Defense Waste Processing Facility – Optimization Opportunities & Key Performance Factors

Ken Wells, Director of DWPF Operations

9/26/2023

SRMC SAVANNAH RIVER MISSION COMPLETION®

BWXT
BWX Technologies, Inc.
amentum FLUOR

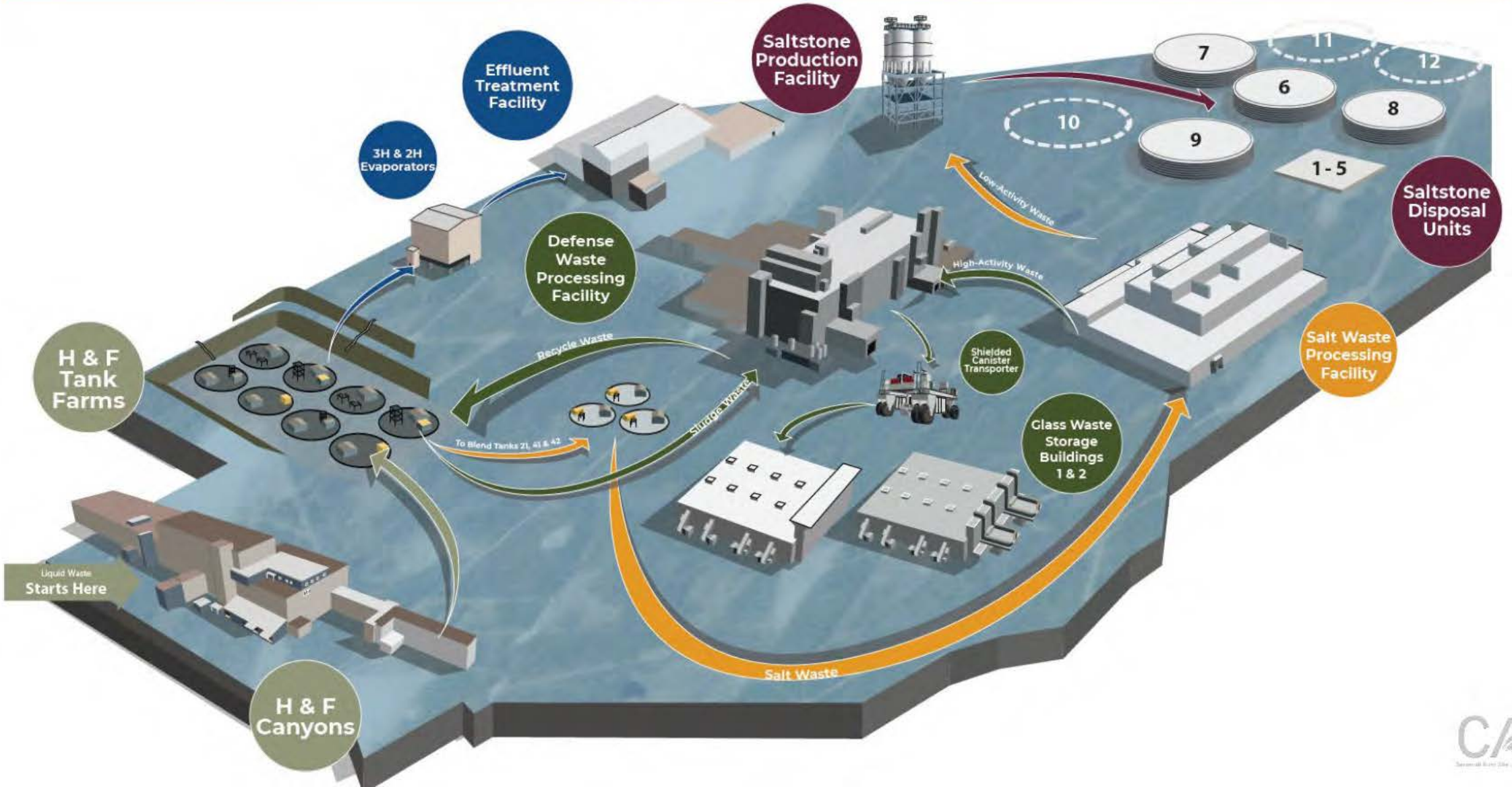
CAB

Acronyms

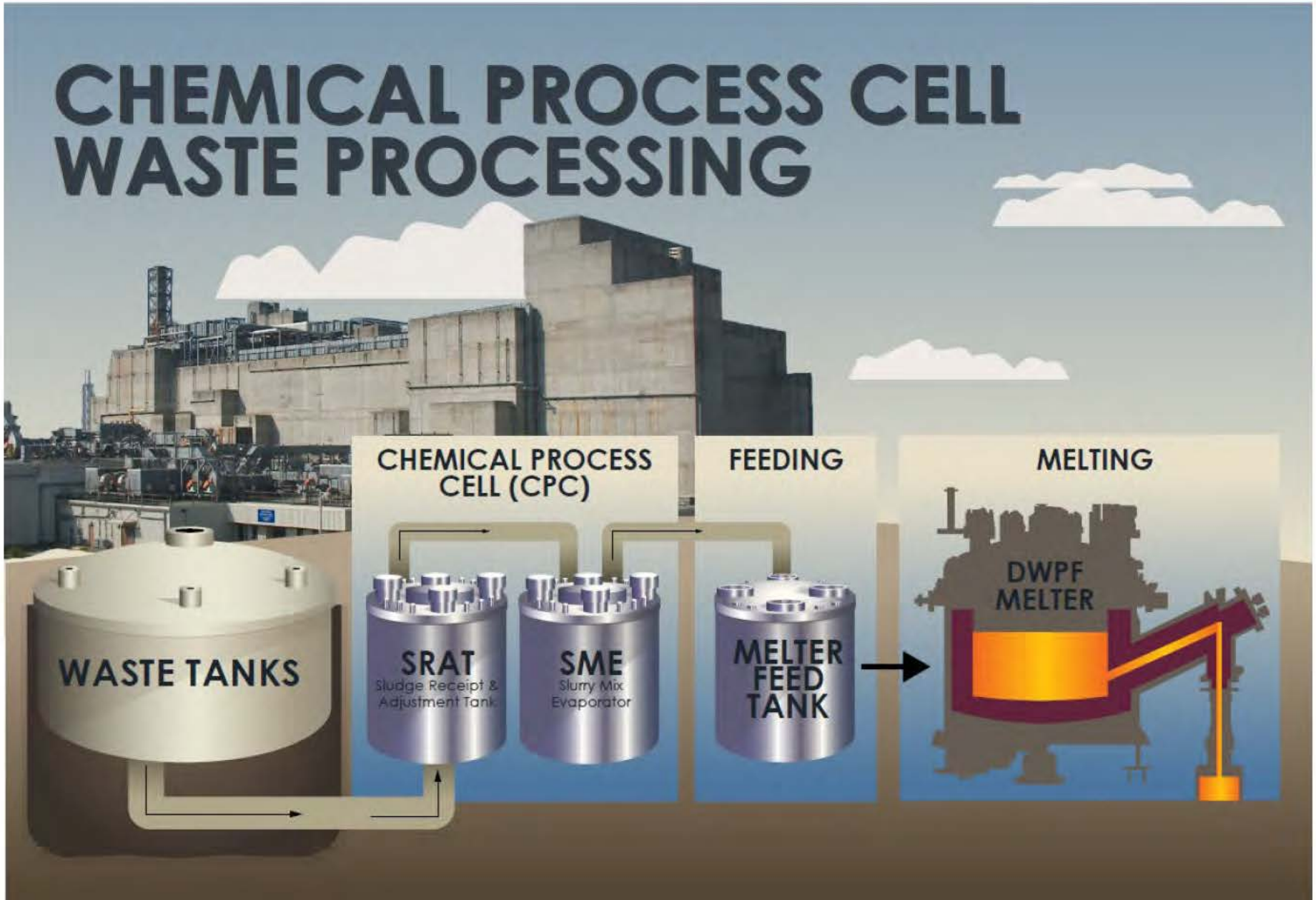
- ARP/MCU – Actinide Removal Process / Modular Caustic Side Solvent Extraction Unit
- DWPF – Defense Waste Processing Facility
- FY – Fiscal Year
- HTF – H Tank Farm
- LW – Liquid Waste
- MFT – Melter Feed Tank
- MTTF – Mean Time to Failure
- MTTR – Mean Time to Repair
- OGCT – Offgas Condensate Tank
- PPT – Precipitate Pump Tank (repurposed to transfer sludge solids from SWPF to DWPF)
- PRFT – Precipitate Reactor Feed Tank (repurposed to store sludge solids from SWPF)
- RCT – Recycle Collection Tank
- SE – Strip Effluent
- SEFT – Strip Effluent Feed Tank
- SEHT – Strip Effluent Hold Tank (located at SWPF)
- SME – Slurry Mix Evaporator
- SMECT – Slurry Mix Evaporator Condensate Tank
- SPT – Sludge Pump Tank
- SRAT – Sludge Receipt and Adjustment Tank
- SRMC – Savannah River Mission Completion (current Liquid Waste Contractor)
- SRS – Savannah River Site
- SSRT – Sludge Solids Receipt Tank (located at SWPF)
- SWPF – Salt Waste Processing Facility

