layer is defined as follows:

"A confinement layer is any boundary that restricts, but does not prohibit, the release of hydrogen gas across the boundary."

- CH-TRU Payload Appendices, Sect. 3.8

Note: This definition of a confinement layer also applies to RH waste.

RTR & AK:
What are Layers of Confinement?

- **Rigid Containers** (>4 Liters), including:
  - Metal cans
  - Rigid liners **with** a lid and no evidence of a vent

  Note: Rigid containers must contain a ≥ 0.3-in. minimum diameter hole OR a filter with a hydrogen release rate equivalent to or greater than a 0.3-in. minimum diameter hole, or it would be considered a sealed container.

AND/OR

- **Plastic bags** (> 4 Liters), including:
  - Smaller Inner Bags
  - Larger Container Liner Bags

WITH

Closures that meet the specifications outlined in Appendix 3.8 of the CH-TRU Payload Appendices.

RTR & AK: Layers of Confinement

"Horsetail"

What are the allowable methods of closure for plastic bags used for waste confinement?

- Twist and tape closure ("Horsetail")
- Fold and tape closure
- Twist and tape closure with a minimum of one filter vent
- Unvented heat-seal closure for a bag with a minimum surface area of approximately 390 square inches. For example, a tube of plastic that is heat sealed on both ends, with nominal dimensions of 14 inches by 14 inches when flattened, would have a surface area of 14 x 14 x 2 = 392 square inches. Large bags are allowed, as the surface area for gas release is greater.

- CH-TRU Payload Appendices, Section 3.8

Note: *See RH-TRU Payload Appendices, Table 2.5-1 for RH Closure Methods*

RTR & AK
What is NOT a Layer of Confinement?

- Punctured plastic bags.
- Liner bags open at the end.
- Pieces of plastic sheeting wrapped around the waste for handling.
- Metal containers with lid closures that allow free hydrogen release.

- CH-TRU Payload Appendices, Section 3.8

- Rigid liners without a lid.
- Basically, anything not closed **OR** with less than 4 liters by volume.

The following items are prohibited per the Treatment, Storage, and Disposal Facility Waste Acceptance Criteria (TSDF-WAC).

Prohibited Items

- Liquids
- >4Liter Sealed Containers
- Compressed Gases
- Sharp or Heavy Objects
- Explosives
- Pyrophorics
- Ignitables
- Corrosives
- Reactives
- PCBs
- Non-Mixed Hazardous Waste
- Inconsistent Waste
- Incompatibles
- Impenetrable Items/Conditions

Note: A NCR is generated when prohibited items are identified. Provide a detailed description of the prohibited items in the NCR to aid in the remediation of the container. For example: what, where, and/or amount of liquid (if applicable).

Prohibited Items: Liquids

"Liquid waste is not acceptable at WIPP. Liquid in the quantities delineated below is acceptable:

- Observable liquid shall be no more than 1 percent by volume of the outermost container at the time of radiography or visual examination."

- WIPP Hazardous Waste Facility Permit

- The overall limit for a payload container has always been 1% by volume of the container and has not changed.
- Please review Appendix B – Volume Calculation Guidelines

Prohibited Items: Liquids, cont…

" - Internal containers with more than 60 milliliters or 3 percent by volume observable liquid, whichever is greater, are prohibited.

- Containers with Hazardous Waste Number U134 assigned shall have no observable liquid."

- WIPP Hazardous Waste Facility Permit

The limit for observable liquid in an internal container depends on the overall volume of that internal container.

Prohibited Items: Liquids, *cont…*

But…what does this mean?

- Up to 60mL of liquid within any internal container is acceptable.
- If the container has greater than 60 mL of liquid, the maximum allowable liquid is **3%** by volume of the container.
- Containers smaller than or equal to 2 liters default to the 60 mL limit. (the greater amount)
- Containers greater than 2 liters default to the 3% limit.
- For example, if you have a 3.8L (one gallon) paint can, the maximum volume of acceptable liquid is 113.7 mL.
- **Total liquid** must be **less than 1% by volume** of the outermost container at the time of RTR.

- All observable liquid must be reviewed to ensure it does not exceed the maximum allowable level. If observable liquid is detected, ensure any estimate close to a limit is verified

Prohibited Items: Liquids, *cont…*
When Liquid **Must** Be Absent

- **Polychlorinated Biphenyls (PCBs)** – Only authorized under an EPA PCB waste disposal authorization.
  - Observable liquid containing PCBs is prohibited at the WIPP.
  - See Appendix C for further clarification.

- CCP-PO-002, Section 3.4.1[A.1]

- *"Containers with Hazardous Waste Number U134 assigned shall have no observable liquid."*
  - Hazardous Waste Code U134 - **hydrofluoric acid**

- CCP-PO-001

Prohibited Items:
> 4 Liter Sealed Containers

"Sealed containers that are greater than 4 liters (nominal) are prohibited except for Waste Material Type II.2 packaged in a metal container; Waste Material Type II.2 does not generate any flammable gas (see Appendix 3.2 of the CH-TRU Payload Appendices)."

- CCP-PO-002, Section 2.8

- Waste Material Types will be further explained in the Incompatibles Section.

Prohibited Items: Compressed Gases

Compressed Gases / Pressurized Containers (e.g., aerosol cans) are prohibited.

- CCP-PO-001

Prohibited Items: Sharp or Heavy Objects

"Sharp or heavy objects in the waste shall be blocked, braced, or suitably packaged as necessary to provide puncture protection for the payload containers packaging these objects."

- CCP-PO-003, Section 2.7

The object(s) would have to be sharp and heavy enough to puncture a payload container. The object(s) must be large and heavy enough that if not braced, blocked, or packaged sufficiently, it may move within the container and could potentially damage and/or puncture the payload container from within. If the packaging is insufficient, a NCR should be written.

Prohibited Items: Explosives

"...any substance or article, including a device, which is designed to function by explosion (i.e., an extremely rapid release of gas and heat) or which, by chemical reaction within itself, is able to function in a similar manner..."

- CCP-PO-003, Section 4.2

Examples of **explosives** are: ammunition, dynamite, black powder, detonators, nitroglycerine, urea nitrate, and picric acid.

Prohibited Items: Pyrophorics

"Non-radionuclide pyrophoric materials, such as elemental potassium, are not acceptable at WIPP."

- WIPP Hazardous Waste Facility Permit

- Review AK for information on pyrophorics, if in doubt. If still unsure, ask the SPM.

