Energy Facility Contractors Operating Group (EFCOG) Review of Trailer Contamination and Supersack Integrity

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Spring 2012 Waste Generator Workshop
April 25, 2012

EFCOG Packaging & Transportation (P&T) Subgroup Purpose

- Established by EFCOG on November 2, 2011
  - Leverage P&T expertise and experience of contractor community to DOE
  - Seek out and promote best management and operating practices
  - Focus on complex-wide integration and experience transfer
  - Develop recommendations to DOE/EM

P&T Formation of Teams

- DOE vs. DOT Surface Contamination Limits
  - Develop consistent application of appropriate regulation for release of packages and commercial carrier equipment used for non-DOE or DOE contractor transportation of radioactive material at DOE Complex sites
- Trailer Contamination and Supersack Integrity
  - Review Nevada National Security Site (NNSS) acceptance and release requirements
  - Evaluate past/current non-conformances
  - Develop and implement corrective actions
  - Identify and resolve potential supersack integrity issue
  - Develop recommendations for EM/HQ

Trailer Contamination and Supersack Integrity Team Members

- Syd Gordon, NSTec (**Team Lead)**
- Travis Myers, CWI/Idaho
- Andy Baumer, LANS/Los Alamos
- Ashok Kapoor, EM-33
- Robert Black, BEA/Idaho
- Dan Shrum, ES-Clive
- Jack Reust, ES-OR
- Don Wadsworth, New World Envr.
- Mike Waters, Cavanagh/Hanford
- Jim Portsmouth, CHPRC/Hanford
- Danny Nichols, Fluor-B&W/Portsmouth
- John McCoy, Fluor-B&W/Portsmouth
- Gregg Geisinger, NSTec
- Bob Stueckrath, NSTec

NNSS Acceptance and Release Requirements

- Shipments must also meet applicable DOT requirements (weight, packaging, routing, contamination)
- Wastes must be refused if non-compliant
- NNSS RadCon Manual imposes10 CFR 835 Appendix D levels
- NNSS Waste Acceptance Criteria (NNSSWAC), DOE/NV--325 Rev. 9
  - Driven by DOE Order 435.1
  - Must be met by all waste generators
  - Generators must be approved to certify wastes
  - Waste profiles approved for specific streams
  - Include packaging and transportation specifications

NNSSWAC Packaging and Transportation Specifications

- Shipment scheduling (monthly HAZTRAK projections)
- Advance notifications (accountable, classified, asbestos, PCBs [1st shipment ONLY], casks, internal contamination)
- Preferred routing
- Oversize, over-weight, highway route-controlled quantities
- Criticality safety
- Special handling (activity dose level)
- Container specifications (weight, load-bearing)
- External contamination (10 CFR 835, App. D)

DOE vs. DOT

- For DOE, 10 CFR 835 is “THE LAW”
  - Appendix D to Part 835 – Surface Contamination Values
- For DOT, 49 CFR 173-178 is “THE LAW”
  - 49 CFR 173.443 – Contamination Control (the shipper)
  - 49 CFR 174.715 – Cleanliness of transport vehicles after use (for rail)
  - 49 CFR 177.843 – Contamination of vehicles (the carrier)

DOT Requirements (49 CFR 173.443) for Contamination Control

TABLE 9 NON-FIXED EXTERNAL RADIOACTIVE CONTAMINATION LIMITS FOR PACKAGES			
Contaminant	Maximum permissible limits		
	Bq/cm^2	uCi/cm^2	dpm/cm^2
1. Beta and gamma emitters and low toxicity alpha emitters	4	10^{-4}	220
2. All other alpha emitting radionuclides	0.4	10^{-5}	22

10 CFR 835 Appendix D Limitations

- Must meet <u>both</u> incoming and outgoing transport
- Exclusion only if not transported by DOE or contractor

Surface Contamination Values (in dpm/100 cm²)

Radionuclide	Removable [2, 4]	Total (Fixed + Removable) [2, 3]
U-nat, U-235, U-238, and associated decay products	[7] 1,000	[7] 5,000
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	20	500
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	200	1,000
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above [5]	1,000	5,000
Tritium and STCs [6]	10,000	See Footnote 6

1. Deposited on but not incorporated into item
2. Rate determined by correcting appropriate detector
3. May be averaged over 1.0 m² if max < 3x average
4. Based on representative area swipes
5. Includes MFP plus Sr-90, if included
6. "Total" value does not apply, except for metals or bulk materials
7. Apply only to alpha emitters in decay series

DOE vs. DOT Non-Fixed Surface Limits

- DOE 10 CFR 835 is more conservative than the DOT 49 CFR
  - Approximately 100 times for alpha
  - Approximately 22 times for beta-gamma
- Both DOT and DOE limits designed to minimize impacts to public or worker health and safety

FY 2009 – 2011 Waste and Trailer Contamination Issues

- NNSS Radioactive Waste Management Site
  - 21 contaminated trailers
  - 9 contaminated packages
- Clive disposal facility
  - 18 DOE rad and container issues (supersacks, intermodals, drums, etc.)

