Moisture Distribution in Hanford's SX Tank Farm

D.A. Myers
CH2MILL Hanford Group, Inc.

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Assistant Secretary for Environmental Management

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A-8001-401 (02/98)
Moisture Distribution in Hanford’s SX Tank Farm

David A. Myers, IT Corp.
Glendon W. Gee, PNNL
Purpose of Study

- Large inventory of contaminants in vadose zone
- Infiltration is only ongoing means of transporting contaminants to depth
- Sediment moisture content controls rate of movement
- Attempt to differentiate precipitation from water-line leaks as sources
Approach

- Use existing tank-farm infrastructure
- Use simple, readily deployable method
  - No truck based system
  - Well established methodology
- Minimize work force numbers
- Record at 1-ft intervals
Interpreted $^{137}$Cs Distribution

Figure E-10. SX Tank Farm Visualization
South Portion of 241-SX Farm
Tool Calibration

- Six Hanford-Specific Moisture Models
  - 6- and 8-inch casings
  - 5, 12, and 20 Volume Percent Equivalent
- Centered and Eccentric Measurements
- Ten, 64-second counts taken per suite
- Certification by 3-Rivers Scientific
Moisture Distribution at 6 ft
Moisture Distribution at 18 ft
Moisture Cross Section A

Cross-Section A Looking North through Tanks SX-115, SX-114, and SX-113

Volumetric Water Content (%)

Gamma Interference

16
12
8
4

Easting (m)

566760 566780 566800 566820 566840

Elevation (ft)

660 620 580 540

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Moisture Cross Section B

Cross-Section B Looking North through Tanks SX-112, SX-111, and SX-110

Volumetric Water Content (%)

Gamma Interference

16
12
8
4

Easting (m)

566760 566780 566800 566820 566840

Elevation (ft)

540 580 620 660

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Moisture Cross Section C

Cross-Section C Looking North through Tanks SX-109, SX-108, and SX-107

Elevation (m)
Preliminary Thoughts

- Water-line leaks can be identified
- Moisture content of backfill is relatively constant
- Highly contaminated zones have indeterminate moisture content
- Perturbations in backfill readily identified
- Geologic system controls moisture distribution
- Laboratory data confirm field measurements
Next Steps

- Complete SX Farm measurements to trace existing water-line status
- Measure distribution in horizontal orientation
  - Use laterals in southern SX Farm
- Collect additional measurements in other Waste Management Areas
- Determine how to adjust for gamma interference
  - Electronic adjustment
  - Detector type
- Determine if long-term monitoring is justified