Prohibited Items: Ignitables (Hazardous Waste Number D001)

- Can be solid waste, compressed gas, or liquids.
- Capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture, or spontaneous chemical changes and if ignited burns so vigorously and persistently that it creates a hazard.
- Examples: sodium metal, nitroglycerine, gasoline, and aluminum phosphate.

  - 40 CFR 261.21, Characteristic of ignitability

Remember: "The prohibition of liquid in excess of TSDF-WAC limits and containerized gases prevents the shipment of corrosive, ignitable, or reactive wastes."

- CCP-PO-001

Prohibited Items:

Corrosives (Hazardous Waste Number D002)

Aqueous materials which have a pH less than or equal to 2 or greater than or equal to 12.5.

A solid waste that exhibits the characteristic of corrosivity has the EPA Hazardous Waste number of D002.

The physical form of the waste and waste generating procedures at the sites ensure that the waste is in a non-reactive form.

Examples: acids and lead acid batteries.

-CCP-PO-003, Section 4.2

Remember: "The prohibition of liquid in excess of TSDF-WAC limits and containerized gases prevents the shipment of corrosive, ignitable, or reactive wastes."

- CCP-PO-001

Prohibited Items: Reactives (Hazardous Waste Number D003)

Normally unstable and undergoes violent change without detonating.

- React violently with water and form potentially dangerous mixtures.
- Can generate toxic gases, mixtures, and fumes.
- Capable of detonation or explosive reaction if exposed to strong initiating force under confinement.
- The prohibition of liquids and containerized gases prevents the shipment of corrosive, ignitable, or reactive wastes.
- Review AK for specifics.
- Examples include: Pyrophoric metals such as sodium, cyanide wastes, ethers, peroxides.

All materials in the final waste form must be inert (nonreactive), be in a nonreactive form, or have been rendered nonreactive.

- 40 CFR § 261.23, Characteristic of reactivity

Remember: "The prohibition of liquid in excess of TSDF-WAC limits and containerized gases prevents the shipment of corrosive, ignitable, or reactive wastes."

- CCP-PO-001

Prohibited Items: PCBs

"PCB contaminated TRU and PCB contaminated TRU waste mixed with a hazardous waste including PCB remediation waste, PCB Articles, and PCB bulk product waste may be stored and disposed at the WIPP…"

- Must have CBFO approval.
- Liquid PCBs are not accepted.
- Examples to look for: light ballast, circuit board capacitors, transformers.
- If any possible PCB containing item is found in the waste container, there must be absolutely no liquid in the container.
- Again, this information is found in the AK.
- See Appendix C for additional information.

- CCP-PO-002, Section 3.1.5

Prohibited Items: Non-Mixed Hazardous Waste

WIPP safely disposes of the nation's defense-related Transuranic-mixed (TRU-mixed) waste.

- TRU indicates radiological properties.
  - Definition per WAC Section 3.3.3:

    "TRU waste shall contain more than 100 nanocuries of alpha-emitting transuranic isotopes per gram of waste, with half-lives greater than 20 years."
- Mixed indicates hazardous properties.
- Hazardous wastes alone are not accepted.
  - All hazardous waste must also be transuranic waste.

Prohibited Items: Summary Form- Inconsistent Waste

How do you answer "Is the physical form of the waste inconsistent with the Waste Stream Description or the Waste Matrix Code?"

- The waste recorded from the RTR process is compared to the AK description.
  - IF the waste described is consistent with the AK description, the answer is **NO**.
  - IF the waste described is **NOT** consistent with the AK description, the answer is **YES** and a nonconformance report (NCR) is generated.

Prohibited Items - Incompatibles

Definition

CH Requirements for Incompatibles

RH Requirements for Incompatibles

How to Determine Incompatibility

Prohibited Items – Incompatibles Definition

"To ensure the integrity of the WIPP facility, waste streams identified to contain incompatible materials or materials incompatible with waste containers cannot be shipped to WIPP unless they are treated to remove the incompatibility. Only those waste streams that are compatible or have been treated to remove incompatibilities will be shipped to WIPP."

- WIPP Hazardous Waste Facility Permit

- The data sheets in RTR contain a task pertaining to indication of incompatible wastes.

Prohibited Items - Incompatibles
CH Requirements for Incompatibles

Chemical Compatibility:

"TRU waste containing incompatible materials or materials incompatible with payload container and packaging materials, shipping container materials, other wastes, repository backfill, or seal and panel closure materials are not acceptable for transport in the TRU-PACT II or HalfPACT or for disposal at the WIPP. Chemical constituents shall conform to the lists of allowable materials in Tables 4.3-1 through 4.3-8 of the CH-TRAMPAC. Other chemicals or materials not identified in these tables are allowed provided that they meet the requirements for trace constituents as specified in Section 4.3.1 of the CH-TRAMPAC."

- CCP-PO-002, Section 3.5.3

Prohibited Items - Incompatibles
RH Requirements for Incompatibles

"TRU waste containing incompatible materials or materials incompatible with payload container and packaging materials, shipping container materials, other wastes, repository backfill, or seal and panel closure materials are not acceptable for transport in the RH-TRU 72-B or 10-160B Cask or for disposal at the WIPP.

"The total quantity of the trace chemicals/materials (materials that occur in the waste in quantities less than 1 percent [weight]) not listed in Table 4.3-1, in the payload container is restricted to less than 5 percent (weight) (Reference 38). Chemical constituents in a payload of a particular waste-specific content code shall conform to the allowable chemical list for that content code. The content code must be reported to the WWIS for each payload container (References 40 and 41)."

- CCP-PO-002, Section 4.10.3[A]

Note: *RH Incompatibles are listed in the RH-TRAMPAC Section 4.4 and Table 4.3-1. The RH TRUCON Codes are waste stream specific and include a list of the chemicals.*

Prohibited Items - Incompatibles
How to Determine Incompatibility

This example is for CH waste.
The same logic is used for RH waste using RH-TRUCON DOE/WIPP 90-045.
Except All RH TRUCON Code Wastes must be compared with Table 4.3-1

Examples on subsequent pages are in RED

To determine the answer to the incompatible waste task, the following information must be reviewed:

Step 1: TRUCON Code from the acceptable knowledge reports for the waste being characterized (e.g., SQ 121 per example on next page).

Step 2: Look up the content code in the TRUCON code manual, DOE/WIPP 01-3194, to find the waste material type.

