



U.S. DEPARTMENT OF
ENERGY

OFFICE OF
**ENVIRONMENTAL
MANAGEMENT**

WIPP Update

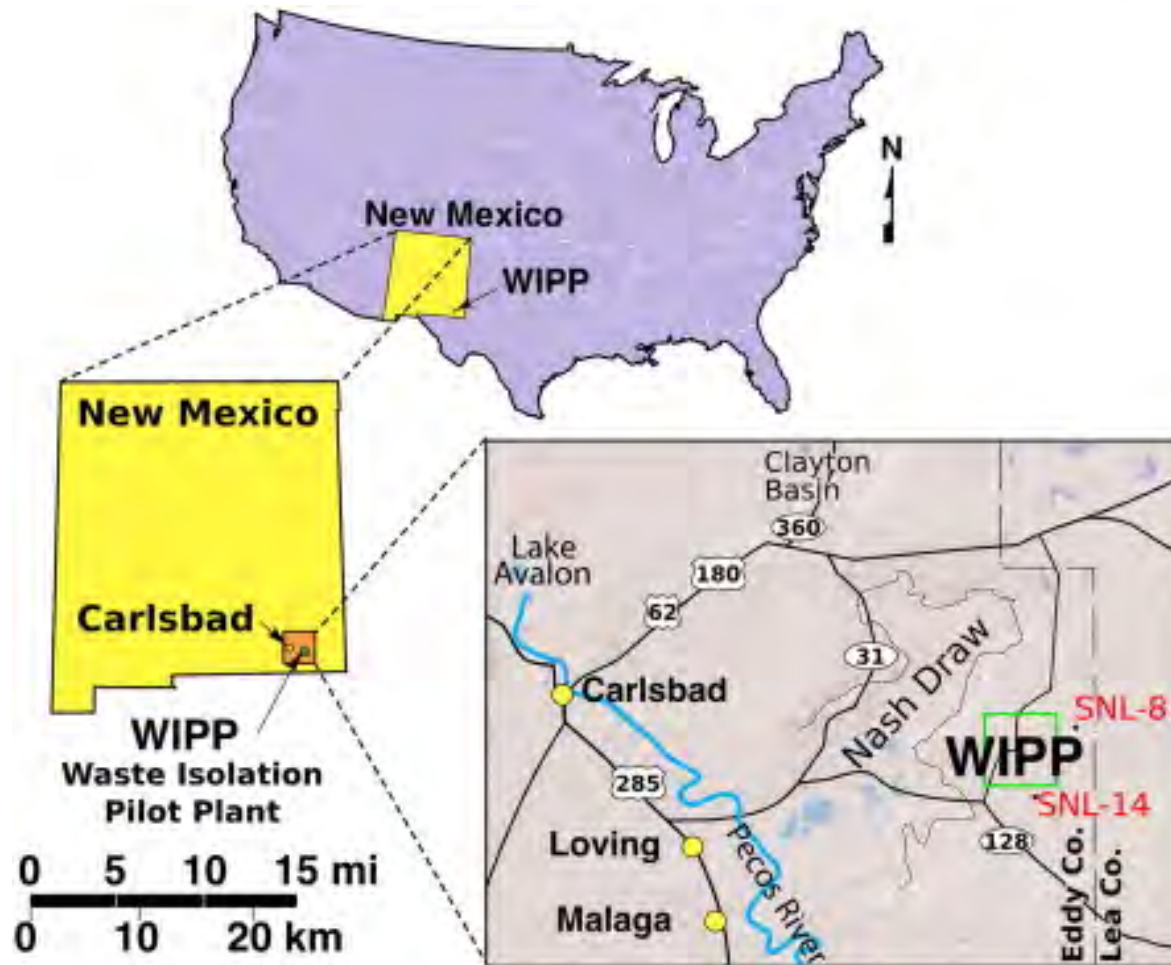
Jeffrey Carswell, Deputy Manager

*Carlsbad Field Office
Office of Environmental Management*

**National Council of State Legislators
June 27, 2017**

- **WIPP Background**
 - Location and geology
 - Transportation system
 - 2014 fire and radiological release events
 - Key steps to recovery
 - Recovery Challenges
- **WIPP Future - Near-Term (next 12 months)**
 - WIPP reopening
 - Waste emplacement operations in Panel 7
 - Resumption of shipping – establishing priorities
 - Supplemental Ventilation
 - Restart of mining operations
 - Mining and waste emplacement model
 - Withdrawal from far south end of the WIPP underground
- **WIPP Future - Long-Term (1 to 5 years)**
 - New - air intake shaft
 - New safety significant permanent ventilation system
 - Conceptual model for additional disposal area

