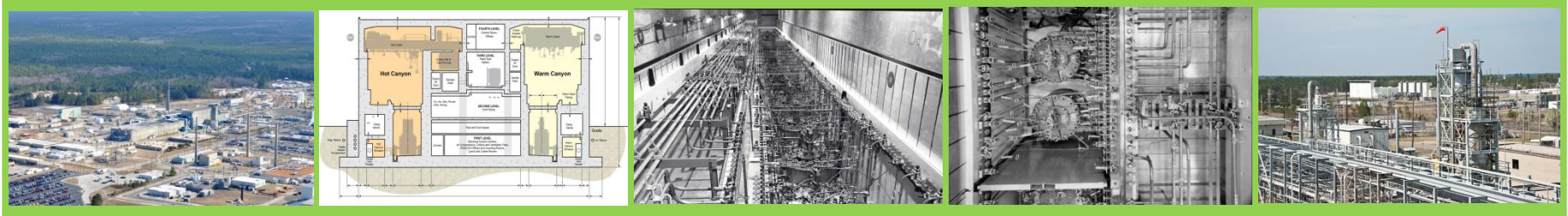




U.S. DEPARTMENT OF  
**ENERGY**



## *Presentation to the Governor's Nuclear Advisory Council*

### **SNF Processing at H-Canyon and the H-Canyon Roadmap**

**January 8, 2015**

**H. Allen Gunter**  
**Senior Technical Advisor**  
**Assistant Manager for Nuclear**  
**Material Stabilization**



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# Aerial View of H Area



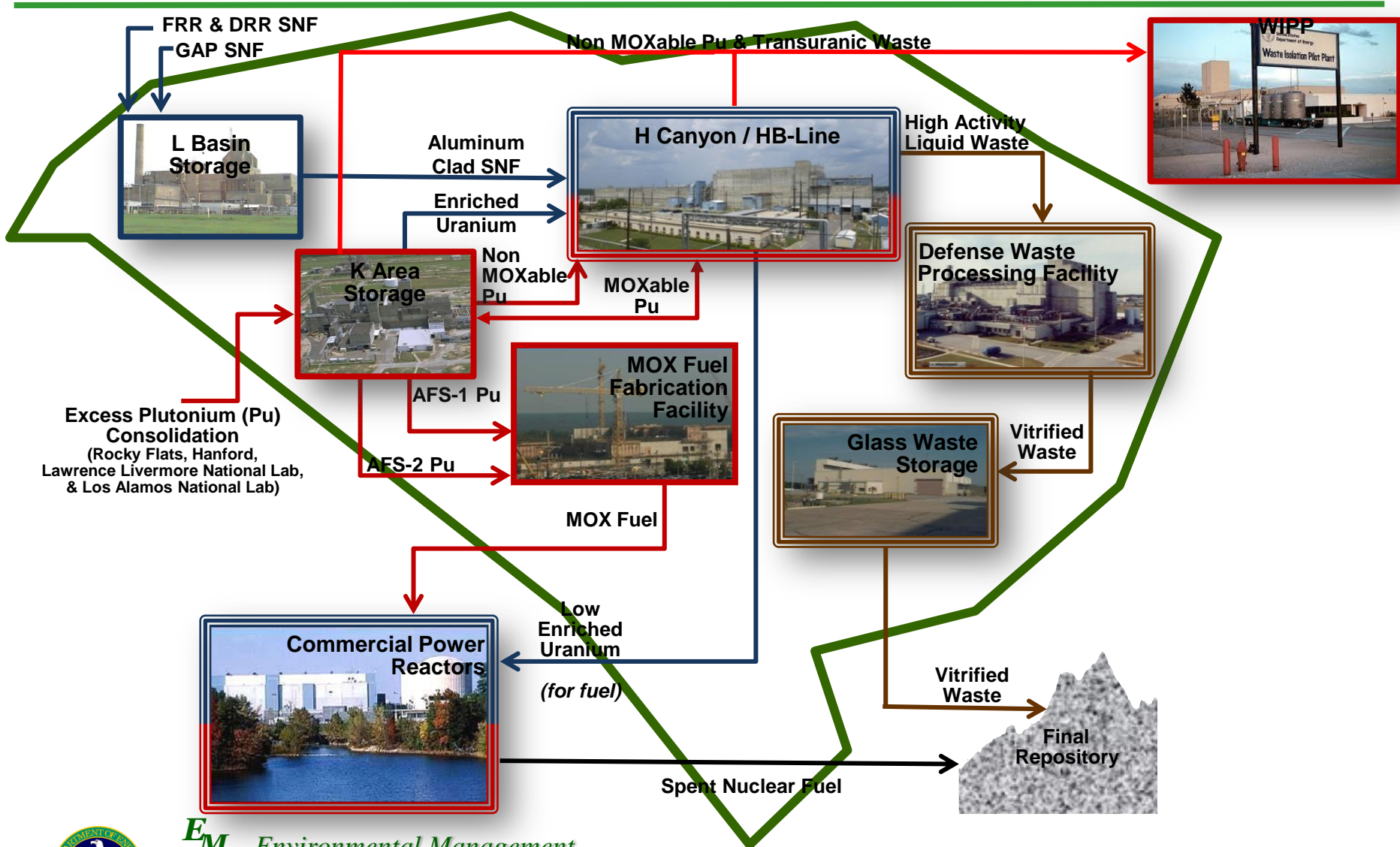
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# Nuclear Materials Disposition Process