» The 1st two letters tell you the site (SQ).

» Use section titled Content Code to select Small Quantity (SQ) and look for the specific number(s) (e.g., 121).

Step 3: The waste material type can be found in the Chemical Compatibility section of the TRUCON code manual.

- Waste Material Type III.1

Step 4: The waste material type is then used in the "allowable materials for waste material type" Table 4.3-1 through 4.3-8 of the TRAMPAC (e.g., Table 4.3-6).

Step 1:

Prohibited Items - Incompatibles
How to Determine Incompatibility

CCP-AK-INL-007, Rev. 2 **Effective Date: 04/18/2007**

CCP Acceptable Knowledge Summary Report **Page 9 of 43**

- 2.0 WASTE STREAM IDENTIFICATION SUMMARY
- Site Where TRU Waste was Generated and Stored
- Generation Location:
  - **Rocky Flats Environmental Technology Site**
  - **10808 Highway 93**
  - **Golden, CO 80402**
  - **EPA ID No. CO7890010526**
  - **Brookhaven National Laboratory**
  - **PO Box 5000**
  - **Upton, New York 11973**
  - **EPA ID No. NY7890008975**
- Storage Location:
  - **Idaho National Laboratory**
  - **Radioactive Waste Management Complex (RWMC)**
  - **EPA ID No. ID4890008952**
- Facility Where TRU Waste Was Generated
  - **This waste was generated at Rocky Flats in Building 771. The waste was solidified at BNL in Building 830. Refer to Section 4.1.2.**
- Facility Mission
  - Rocky Flats had two primary missions: the production of triggers for nuclear weapons, and the processing of retired weapons for plutonium recovery. The triggers, also known as pits, were the first-stage fission bombs used to initiate the second-stage fusion reaction in hydrogen bombs. Plutonium metal was recovered from retired warheads and manufacturing residues for reuse. Refer to Section 4.2.
- BNL's broad mission is to conduct excellent science in a safe, environmentally sound manner with the cooperation, support, and appropriate involvement of the scientific and local communities. For more than 50 years, BNL has been one of the leading research institutions in the nation and the world. Much of the Laboratory's effort is directed at the study of the basic nature of matter, including subatomic particles and the structure of the atom (Reference M009).
- Summary Category Group: S3000 – Homogeneous Solids
- Waste Matrix Code Group: Solidified Inorganics
- Waste Matrix Code: S3111
- **TRUPACT-II Content Code (TRUCON): SQ 121 AB and SQ 121 AC (Reference 5)**
- Waste Stream Transuranic Waste
- Baseline Inventory Report (TWBIR) ID: RF-MR0420
- Layers of Confinement: One (1) layer

Step 2:

CONTENT CODE: SQ 121, SQ 221 (See Waste Packaging Description Table)

CONTENT DESCRIPTION: Solid Organic Waste

GENERATING SITE: Various

WASTE DESCRIPTION: This waste consists of a variety of combustible and noncombustible organic items.

GENERATING SOURCES: These wastes were generated from various operations at the sites.

WASTE FORM: The waste may include combustible items such as cloth and paper products (e.g., from the cleanup of spills), rags, coveralls and booties, plastic, cardboard, rubber, wood, surgeons gloves, and Kimwipes. The waste may also include filter waste, (e.g., dry box filters, HEPA filters, and filter cartridges); noncombustible Benelex and plexiglas neutron shielding, blacktop, concrete, dirt, and sand; leaded gloves and aprons comprised of Hypalon rubber and lead oxide impregnated neoprene; and small amounts of metal waste. This waste may also include particulate and sludge-type organic process solids immobilized/solidified with Portland cement, vermiculite, Aquaset, or Petroset. The waste may also include items from decontamination and decommissioning activities (tools, supplies, equipment, etc.) and stabilized plutonium ash.

WASTE PACKAGING: Details of the waste packaging for each code are presented in the following table:

WASTE PACKAGING DESCRIPTION TABLE

Code	Description*
SQ 121A SQ 221A	The waste is placed directly into a 55-gallon drum, an SWB, or a TDOP with no layers of confinement.
SQ 121AA SQ 221AA	The waste is placed directly into a metal can with the filter removed from the bung hole. The metal can is contained in a 55-gallon drum that is lined with a rigid liner. The rigid liner lid is removed.
SQ 121AB SQ 221AB	The waste is contained in one-gallon paint cans. The one-gallon paint cans are placed directly into a 55-gallon drum with no confinement layers and no rigid liner.
SQ 121AC SQ 221AC	The waste is contained in one-gallon paint cans. The one-gallon paint cans are placed in one heat-sealed filtered liner bag, which is then placed into a 55-gallon drum with no rigid liner.
SQ 121B SQ 221B	The waste is packaged directly into one plastic bag and is then placed into a 55-gallon drum, an SWB, or a TDOP.
SQ 121C SQ 221C	The waste is packaged directly into two plastic bags and is then placed into a 55-gallon drum, an SWB, or a TDOP.
SQ 121D SQ 221D	The waste is packaged directly into three plastic bags and is then placed into a 55-gallon drum, an SWB, or a TDOP.
SQ 121DA SQ 221DA	The waste is packaged directly into two plastic inner bags and one plastic liner bag. The waste is then placed into a 55-gallon drum with no rigid liner.
SQ 121E SQ 221E	The waste is packaged directly into three plastic inner bags and is then placed into a 55-gallon drum with no rigid liner. No closed plastic liner bags are used inside the 55-gallon drum.

Prohibited Items - Incompatibles
How to Determine Incompatibility

Step 3:

PYROPHORICS: Nonradioactive pyrophorics in the payload containers are prohibited by waste packaging procedures. Waste packaging procedures shall ensure that all pyrophoric radioactive materials are present only in small residual amounts (less than 1 weight percent) in payload containers.

CORROSIVES: Corrosives are prohibited in the payload containers. Acids and bases that are potentially corrosive shall be neutralized and rendered noncorrosive prior to being a part of the waste. The physical form of the waste and the waste generating procedures ensure that the waste is in a nonreactive form.

CHEMICAL COMPATIBILITY: A chemical compatibility study has been performed on this content code, and all waste is chemically compatible for materials in greater than trace (>1% weight) quantities. The chemicals found in this content code are restricted to the table of allowable materials for Waste Material Type III.1 in the CH-TRAMPAC.