WIPP Footprint

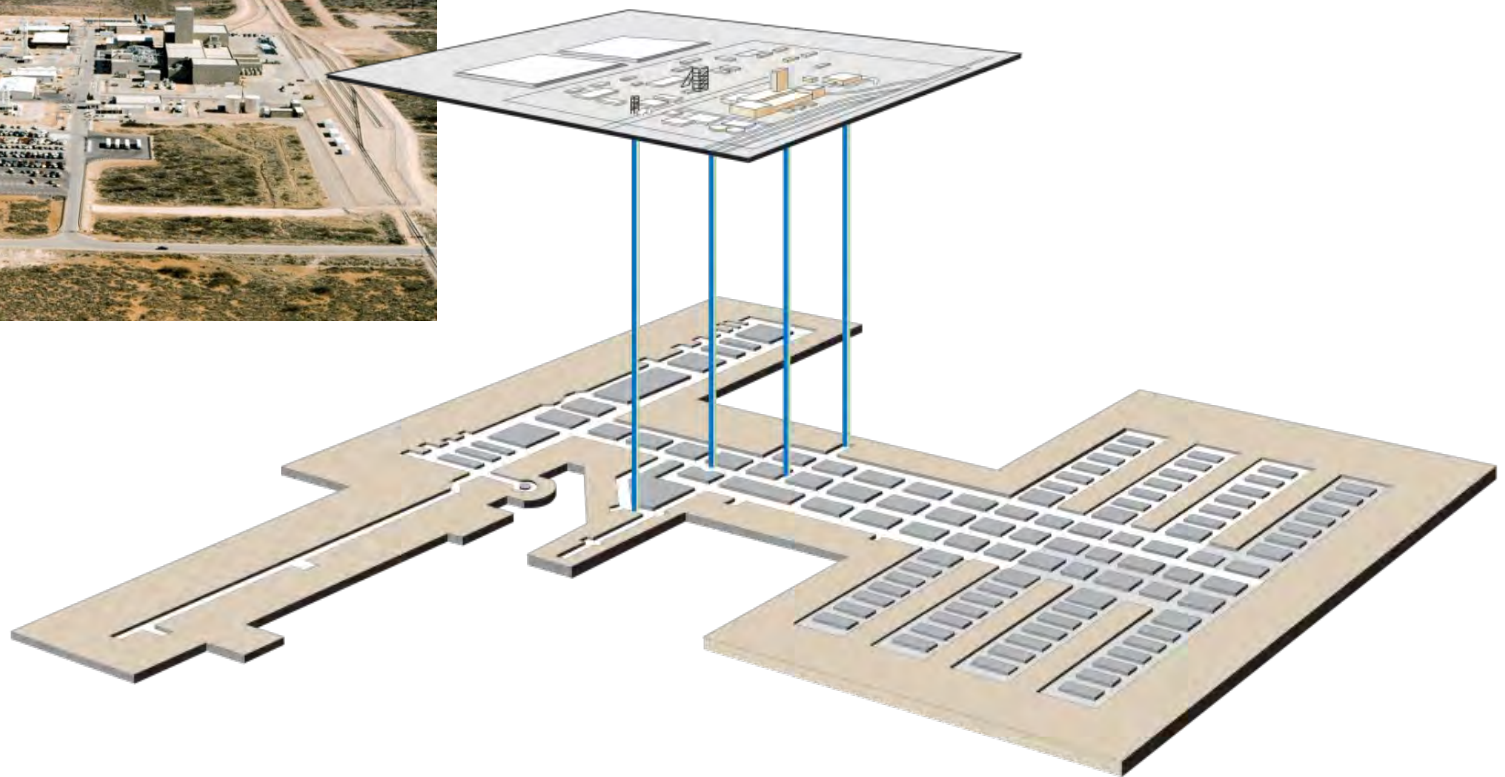








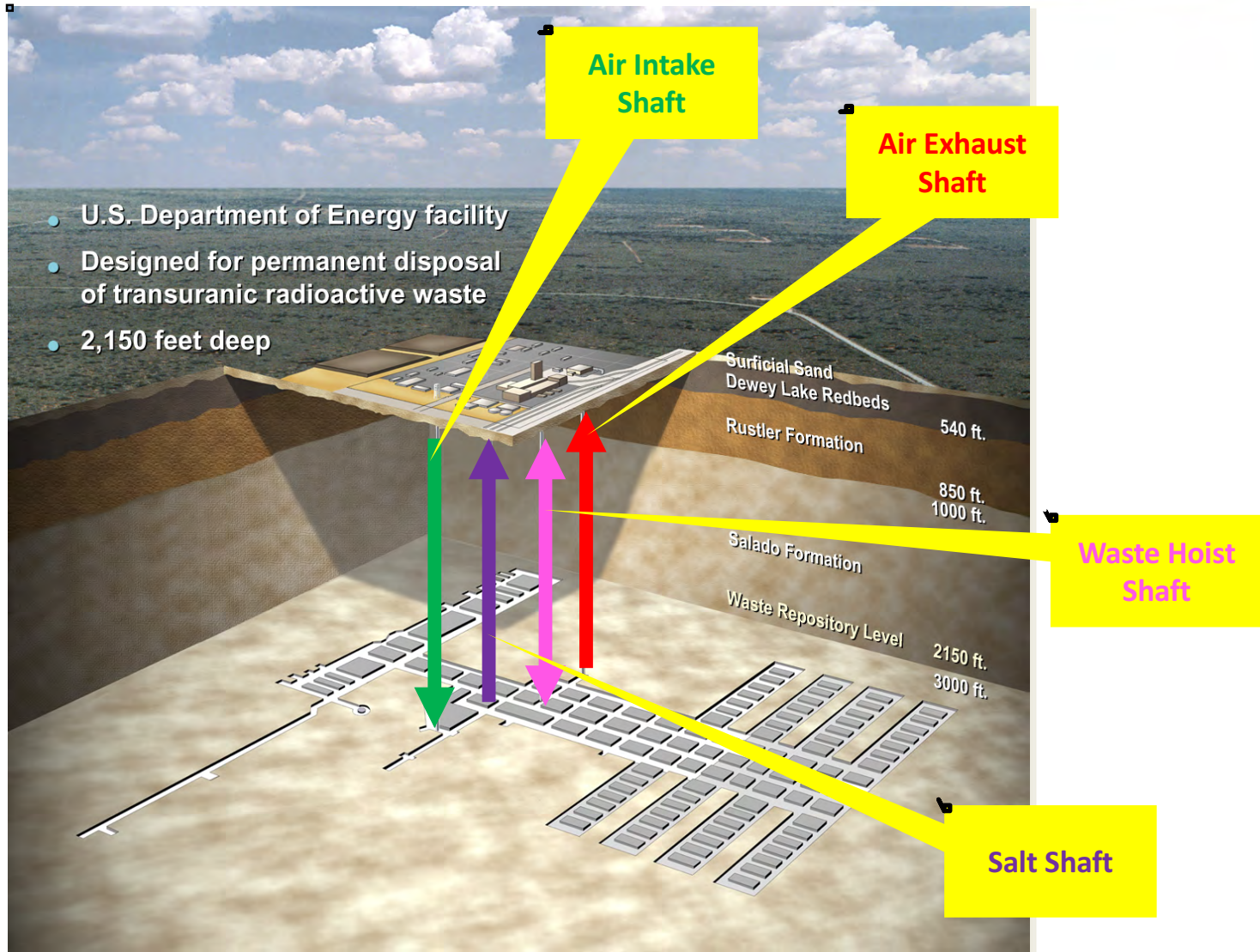
WIPP Configuration



WIPP Configuration



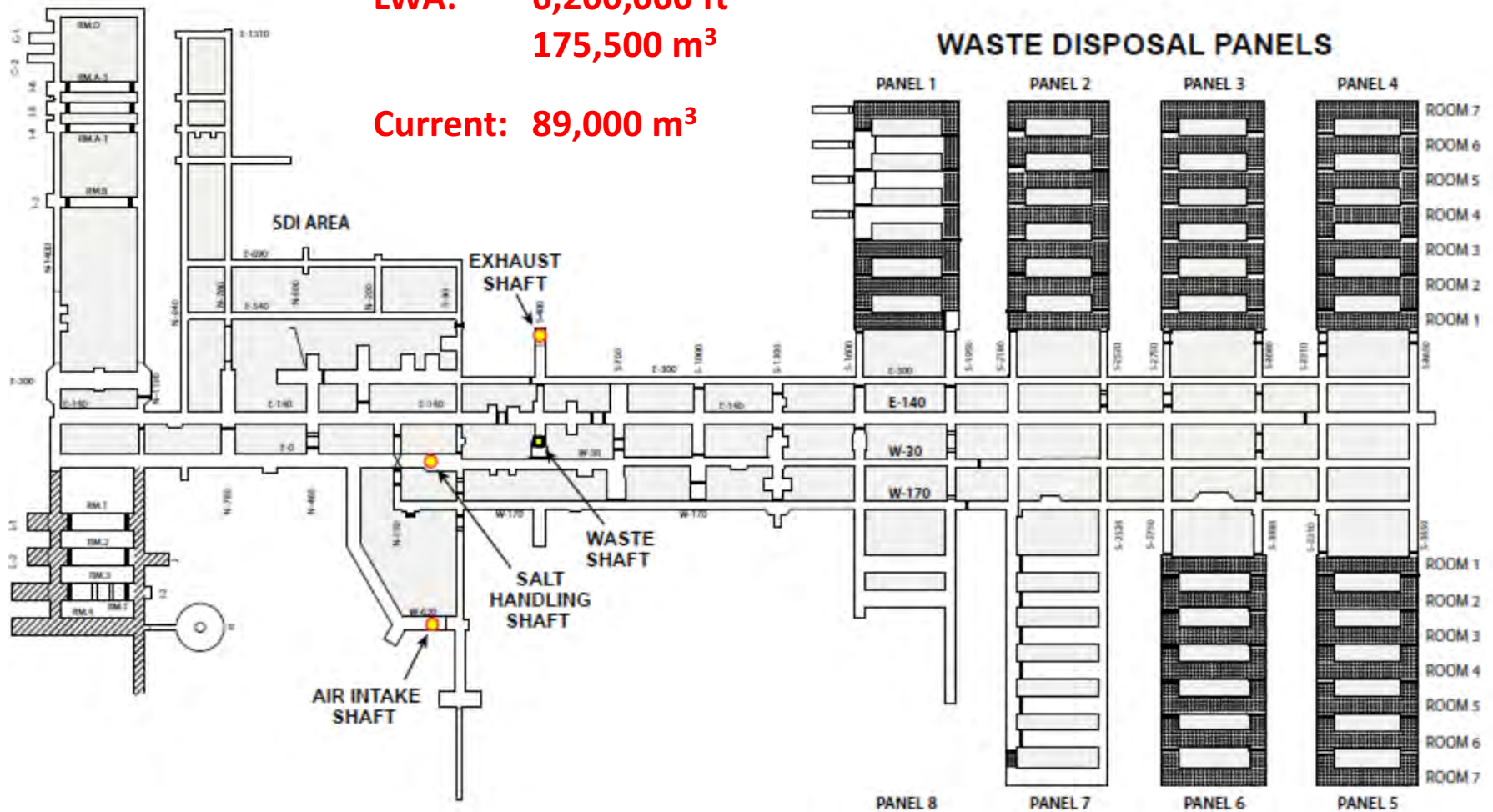
WIPP Facility - Underground



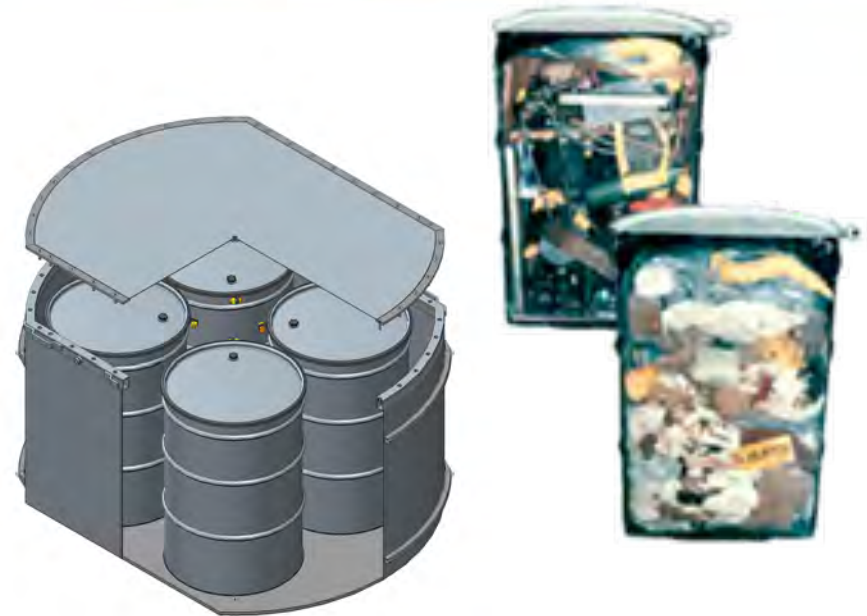
WIPP Facility – Underground Map

**LWA: 6,200,000 ft³
175,500 m³**

Current: 89,000 m³



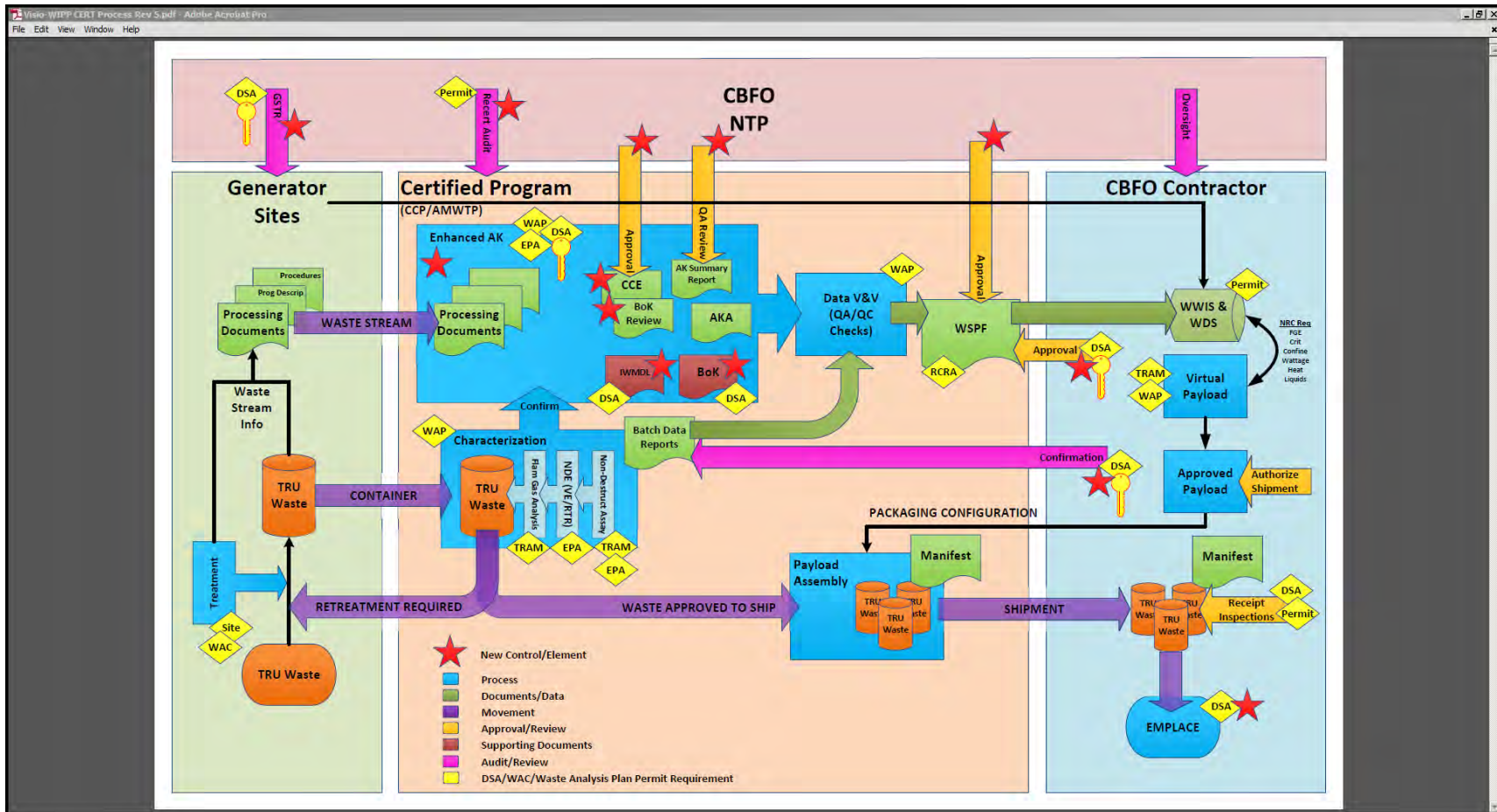
- Waste associated with defense
- Materials contaminated with man-made radioactive elements heavier than uranium (mostly Plutonium)
 - Alpha emitting isotopes/ $t^{1/2} > 20$ years
 - Clothing, tools, rags, containers, etc.
 - Soils and debris
- Two types of TRU waste
 - Contact-Handled (<200 mrem/hr)
 - Remote-Handled (>200 mrem/hr)
- Various Container Types
 - 55 gallon drums
 - 100 gallon drums
 - Boxes
- Legacy inventory ~700,000 drum equivalents



Periodic Table of the Elements

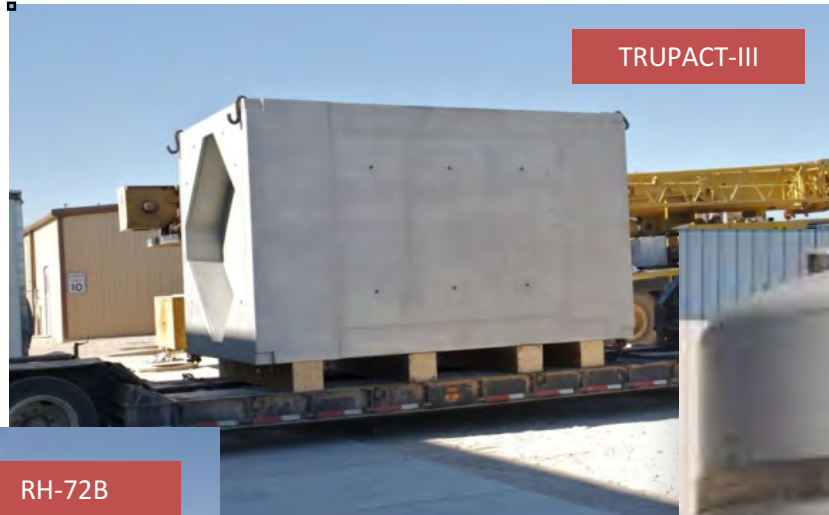
1	IA																2	0	
1	H																	He	
2	IIA												VIIA		10				
3	Li	Be											B	C	N	O	F	Ne	
4	IIIA												Al	Si	P	S	Cl	Ar	
5	Na	Mg	IIIB	IVB	VB	VIB	VIB	VII		IB	IB	31	32	33	34	35	36		
6	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	
7	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe	
8	Cs	Ba	*La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn	
9	Fr	Ra	+Ac	Rf	Ha	Hg	Hs	Hs	Mt	110	111	112	113						
			* Lanthanide Series																
			+ Actinide Series																
			58	59	60	61	62	63	64	65	66	67	68	69	70	71			
			Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu			
			90	91	92	93	94	95	96	97	98	99	100	101	102	103			
			Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr			

National TRU Program Process



WIPP Transportation System

NRC certified Type B containers:



WIPP Transportation System



Waste containers are loaded into protective shipping containers (such as TRUPACT-II)



Shipping containers are loaded onto specially designed flatbed trailers. State personnel inspect load before departure



Drivers inspect their rigs and loads every 3 hours or 150 miles. Some states require additional inspections at their ports of entry



For safety and security reasons, shipments are tracked throughout their journey using a satellite system (TRANSCOM)



WIPP-trained state and local emergency responders along all shipping routes, with frequent exercises

WIPP Transportation System



- US Interstate (Open)
- US Highway (Open)
- State Highway (Open)
- Route Not Open
- Route Closed

22 sites completed
11,800 shipments thru Feb. 2014
14 million loaded miles

WIPP Transportation System





Waste containers are unpackaged and placed on waste hoist for 2155' descent into underground



Waste Emplacement

In underground, waste is removed from the hoist and transported to a disposal room



Waste Emplacement

Waste is emplaced in recently mined rooms. Magnesium oxide is placed on waste stack.

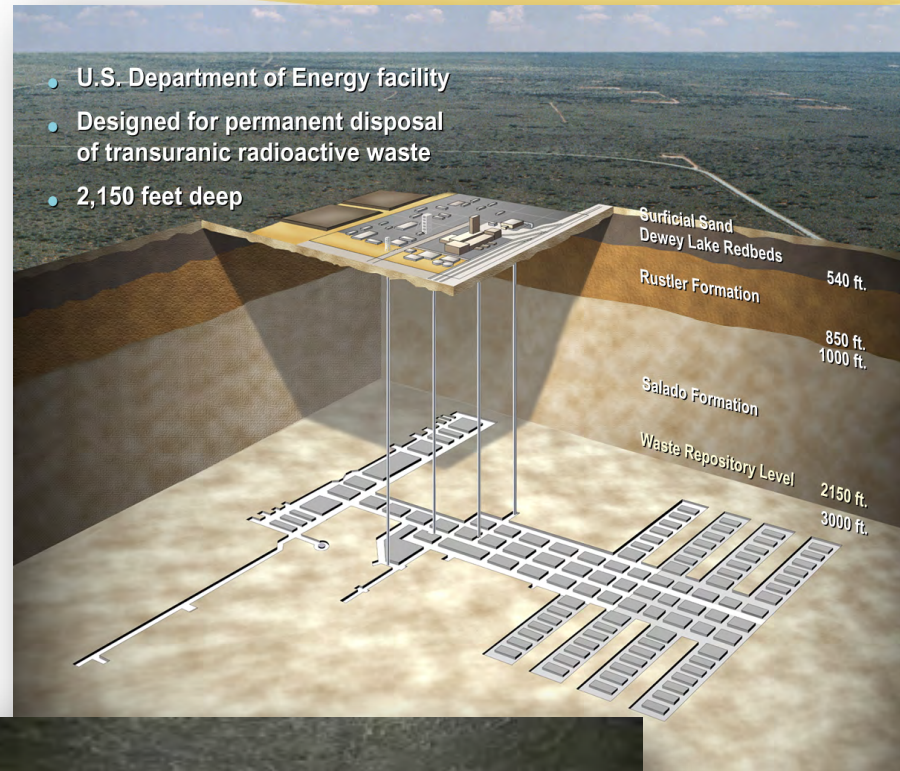


Shipping priorities are based on many factors, including:

- Equipment maintenance
- Stacking to maximize footprint usage
- Ground Control
- Curie limits
- VOC limits



Facility mined in salt:
2,150 feet deep in ancient
salt formation that closes in
and entombs waste forever