NNSS Contamination Incidents
PermaFix NW – October 2008

- Receipt inspection on three shipments
- Various packages failed 10 CFR 835, Appendix D limits
- No contamination on tractors or trailers
- Packages contaminated with weapons grade plutonium
- MLLW debris grouted in boxes
- Shipments returned to PermaFix NW (nine boxes)
- Cause identified as no access to underside of boxes on forklift
- Generator revised site procedures for wrapping, access to bottom surfaces

NNSS Contamination Incidents
LATA – Parallax Portsmouth – December 2010

- Total of 47 trailers shipped; two trailers failed NNSS release survey
- Contamination isolated to small area in center of trailer flooring
- Generator personnel verified contamination at NNSS
- Trailers returned to Portsmouth as rad empty
- Root cause identified as legacy contamination on box exterior transferred to trailer floor
- Generator corrected problem through:
  - Implementation of engineered racking system to permit enhanced visual and rad survey of container bottoms
  - Oversight of pre-shipment vehicle surveys
  - Re-survey of loaded and empty trailers staged at Portsmouth
  - Requiring large area swipe surveys on accessible areas of containers

NNSS Contamination Incidents

BEA-Idaho National Laboratory – August 2011

- One shipment with contamination in middle of wooden trailer bed (cargo container plus 10 boxes)
  - Contamination within DOT limits but not DOE free-release limits
- Required extensive decontamination (wood removal/metal cleaning)
- Causal factors included spot surveys (less than 100%), inadequate survey guidance
  - Other factors: no incoming rad survey at generator site; pre-load survey not 100%; no contamination on containers or handling equipment during off-loading at NNSS
- Corrective actions included
  - Detailed survey requirements issued
  - Applicable procedures revised (RadCon, Waste Generators Svcs.)

NNSS Contamination Incidents

Fluor-B&W Portsmouth – March 2011 (end of LPP transition)

- 35 shipments involving wooden boxes from Uranium Management Center (UMC)
- Two trailers failed NNSS release survey – returned to Portsmouth
- Contamination limited to 2 ft. x 2 ft. patch on each trailer floor (box footprint)
- One additional trailer (still at Portsmouth) found to be contaminated
- Root causes proposed: vibration loss; legacy contamination; legacy particle contamination not detectable
- No single root cause ruled out

NNSS Contamination Incidents

Fluor-B&W Portsmouth – March 2011 (end of LPP transition) (continued)

- Independent Certified Health Physicist (CHP) conducted assessment of site RadCon process
- Corrective actions
  - Onsite survey revised to include 10% independent verification
  - Implemented tacky roller on floors, outer surfaces to perform large area swipes
  - Arranged for use of “new” trailers on remaining shipments
  - Wrapped boxes with clear stretch wrap
- Lessons learned: trailer history and trending; independent survey oversight; and 100% survey with large area floor monitor

NNSS Contamination Incidents

Los Alamos Nuclear Services – September 2011

- ARRA shipment campaign – debris in supersacks
- Over 200 bags received without incident
- 13 trailers failed free-release survey
  - No contamination on bags off-loaded
  - Generator self-suspended to evaluate cause after 2nd contaminated trailer
- Decontamination performed at NNSS – some required multiple effort
- Generator visited NNSS to observe trailers

NNSS Contamination Incidents

Los Alamos Nuclear Services – September 2011

(continued)

- Causal factors
  - Improper storage of filled bags on pallets outdoors led to contamination migration
  - Inconsistent closure of weather protection flap (also observed by NNSS)
  - Procedural inconsistencies on flatbed trailers surveys
  - Un-surveyed area in middle of trailer bed
  - Incoming receipt surveys not performed at loading area

NNSS Contamination Incidents

Los Alamos Nuclear Services – September 2011

(continued)

- Corrective actions implemented
  - All waste packages to be stored in secure area with weather protection
  - Detailed rad survey of packages prior to loading
  - 100% survey on all transport vehicle load surfaces
  - Documented training to new procedures

Ongoing Activities

- EFCOG P&T team review of incidents and correction actions
- Collect background on soft-sided packaging performance
- Identify complex-wide implications
- Provide system-wide recommendations to EM/HQ
- Technical support for implementation