DWPF Supports the Liquid Waste Mission

SRS Liquid Waste Facilities



DWPF Waste Processing Overview



Canister Processing – Past and Future

- **DWPF Canister Production is tied to the overall Liquid Waste System capabilities and salt/sludge inventory**

- **Full-scale, sludge-only processing (FY96-FY07)**
  - Began treating Tank Farms sludge waste (10% of the volume and 50% of the curies)
  - Provide hazard reduction progress while a new salt waste processing approach was determined

- **Pilot-scale salt and full-scale sludge processing (FY08–FY19)**
  - Proved that the SWPF technology would work using pilot scale ARP/MCU processes
  - Initiated pilot scale salt waste treatment (90% of the volume and 50% of the curies)
  - Sludge must be mixed with salt waste to support making glass with current flowsheet
  - DWPF canister rate reduced in FY14 to conserve sludge for processing with salt feed

- **Integration of SWPF with other LW Facilities (FY20)**
  - Facility modifications
  - Program and procedure changes
  - Sludge conservation

- **Full-scale salt and sludge processing (FY21–Completion of Mission)**
  - Started with SWPF Hot Commissioning then Hot Operations
  - Provides full liquid waste system capabilities to finish waste treatment in 2036
  - Enables both DWPF and SWPF to operate at maximum rates
  - Resuming Full DWPF production in FY24 with ramp-up actions in progress

	End of Fiscal Year	SRS Cans Poured Yearly	SRS Cans Poured Cum.
Sludge Only	*FY96*	*64*	*64*
	FY97	*169*	*233*
	FY98	*250*	*483*
	FY99	*236*	*719*
	FY00	*231*	*950*
	FY01	*227*	*1,177*
	FY02	*160*	*1,337*
	FY03	*115*	*1,452*
	FY04	*260*	*1,712*
	FY05	*257*	*1,969*
	FY06	*245*	*2,214*
	FY07	*160*	*2,374*
Sludge + ARP/MCU Salt	*FY08*	*225*	*2,599*
	FY09	*196*	*2,795*
	FY10	*192*	*2,987*
	FY11	*264*	*3,251*
	FY12	*277*	*3,528*
	FY13	*224*	*3,752*
	FY14	*125*	*3,877*
	FY15	*93*	*3,970*
	FY16	*136*	*4,106*
	FY17	*52*	*4,158*
	FY18	*15*	*4,173*
	FY19	*34*	*4,207*
	FY20	*8*	*4,215*
Sludge + SWPF Salt	*FY21*	*59*	*4,274*
	FY22	*45*	*4,319*
	FY23	129*	4,448
	FY24	260	4,708
	FY25	278	4,986
	FY26	282	5,268
	FY27	292	5,560
	FY28	301	5,861
	FY29	183	6,044
	FY30	295	6,339
	FY31	303	6,642
	FY32	282	6,924
	FY33	280	7,204
	FY34	299	7,503
	FY35	319	7,822
	FY36	291	8,113

