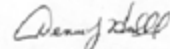


Logic for Use of Radiological Protection Technician as Posting and Barricade for Contamination Areas

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UNCLASSIFIED
DOES NOT CONTAIN UNCLASSIFIED
CONTROLLED NUCLEAR INFORMATION

ADC/RO		Health Physics Services
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(Name/Organization)

DATE: October 13, 2011

Purpose & Objective

- Present operational challenges associated with “mining” of TRU containers
- Present radiological control support challenges for these operations
- Present approach(es) with respect to:
 - Protection of the Worker, Environment, & Public
 - Support practical and efficient Operations
 - Provide Technically Defensible Measurements & Controls
 - Provide Regulatory Compliant Support
 - Practice ALARA which includes Good Stewardship of Resources
 - Impact of Reportable Occurrences (ORPS Reportable)

Operational Challenges of Mining Containers

- Show Magnitude of Challenge
 - Drums
 - Standard Waste Boxes
 - Large Standard Boxes
- Show Logistic Challenges of Assembling a prescribed manifest
- Correlate Operational Activities with Radiological Conditions and Efficient Support by RPD

Aerial View of "E-Area" (Solid Waste Management)



TRU Pad 16



TRU Pad 5

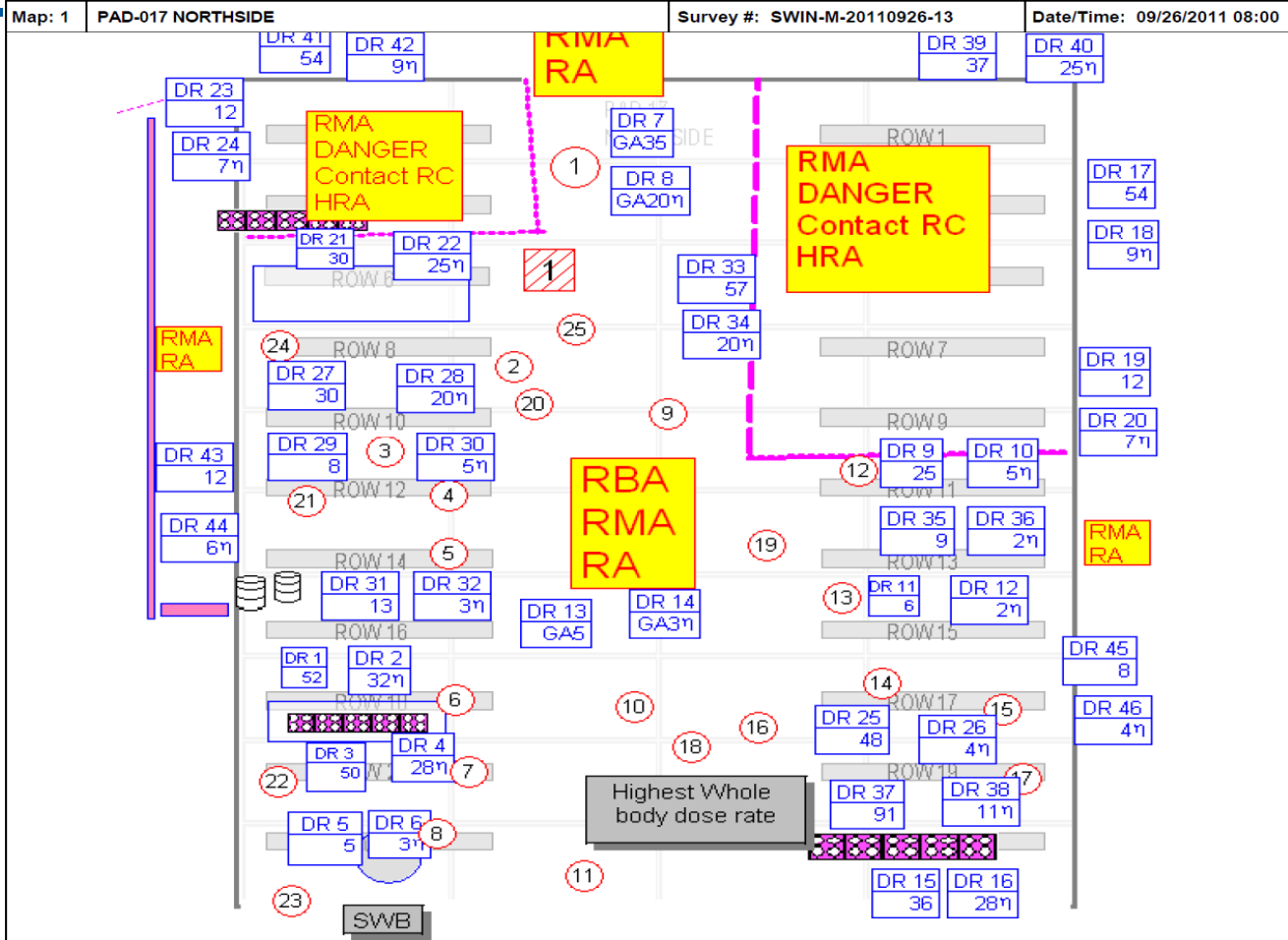


Four TRU Drums (>5mrem/hr on contact)



Radiological Survey Map of a Pad 17

VSDS Standard Map RLS



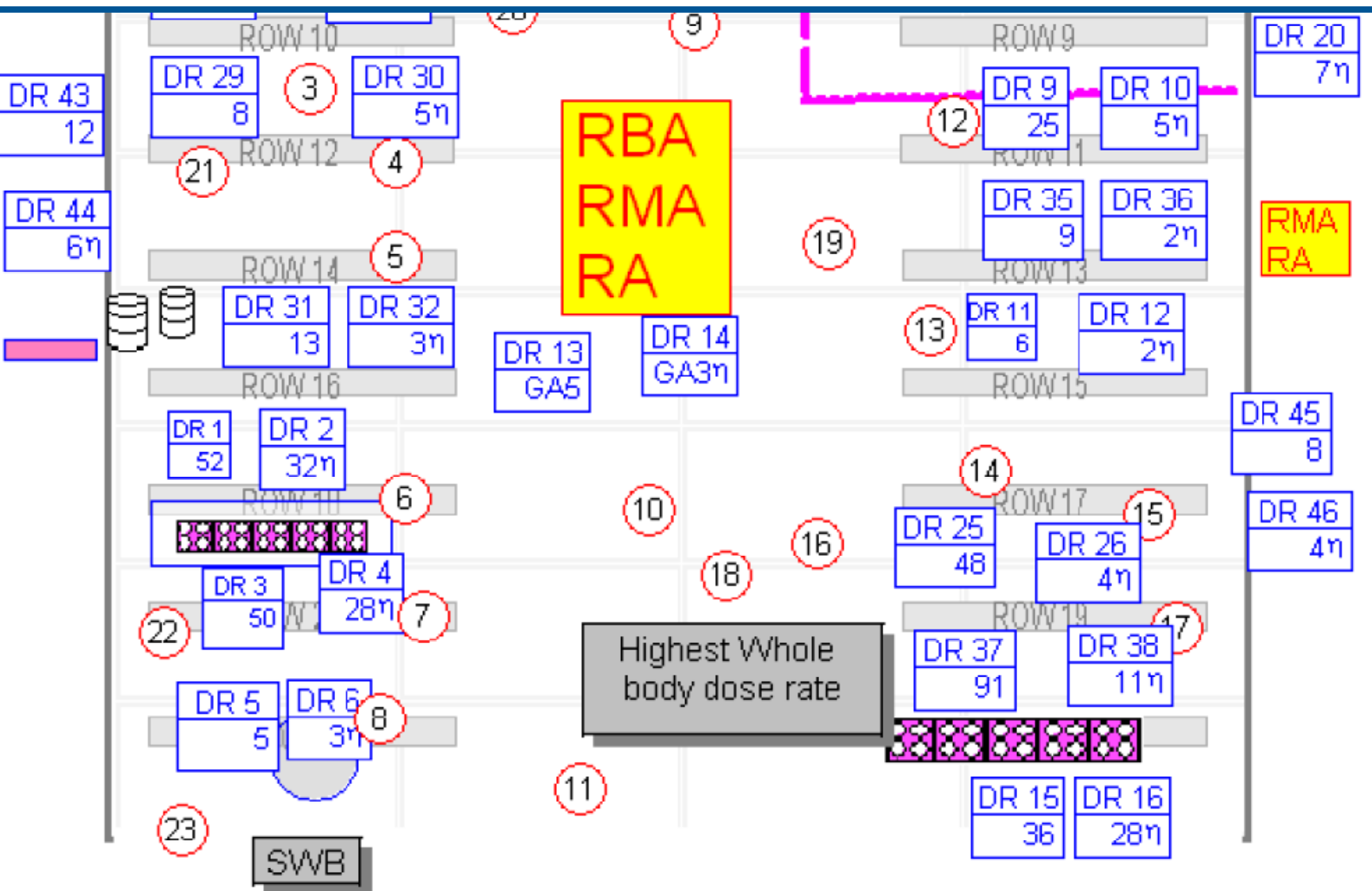
Comments:

