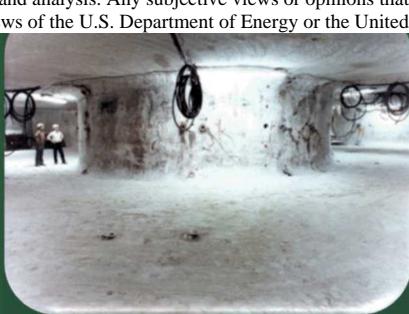
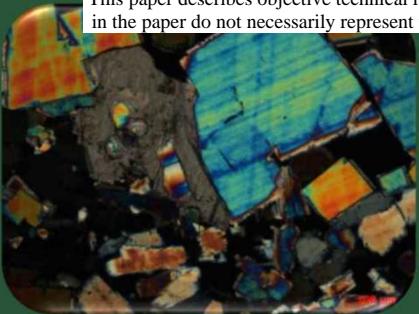
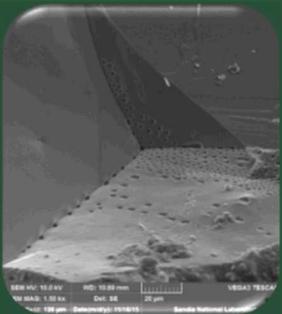


This paper describes objective technical results and analysis. Any subjective views or opinions that might be expressed in the paper do not necessarily represent the views of the U.S. Department of Energy or the United States Government.



WIPP Events and the Lasting Impact

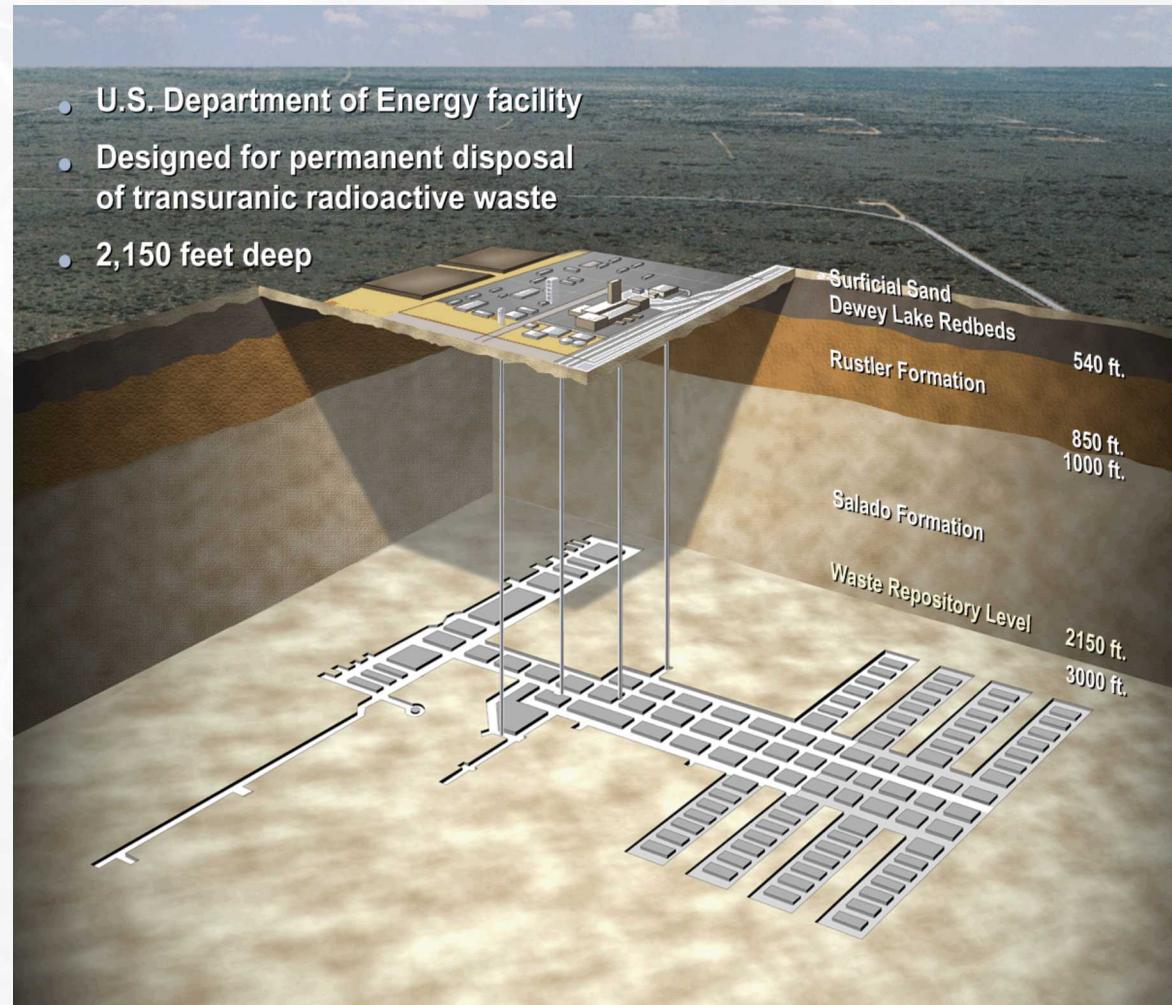
Sean Dunagan
Sandia National Laboratories

IGSC Safety Case Symposium 2018
October 11, 2018

Sandia National Laboratories is a multi-mission laboratory managed and operated by National Technology and Engineering Solutions of Sandia LLC, a wholly owned subsidiary of Honeywell International Inc. for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525. This research is funded by WIPP programs administered by the Office of Environmental Management (EM) of the U.S. Department of Energy.