The February 2014 Accidents at WIPP

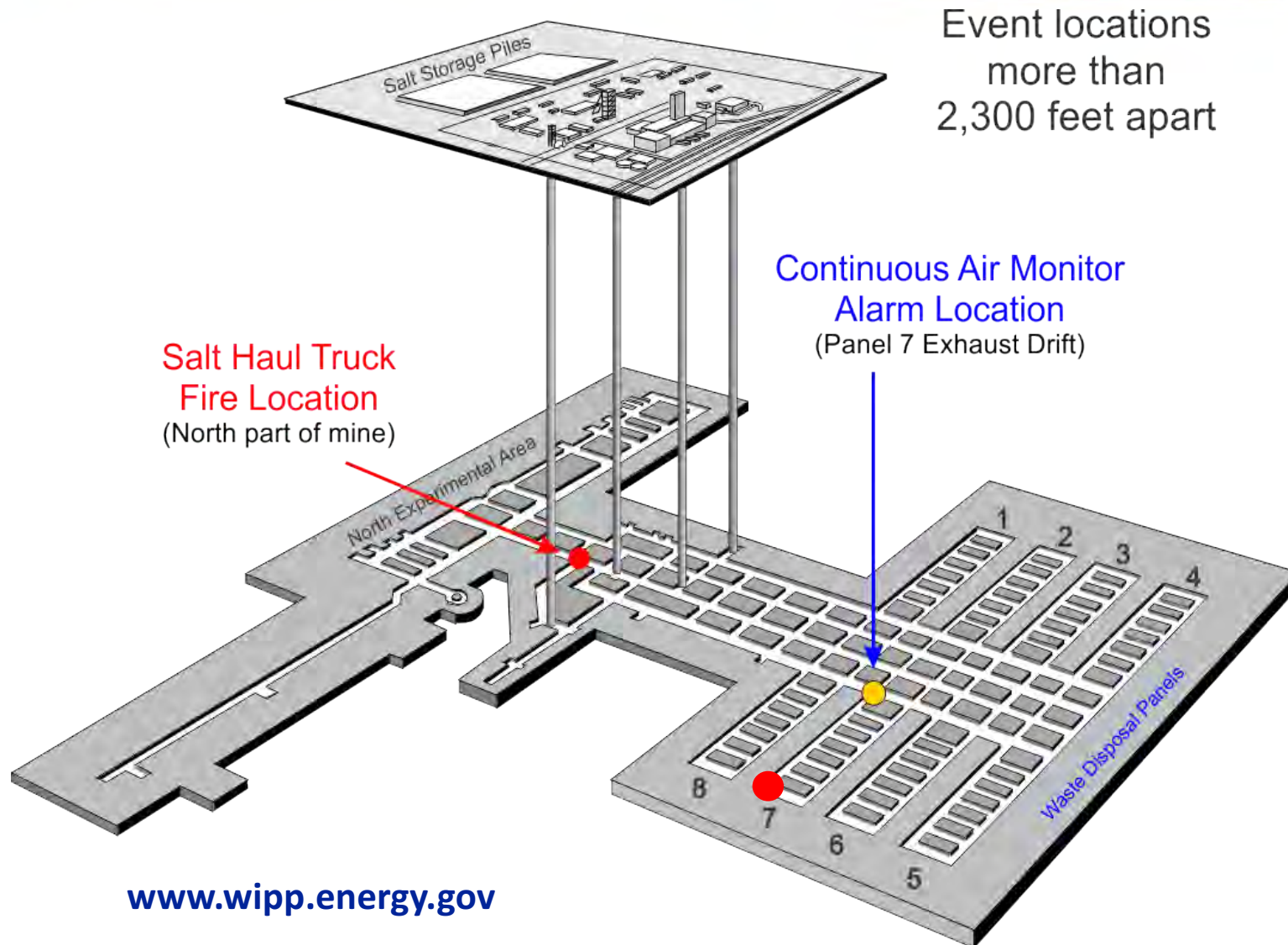


- Shipments made 1999 through 2014
 - 11,897 shipments from 22 sites around the country
- Waste receipt and emplacement suspended in February 2014 due to two events:
 - Fire on underground vehicle
 - Thermal event in an emplaced drum



25

Recap of Incidents: Layout of the Underground



www.wipp.energy.gov

Reopening and Resumption of Shipments



Key Steps Toward Recovery

- Documented Safety Analysis Revisions
- Safety Management Program Revitalization
- Underground Restoration
 - Re-Establish Degraded Equipment
 - Fire Protection
 - Maintenance and Ground Control
 - Radiological Roll-back
 - Soot cleaning of electrical panels
- Expedite mine stability
- Initial Panel 6 and Panel 7, Room 7 Closure
- Interim Ventilation



Key Steps Toward Recovery

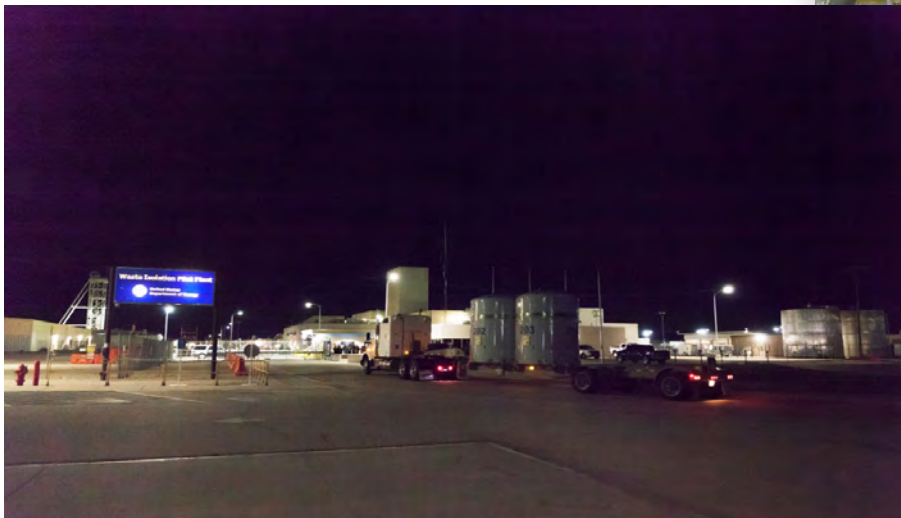
- Initial Panel 6 and Panel 7, Room 7 Closure – isolation of nitrate salt waste
- Procurement and installation of Interim Ventilation System



WIPP Facility – Waste Handling



- Significant changes to site safety management programs
- Extensive readiness activities performed in 2016
- DOE/State of NM authorized operations in December 2016
- First emplacement in early January 2017
- First shipments received in early April 2017



- Waste in WHB
- Waste at WCS
- Waste in Complex



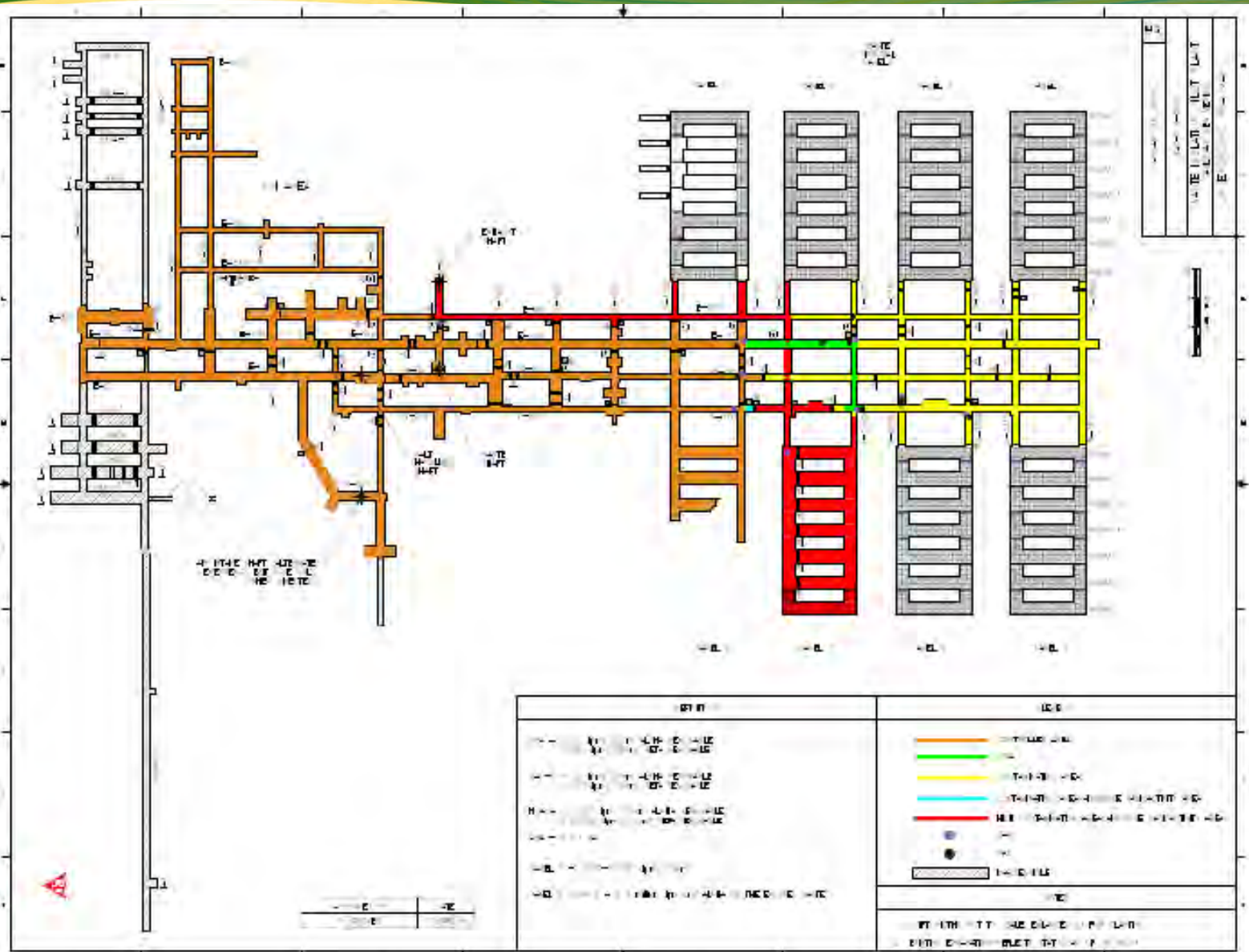
- With Panel 7 contaminated, emplacement rates are 2-3 a week.
- The goal will be getting to 4-5 emplacements next year.
- Panel 7 will take 3-4 years to fill.
- Shipping rates will return to higher rates once emplacement begins in Panel 8 and a new ventilation system is on-line.