Optimization – Ramp Up Focus Areas

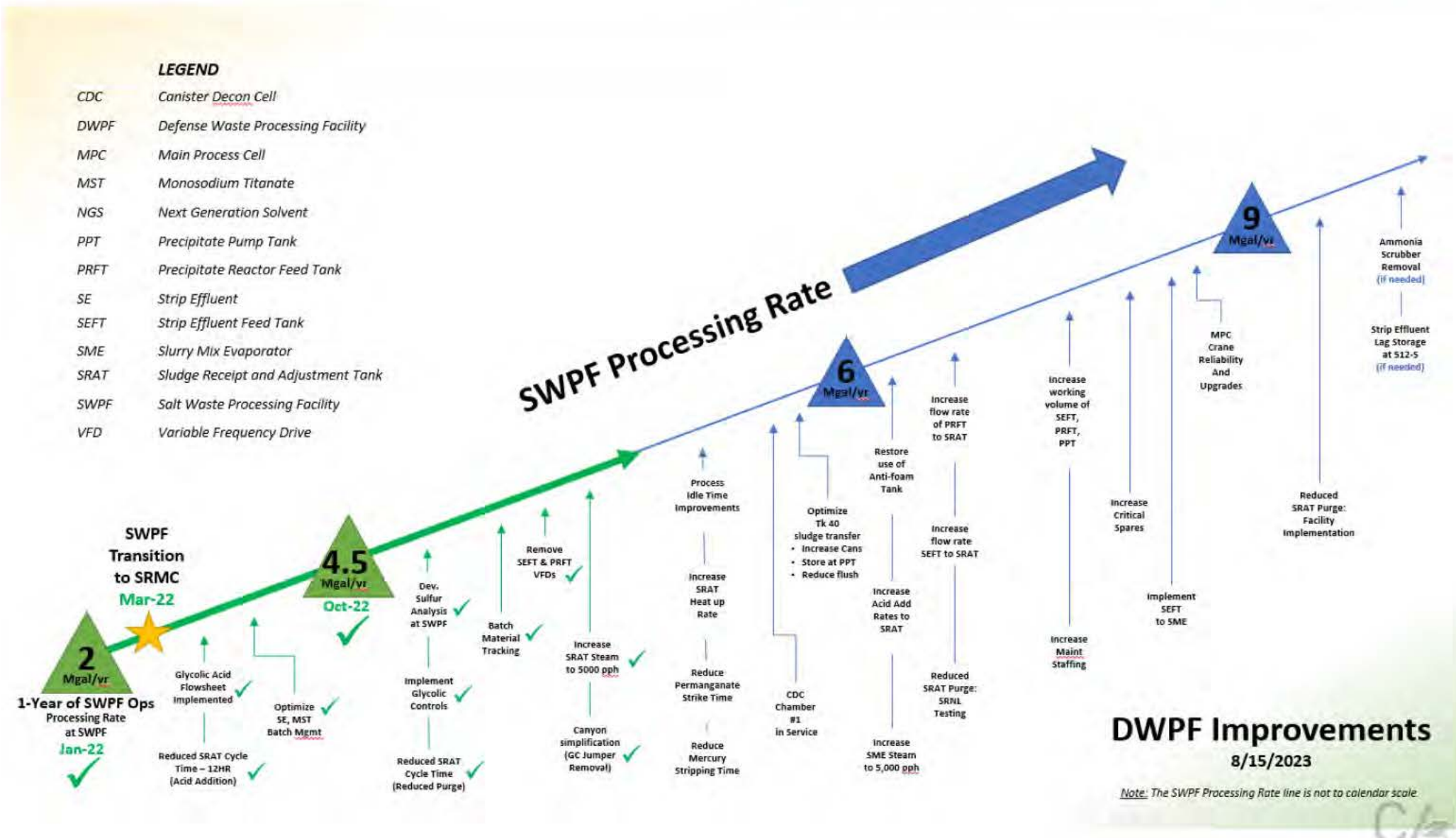
- **Reduce processing cycle times**
  - Optimize consolidation of salt waste and sludge feed
  - Increase steam rates to concentrate and treat waste faster
  - Maximize waste processing efficiencies thru concurrent activities