Outline

- Recovery
- Ground Control Challenges
- Waste Emplacement
- Resumption of Shipments
- Mining Status
- Withdrawal from south end of mine
- Lessons Learned



WIPP Incidents

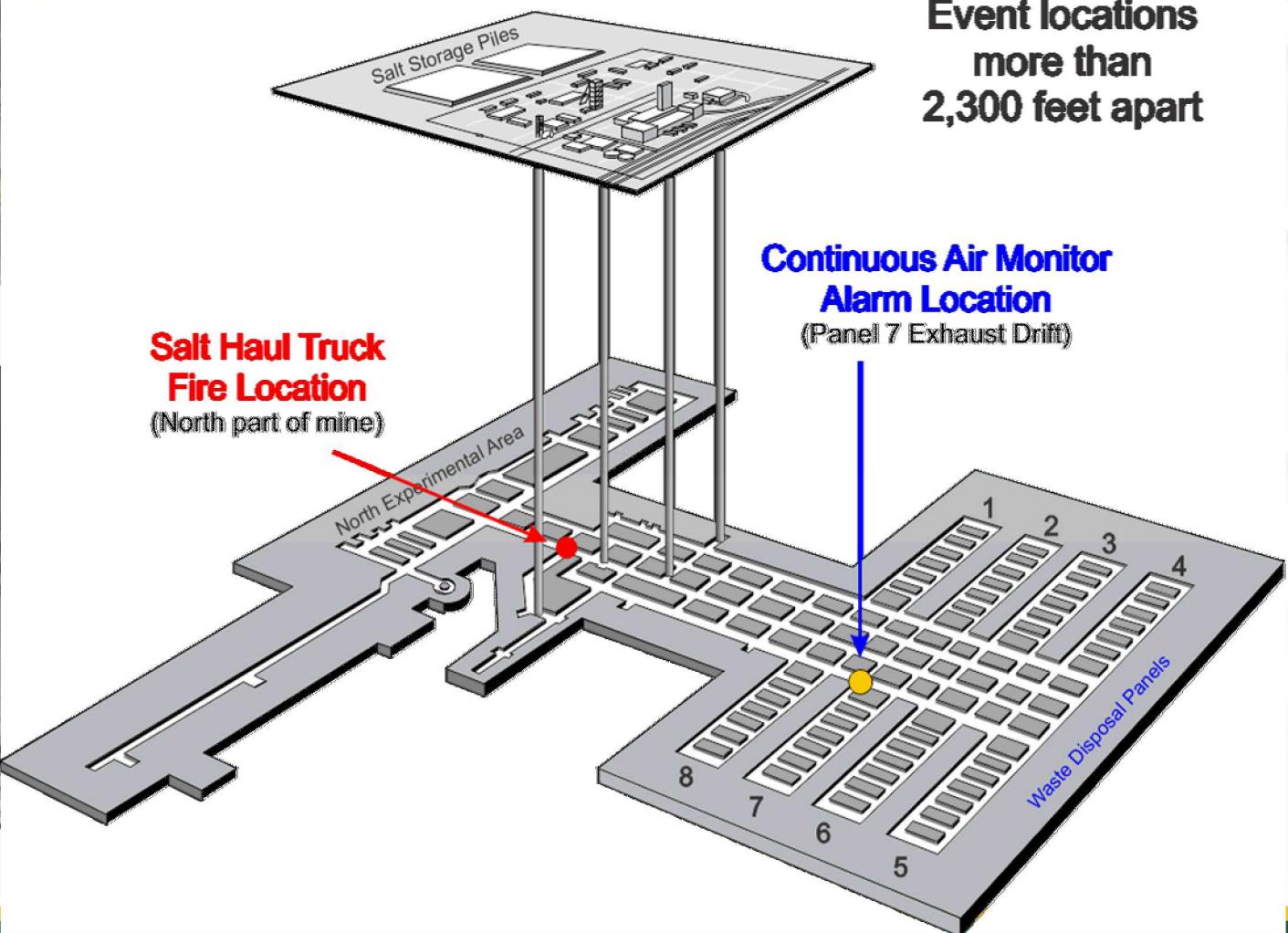
February 5, 2014 Truck Fire:

- All operations at the repository ceased following salt haul truck fire in the WIPP underground.
- An investigation team was deployed to determine the cause of the fire.

February 14, 2014 Radiological Incident:

- A continuous air monitor detected airborne radiation in the underground.
- WIPP's ventilation system automatically switched to high-efficiency particulate air (HEPA) filtration mode when airborne radiation was detected
- Underground and the WIPP mine remains in filtration mode at this time.
- Extensive sampling and monitoring conducted by DOE, New Mexico, and Carlsbad Environmental Monitoring Research Center
- Efforts by the DOE and Nuclear Waste Partnership are ensuring workers are fully protected during recovery and restart.