Challenges



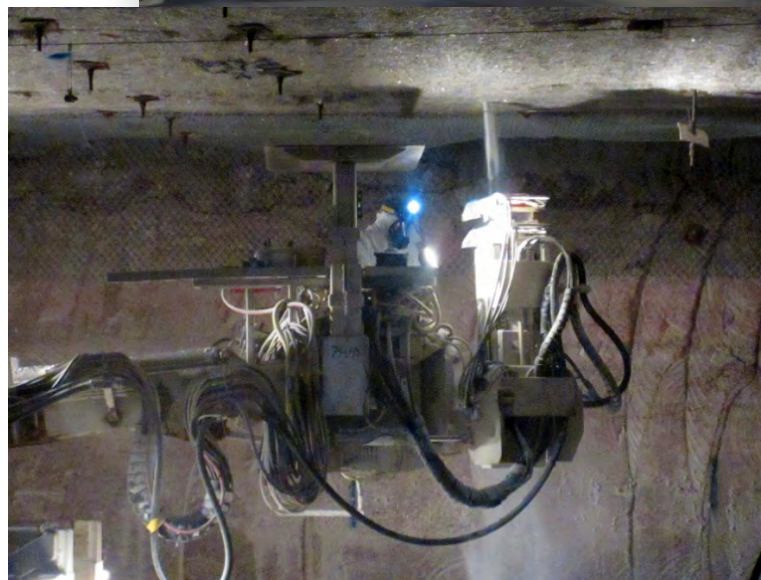
Challenges - Radiological Conditions



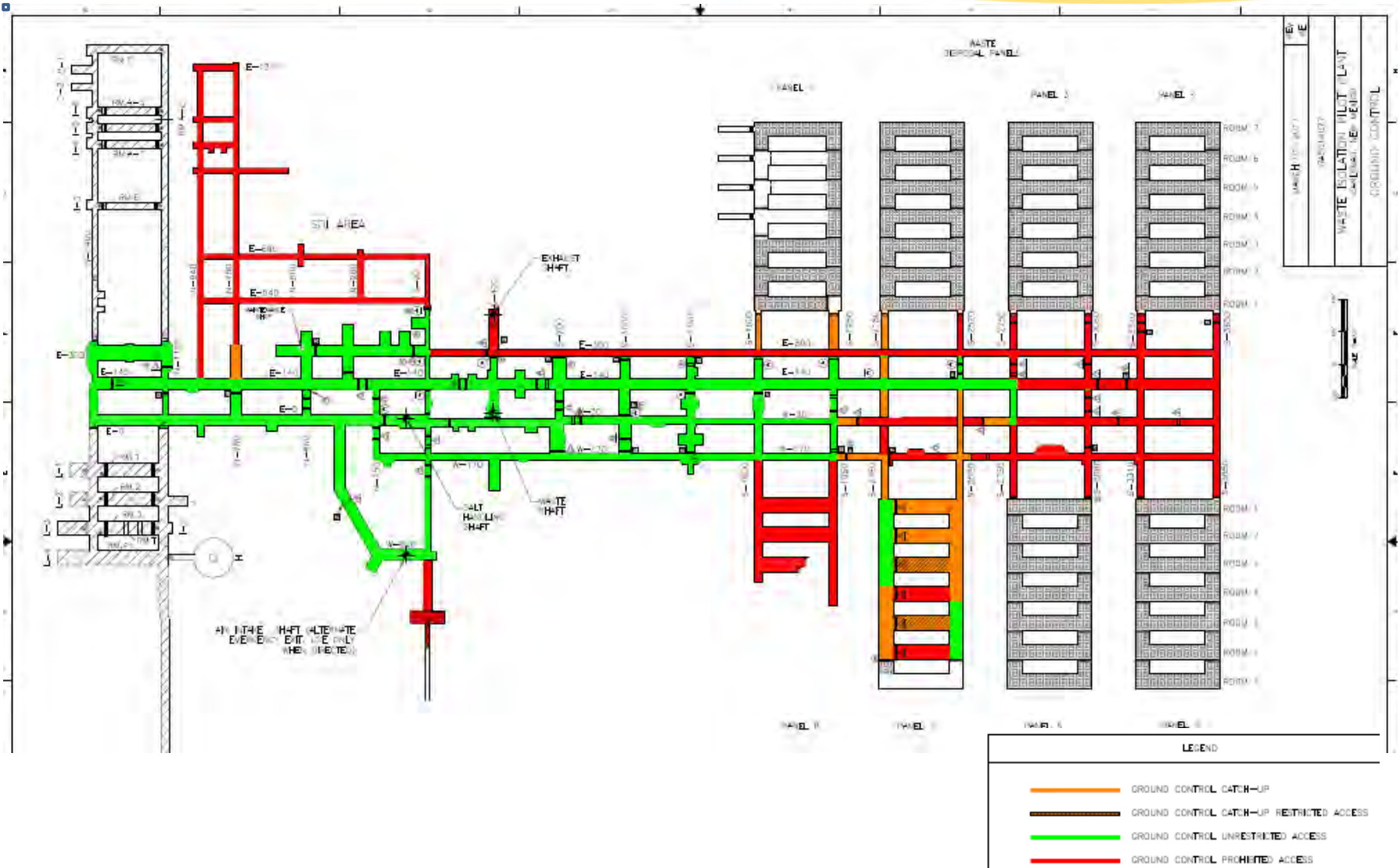
Challenges - Ground Control

Limitations:

- 9 – months with no ground control following incidents
- Low ventilation rates limited bolting operations
- Need for workers to operate in personal protective clothing and respirators

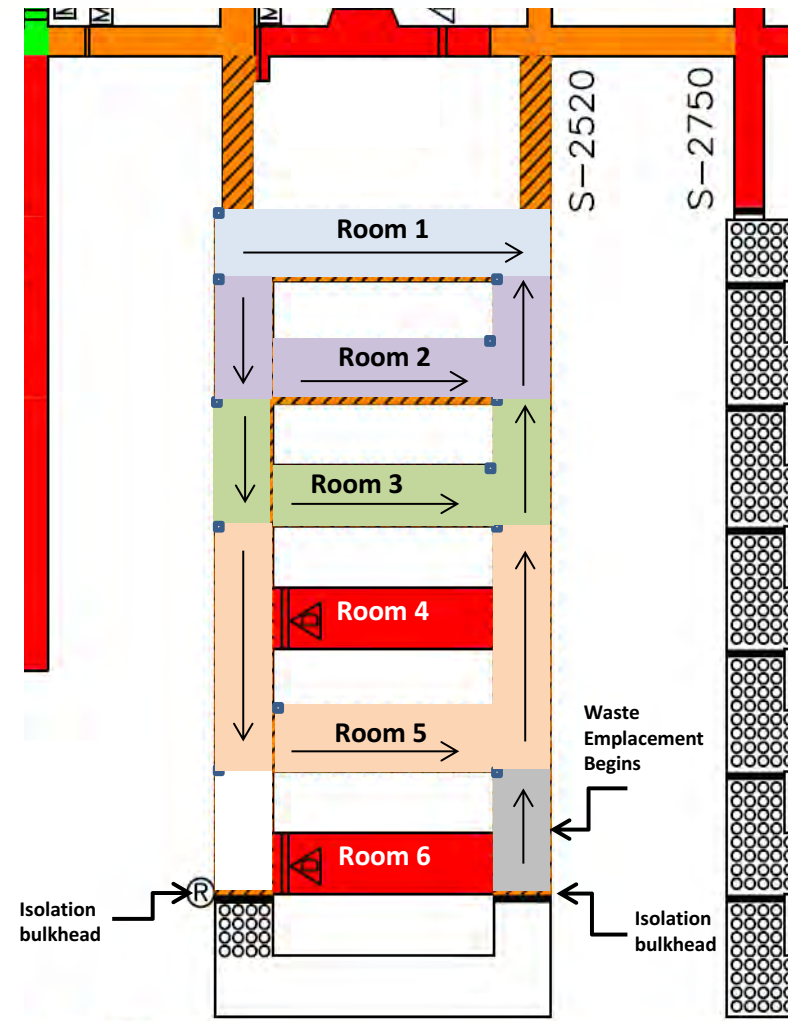


Challenges - Ground Control



Panel 7 Status

- Bulkhead were placed at both ends of Room 7 to isolate waste following events – remains closed
- Rock fall occurred in Room 4 on November 3, 2016 – fall was predicted and room was already prohibited
- Room 6 is prohibited due to ground control – also contains abandoned equipment
- Rooms 1, 2, 3 and 5 are safe and usable for waste emplacement
- Waste emplacement has started in S2520 moving west to east
- Currently available disposal capacity in Panel 7 should last approximately 3 years, depending on shipping rates



