U.S. DEPARTMENT OF ENERGY

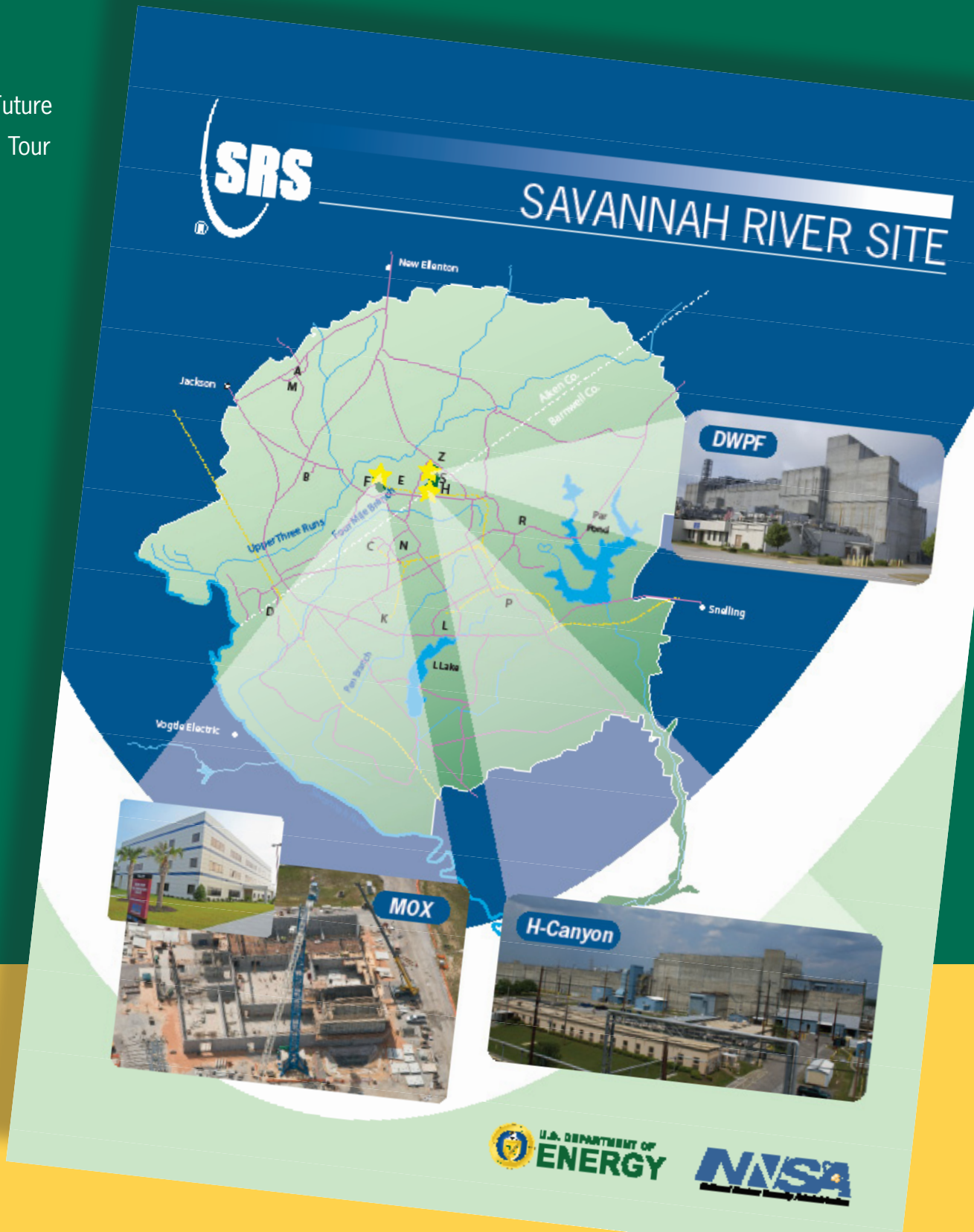
NNSA National Nuclear Security Administration

Savannah River Site
Facility Descriptions and Highlights

Blue Ribbon Commission on America's Nuclear Future

Savannah River Site Tour

January 6-7, 2011



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NNSA

Savannah River Site Tour Agenda

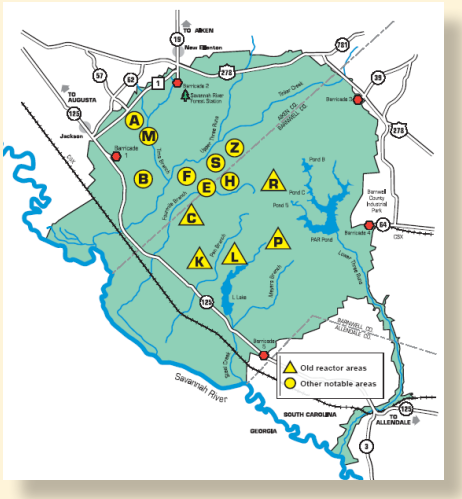
Thursday, January 6, 2011

Drive-by Tour

- Savannah River National Laboratory (SRNL)
- Decontamination & Decommissioning activities (M Area)
- Low-level Waste Disposal Facilities (E Area)
- H Area/H Canyon
- Salt Waste Processing Facility (J Area)
- Saltstone Facility (Z Area)

Toured

- H Canyon
- Mixed Oxide Fuel Facility Construction Site
- Defense Waste Processing Facility (DWPF)