PAYLOAD CONTAINER VENTING AND ASPIRATION: Payload containers in this content code that have been stored in an unvented condition (i.e., no filter and unpunctured liner) will be aspirated using one of the three options described in the CH-TRAMPAC.

ADDITIONAL CRITERIA: In accordance with the CH-TRAMPAC, each drum is fitted with a minimum of one filter vent, and the rigid liner (if present) is punctured. Each SWB is fitted with at least two and up to four filters. Each TDOP is fitted with at least nine filters.

SHIPPING CATEGORY: See Table 2, Summary of Approved Content Codes and Corresponding Shipping Categories.

MAXIMUM ALLOWABLE WATTAGE: The maximum allowable wattages for analytical and test category waste are specified in the CH-TRAMPAC.

Prohibited Items - Incompatibles

How to Determine Incompatibility

Step 4:

Table 4.3-6 – Allowable Materials for Waste Material Type III.1①
Solid Organic Materials

Any material in Waste Types I or II (Table 4.3-1 through Table 4.3-5)
Absorbent polymers, organic
Acids, solid, organic
Asphalt
Bakelite® ②
Cellulose (e.g., Benelex®, cotton Conweed®, paper, rags, rayon, wood)
Cellulose acetate butyrate
Cellulose propionate
Chlorinated polyether
Detergent, solid (e.g., emulsifiers, surfactants)
Fiberglass, organic
Filter media, organic
Greases, commercial brands
Insulation, organic
Leaded rubber (e.g., gloves, aprons, sheet material)
Leather
Oil (e.g., petroleum, mineral)
Organophosphates (e.g., tributyl phosphate, dibutyl phosphate, monobutyl phosphite)
Paint, dry (e.g., floor/wall paint, ALARA)
Plastics [e.g., polycarbonate, polyethylene, polymethyl methacrylate (Plexiglas®, Lucite®), polysulfone, polytetrafluoroethylene (Teflon®), polyvinyl acetate, polyvinyl chloride, polyvinylidene chloride (saran)]
Polyamides (nylon)
Polychlorotrifluoroethylene (e.g., Kel-F®)
Polyesters (e.g., Dacron®, Mylar®)
Polyethylene glycol (e.g., Carbowax®)
Polyimides
Polyphenyl methacrylate
Polypropylene (e.g., Pul-Flo® filters)
Polyurethane
Polyvinyl alcohol
Resins (e.g., aniline-formaldehyde, melamine-formaldehyde, organic resins, phenol-formaldehyde, phenolic resins, urea-formaldehyde)
Rubber, natural or synthetic [e.g., chlorosulfonated polyethylene (Hypalon®), ethylene-propylene rubber, EPDM, polybutadiene, polychloroprene (neoprene), polyisobutylene, polyisoprene, polystyrene, rubber hydrochloride (pliofilm®)]
Sand/Soil
Waxes, commercial brands

Notes:

① Other chemicals or materials not identified in this table are allowed provided that they meet the requirements of Section 4.3.1. All materials in the final waste form must be inert (nonreactive), be in a nonreactive form, or have been rendered nonreactive.

② Bakelite is a trademark for materials that can be composed of several different polymers, including polyethylene, polypropylene, epoxy, phenolic, polystyrene, phenoxy, perylene, polysulfone, ethylene copolymers, ABS, acrylics, and vinyl resins and compounds.

Prohibited Items – Impenetrable Items/Conditions

Definition

Managing Containers

Impenetrable Items/Conditions Definition

Impenetrable items are items which prevent the positive identification of the waste and prevent the identification of prohibited items due to the denseness of the item, and/or several dense items in close proximity, which limits the ability to review an area of the container.

Impenetrable Items/Conditions…cont.

IF a container is identified in the S5000 Summary Category group that CAN **NOT** be penetrated by the RTR method because of the presence of lead, or other shielding, **THEN** initiate a NCR in accordance with CCP-QP-005, *CCP TRU Nonconforming Item Reporting and Control.*

IF a container is identified in the S3000 or S4000 Summary Category Group, **AND** RTR is **NOT** capable of penetrating the container, due to lead, other shielding, or contents, and preventing the examination of the top, sides, or bottom of the waste form, **THEN** initiate a NCR in accordance with CCP-QP-005.

- CCP-TP-053

Impenetrable Items/Conditions….cont.

"Containers whose contents prevent full examination of the remaining contents are subject to VE unless the CCP certifies that VE would provide no additional relevant information for that container based on the acceptable knowledge information for the waste stream."

- CCP-PO-001

Impenetrable Items/Conditions Managing Containers

- Perform a full (100%) examination on the waste container:
  - Slow down and frequently stop to examine areas between the impenetrable(s).
  - Clearly state (for the record) all your determinations during the examination.
- Document all identified waste material parameters on the data sheet.
- If a full examination is not possible, generate a nonconformance report (NCR) which identifies **"contents prevent full examination".**
  - Do not invalidate the data by drawing a line through the data sheet.

Impenetrable Items/Conditions Managing Containers…cont.

- A waste container may contain an impenetrable item and not be rejected, e.g., an identifiable solid object.
- Some items/objects are harder to penetrate than others due to the type of material and its denseness, especially if there is more than one in a bag or bundle (e.g., lead lined gloves or absorbents).
- Most such items are not prohibited by the WAP, but depending on their configuration within the drum, they may contain unforeseen objects within their contents or between the bundles and may prevent a full (100%) examination.
  - In cases like these, greater care should be taken during inspection to ensure no prohibited items are overlooked.

RTR Briefing Summary

RTR Briefing Summary

- The DQOs for RTR are to determine the physical waste form, confirm the absence of prohibited items, and additional waste characterization techniques that may be used based on the Summary Category Groups (i.e., S3000, S4000, S5000).
- RTR reports the Waste Material Parameters (e.g., cellulosic's, plastics, rubber) per the procedure.
- **Absolutely no liquids are allowed in waste with possible PCB containing items (See Appendix C) or with U134 present.**
- A layer of confinement is any boundary that restricts, but does not prohibit, the release of hydrogen gas across the boundary.
- An internal container is a container inside the outermost container examined during radiography or VE. This container was designed at the time of original waste packaging to hold liquid.
- RTR compliance requires identification and documentation of 100% of prohibited items.
  - This same diligence should also be applied to identifying waste material parameters and determining if the waste is considered incompatible.
  - The RTR record is only as good as the documentation. RTR Operators should double-check your paperwork, to ensure correctness and compliance. Any corrections made to RTR batches should be single-lined through, initialed, and dated.
- RTR's function is to VERIFY the AK

APPENDIX A
HOMOGENEOUS WASTE & ABSORBENT

- Absorbent
- Absorbent & Debris Waste
- Absorbent & Sludge Waste
- Homogeneous Waste (S3000)
- Solidified Liquid Waste
- S3000 Examples

Absorbent

Serves two distinct purposes:

1. To solidify liquid waste (becomes solidified waste-sludge).
   - In this case, the absorbent assumes the identity of the waste it is solidifying – S3000 waste.
2. To absorb residual liquids.
   - In this case, the absorbent should be listed as other inorganic material - S5000 waste.