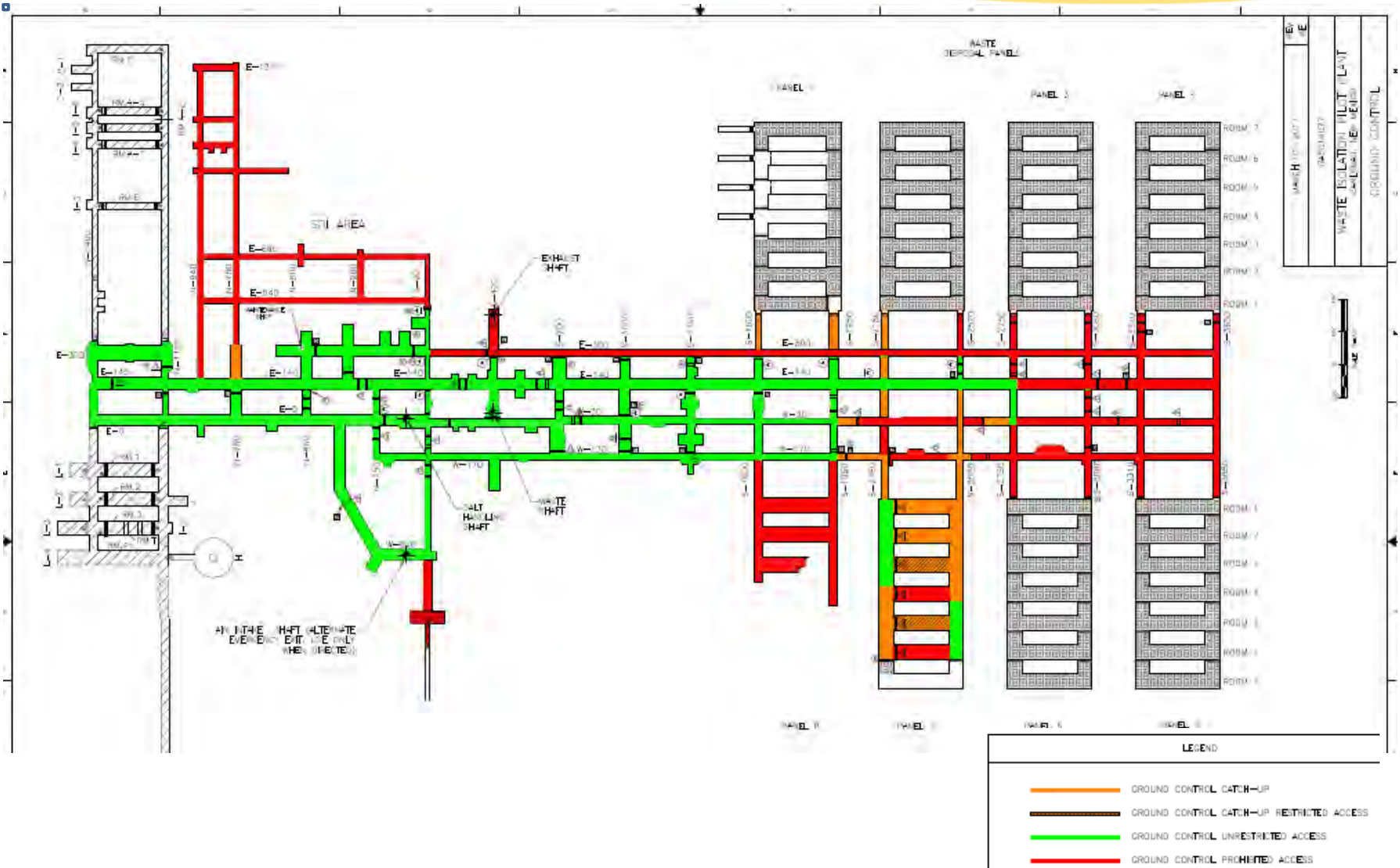
Mining Panel 8 Will Resume

Mining of Panel 8:

- Planned to begin in October 2018
- No contamination present
- Required to bolt our way into the panel to remove equipment that has remained there since events
- Mining operations are expected to take approximately 3 years



Challenges - Ground Control



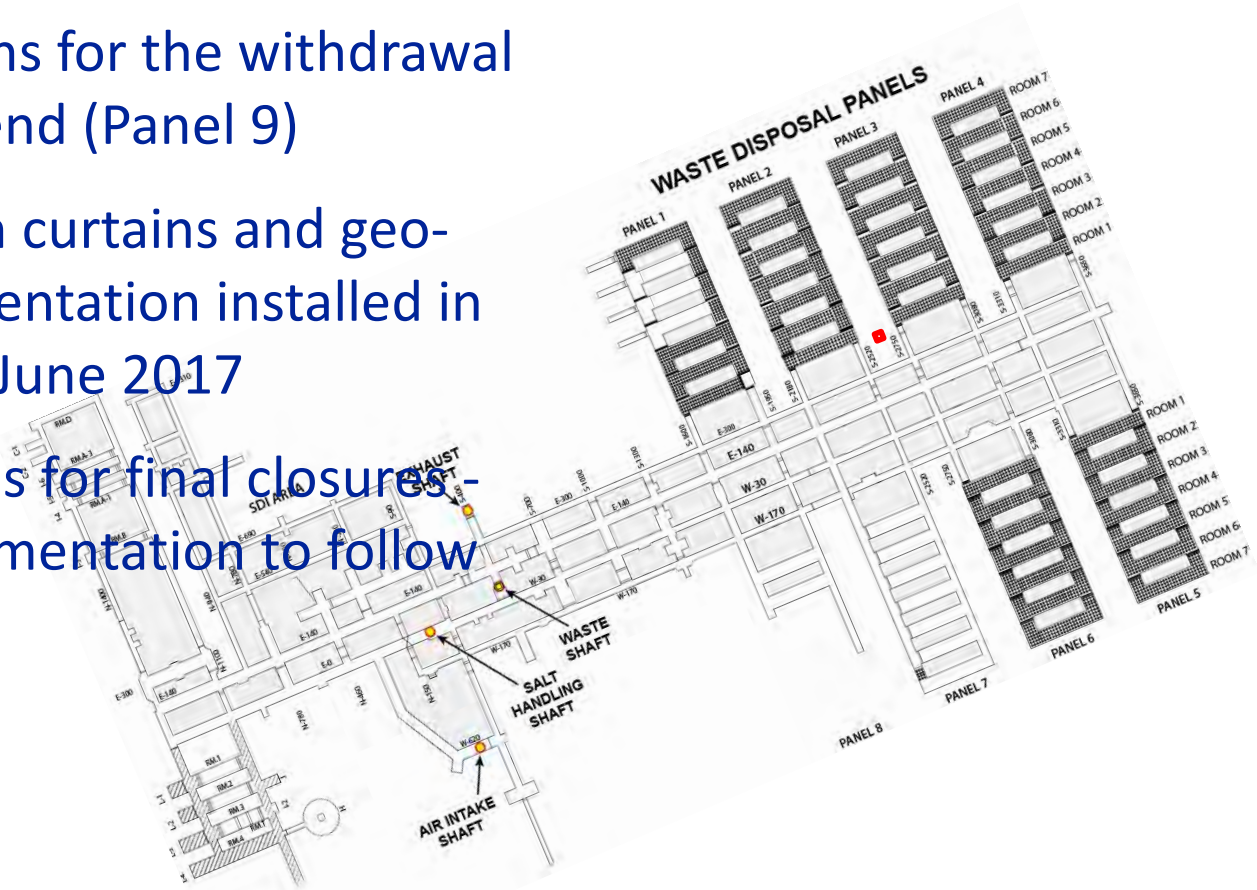
Supplemental Ventilation System (SVS) will add 70 KCFM to underground to support mining operations – on line in late September



Use of new “de-dusting” technology should reduce impacts of salt dust on air filtration systems

Far South End Closure Progress

- Initiated preparations for the withdrawal from the far south end (Panel 9)
- Cribbing, ventilation curtains and geo-mechanical instrumentation installed in the south mains by June 2017
- Regulatory approvals for final closures - 2+ years with implementation to follow



Projected Shipping Estimates

Key considerations in the development of the shipping estimate and points of origin included:

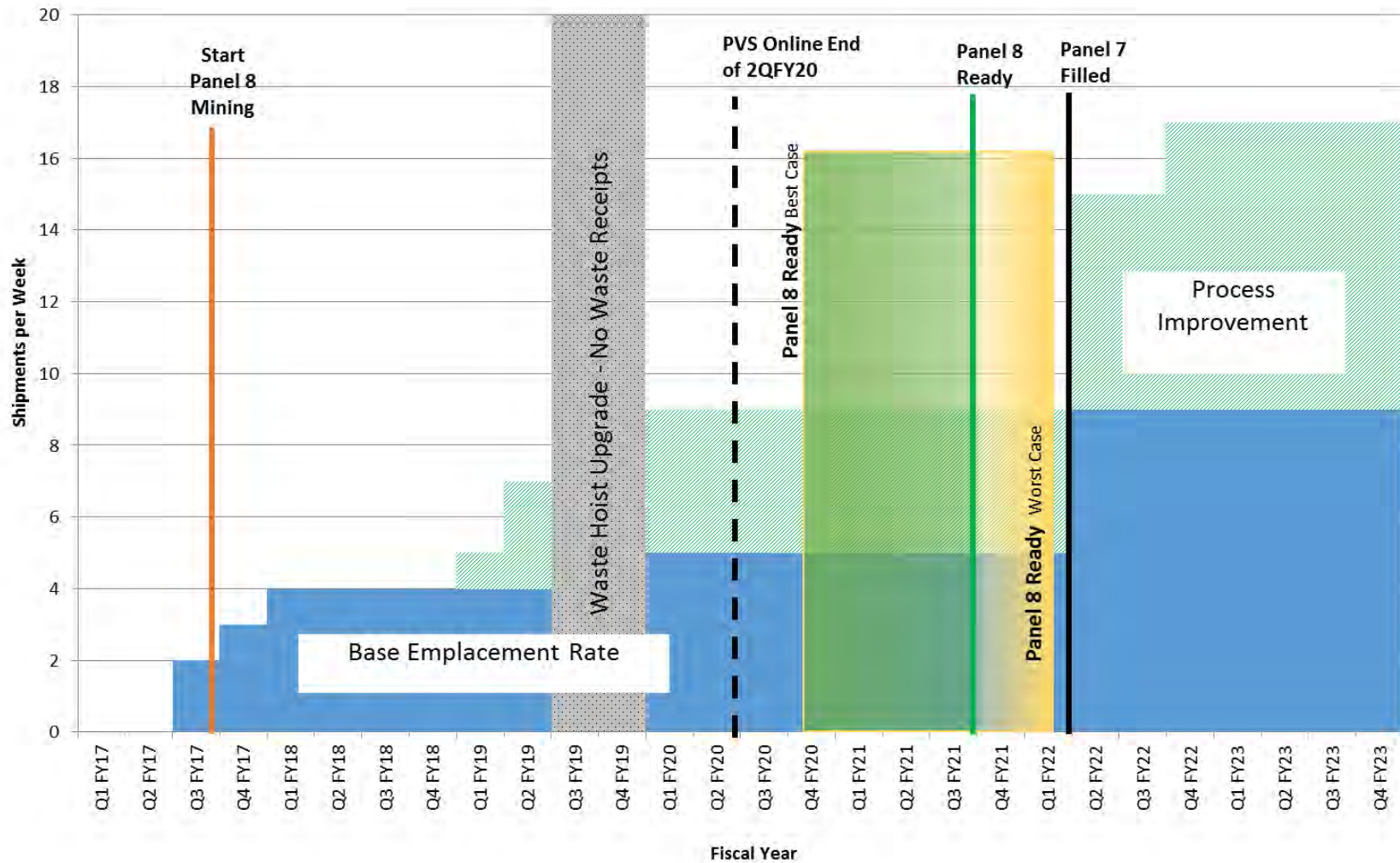
- WIPP waste emplacement rate;
- Available waste to ship;
- Regulatory commitments and agreements;
- WIPP transportation/waste acceptance capabilities;
- Flexibility for changing technical and policy constraints.