WIPP Incidents



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



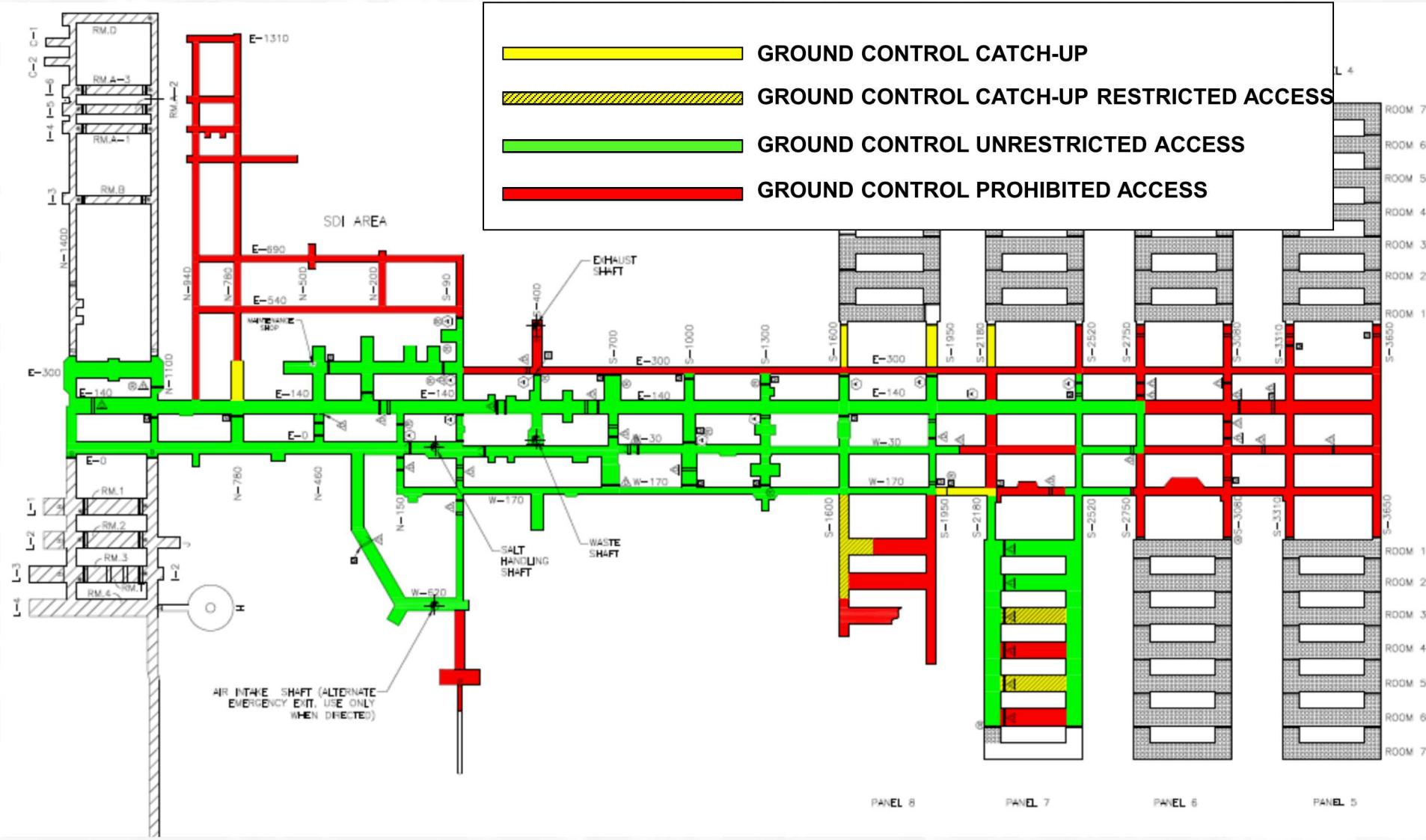
Ground Control Challenges

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



Ground Control Status



Reopening



WIPP Officially Reopened with a ribbon cutting
ceremony held on January 9, 2017

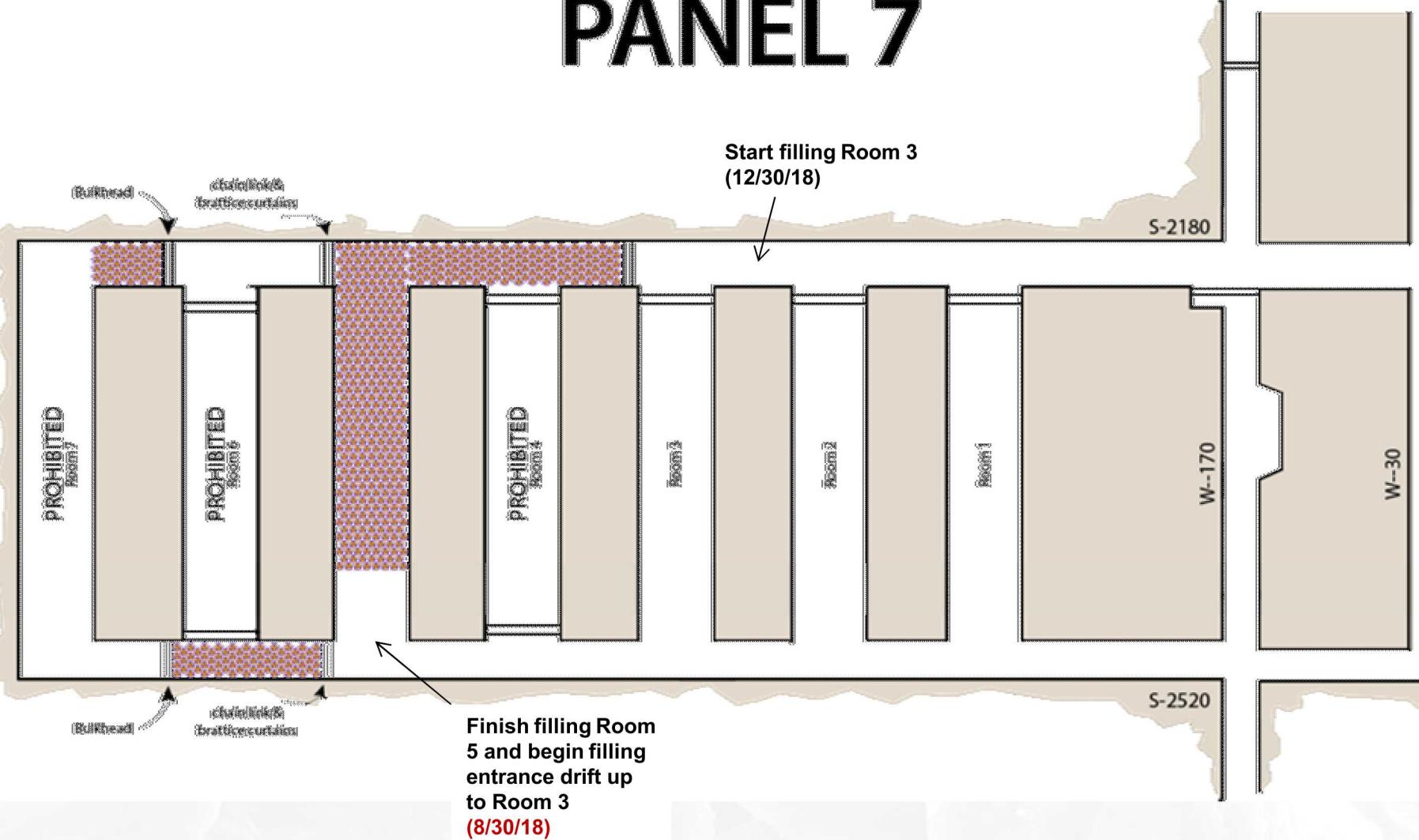
Waste Emplacement Resumes



- Waste emplacement operations resumed in Panel 7 – transition point between clean and contaminated area is necessary

