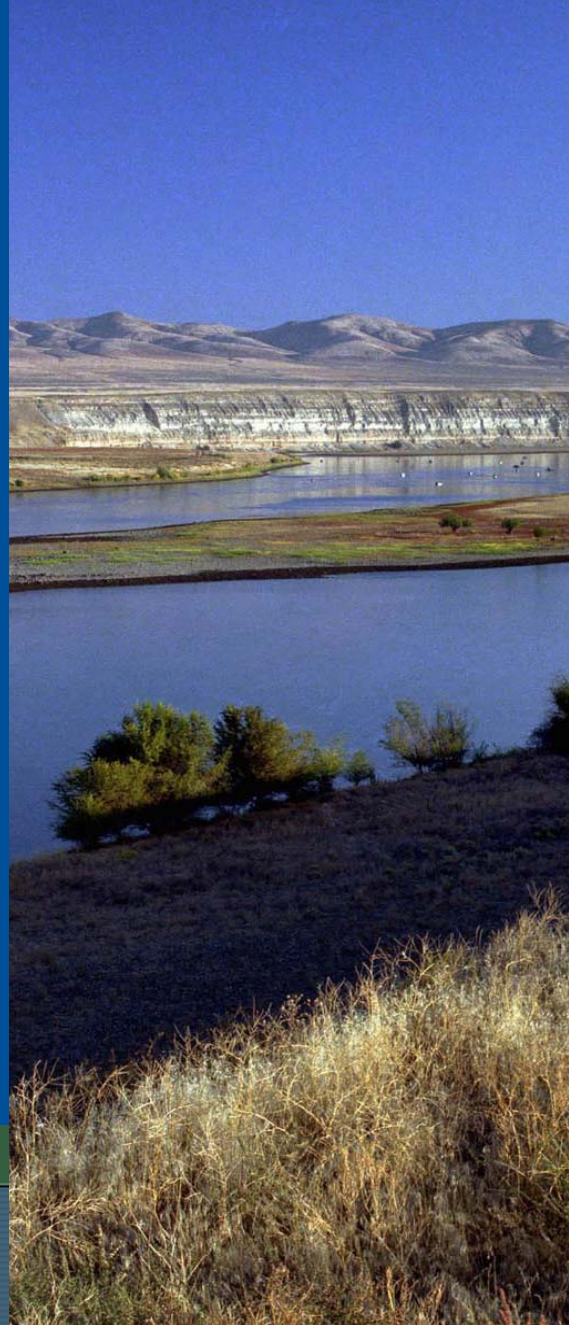
Hanford Waste Treatment and Immobilization Plant Project