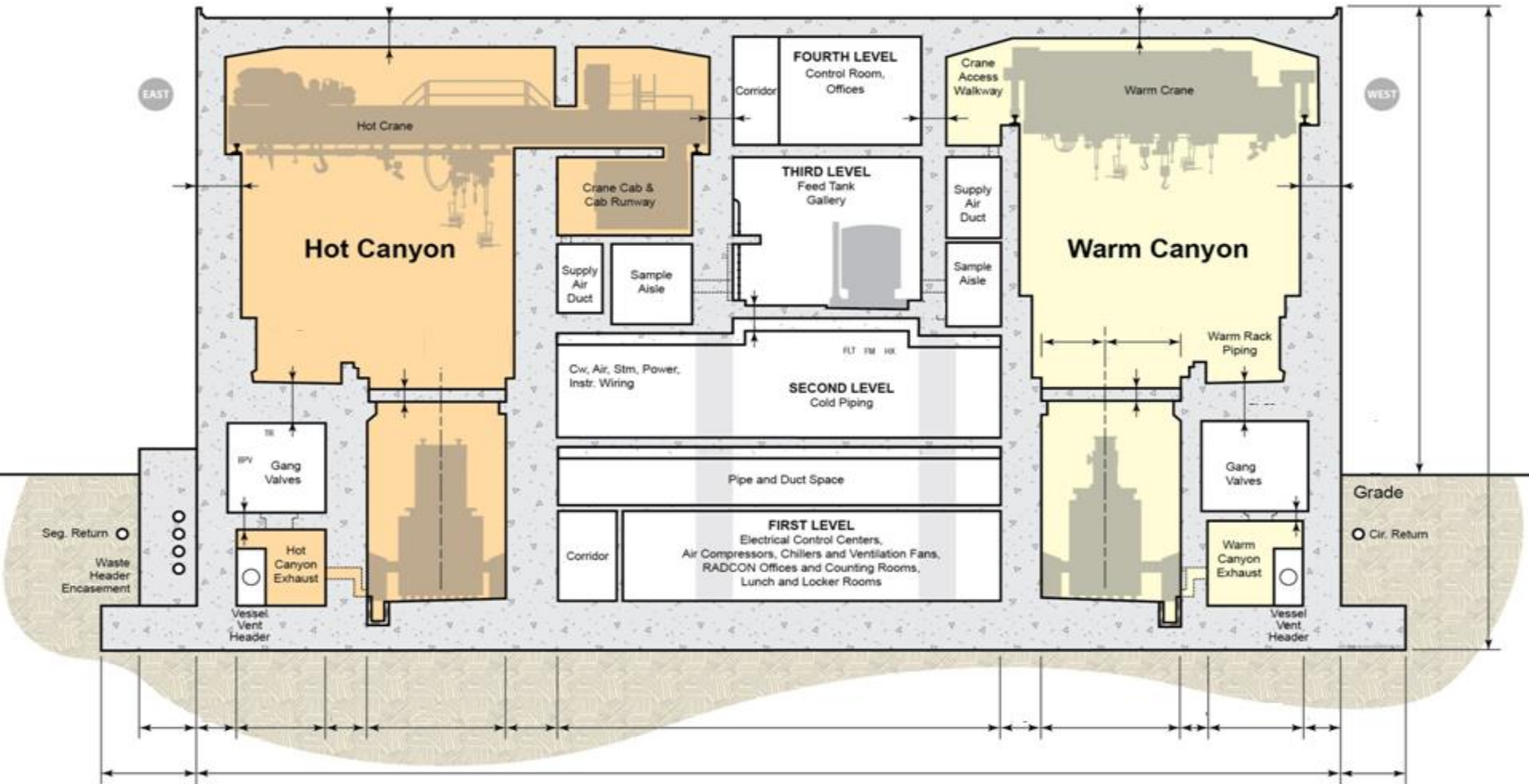


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# H-Canyon - Cross Section