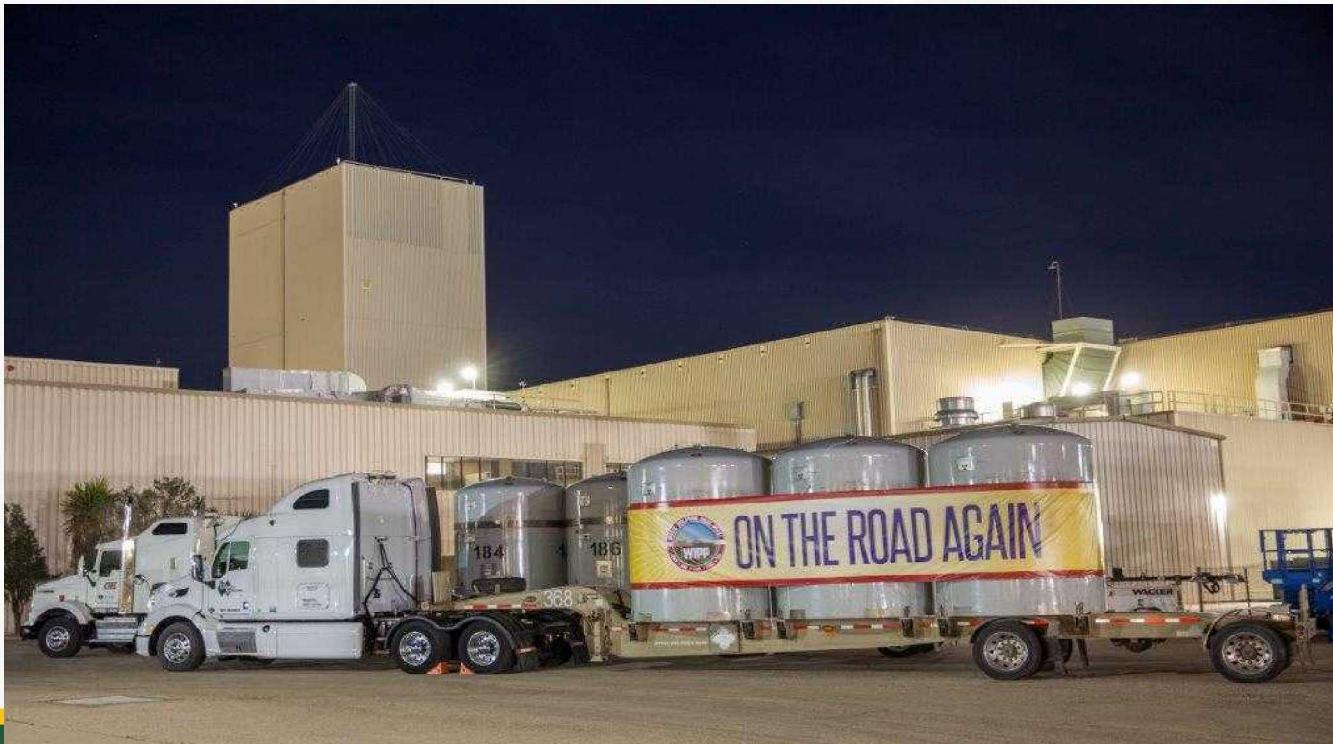
Panel 7 Status

PANEL 7



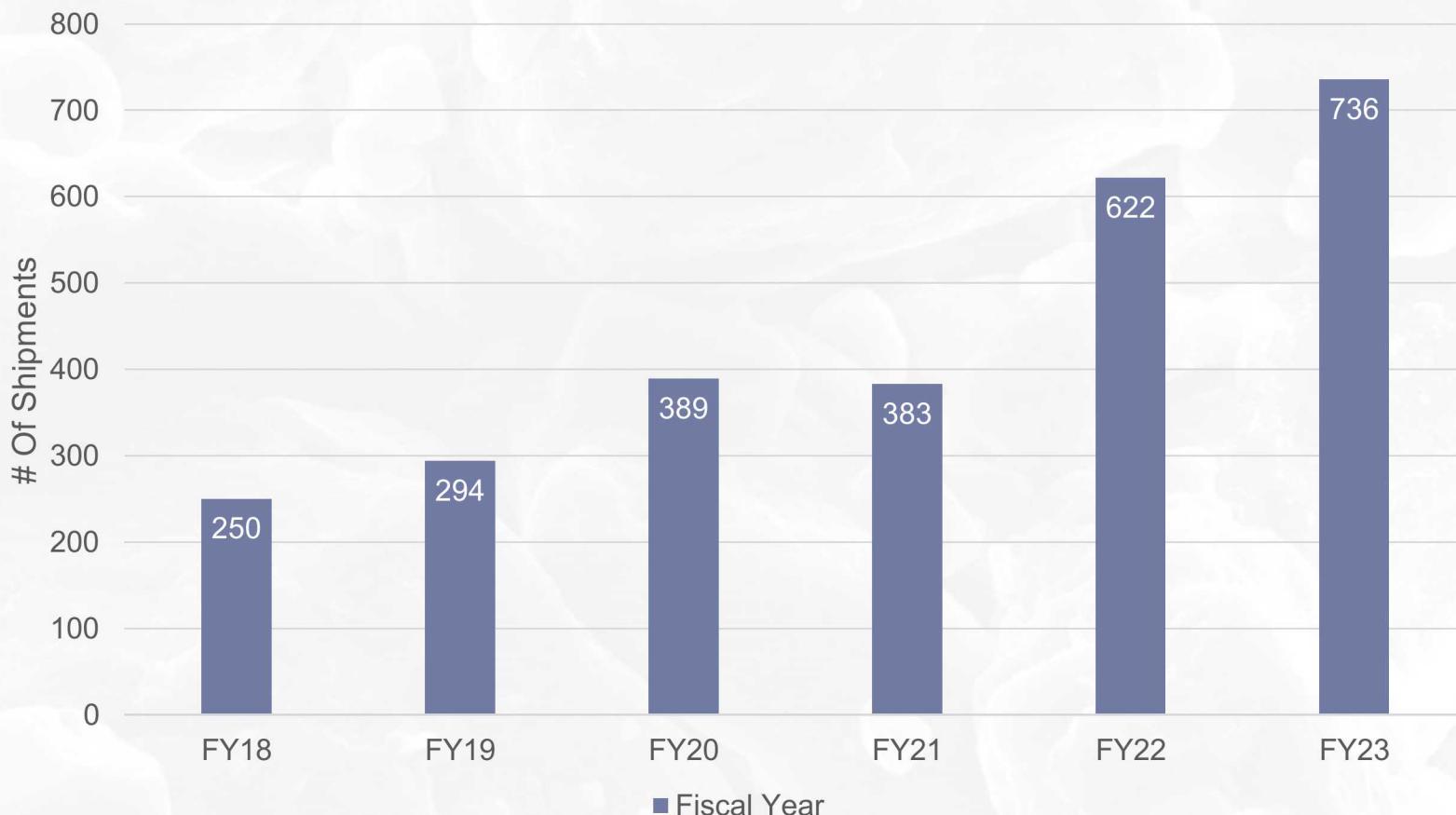
Shipments Resumed

- First shipment since incidents was received from Idaho in April 2017
- Total Shipments received (since 1999) – 12,214. Shipments since restart – 320