Type: Monthly

Symbol Legend (for example only) RWP #: 11-SWM- 001 & 002

Summary of Highest Readings (All available values may not be listed)	
Smears	Air Samples & Wipes
25) <20 DPM/100 cm ² α	Wipe 1) ND DPM/Wipe α
25) <200 DPM/100 cm ² β/γ	Wipe 1) ND DPM/Wipe β/γ

Radiological Survey Map of a Pad 17 (Detailed)

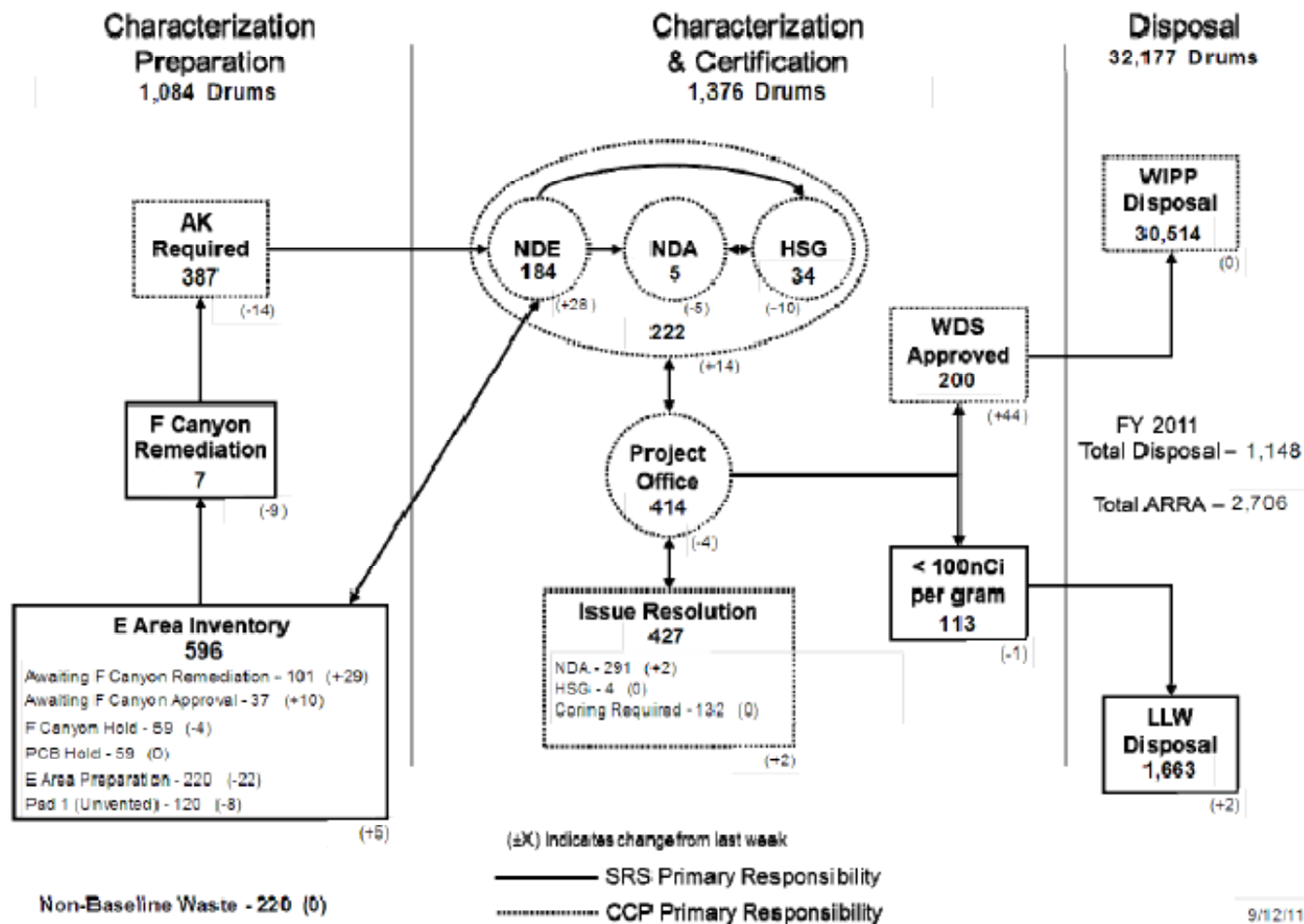