Note: *The presence of absorbent should be verified with the specific AK.*

Absorbent & Debris Waste

Absorbs liquids during waste packaging:

- Will typically appear in small amounts and will darken as liquid is absorbed.
- Can usually be distinguished as a small amount of material within containers, bagging, or packaging.
- Will conform with gravity.

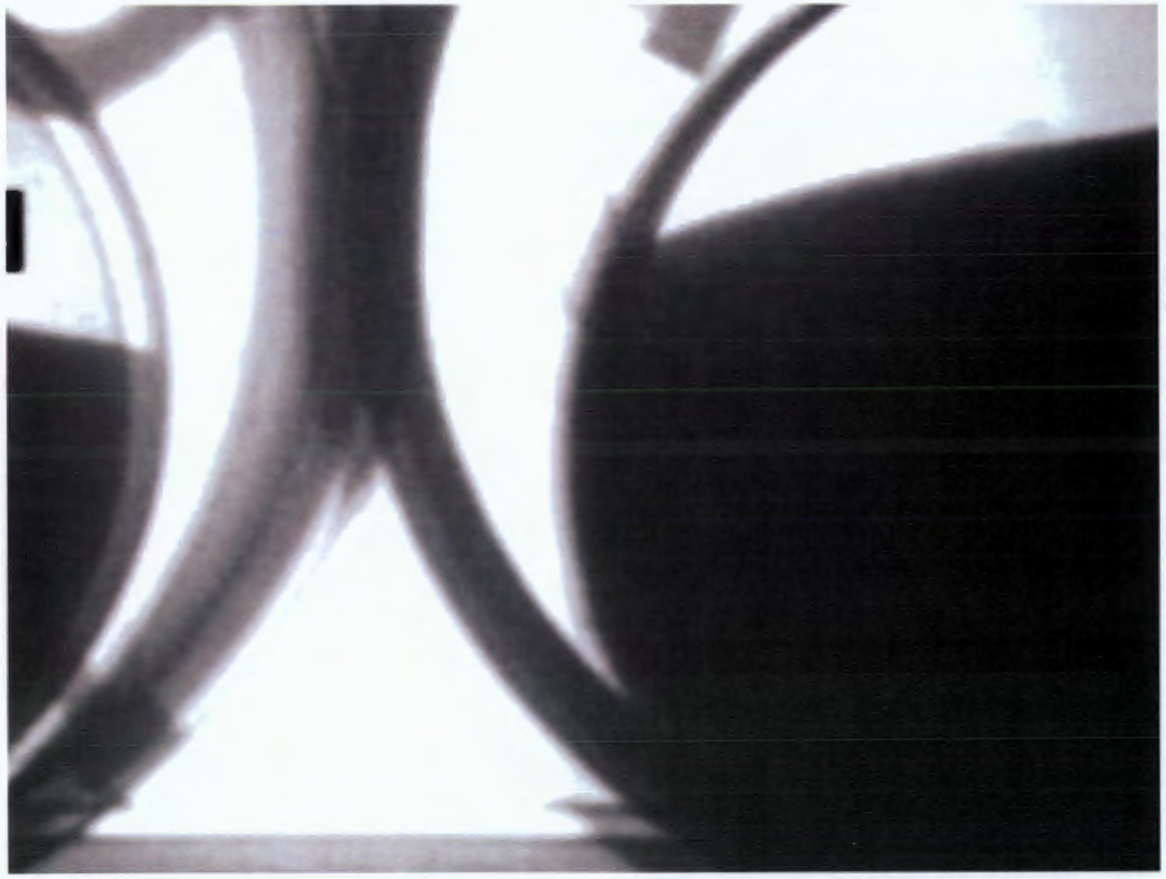
Absorbent & Sludge Waste

- Typically more absorbent will be used - usually on top of the sludge.
- Appears to be less dense and smoother than the sludge waste.

Homogeneous Waste (S3000)

- When absorbent is used to solidify liquid waste, the resulting waste is homogeneous with a waste matrix code of S3000.
- Other homogeneous waste forms include:
  - Salt cake pieces
  - Ash
- The identity of the homogeneous waste is identifiable with RTR based on density, shape, etc.

Note: *Absorbent should never be considered as primary waste for any radioactive waste container/package .*



Appendix A: Homogeneous Waste & Absorbent

Waste appears to be ash, packaged in two metal cans (can within a can).

Solidified Liquid Waste

Things to watch for:

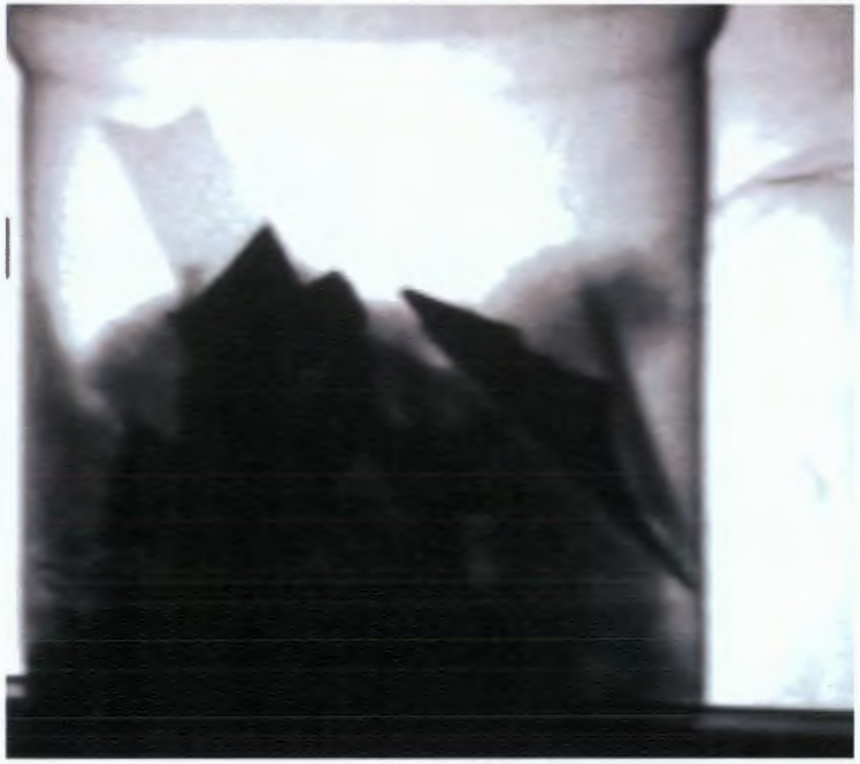
- Packaging Configuration: These are examples of packaging indicating the waste within is **not** primarily absorbent, but some other form of S3000 waste (salts, ash, solidified material-sludge).
  - Hagen cans in plastic bags
  - Double canned setups in plastic bags
  - Pipe over-pack containers (POC)
- Appearance: Absorbent will not typically appear as chunks of material, or as coarse material.