National Spent Nuclear Fuel Program

Idaho Falls, Idaho

24 March 2010



Office Of Environmental Management

safety ❖ performance ❖ cleanup ❖ closure

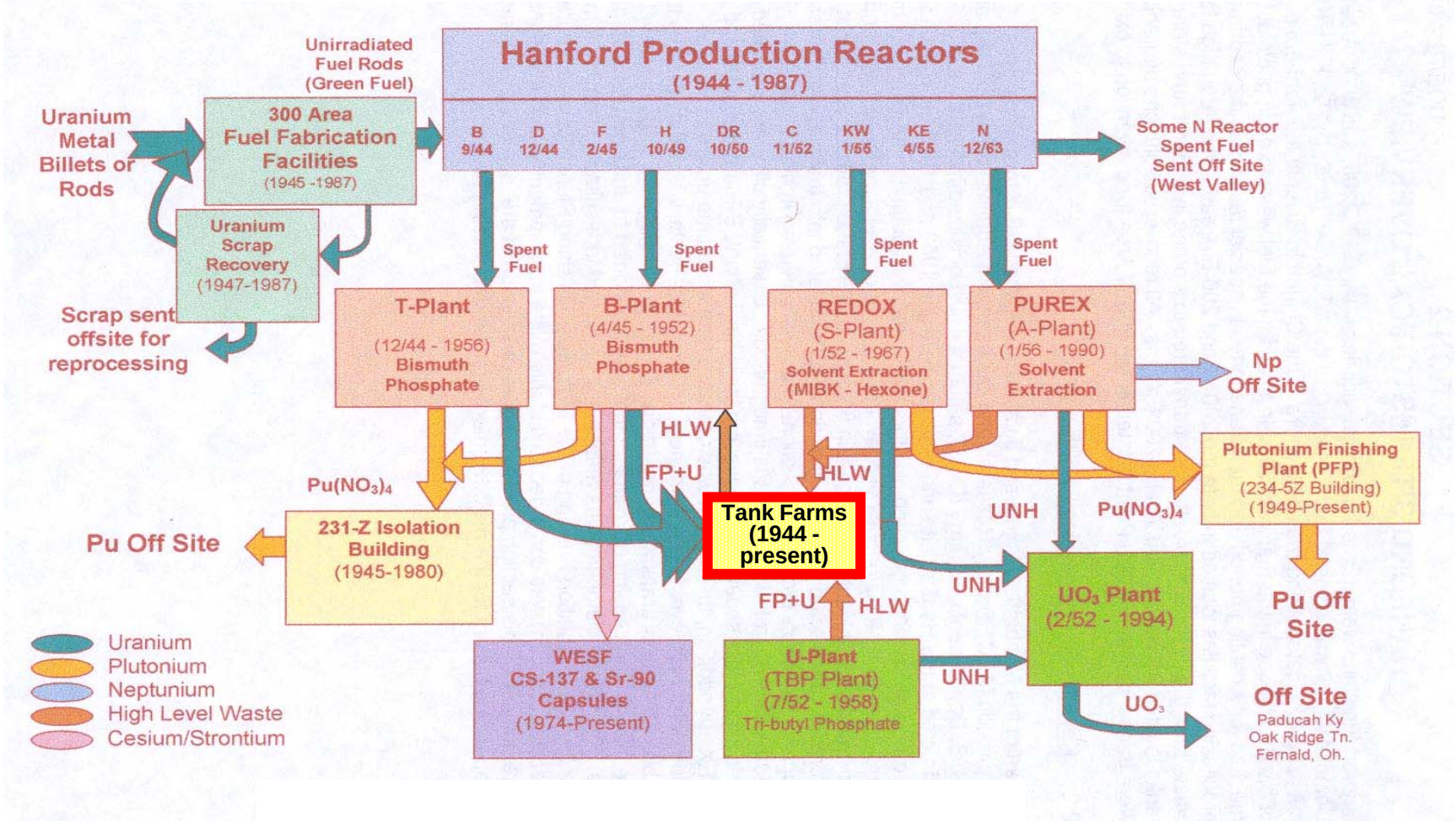
Office of River Protection

Albert A. Kruger

Outline

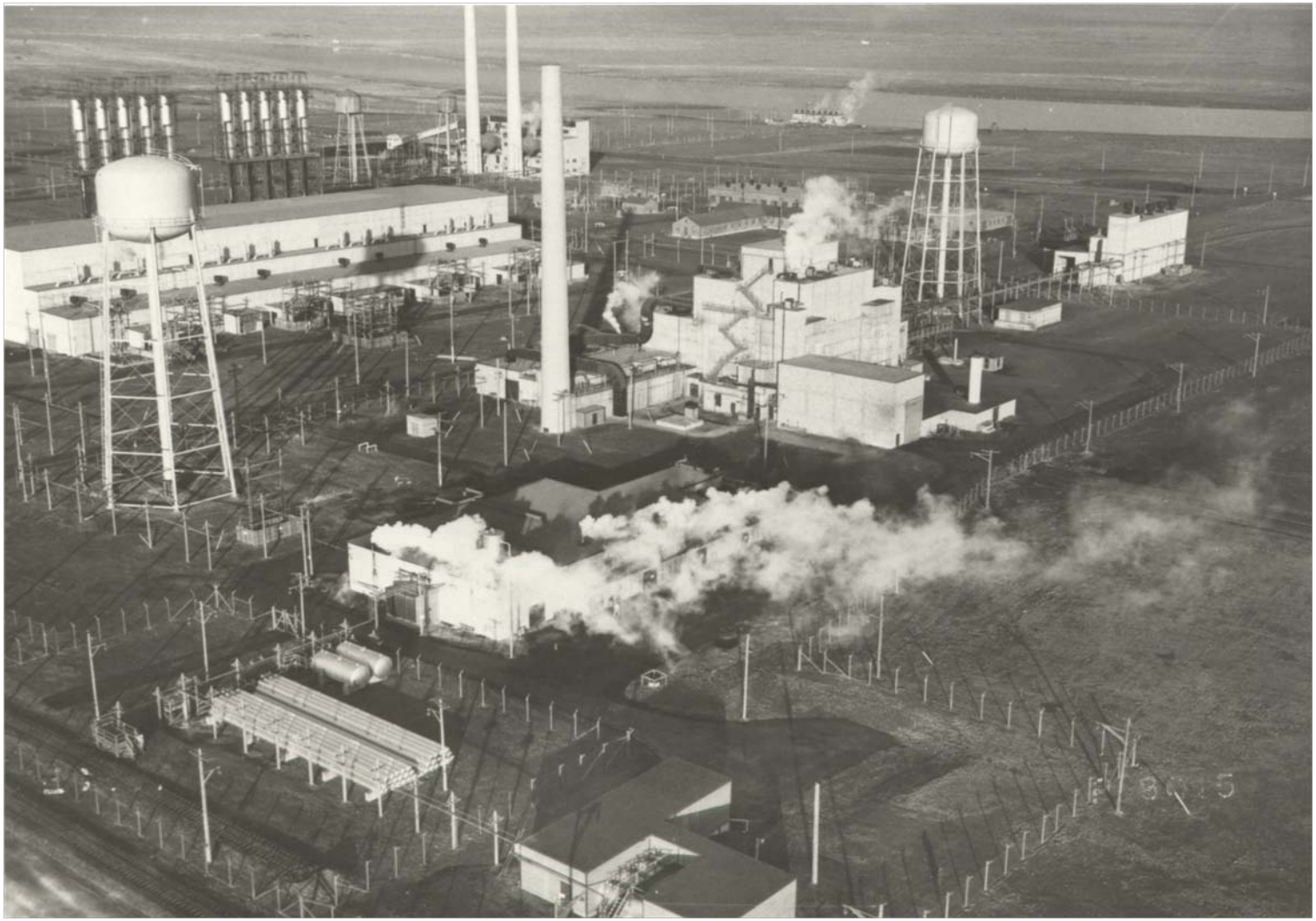
- Background
  - Waste Generation at Hanford
  - Waste Treatment and Immobilization Plant (WTP) Project
- Update
  - Compliance Based Audit (10-DOE-AU-001)of the BNI HLW QA Program
  - WTP IHLW WQR EM/RW-HQ Review
- Next Steps: It's Why I'm Here; to Hear from You