Highest Dose Rate Container on Pad Today



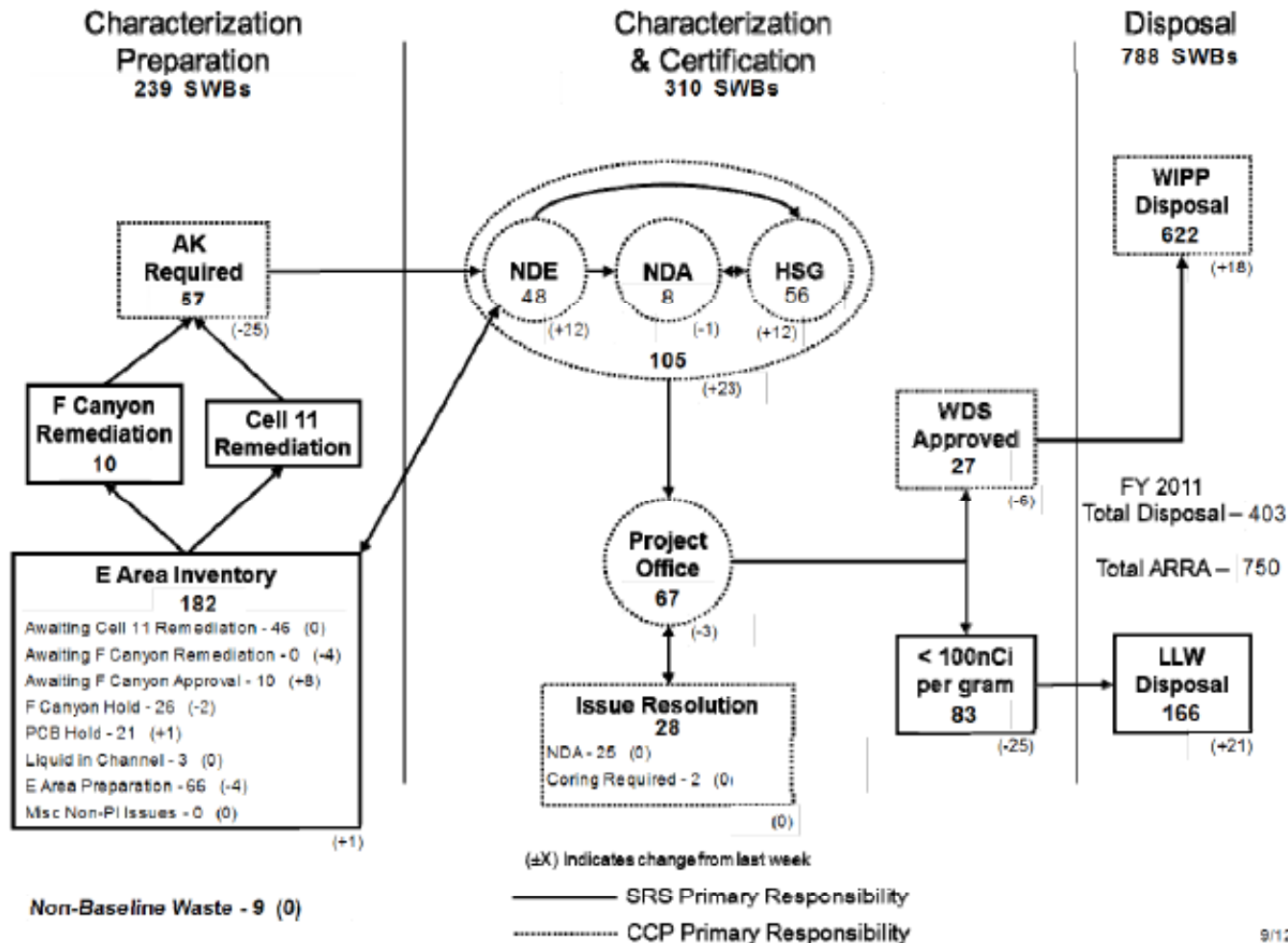
Status sheet for Drums

SRS TRU CH Drummed Waste Program



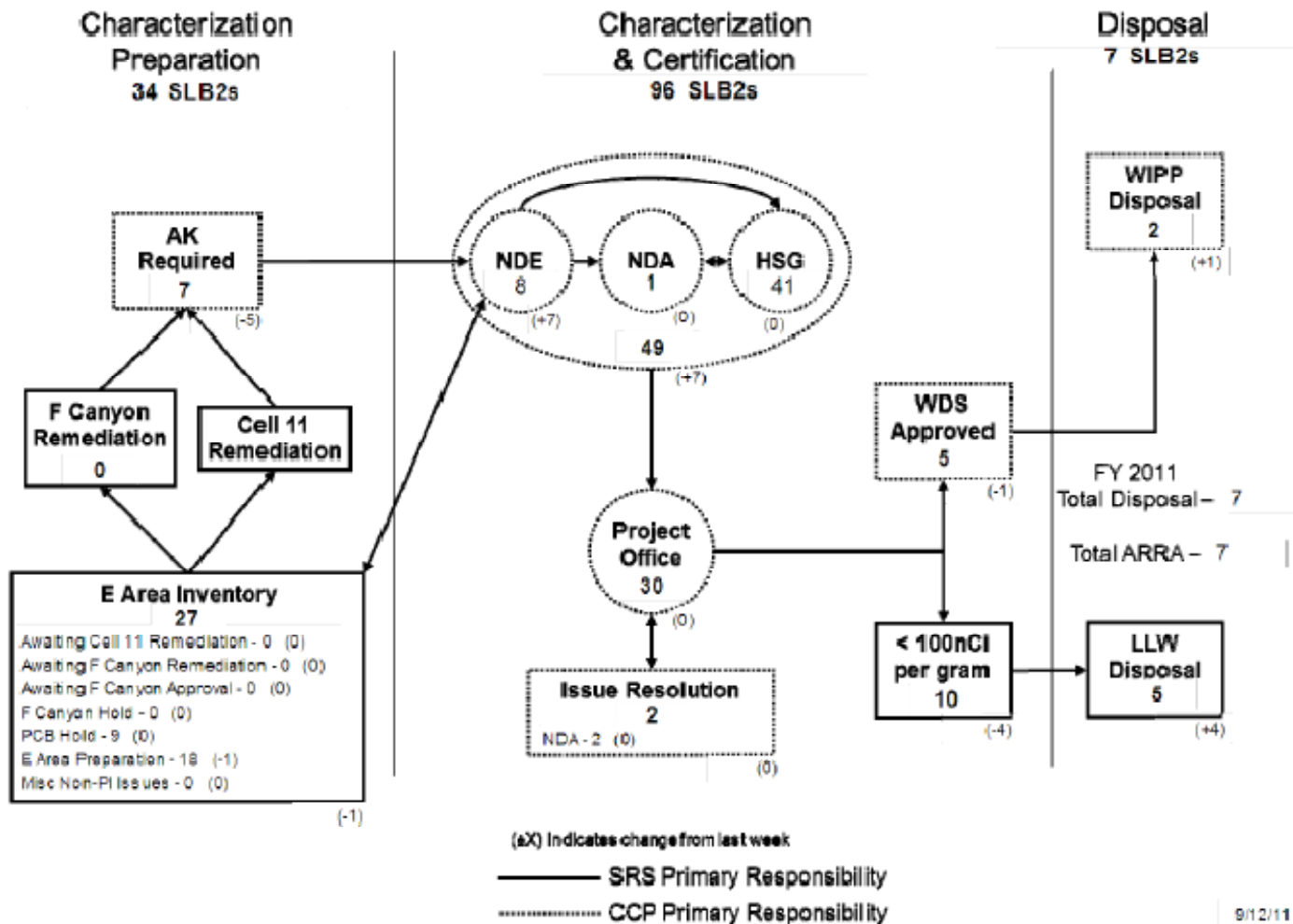
Status sheet for SWBs

SRS TRU SWB Waste Program



Status sheet for SLBs

SRS TRU SLB2 Waste Program



Radiological Protection of the Worker

- Hazard(s)
 - Primarily Radiation Dose Rates (β - γ and neutron)
 - α , β , & γ Contamination Levels maintained below “Contamination Area” criteria
- Controls
 - Eliminate the source? – No
 - Use Engineered Controls? – Yes
 - Container
 - Ventilation
 - Administrative Controls – Yes
 - Personal Protective Equipment – No
(Not for Radiological Purposes)