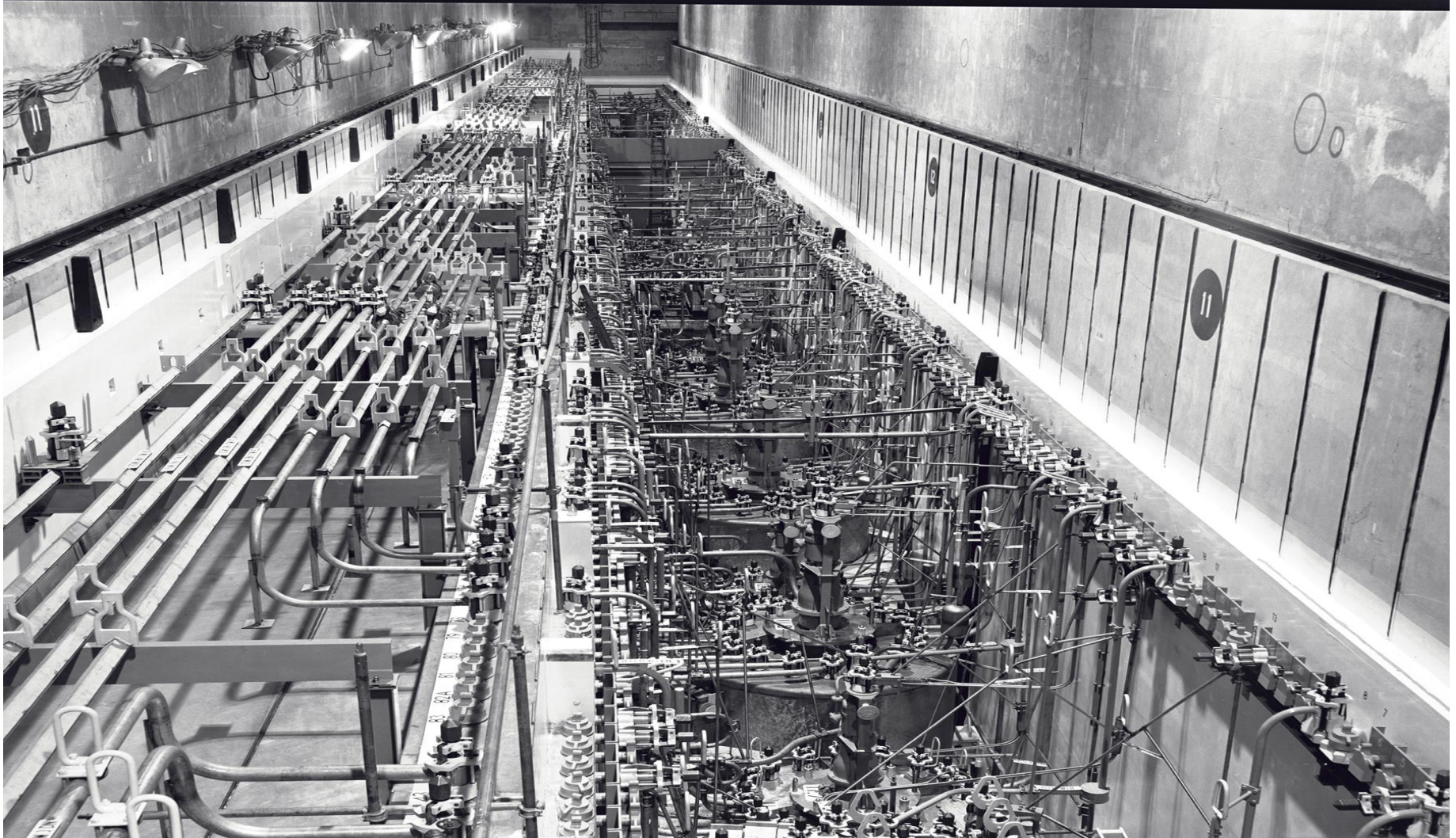
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# H-Canyon Warm Canyon