Appendix A: Homogeneous Waste & Absorbent

S3000 Examples:

Appears to be S3000 solidified material.

Appears to be salt cake pieces (with pieces of metal present).



APPENDIX B
VOLUME CALCULATION GUIDELINES

-Imaging System Correction Factor

-Liquid Volume Estimation MV/CF=AS

-Actual Dimensions Depend On:

1. Measured Dimensions
2. Location

-Scale All Measurements Before Doing Calculations

-Calculating the Height of Liquid in a Tilted Cylinder

-Volume Formulas

-Measurement Conversion Chart

Imaging System Correction Factor

- Every RTR system has a correction factor that must be determined.
  - Aids in providing estimates for container sizes and liquid volumes.
- Based on two primary factors:

1) The geometry of the RTR system. This includes the overall distance from the x-ray producing device to the imaging system and the distance from the container being inspected to the RTR system.
2) The software utilized to convert the RTR image into the image as viewed.

Imaging System Correction Factor, *Continued*

- Determined by measuring a known item *(e.g., one inch lead number or ½ inch wide locking ring bolt)* with the item rotated so the known item is directly in front of the imaging system, then measuring the item on the RTR monitor.

Imaging System Correction Factor, *Continued*

- Rotate the container the 180 degrees so the known item is directly in front of the x-ray producing device and re-measure on the monitor.
  - For example, if the 1 inch lead number now measures 3 inches, there is a magnification factor of 3 for items appearing next to the x-ray producing device.
  - This factor should be the <u>MAXIMUM</u> correction factor for the system/container.
    - For example, an item in the center of the container would be magnified approximately 1.5 times, and corrected accordingly.

Imaging System Correction Factor, *Continued*

LOCATION, LOCATION, LOCATION!

- Observing an item and its change in size and position as it rotates during container inspection, gives a RTR operator an idea of its location.
  - If a container is rotated 360 degrees, and the item barely moves from side to side, it is located near the center of the container.
  - If a container is rotated 360 degrees, and the item moves from side to side, it is located nearer to the side of the drum.
  - For box inspections, the item will have to measured on one side, then re-measured on the other side to get an approximate location.

Imaging System Correction Factor, *Continued*

- To obtain the clearest and most accurate estimate of an item, measure it as close to the imaging side of the RTR system as practical.
  - When this is not possible due to waste configuration, use the correction factor if an estimate is needed.

Liquid Volume Estimation: MV/CF=AS

Examples:

1) An item is located in/near the center of a drum, measures approximately 4 inches high, and the correction factor is 1.5. The following equation can be use to measure close to actual size: MV/CF=AS

Where : MV = measured value = 4 in.

CF = correction factor = 1.5

AS = actual size = 4/1.5 = 2.7 in.

2) A small bottle measured 10 cm high and 7 cm wide:

10(MV)/1.5(CF)= 6.67 cm (AS)

7 cm(MV)/2= 3.5 cm radius/1.5= 2.33 cm(AS)

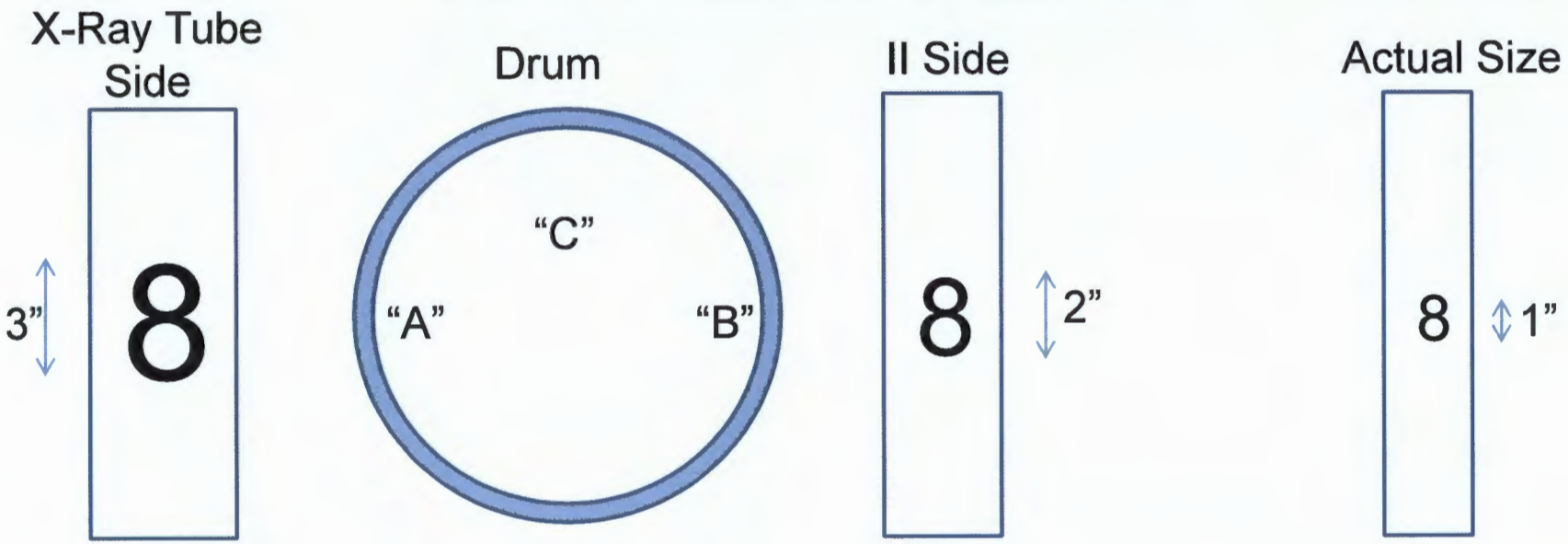
Cylinder Volume Formula = 3.14 x radius^2 x height

3.14 x 2.33 x 2.33 x 6.67= 113 ml, or rounded up to a 125 ml bottle

Appendix B: Volume Calculation Guidelines

Actual Dimensions Depend On: Measured Dimensions and Location

Note: All measurements are examples!



