





Richland Operations Office **Plutonium/Uranium Extraction Facility (PUREX) Tunnels** Dr. John Marra, DOE-EM Tom Fletcher, DOE-RL

PUREX Facility

- Operated From 1956-1972 and 1983-1988
- Processed vast majority of plutonium for US
- Reclaimed uranium for fuel rod production





PUREX Tunnels







PUREX Tunnel 1 Construction History

- Constructed 1954-1956 and filled between 1960-1965
- 358 feet long, 22 feet high x 19 feet wide
- 90-pound roofing material and tar were laid over the timbers
- Approximately 8 feet of overburden was placed on top







PUREX Tunnel 2 Construction History

- Constructed 1964-1966
- Different construction than Tunnel 1
- 1,688 feet long, steel and concrete















Options Evaluated

- 1. No Action
- 2. High Density Polyethylene Cover
- 3. Soft-Surface Tent Cover
- 4. Hard-Surface Tent Cover
- 5. Pre-Engineered Building
- 6. Injection of Poly-Foam Fill
- 7. Controlled Collapse
- 8. Sand or Clay Fill
- 9. Engineered Grout Fill
- **10. Waste Retrieval**
- 11. Enhanced Surveillance & Monitoring























Input from Public Workshop

Concerns

 Risk, timeliness, future remediation/closure, costs, characterization

Options

Fill with Sand/Soil

- Angle of repose challenges void fill
- Pneumatic conveyance introduces dispersion risk
- Provides limited/no water intrusion protection
- Evaluation Criteria
 - Request for quantification, especially cost





Tunnel 1 Mock-Ups and Preparations













PUREX Tunnel 1 Grouting Complete

- In October 2017, grout placement began at PUREX Tunnel 1
- Workers completed the stabilizing in November
- Approximately 521 truckloads of grout were placed in the tunnel.









PUREX Tunnel 2 Analysis Results

Element*	Max DCR
A: Arched Rib-beam/splice	1.09
B: Concrete Arch Girders	0.59
C: Steel Wale Beams	1.12
D: Wale Beam Anchors	1.04
E: Concrete Footing	1.09
F: Foundation Soil Load	1.03

Loads on multiple structural members exceed building code design capacities; Tunnel 2 has a 'potential high' risk of collapse



PUREX Tunnel 2 Evaluation

- Inputs:
 - Construction drawings, photos & other files used
 - Structural integrity evaluation results
 - Public meeting
- Methodology:
 - Review of 'safe storage' experience
 - Defined key criteria for qualitative options analysis
- Other Considerations:
 - Tunnel 1 stabilization decision unchanged
 - Focused on Tunnel 2
 - Each option, even no action, has risk



PUREX Tunnel 2 – Recommendations

- Structural analysis of PUREX Tunnel 2 indicates that stabilization action is warranted
- Stabilization with grout viewed as preferred option
 - Favored in both 'raw' score and 'weighted evaluation'
- Grout offers multiple advantages
 - Flowable, cost-effective & widely used
 - Allows either in-situ disposal or material removal depending on Record of Decision
- Expert Panel action
 - Tunnel 1 experience directly applicable to Tunnel 2 Expert Panel can review Tunnel 1 process and provide recommendations for Tunnel 2



PUREX Tunnel 2 Expert Panel

- Expert Panel charged to:
 - Evaluate the current state of Tunnel 2
 - Provide guidance and decisionmaking criteria for near-term stabilization of Tunnel 2 hazards.

Panel Members		
John Marra, Chair	ef Engineer, DOE Office of Environmental Management DE-EM)	
Tom Fletcher	eputy Manager, DOE Richland Operations Office (DOE-RL)	
David Kosson	ornelius Vanderbilt Professor of Engineering, Civil & nvironmental Engineering, Vanderbilt University	
Craig Benson	Dean, School of Engineering, Hamilton Endowed Chair in Civil & Environmental Engineering, Jniversity of Virginia	
Kathy Higley	Professor and Head, School of Nuclear Science and Engineering, Dregon State University	
Christine Lee	e President, ESHQ, CH2MHill-BWXT West Valley	
Kurt Kehler	Vice President, Decommissioning & Waste Management, Canadian Nuclear Laboratories	
John Ballantyne	Ballantyne Chief Engineer, Nuclear Structures, CH2M-UK	
Observers		
Mark Hasty	Chief Engineer, CH-Plateau Remediation Company (CH-PRC)	



Class 3 Permit Modification

- DOE-RL is holding a 60-day public comment period starting approximately in February 2018.
- Modification addresses the stabilization of PUREX Tunnels 1 and 2 to reduce the potential for future structural impacts until final closure decisions are made and implemented