Site	Projected Shipments
Idaho	61
Savannah River	8
Waste Control Specialists	11
Los Alamos	24
Oak Ridge	24
TOTAL	128

Out years: Argonne, Lawrence Livermore, Sandia

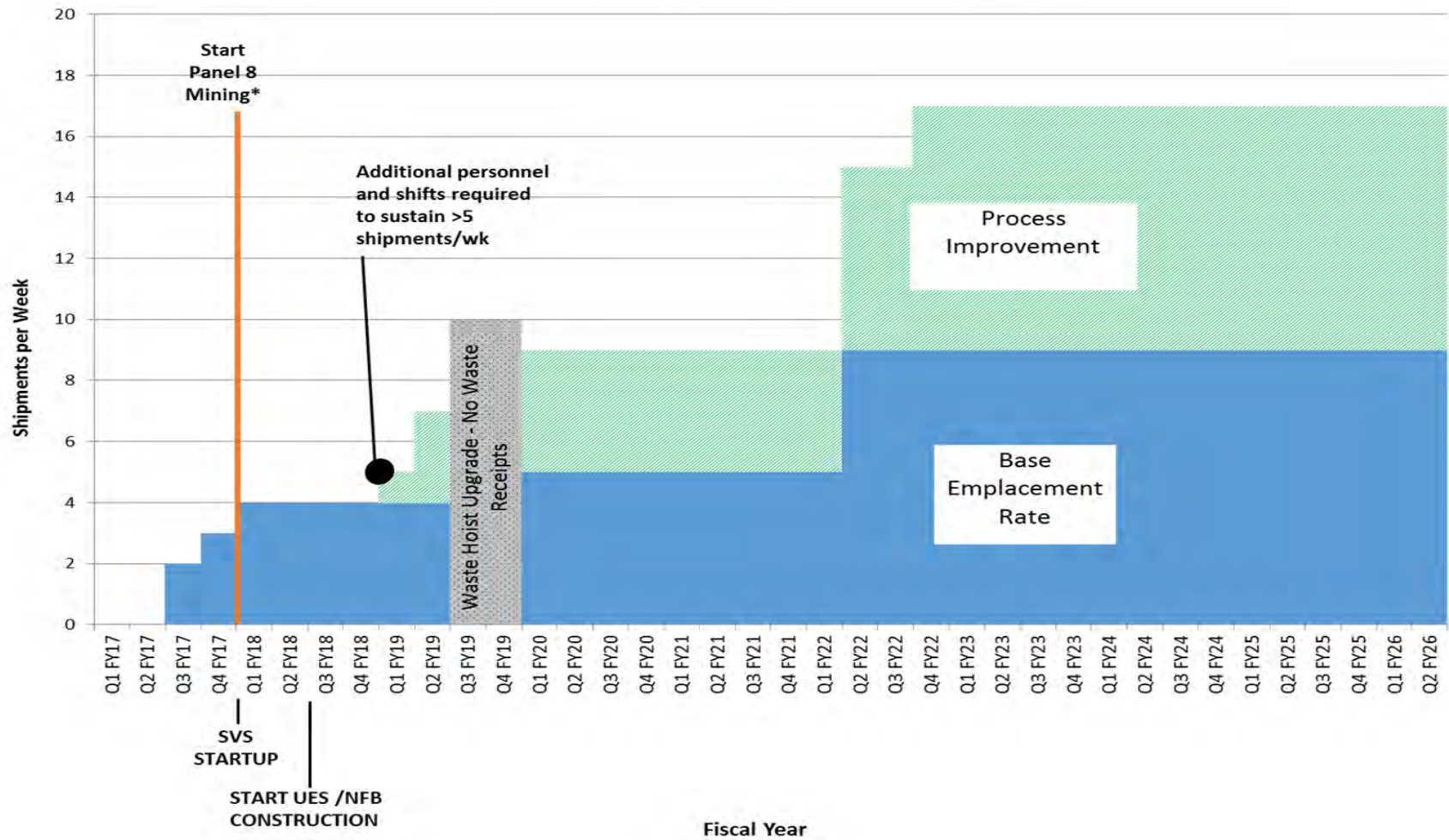
WIPP Mining and Waste Emplacement Model

Waste Emplacement Rates FY17 - FY23



Projected Waste Emplacement Rates FY17-26

Waste Emplacement Rates FY17 - FY26



Future



Path Forward: Near-Term and Long-Term

- **Near-Term (next 12 months)**
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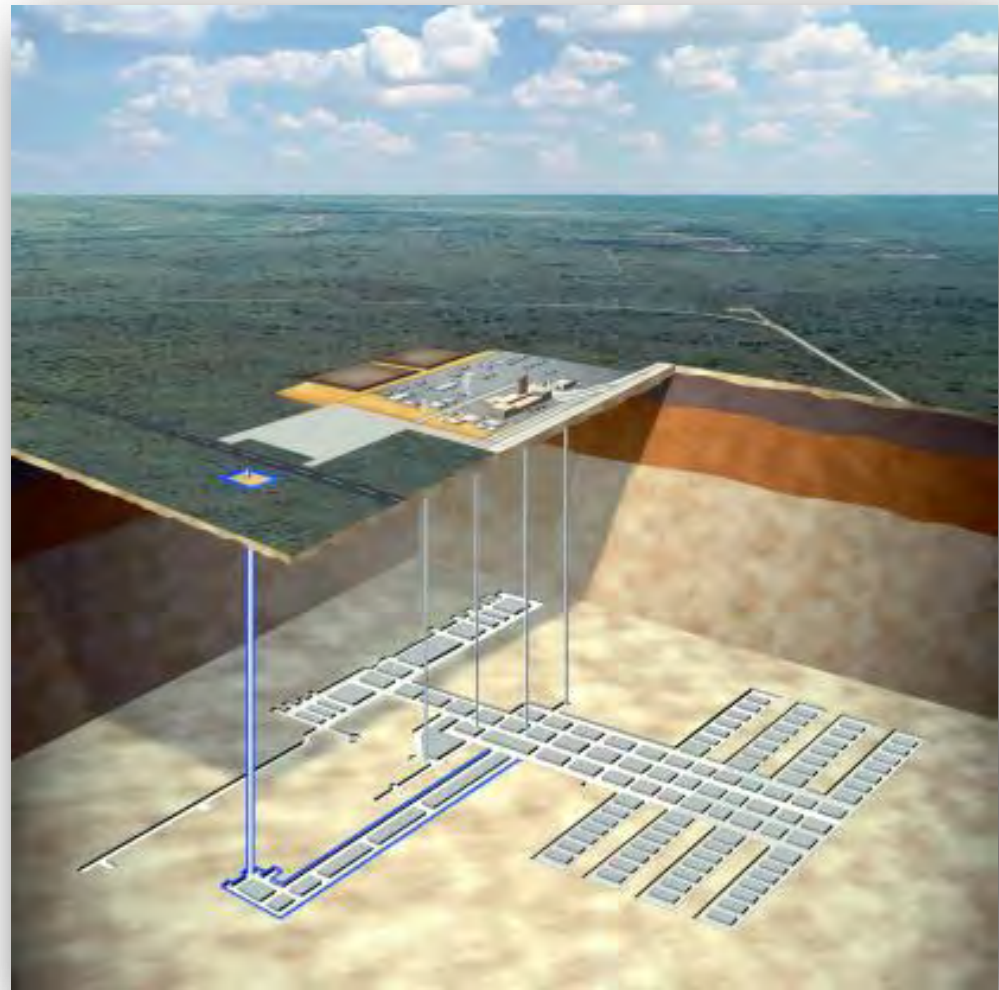
New Ventilation Shaft

- Using top-down drilling method
- Located across the access road from the WIPP parking lot
- Geotechnical core drilling to 2,300 feet is complete
- Critical Decision 2/3 expected in March 2018
- CD 4 expected in December 2020