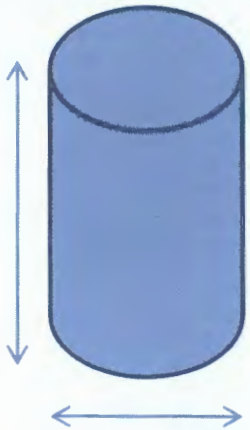
Actual dimensions at location "A" = Measured dimensions divided by 3

Actual dimensions at location "B"= Measured dimensions divided by 2

Actual dimensions at location "C" = Measured dimensions divided by 2.5 or (3 + 2)/2

Scale All Measurements Before Doing Calculations

Measured Height is 21 cm



The Scaling Factor for this example was determined to be 3:1 so, Measured Dimensions need to be divided by 3 to get Actual Dimensions

Measured Diameter is 12 cm (Measured radius is 6 cm)

Determine Actual Dimensions First

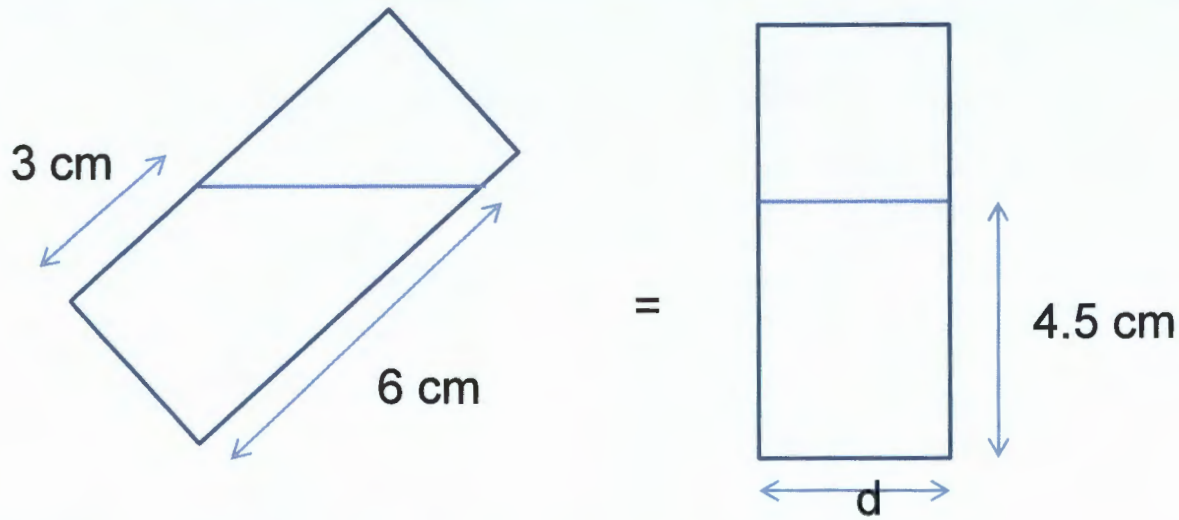
Radius = 6 cm / 3 = 2 cm and Height = 21 cm / 3 = 7 cm

Volume = $\pi r^2 h = \pi (2)^2 (7) = 88$ cm^3 or 88 ml *(CORRECT)*

Don't do Calculations First then Divide by Scaling Factor:

Volume = $\pi r^2 h = \pi (6)^2 (21) / 3 = 792$ cm^3 or 792 ml ***(WRONG !!!)***

Calculating the Height of Liquid in a Tilted Cylinder



Upright height = h = (3 cm + 6 cm) / 2 = <u>4.5 cm</u>

Radius = r = d/2

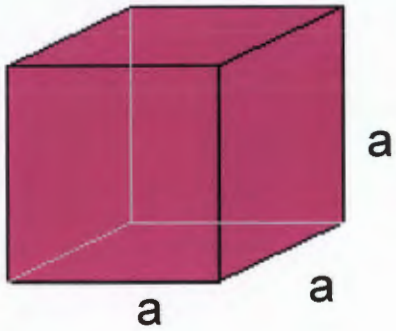
Volume = $\pi r^2 h$

Notes:
1. The liquid level must be measured along both upper and lower sides.
2. If the liquid level is at the bottom or top of the cylinder, this method does not work.

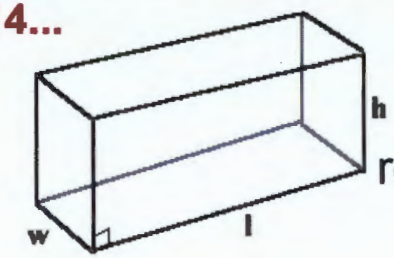
Volume Formulas

Be careful!! Units count. The same units should be used for all measurements.

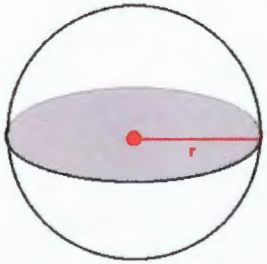
π = 3.14...