- Averaging 7-8 shipments/week, increasing to 8-10 shipments/week now
- WIPP anticipates receipt of approximately 128 shipments between April of 2017 and the end of January 2018



Projected Shipping

SHIPMENT PLANNING ASSUMPTION (FY18 – FY23)



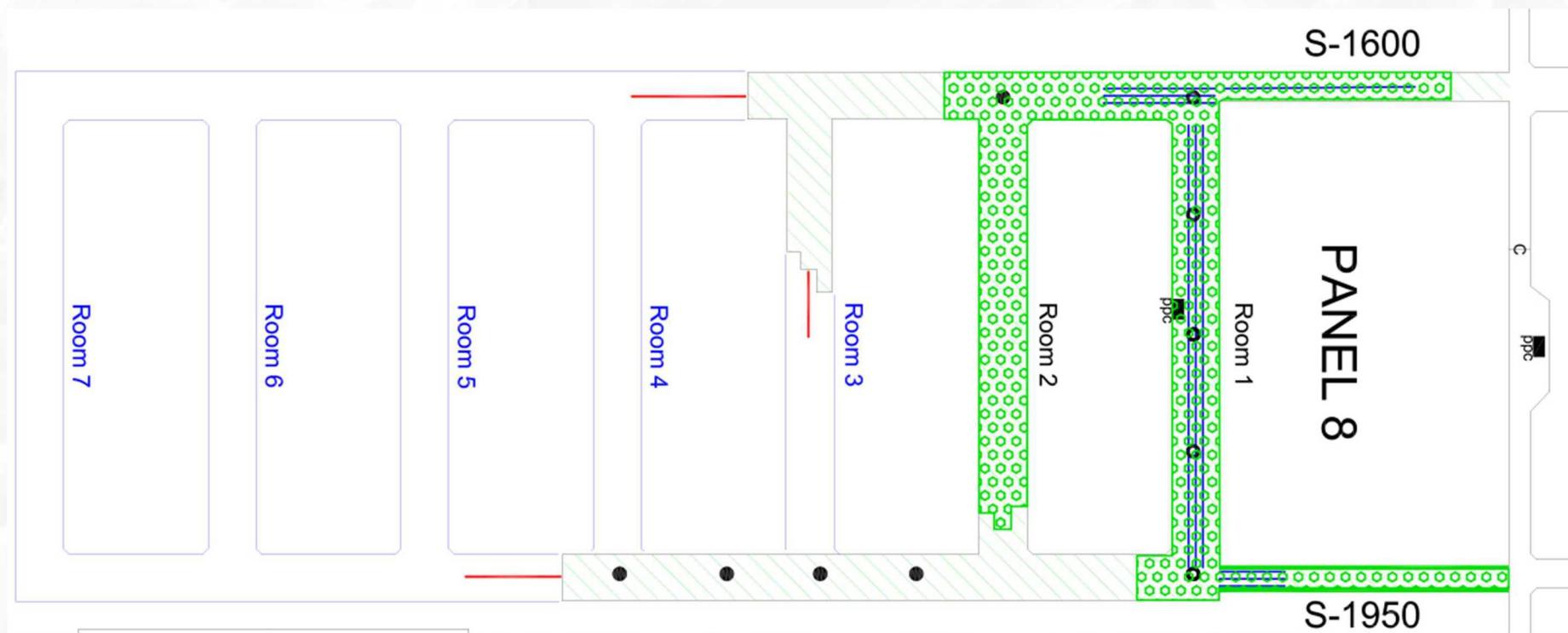
Mining Panel 8

Mining of Panel 8:

- No contamination present
- Mining operations are expected to take approximately 3 years

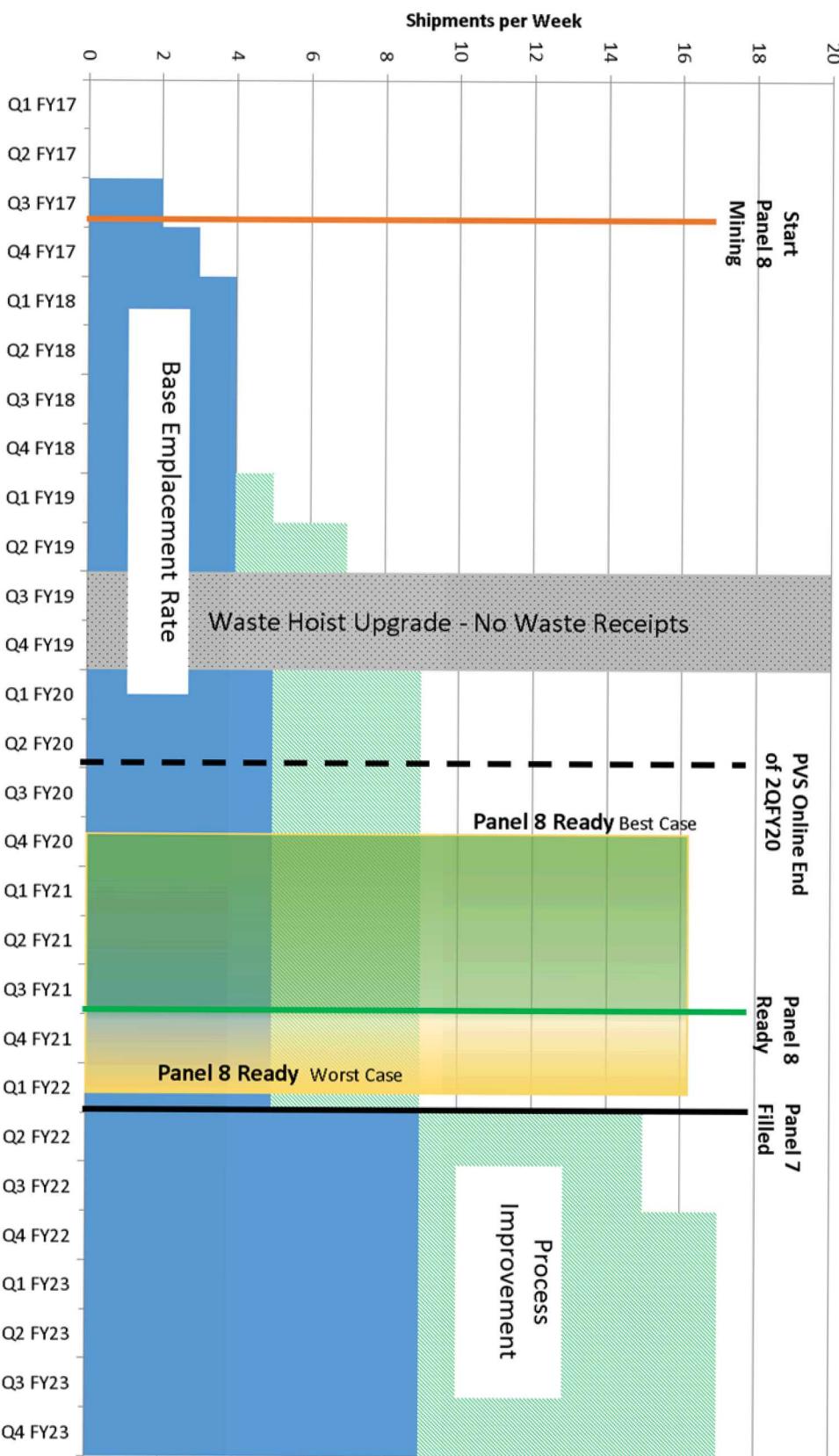
Legend

- Planned mining
- Probe hole drilled
- Initial mining
- Re-Mine to Clay G
- Rib Trimming
- Initial Air relief hole drilled
- Re-drilled Air relief hole
- Initial bolting completed