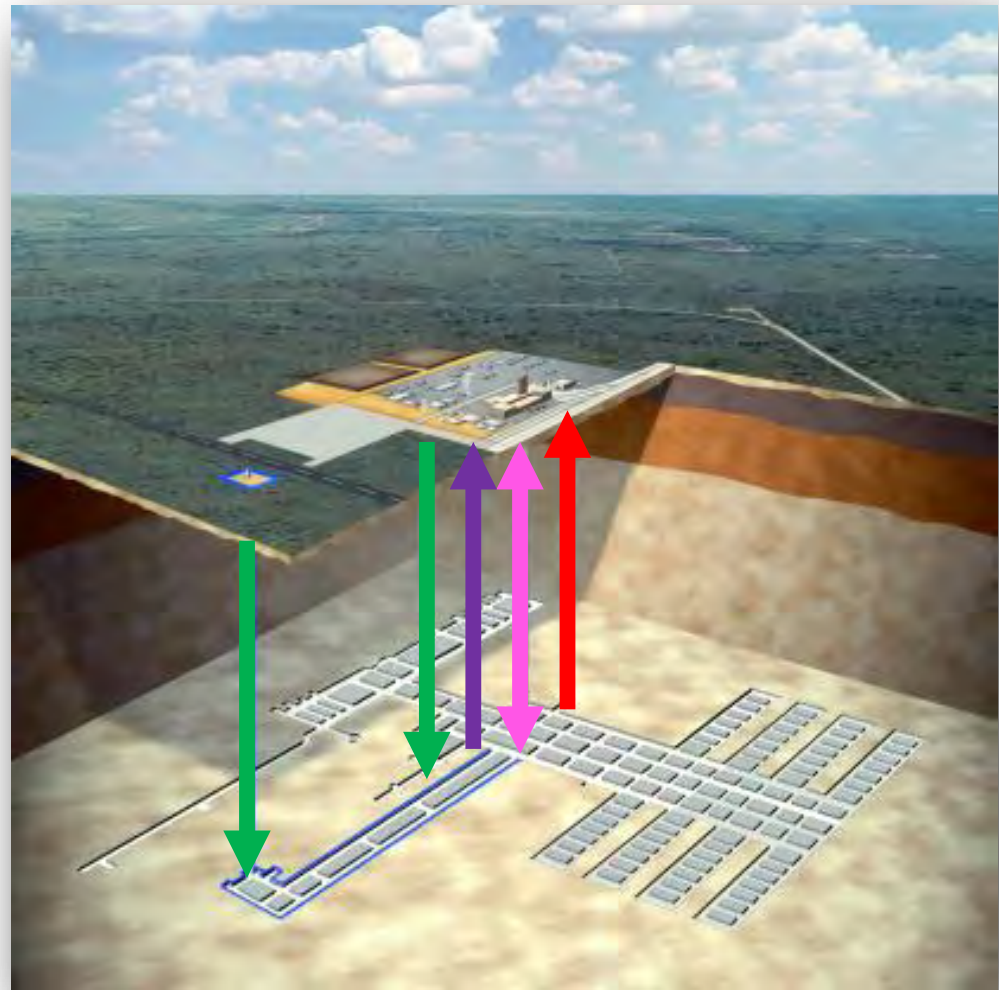
Depiction of New Footprint

- **New footprint is being evaluated with the following criteria:**
 - ✓ Priority will be to create panels to compensate for authorized disposal area that was reduced by ground control issues in the far south end
 - ✓ Panels and drifts construction is under review
 - ✓ Panels will be mined with existing equipment and methods



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 - ✓ Panels will be mined with existing equipment and methods
 - ✓ Regulatory issues

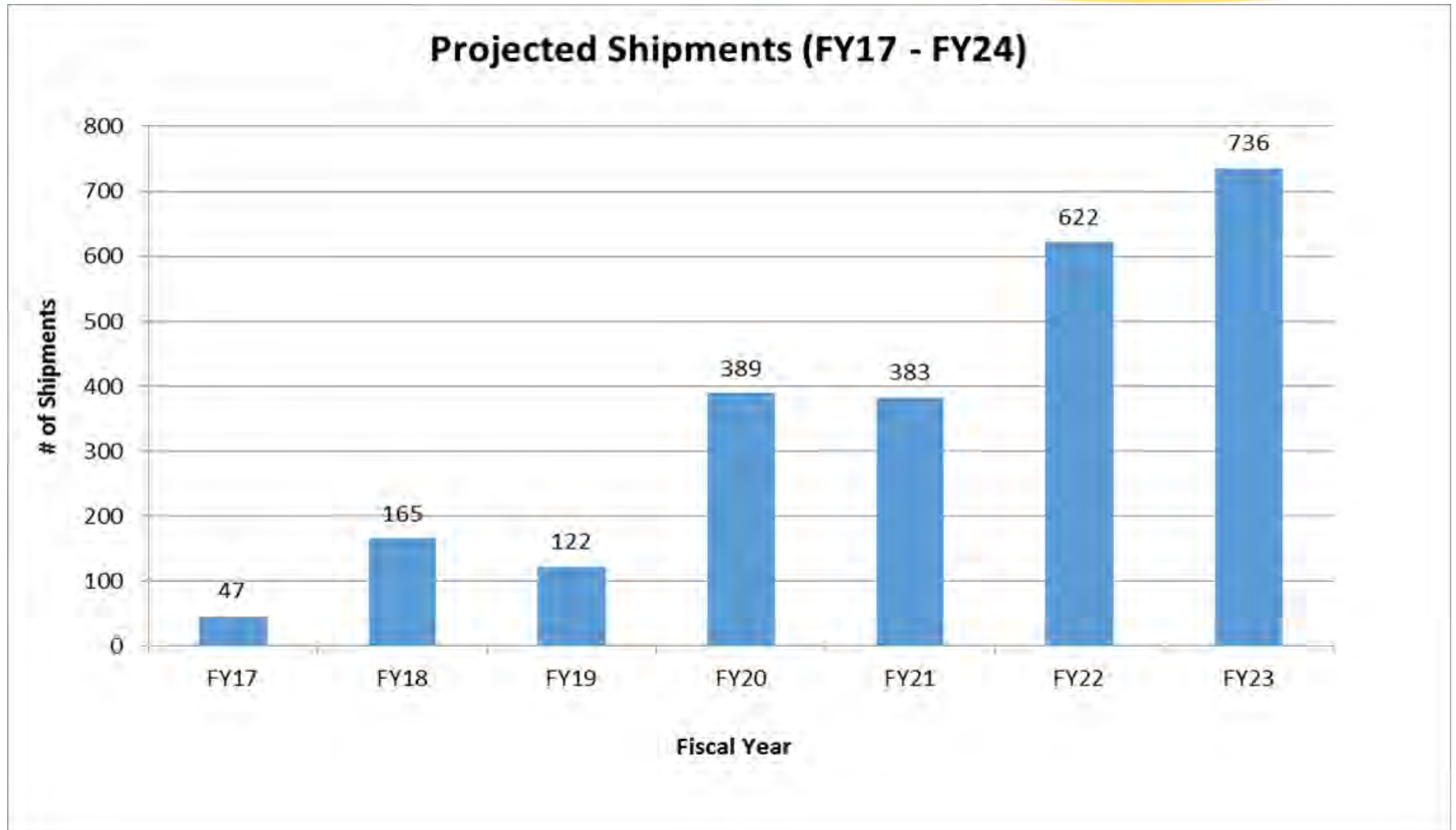


WIPP is pursuing adding Above Ground Storage Capability

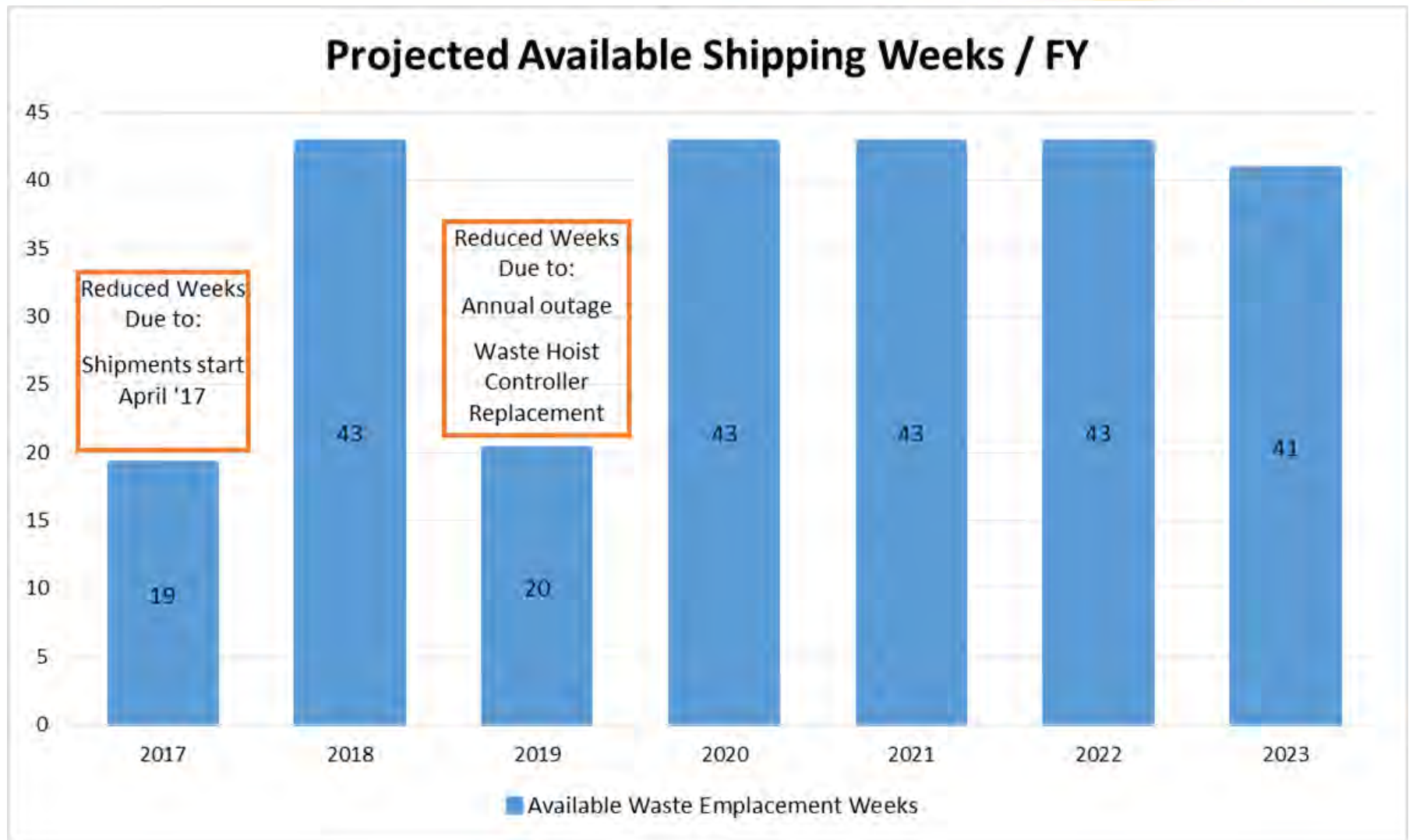
- System is similar to that used at Savannah River Site
- Storage limited to one year
- Would accommodate up to 8 weeks of shipments at 17 shipments per week
- Storage is for operational flexibility, not for storage from other sites



Out-Year Projected Shipments



Out-Year Available Shipping Weeks



Questions