H Canyon Highlights

- Proven Performance - over 55 years of safe, reliable operation
- Only operational U.S. large-scale, shielded radiochemical separation facility capable of dispositioning surplus Used Nuclear Fuel (UNF), and uranium, plutonium and neptunium
- Demonstrated technology with flexible capabilities and low risks; operations comply with today's environmental standards
- Proven and qualified work force with demonstrated world-class safety performance and disciplined operations
- Robust Systems and Support Infrastructure
  - Safety Class seismically qualified structure and exhaust ventilation
  - Engineered features for risk reduction
  - Modular/flexible process cells
  - Extensive support systems (e.g., cold chemicals, cooling water, steam)
- Since 2003, recovered ~22 MT surplus Highly Enriched Uranium and blended down for use in TVA commercial nuclear reactors
  - Enough energy to power every home in United States for 50 days
  - Permanently eliminated ~500 nuclear weapon equivalents
- Optimum disposition path for post Cold War surplus of NNSA/EM materials and domestic/foreign research reactor fuels
  - UNF planned for disposition represents ~14 MT additional HEU
- Nation's only capability for scale-up testing of new processes without major new construction

Potential Missions Using H Canyon

- Demonstration of Aqueous Processing Concepts
  - Decladding techniques
  - Extraction technologies without pure Pu separation
  - Gaseous fission product management
  - Recovery of used fuel for initial fabrication of demonstration fuels for recycling reactors
- Demonstration of Next Generation Safeguards Technology
  - Remote Equipment
  - Highly contaminated/radiation environment
- UNF and other missions not precluded

MFFF Accomplishments

- Construction achieved 4.7 million safe man-hours in 2010
- Significant awards made to small businesses
  - Over 4,600 small business subcontracts awarded to date
  - Over $500M of subcontracts to small businesses
- Two utilities are formally evaluating the potential use of MOX fuel in their reactors
  - Tennessee Valley Authority (3 BWRs, 2 PWRs)
  - Energy Northwest (1 BWR)
- In December 2010, NRC approved the Safety Evaluation Report of the MFFF License Application

MFFF Facts

- Construction began August 2007
- Total project complete: 49%
- Construction Complete: 32%
- Current employment: 2,000
- Start Operations: October 2016
- Building is a 500,000 ft., highly secure, seismically-resistant steel reinforced concrete structure
  - Aqueous Polishing Area will convert surplus plutonium to purified plutonium oxide powder
  - Fuel Manufacturing Area will blend the plutonium oxide with depleted uranium oxide powder and produce mixed oxide fuel assemblies
  - Shipping and Receiving Area is where plutonium shipments will be received and MOX fuel assemblies will be shipped to commercial nuclear reactors
- 16 Support Facilities complete the MFFF scope

Mixed Oxide Fuel Fabrication Facility

Conversion of at least 34 metric tons of weapons grade plutonium into mixed oxide fuel for use in commercial nuclear power plants

Mixed Oxide Fuel Fabrication Facility (MFFF) *(photo above)*

Produce mixed oxide fuel elements for irradiation in commercial nuclear power plants

Pit Disassembly and Conversion (PDC)

Disassemble nuclear weapon pits, remove impurities, and convert the metal into oxide for MFF

Waste Solidification Building (WSB)

Receive high activity and low activity liquid waste streams from MFFF and PDC

Waste Solidification Building

WSB will receive liquid waste streams from MFFF and PDC.

- Separate waste via evaporation
- Low level liquid waste is transferred to the SRS Effluent Treatment Facility (ETF)
  - ETF conducts a final treatment process and cleans water; then releases to streams on Site
- Higher activity waste is stabilized
  - Waste is combined with a cementitous mixture and put into 55 gallon drums
- Stabilized waste will be disposed at an approved onsite or offsite location

Pit Disassembly and Conversion

PDC process will convert surplus weapons grade plutonium into plutonium oxide suitable for use in the fabrication of mixed oxide fuel.

- Plutonium is converted to plutonium oxide
  - Residual classified attributes are removed
  - Then, plutonium oxide is made available for conversion to MOX fuel
- PDC will also process non-plutonium components
  - Decontaminate, convert and package uranium materials
  - Use declassification processes to disposition other materials as waste

SRS Liquid Waste Highlights

- Resolve SRS legacy of nuclear weapons production by treating and disposing of Radioactive Liquid Waste and closing tanks
- Highest priority of DOE – Office of Environmental Management (EM)
  - Safely treat and disposition 37 million gallons of waste and close 49 underground storage tanks by 2028 to reduce risk and meet regulatory commitments
  - Resolve the primary source of risk to public health and the environment
  - Continually improve efficiency to accelerate schedule and reduce cost for the taxpayers
  - Enable transformation of the Site for future missions

Defense Waste Processing Facility

- Minimal waste volume, but almost all curies are dispositioned at DWPF
- Largest vitrification plant in the world
- Recently poured 3,000th canister
- Nearly half-way finished with mission
- DWPF poured more than 11.7 million pounds of glassified waste
- Entire 37 million gallons of waste in the tanks awaiting disposition (about 340 million curies of radioactivity)
  - Immobilized more than 31 million curies
  - New technology has capability to nearly double canister output
- DWPF Glass Waste Storage Buildings
  - GWSB 1 contains 2,244 canisters
  - GWSB 2 can store 2,340 canisters; currently stores over 800 canisters
  - GWSB 3 required by 2015
- DOE intent and commitment is to deliver the canisters to a repository

11PA00102

Saltstone Facilities

- Vast majority of waste volume from tanks – but few curies – are left in South Carolina
- Those left in the state are disposed at the Saltstone Production Facility
  - Safely stabilizes low-level radioactive liquid salt wastes
  - Salt solution stabilized by mixing with cement, fly ash and slag
  - Resulting grout mixture is mechanically pumped into concrete disposal units within Saltstone Disposal Facility
  - Grout solidifies into a non-hazardous, low-radioactive waste form called “saltstone”
  - Capped/radioactivity decays