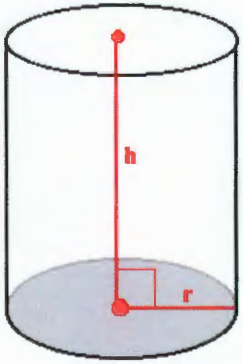
cube = a^3



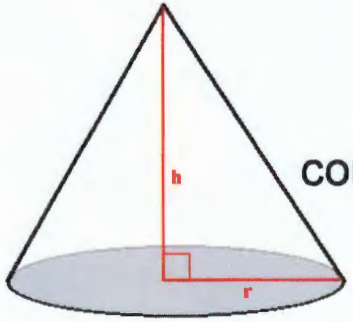
rectangular prism = l w h



sphere = $(4/3)\ \pi\ r^3$



cylinder = $\pi\ r^2\ h$



cone = $1/3\ \pi\ r^2\ h$

http://www.math.com/tables/geometry/volumes.htm

math.com The World of Math Online

http://library.thinkquest.org/20991/geo/solids.html

Measurement Conversion Chart

LIQUID VOLUME CONVERSION CHART

Unit	Tsp.	Tbl.	fl. Oz.	Cups	Pints	Quart	mL	Liters
1 Gallon	768	256	128	16	8	4	3785.4	3.79
1 liter	203	67.6	33.8	4.2	2.1	1.1	1000.0	1.00
1 quart	192	64	32	4	2	1	946.4	0.95
1 pint	96	32	16	2	1	1/2	473.2	0.47
1 cup	48	16	8	1	1/2	1/4	236.6	0.24
1/2 cup	24	8	4	1/2	1/4	1/8	118.3	0.12
1/3 Cup	16	5.33	2.67	1/3			78.9	0.08
1/4 cup	12	4	2	1/4			59.1	0.06
1 fluid ounce	6	2	1				29.6	0.03
1 Tablespoon	3	1	1/2				14.8	0.01
1 teaspoon	1	1/3	1/6				4.9	
1/2 Teaspoon	1/2						2.5	
1/4 Teaspoon	1/4						1.2	

1 cubic inch (in^3) = .016387 L = 16.39 mL

APPENDIX C

PCB BULK PRODUCT WASTE STREAMS & LIQUID

- Definition of a PCB Article
- Definition of PCB Bulk Product Waste
- PCB Bulk Product Waste Streams May Include
- Allowable Liquid in PCB Bulk Product Waste Streams
- Potential PCB Scenarios
- Capacitor & Motor Examples

Definition of a PCB Article

"**PCB Article** means any manufactured article, other than a PCB Container, that contains PCBs and whose surface(s) has been in direct contact with PCBs. "PCB Article" includes capacitors, transformers, electric motors, pumps, pipes and any other manufactured item (1) which is formed to a specific shape or design during manufacture, (2) which has end use function(s) dependent in whole or in part upon its shape or design during end use, and (3) which has either no change of chemical composition during its end use or only those changes of composition which have no commercial purpose separate from that of the PCB Article."

- 40 CFR §761.3

Definition of PCB Bulk Product Waste

"**PCB bulk product waste** means waste derived from manufactured products containing PCBs in a non-liquid state, at any concentration where the concentration at the time of designation for disposal was ≥50 ppm PCBs. PCB bulk product waste does not include PCBs or PCB Items regulated for disposal under § 761.60(a) through (c), § 761.61, § 761.63, or § 761.64."

- 40 CFR §761.3

PCB Bulk Product Waste Streams May Include:

"(1) Non-liquid bulk wastes or debris from the demolition of buildings and other man-made structures manufactured, coated, or serviced with PCBs. PCB bulk product waste does not include debris from the demolition of buildings or other man-made structures that is contaminated by spills from regulated PCBs which have not been disposed of, decontaminated, or otherwise cleaned up in accordance with subpart D of this part."

"(2) PCB-containing wastes from the shredding of automobiles, household appliances, or industrial appliances."

- 40 CFR §761.3

Appendix C – PCB Bulk Product Waste Streams & Liquid PCB Bulk Product Waste Streams May Include: cont…

"(3) Plastics (such as plastic insulation from wire or cable; radio, television and computer casings; vehicle parts; or furniture laminates); preformed or molded rubber parts and components; applied dried paints, varnishes, waxes or other similar coatings or sealants; caulking; adhesives; paper; Galbestos; sound deadening or other types of insulation; and felt or fabric products such as gaskets."

"(4) Fluorescent light ballasts containing PCBs in the potting material."

- 40 CFR §761.3

Allowable Liquid in PCB Bulk Product Waste Streams:

Liquids will be allowable in PCB bulk product waste streams. Normal liquid guidelines would apply:

- Observable liquid shall be less than 1 percent1 by volume of the outermost container at the time of radiography or visual examination (VE).
- Internal containers with more than 60 milliliters (ml) or 3 percent by volume observable liquid, whichever is greater, are prohibited.
- Containers with Hazardous Waste Number U134 assigned shall have no observable liquid.
- Overpacking the outermost container that was examined during radiography or visual examination or redistributing untreated liquid within the container shall not be used to meet the liquid volume limits.

Potential PCB Scenarios:

Three Scenario Categories Exist:

1. PCB Bulk Product Waste Stream
2. PCB Article Waste Streams &
3. PCB Bulk Product with PCB Articles.
   - This will be indicated in the AK summary report.

Potential PCB Scenarios:

Scenario 1: PCB Bulk Product Waste Stream

This waste stream contains PCB bulk product, but no PCB articles.

- Normal liquid guidelines would apply.

Potential PCB Scenarios:

Scenario 2: PCB Article Waste Stream

This waste may contain PCB articles.

- **NO** Liquid would be allowed in those containers that AK or RTR indicates contain a PCB article.
- If a container does not contain a PCB article per AK, then RTR normal liquid guidelines apply.

Potential PCB Scenarios:

Scenario 3: PCB Bulk Product With PCB Articles

This waste stream as a whole is PCB Bulk Product and may contain PCB articles in some containers.

- If the container does not contain a PCB article, normal liquid guidelines apply.
- If the container has a PCB article, **NO** Liquid is allowed.

Example: Small Capacitors

Example: External Motor Capacitors

Example: Internal Motor Capacitor

Example: Light Fixture Ballasts

APPENDIX D

CURSOR USAGE DURING CERTIFIED RTR SCANS

- Developed to address observations and recommendations by NMED
- Gives Guidance on the Usage of the Computer's Cursor using CCP-TP-053 and CCP-TP-508

Background

- During several audits at multiple sites, NMED observed the use of the computer cursor being used in a way they feel jeopardized the independence, required by Sections C1 and C3 of WIPP's HWFP, of Independent Observations (IOs).
- During the scans observed, the operator used the cursor to point out items in the waste container.

Certificate of Completion

_____

(Printed Name)

Has Completed:

CCP-RTR-101

Real-Time Radiography (RTR)
TRU Waste Characterization Briefing

for Contact-Handled (CH) & Remote-Handled (RH) Waste

I have read and understand the information presented in this module.

_____

Trainee Signature Date