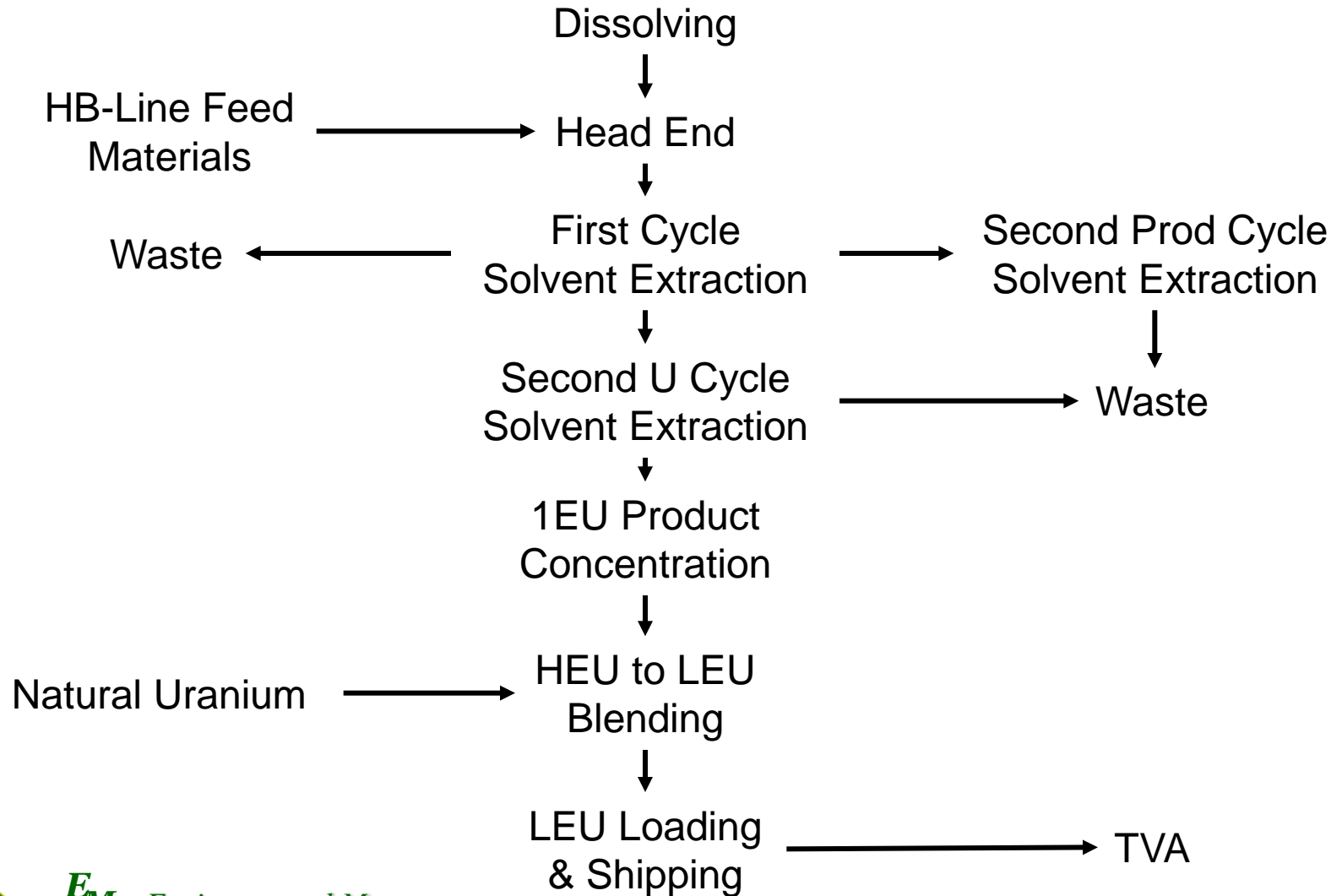


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# HM Process

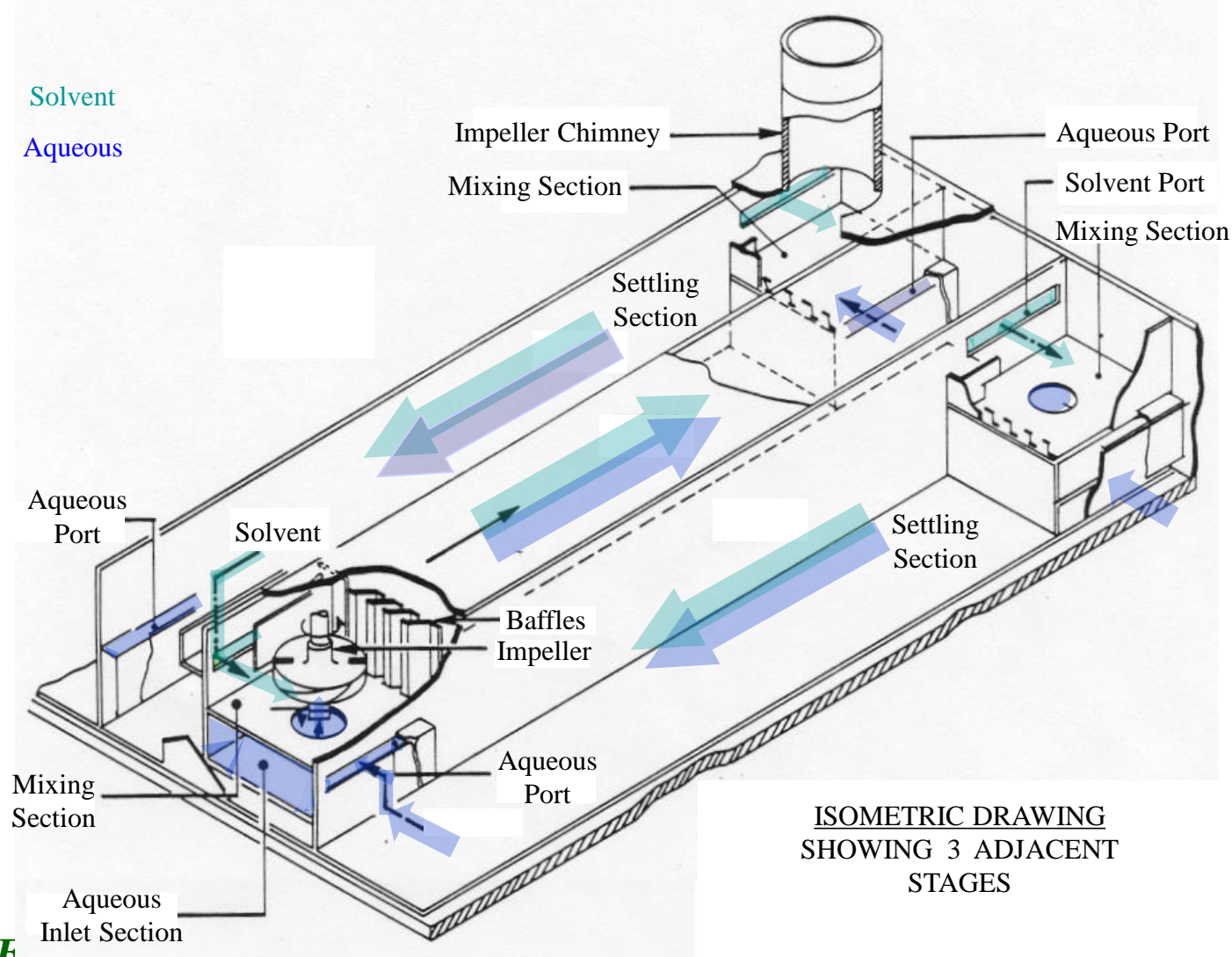


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# Mixer-Settler



**ISOMETRIC DRAWING  
SHOWING 3 ADJACENT  
STAGES**



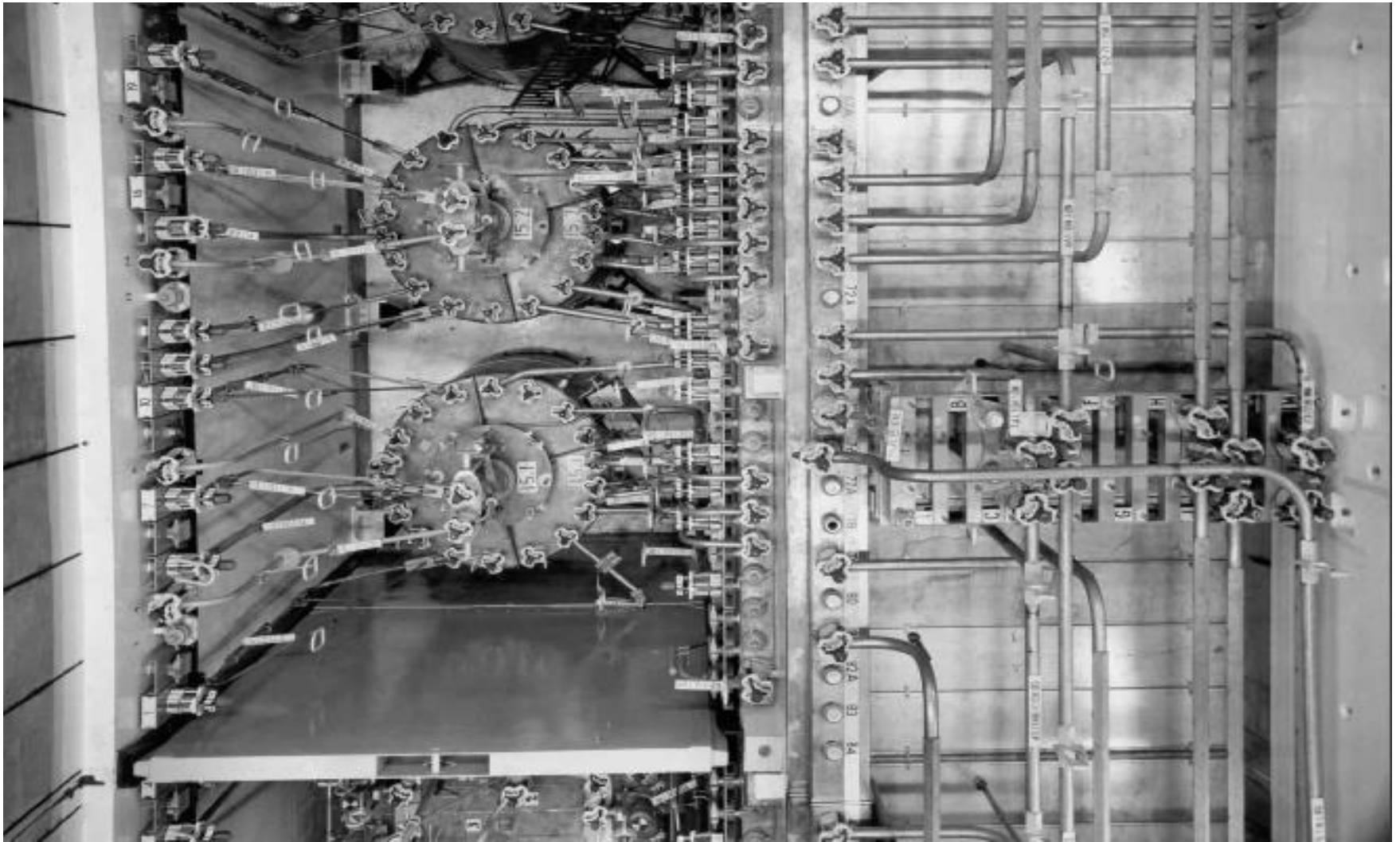
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# H-Canyon – Overhead Photo of Typical Cell



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# H-Canyon – Hot Canyon Crane



Hot Canyon Overhead Crane viewed from Maintenance Area



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# Key NEPA Decisions

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- 1996 – FRR EIS and ROD issued
  - Begin FRR receipts (US origin material)
- 2000 - SRS Spent Nuclear Fuel EIS and ROD was issued with Melt and Dilute of Al-clad UNF
  - Melt and Dilute
    - Al-clad fuel cropped
    - Melted with depleted uranium to form low enriched uranium metal
    - Cast in disk and placed in cans for disposal with high level waste canisters
  - Other alternatives evaluated:
    - Processing through H Canyon; Wet Storage; Other Technologies
- 2006 - Department approved the Uranium Disposition Project which included processing unirradiated highly enriched uranium materials and the Al-clad UNF. Recover the enriched uranium, down blend to low enriched uranium, and ship to TVA.
  - Required issuance of Amended Record of Decision for UNF processing
- 2013 – EM-1 signed an Supplement Analysis and Amended Record of Decision
  - Process 1,000 bundles of Material Test Reactor fuel
  - 200 cores of High Flux Test Reactor Cores
  - Recover the Enriched Uranium and Down Blend to 4.95% enrichment and use as feed for Tennessee Valley Authority reactor fuel