Generation of Hanford Tank Wastes

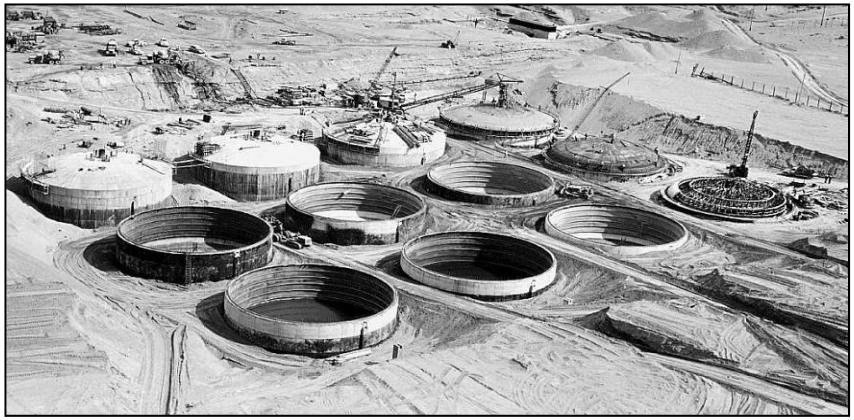


9 Reactors; 4 Fuel Reprocessing Flowsheets; 100,000 MT Fuel Processed

Hanford's B Reactor, as it stood in 1945



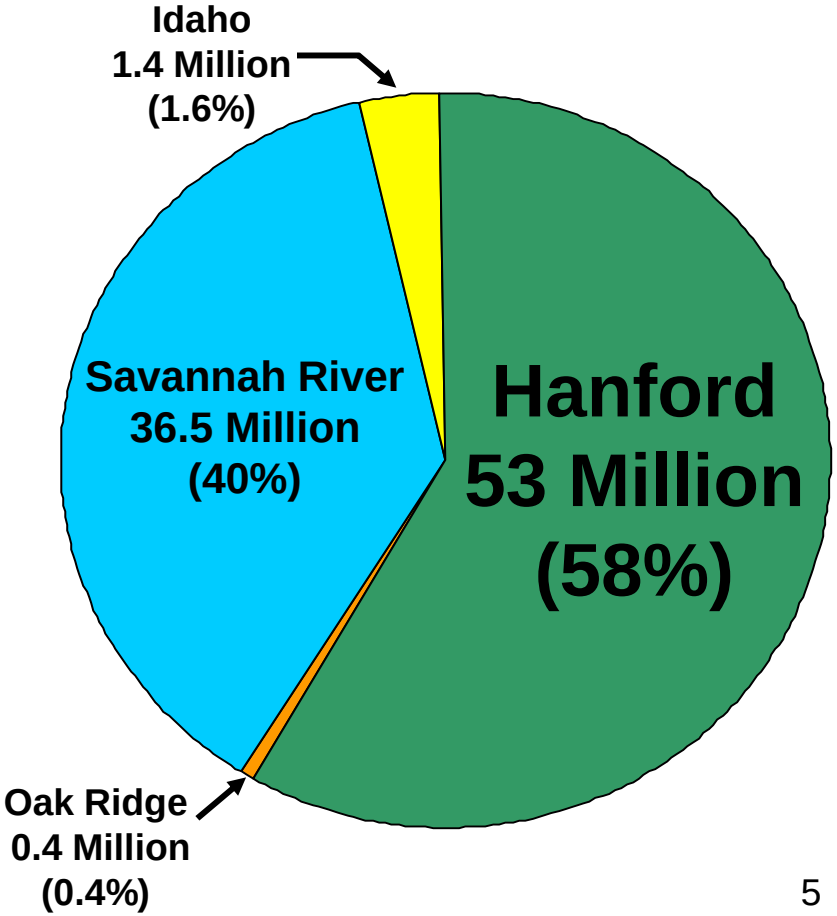
Hanford Tank Waste Cleanup Challenge



Hanford has:

- 63% of DOE tanks; 80% of DOE single-shell tanks
- 58% of DOE total tank waste
- ~194 million curies of radioactivity
- ~190,000 tons of chemicals

Total Number of Gallons in Waste Tanks at DOE Sites:



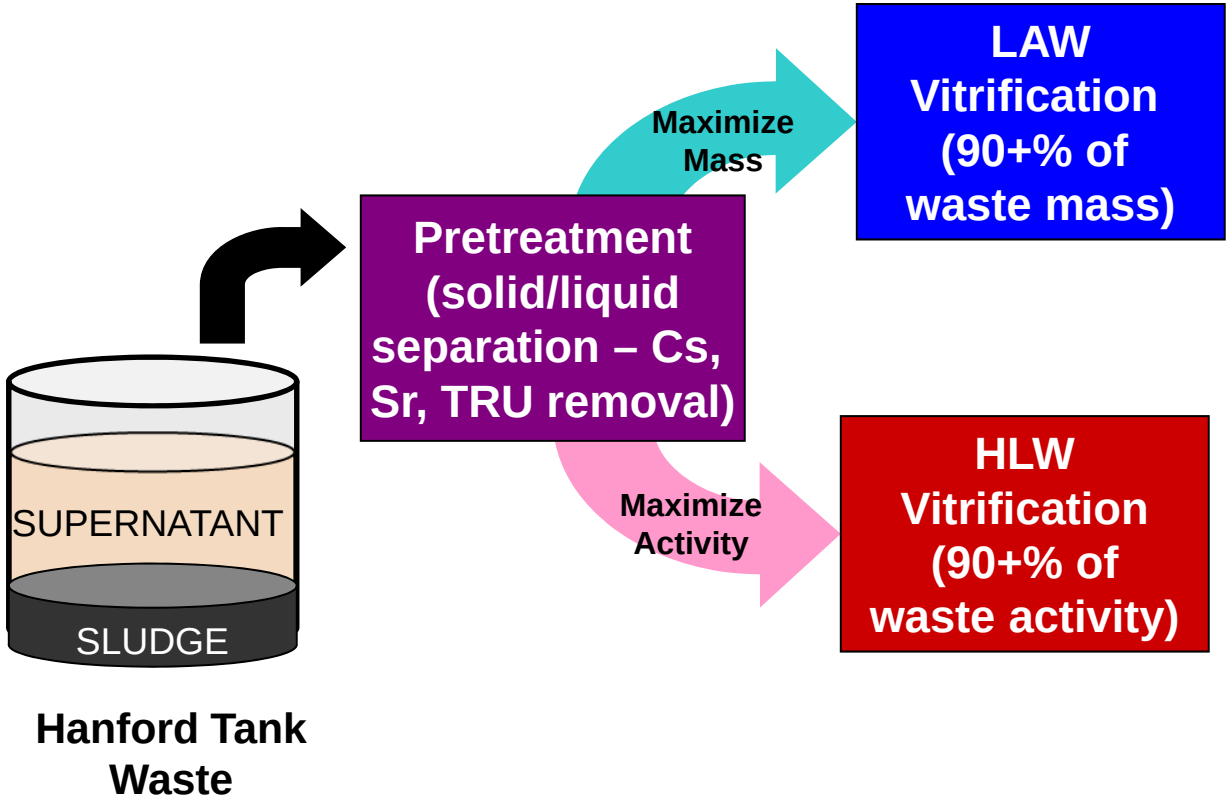
Single Shell Tanks (SSTs) under Construction

149 SSTs
Capacity up to 1 Mgal

Double-Shell Tanks (DSTs) under Construction

28 DSTs
Capacity 1 Mgal
Diameter 80 ft
Height 49 ft

WTP Flow Sheet – Key Process Flows



Completion Status

Data as of February 2010

Total Project 53% Complete (78% Eng., 52% Proc., 49% Const.)

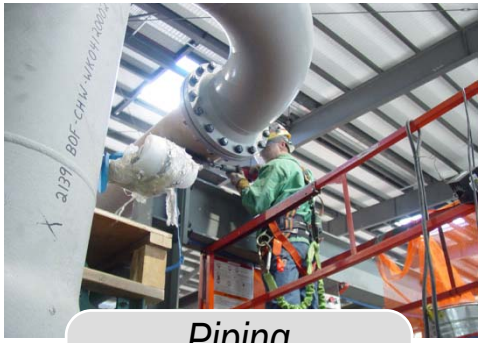
Construction Scope of Work

Concrete

263,000 cubic yards

Structural steel

36,500 tons



Piping

901,000 feet

Ductwork

2,090 tons

Electrical raceway

1,100,000 feet

Electrical cable

4,667,000 feet

Craft hours to build: 24,000,000 hours

How is the Vitrified Waste Dispositioned?