- **Increase quantity of sludge in each process batch**
  - Make more canisters for every batch
  - Increase the time that the DWPF Melter has feed
  - Minimize excess tank farms sludge to be treated in 2036

- **Increase DWPF equipment reliability**
  - Upgrade critical equipment (cranes and canyon equipment)
  - Replace obsolete process and mechanical equipment controls
  - Invest where needed to minimize mission completion risk

DWPF Support of SWPF Climb to 9 Mgal/yr

SRMC



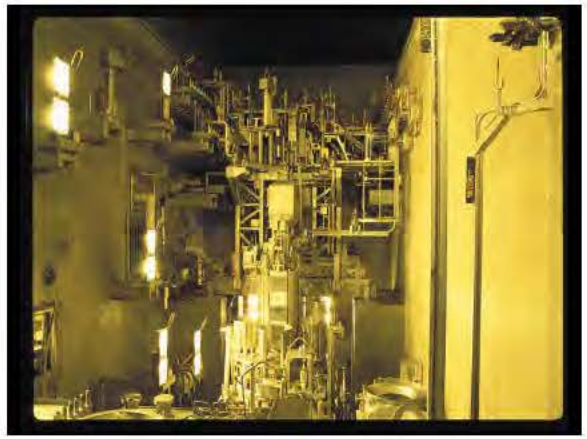
Key Production Affecting Equipment

- **Overall Facility Availability**
  - Track process impacting equipment failures
    - *Main Process Cell Crane*
    - *Canyon Equipment (pumps, agitators, cooling coils, vessels)*
    - *Canister Welder*
    - *Shielded Canister Transporter*
  - Extend Mean Time to Failure (MTTF) with reliability upgrades
  - Reduce Mean Time to Repair (MTTR) with task-ready parts, paper, people

DWPF Waste Processing Canyon
(Photo Taken Prior to Radioactive Operations)

Key Performance Factors

- **Batch Cycle Times (System Plan Batch Size)**
  - SRAT (transfers in/out, chemicals, concentration, sampling)
    - *Varies based on number of Salt (Strip Effluent) additions*
    - *2 Salt = 14 Days*
    - *1 Salt = 7 Days*
    - *Optimized Salt & Sludge = 4 Days & 4.5 Canisters*
  - SME (process / canister decon frit, concentration, sampling, transfer)
    - *Varies based on number of canisters decontaminated*
    - *Optimized Salt & Sludge = 4 Days & 4.5 Canisters*
  - RCT (wastewater collection, chemicals, sampling, transfer)
- **Canister production**
  - System Plan sized SRAT batches (4 days) support pouring 4.5 canisters / week
  - Larger SRAT batches (5-6 days) support pouring 6 canisters / week and more time for repairs



DWPF - Melt Cell

Performance Indicator Examples

Legend

SE = Strip Effluent

1 SE Addition Performed

2 SE Additions Performed

3 SE Additions Performed

Target Batch Time