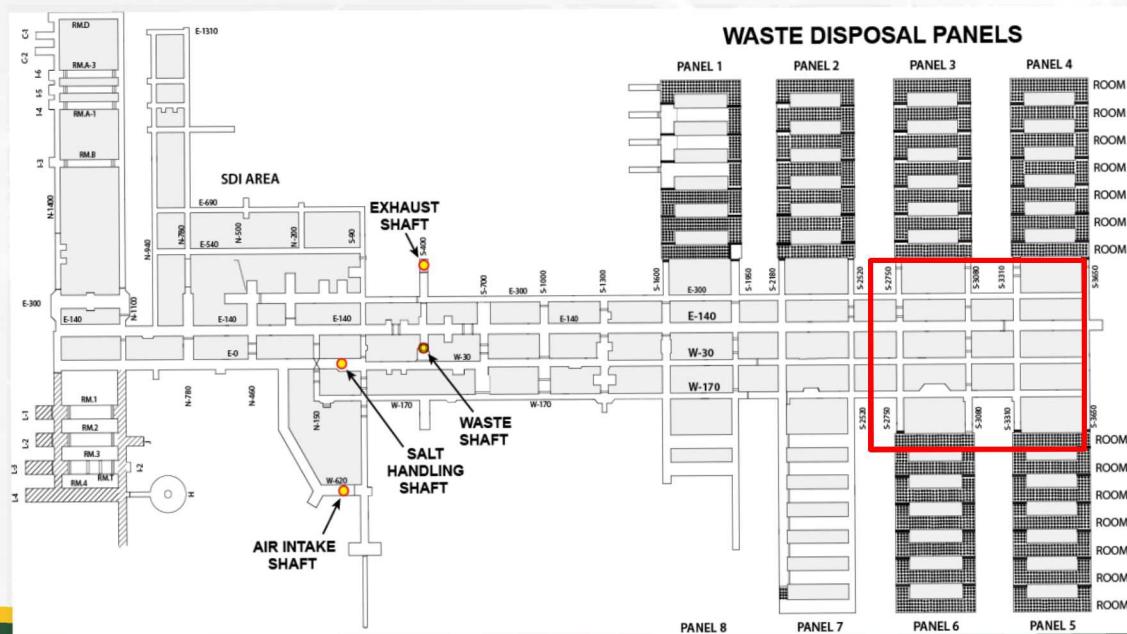
WIPP Mining and Emplacement Model

Waste Emplacement Rates FY17 - FY23

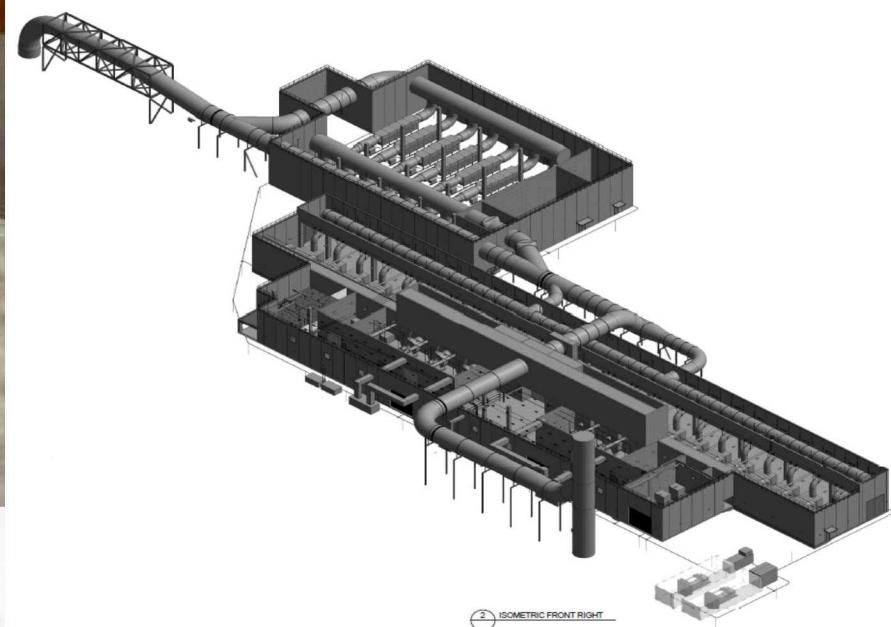
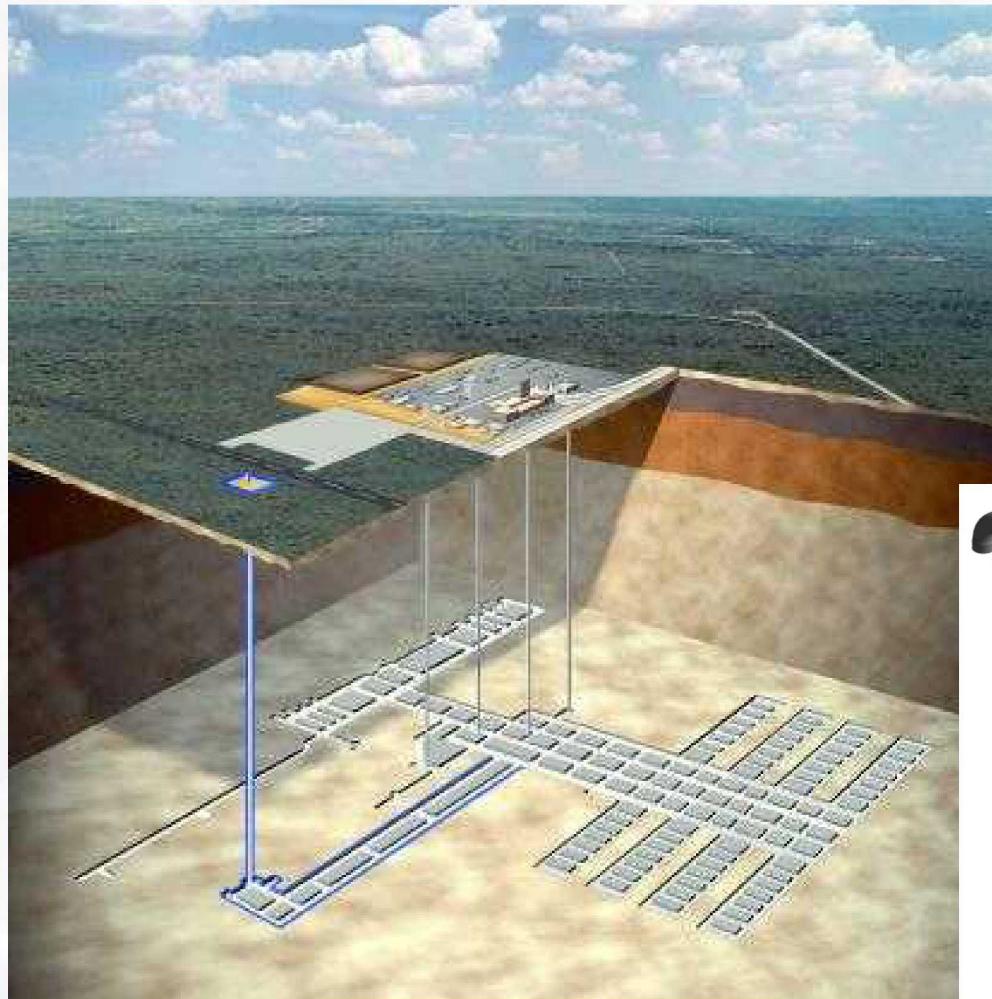