# H Canyon –SNF Disposition Status

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- “Vulnerable”
  - Completed the dissolution of Sodium Reactor Experiment (SRE) SNF on August 14, 2014
  - SRE and other Hi Al/Low Uranium SNF campaigned as a blend to mitigate viscosity issues of thorium-based fuel (SRE) in caustic solution
  - Disposition of resulting solution directly to sludge batch tank
  - Initiated transfers to the sludge batch tank
- “Highly Enriched Uranium Al-clad SNF”
  - Initiated the dissolution of Material Test Reactor Fuel on September 14, 2014



# Waste Generation

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- Processing of Al-clad SNF and plutonium materials are expected to generate between 150,000 and 250,000 gallons annually of high level liquid waste
- H Canyon has a concerted effort to identify facility and process changes that reduce the amount of high level liquid waste H Canyon will generate and send to the waste system
- Based on projected budgets, Savannah River Operations Office issued the following guidance to Savannah River Nuclear Solutions identifying waste receipt volumes in the tank farms to be used in program planning, these fully support program:
  - FY15 – 150,000 gallons
  - FY16 -17 – 200,000 gallons yearly
  - FY18 -25 – 300,000 gallons yearly



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# Nuclear Materials Assigned Missions Roadmap

Prep   SNF -Uranium   Plutonium

	FY12	FY13	FY14									FY15									FY16									FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	FY32	FY33	FY34	FY35
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep												
6.4 Dissolver	Sodium Reactor Experiment										Spent Nuclear Fuel Dissolving												SNF Dissolving																									
6.1 Dissolver	NNSA Plutonium Dissolving																		SNF Dissolving																													
H Canyon	Evaluate/Implement Waste Minimization activities																		Evaluate/Implement Waste Minimization activities																													
	Additional Safeguards Research & Development Testing												Additional Safeguards Research & Development Testing																																			
HCA Truck Well	Preps H-Area Receipt - Canadian Highly Enriched Uranium												Canadian HEU Receipt																																			
H Outside Fac													Uranium Down Blending and Shipping to Tennessee Valley Authority												HEU Down Blend / Ship to TVA																							
HB-Line	Preps/Revise Doc Safety Analysis												NNSA Plutonium Oxide Production																																			
K-Area	Plutonium Receipt, Storage, and Ship																																															
	Ship Plutonium from K Area Complex to HB Line																																															
	Prep - Non-Spec Down Blend Design Safety Analysis												Down Blend Non-Spec Plutonium for disposition																																			
													NNSA Pu Disposition																																			
L-Area	3013 Destructive Evaluation Surveillance																																															
	Foreign Research Reactor & GAP Fuel Receipts																																															
	Domestic Research Reactor Fuel (MURR, MIT, NIST, HFIR) Receipts, Storage, and Ship/ Basin Deinventary																																															
													Ship SNF from L-basin to H canyon												Ship SNF L to H																							
	AMCAP												Augmented Monitoring Condition & Assessment Program																																			
Basin Modifications																																																

# Required Upgrades

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- Savannah River Site has maintained and will continue to maintain the safety systems in H Canyon which ensure the protection of the public, environment, and workers
- DOE must provide adequate funds to support required infrastructure upgrades and spare equipment inventory to support continued H Canyon operations
  - Some examples of the production support systems that need to be upgraded which have been identified on a consolidated site priority lists:
    - ❑ Substation
    - ❑ Transformers
    - ❑ Roofs
    - ❑ Exhaust Fan



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# Modifications Required to Process non-Aluminum SNF

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- H Canyon utilizes a nitric acid based modified PUREX process to dissolve and recover enriched uranium from Al-clad SNF which is not compatible with stainless steel or zirconium clad SNF
- In order to dissolve non-Al SNF, a modified head-end process (shear) would have to be installed on H Canyon
- The shear would expose the uranium in the fuel assembly allowing the uranium material to be leached out utilizing the existing H Canyon process chemistry
- Included in the modifications would be a capability to remove and dispose of the residual hulls



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# Questions?



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