High Level Waste Canisters

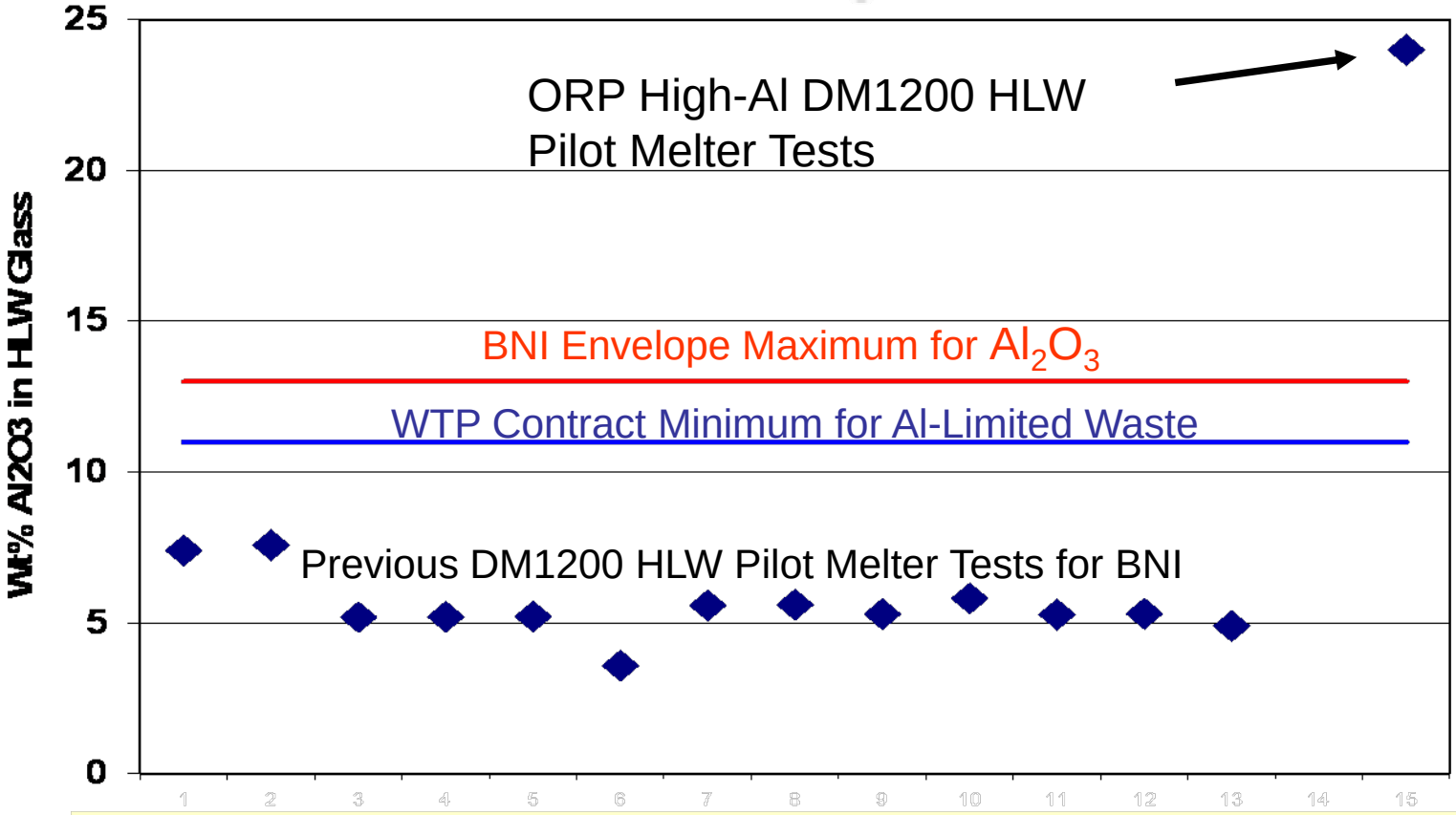
- 2’ x 14.75’
- 6,600 pounds of glass
- 600 canisters to be produced/year
- Temporarily stored in Hanford’s Canister Storage Building until National Repository opened

implemented

Low Activity Waste Containers

- 4’ x 7.5’
- 13,000 pounds of glass
- 1,300 containers to be produced/year
- Disposed on Hanford Site

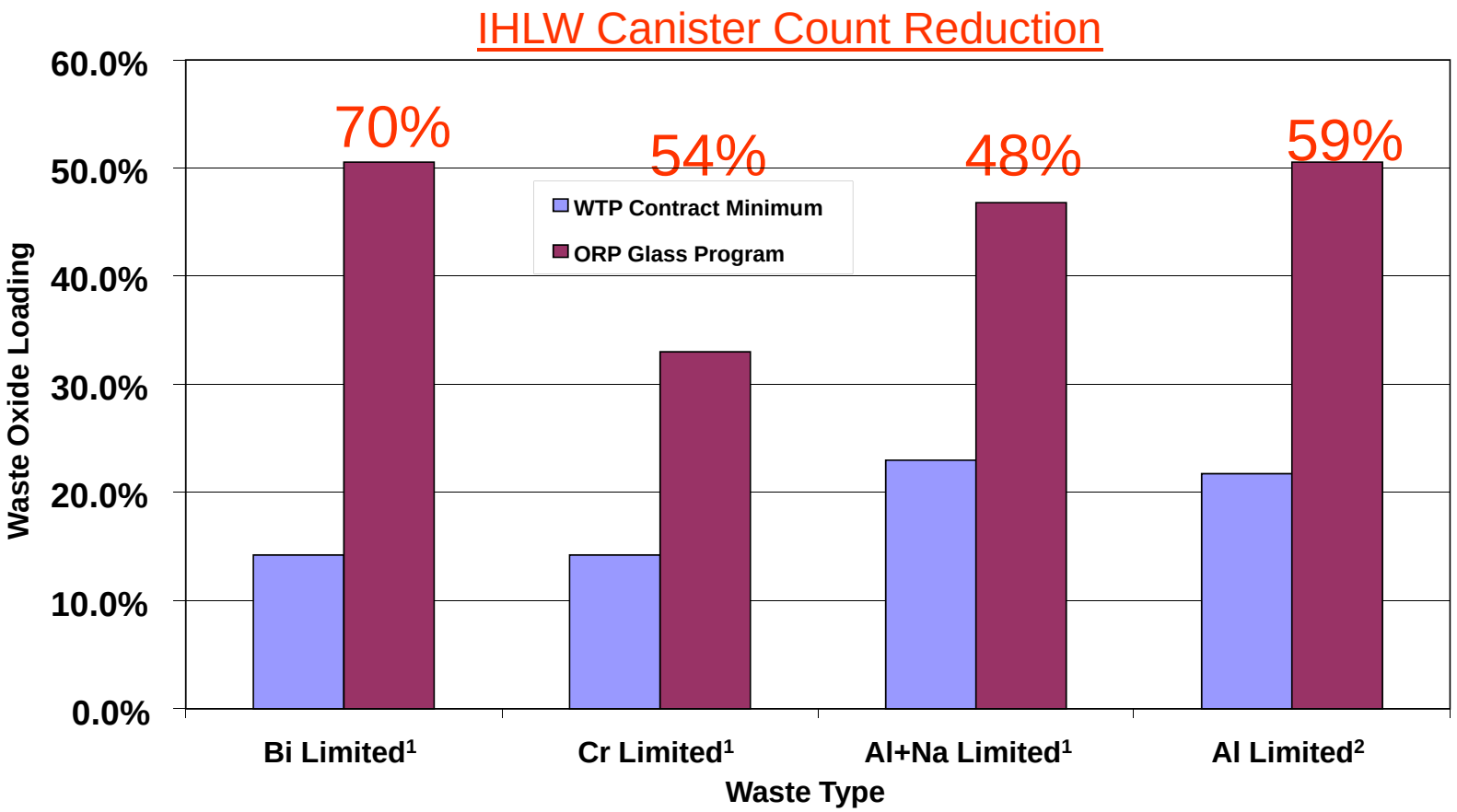
ORP – 2008 Results
Increased Aluminum Loading in HLW Glasses