Far South End Closure Progress

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



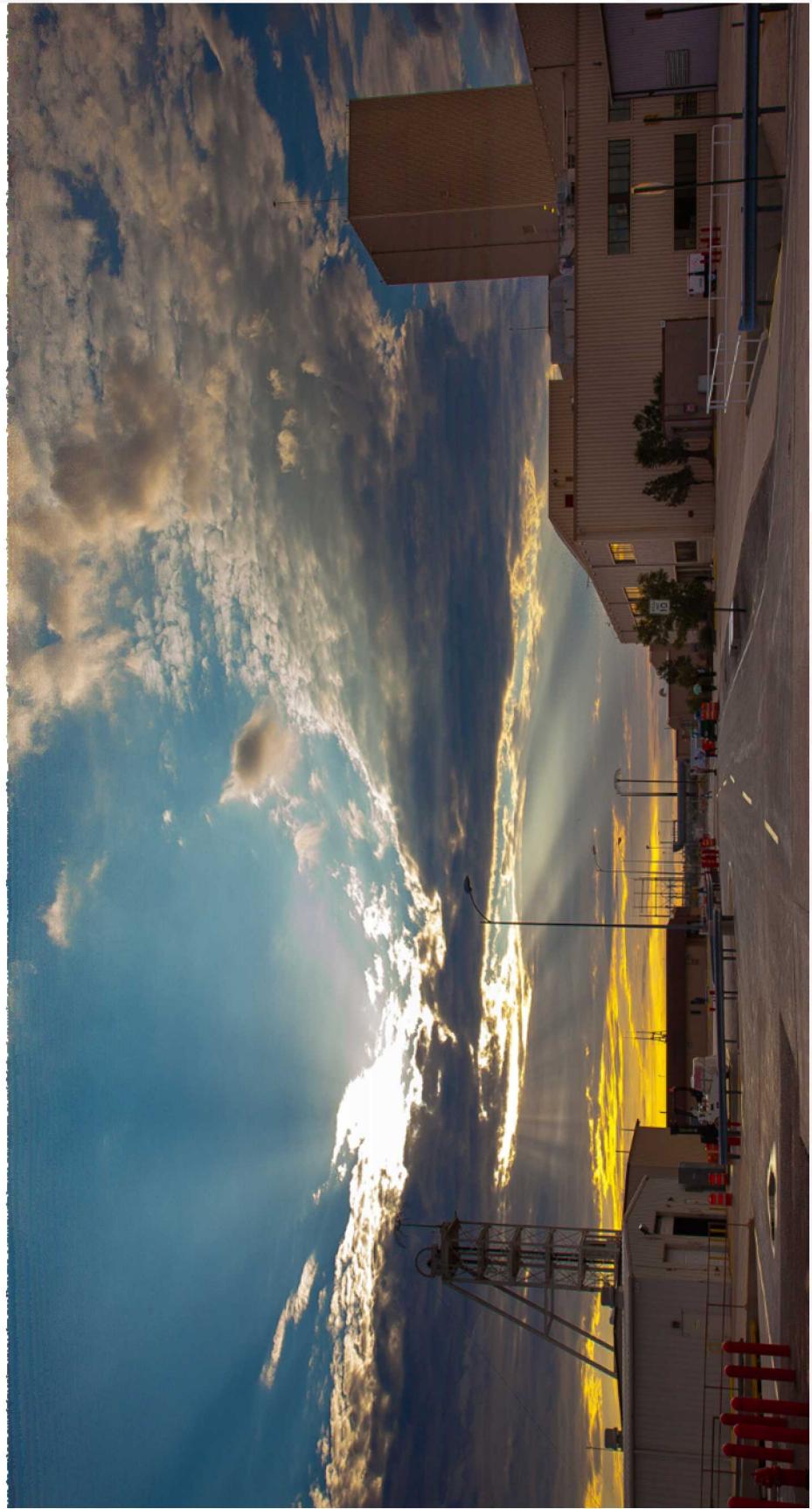
New Shaft and Ventilation



Lessons Learned

- Schedule over safety and conflicting cultures of nuclear vs mining were two major contributors to the incidents.
- Focus was on Nuclear Safety after the incidents. This is what DOE does best and knows historically. Ground control safety did not have appropriate priority.
- Ground control issues throughout repository, culminated in withdrawal of south end of mine following roof falls.
- Differences between the miners and the geotechnical engineers had to be resolved to move forward with ground control resolution.
- In limited operations now with limited ventilation.
- Have identified path forward to full operational return with full ventilation. This won't occur for approximately 4 years.

Questions



WIPP Underground Map