Administrative Radiological Controls Implementation

- Routine Habitability Surveys (Daily)
- Radiation Work Permits with Suspension Guides @ 10 CFR 835, Appendix D values
- Monthly Dosimetry Exchange
- Continuous RP Coverage during operations
 - Monitoring Dose Rates
 - Confirming the Absence of Contamination
- Area Posted and Controlled as Radiological Buffer Area – for Exposure not Contamination

Support Practical and Efficient Operations

- Potential for multiple container movements to configure WIPP Shipment per manifest
- Need to minimize interruptions in flow while continually monitoring and confirming radiological conditions
- Need to minimize access and egress restrictions based on radiological conditions
- Provide Radiological Protection that is
 - Technically Sound and Operationally Practicable
 - Compliant with Regulations and Defensible

Provide Technically Defensible Measurements & Controls

- Survey Instruments
 - Calibrated and Maintained in accord with ANSI N323.A
 - Technical Basis for Contamination Survey Technique
 - Technical Smear (100 cm²) with Detection Sensitivity of 20 dpm
 - Large Area Wipe (1,000 cm²) with Detection Sensitivity of 200 dpm [DOE-STD-1128-2008]

DOE-STD-1128-2008 "Plutonium Good Practices Handbook"

DOE-STD-1128-2008

–For transuranic radionuclides, the guideline values for removable contamination are lower than the MDA of portable instruments. During a wipe survey, the surface area of the material must be large enough that the quantity of radioactivity collected on the swipe will be greater than the MDA of the instrument.

–The minimum area for using a large-area wipe survey is given by:

$$A_{\text{(minimum)}} = \frac{\text{MDA}}{L} \times 100\text{cm}^2$$

Where L = Removable surface contamination limit (20 dpm/100 cm²) and MDA is in dpm

For alpha survey instrument MDA of 200 dpm, this corresponds to a large area swipe area of 1000 cm².

Provide Regulatory Compliant Support?

- Use of RP Inspector (technician) as posting and barricade allowed by DOE regulatory requirements
- SRS implementing procedures allow the use of RPI as posting and barricade
- Radiological Surveys used to confirm absence of contamination
- With the area posted and/or controlled, ORPS criteria 6B(2) through 6B(5) would not apply in the event that contamination is detected
- The contamination surveys conducted to downpost or rollback the area, take into account ALARA concerns as well as potential for contamination to be present

Regulatory Technical Compliance Concern

APPENDIX D TO PART 835—SURFACE CONTAMINATION VALUES

The data presented in appendix D are to be used in identifying the need for posting of

contamination and high contamination areas in accordance with §835.603(e) and (f) and identifying the need for surface contamination monitoring and control in accordance with §§835.1101 and 835.1102.

SURFACE CONTAMINATION VALUES ¹ 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 tritiated compounds ⁶	10,000	N/A

¹ The values in this appendix, with the exception noted in footnote 5, apply to radioactive contamination deposited on, but not incorporated into the interior or matrix of, the contaminated item. Where surface contamination by both alpha-and beta-gamma-emitting nuclides exists, the limits established for alpha-and beta-gamma-emitting nuclides apply independently.

² As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

³ The levels may be averaged over one square meter provided the maximum surface activity in any area of 100 cm² is less than three times the value specified. For purposes of averaging, any square meter of surface shall be considered to be above the surface contamination value if: (1) From measurements of a representative number of sections it is determined that the average contamination level exceeds the applicable value; or (2) it is determined that the sum of the activity of all isolated spots or particles in any 100 cm² area exceeds three times the applicable value.

⁴ The amount of removable radioactive material per 100 cm² of surface area should be determined by swiping the area with dry filter or soft absorbent paper, applying moderate pressure, and then assessing the amount of radioactive material on the swipe with an appropriate instrument of known efficiency. (Note—The use of dry material may not be appropriate for tritium.) When removable contamination on objects of surface area less than 100 cm² is determined, the activity per unit area shall be based on the actual area and the entire surface shall be wiped. It is not necessary to use swiping techniques to measure removable contamination levels if direct scan surveys indicate that the total residual surface contamination levels are within the limits for removable contamination.