Demonstrated potential to double WTP HLW aluminum treatment capacity with no increase in HLW glass produced.

Melt Rate Enhancement for High Aluminum HLW Glass Formulations, VSL-08R1360-1, Rev 0

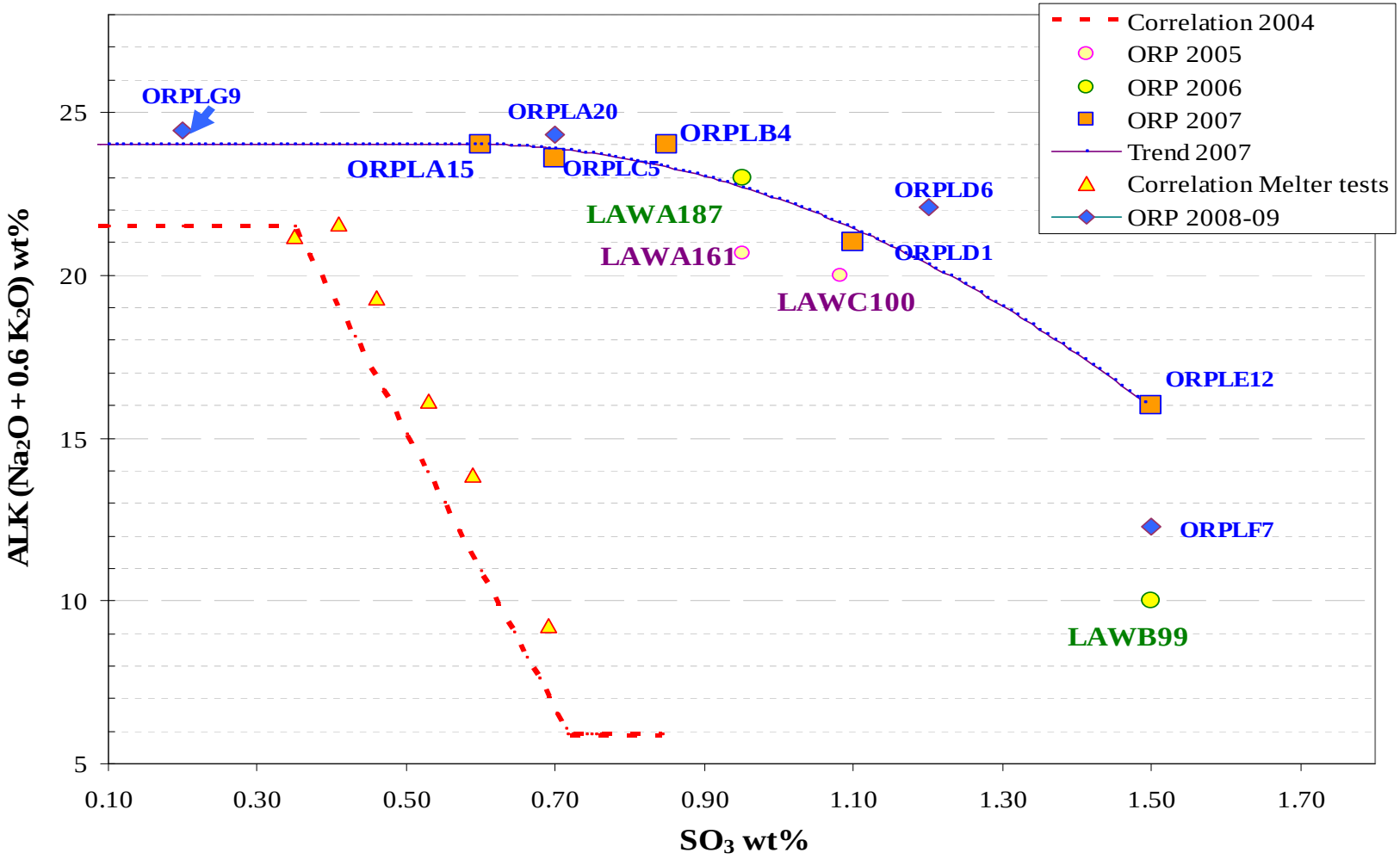
ORP Calculates a Reduction of ~4500 HLW Canisters Tied to HLW Optimization



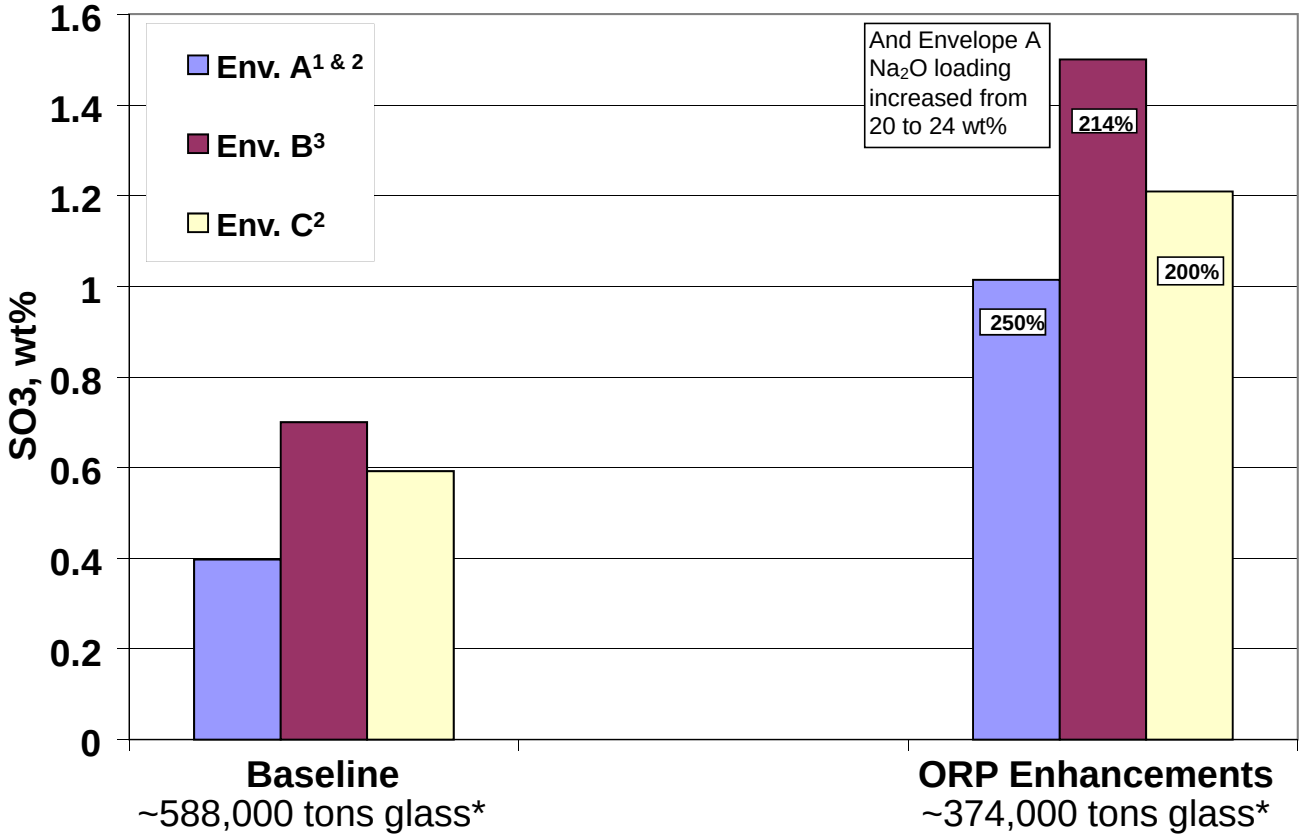
[1]High Level Waste Vitrification System Improvements, VSL-07R1010-1, Rev. 0

[2]DM100 and DM1200 Melter Testing with High Waste Loading Glass Formulations for Hanford High Aluminum HLW Streams, VSL-10R1690-1, Rev. 0

Recent Advances for LAW Treatment



LAW Sulfate and Sodium Optimization Results – Hanford will Produce ~200,000 MT LESS LAW Glass – About 11.4 years of operating time saved



*Glass quantities presume ~50,000 MT sodium is converted to glass

[1]LAW Envelope A and B Glass Formulation Testing to Increase Waste Loading, VSL-06R6900-1, Rev. 0.

[2]Glass Formulation Development and DM10 Melter Testing with ORP LAW Glasses, VSL-09R1510-2, Rev. 0.

[3]Enhanced LAW Glass Formulation Testing, VSL-07R1130-1, Rev. 0.

Compliance Based Audit (10-DOE-AU-001)

of the

Bechtel National Incorporated
High Level Waste QA Program

March 15-19, 2010

Audit Team Members

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- Denis J. Koutsandreas, EM-43, Auditor
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- Jeff Ray, SRS, Auditor
- Kyle M. Rankin, DOE-Richland, Auditor
- Herbert G. Sutter, Auditor
- Robert A. Toro, EM-23, Auditor
- Lisa C. Treichel, HS-23, Auditor

Audit Scope

- Phase 1, a preliminary review of status, was completed in December 2008
- Phase 2, a program adequacy review by OCRWM, was completed in April 2009 with acceptance by OCRWM
- Phase 3, this audit, was an initial compliance-based audit of and BNI to evaluate implementation of DOE/RW-0333P, Revision 20, Quality Assurance Requirements and Description (QARD)