⁵ This category of radionuclides includes mixed fission products, including the Sr-90 which is present in them. It does not apply to Sr-90 which has been separated from the other fission products or mixtures where the Sr-90 has been enriched.

⁶ Tritium contamination may diffuse into the volume or matrix of materials. Evaluation of surface contamination shall consider the extent to which such contamination may migrate to the surface in order to ensure the surface contamination value provided in this appendix is not exceeded. Once this contamination migrates to the surface, it may be removable, not fixed; therefore, a "Total" value does not apply.

⁷ (alpha)

10 CFR 835, Appendix D, Footnote 4

- 4 The amount of removable radioactive material per 100 cm² of surface area should be determined by swiping the area with dry filter or soft absorbent paper, applying moderate pressure, and then assessing the amount of radioactive material on the swipe with an appropriate instrument of known efficiency. (Note - The use of dry material may not be appropriate for tritium.) When removable contamination on objects of surface area less than 100 cm² is determined, the activity per unit area shall be based on the actual area and the entire surface shall be wiped. It is not necessary to use swiping techniques to measure removable contamination levels if direct scan surveys indicate that the total residual surface contamination levels are within the limits for removable contamination

Question regarding Large Area Wipe versus Technical Smear

- DOE-STD-1128-2008, "*GUIDE OF GOOD PRACTICES FOR OCCUPATIONAL RADIOLOGICAL PROTECTION IN PLUTONIUM FACILITIES*" discusses two types of surveys used for removable contamination:
 - a large-area wipe survey, and,
 - a technical swipe or smear survey

Large - Area Wipe as used in TRU Drum Mining

- Detector:
 - Eberline Model AC-3 alpha scintillation probe; 59 cm² of active area; window aluminized Mylar, 1.5 mg/cm².
- Minimum Detectible Activity (MDA)
 - 200 dpm
- *Pu Good Practices*' description of Use:
 - "A large-area wipe survey is used to detect gross removable contamination."
 - "The survey is performed by wiping the surface of the area being surveyed and conducting frequent checks of the cloth using a portable instrument."
 - "If radioactivity above background is measured, the material is contaminated."

Technical Swipe or Smear

- Detector:
 - THERMO ELECTRON HANDECOUNT SYSTEM; 2-inch diameter dual phosphor scintillator coupled to a sliding drawer mechanism accommodating a 2-inch diameter (50.8 mm) sample.
 - Minimum Detectible Activity (MDA) >20 dpm
- *Pu Good Practices*' description of Use:
 - "The purpose of a technical smear survey is to locate and quantify removable contamination that is known or suspected to exist."
 - "A technical smear or swipe survey is performed by wiping a cloth, paper, plastic foam, or fiberglass disk over a 100-cm² area of the surface."
 - "To improve the detection limit, smears maybe taken over areas larger than 100 cm²."

Discussion

- 10 CFR 835, states:

“The amount of removable radioactive material per 100 cm² of surface area should be determined by swiping the area”
- DOE-STD-1128-2008, lists:
 - Large Area Wipe as acceptable with Instrument MDA matching area to achieve dpm/100 cm²
 - Technical Smear as acceptable with Instrument MDA matching area to achieve dpm/100 cm²

Discussion (Continued)

- Integration of Large Area Smear and using Radiological Protection Technician as barricade and posting until absence of contamination is confirmed has benefits of:
 1. Minimizing contamination monitoring time during operations (Lowers dose to workers)
 2. Provides a “Good Practice” method that is technically defensible to monitor for 20 dpm/100cm²
 3. Reduces Non-ORPS and ORPS reportable events reducing costs and resources to address events
 4. Radiation Work Permit has Appendix D values as Suspension Guides which would prompt “time out” and response

Discussion (Continued)

- Appendix D, Footnote 4 “Should” interpreted as “Shall be 100 cm²” with no allowance for > 100 cm² prohibits use of large area swipes to confirm absence of contamination for deposing of areas
- Minimization of Time and consequently dose requires continuation of technique without benefit of “Posting and Deposting”
- Not implementing “Posting” administrative controls elevates potential for reportable event
- Reportable event(s) require formal fact finding, corrective actions, significant level of effort and resources to address
- Costs of response may not be directly related to benefit of risk reduction or operational improvement
- Is this really ALARA?

Questions