Programmatic Elements Audited

- Section 1.0 Organization
- Section 2.0 Quality Assurance Program
- Section 3.0 Design
- Section 4.0 Procurement Document Control
- Section 5.0 Procedures, Instructions, and Drawings
- Section 6.0 Document Control
- Section 7.0 Control of Purchased Material, Equipment, and Services
- Section 8.0 Identification and Control of Materials, Parts, and Components
- Section 9.0 Control of Special Processes
- Section 10.0 Inspection
- Section 11.0 Test Control
- Section 12.0 Control of Measuring and Test Equipment
- Section 13.0 Handling, Storage, and Shipping
- Section 14.0 Inspection, Test, and Operating Status
- Section 15.0 Nonconforming Materials, Parts, or Components
- Section 16.0 Corrective Action
- Section 17.0 Quality Assurance Records
- Section 18.0 Audits
- Supplement I Software
- Supplement II Sample Control
- Supplement III Scientific Investigation
- Supplement IV Field Surveying
- Supplement V Control of the Electronic Management of Information
- Appendix A Waste Custodians
- Appendix C Storage and Transportation

Audit Conclusions

- Based on the analysis of the results of the audit, BNI is satisfactorily implementing the following QARD sections:

1.0	2.0	3.0	4.0	5.0	6.0
7.0	8.0	9.0	10.0	11.0	12.0
13.0	14.0	15.0	16.0	17.0	18.0
Supplement I				Supplement III	
Supplement V				Appendix A	

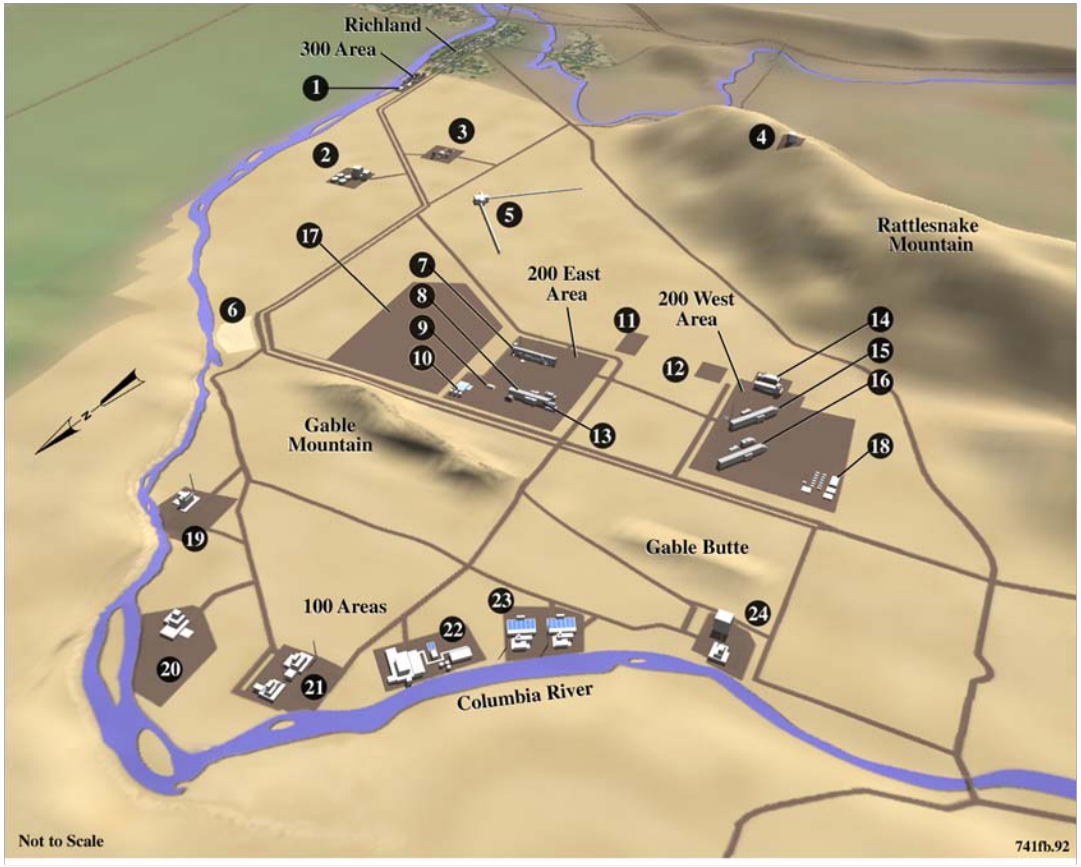
- Implementation could not be assessed on the following QARD sections:

  Supplement II Supplement IV Appendix C

- There are no sections of the QARD implemented by BNI that the team found to be unsatisfactory.

Backup

Hanford Cleanup Site



1. 300 Area Liquid Effluent Treatment Facility
2. Commercial Operating Nuclear Power Plant
3. Fast Flux Test Facility
4. Observatory
5. Laser Interferometer Gravitational Wave Observatory
6. Old Hanford Town Site
7. Plutonium Uranium Extraction Plant
8. B Plant
9. Prototype Engineered Barrier
10. 200 East Area Effluent Treatment Facility
11. U.S. Ecology Commercial Solid Waste Site
12. Environmental Restoration and Storage Facility
13. Waste Encapsulation and Storage Facility
14. REDOX
15. U Plant
16. T Plant
17. Waste Treatment Plant
18. Waste Receiving and Processing Facility
19. F Reactor
20. H Reactor
21. D and DR Reactors
22. N Reactor
23. KE and KW Reactors
24. B and C Reactors