U.S. DEPARTMENT OF ENERGY | OFFICE OF ENVIRONMENTAL MANAGEMENT

WIPP Town Hall Meeting

Sponsored by the U.S. Department of Energy
and the
City of Carlsbad, NM

October 13, 2016

Agenda

- Opening Comments – Mayor Dale Janway
- Introductions – Tim Runyon (moderator)
- WIPP Status – Phil Breidenbach, NWP
- Status of WIPP Ground Control– John VandeKraats, NWP
- Questions and Answers
  - In house
  - Internet

Update on WIPP Activities

Phil Breidenbach, President & Project Manager

NWP
Nuclear Waste Partnership LLC

An AECOM-led partnership with BWXT and AREVA

WIPP Update

- Interim Ventilation System
- Management Self-Assessment
- Contractor Operational Readiness Review
- WIPP Fire Department
  - National Combat Challenge
- New exhaust shaft
- Ground Control introduction

Point of View

- Rock fall is the single highest hazard to workers and the mission at WIPP
  - Improving ground control is our highest priority
  - We have made great progress but we still have work to do
- Where potentially unstable ground is identified, areas are closed and barricaded to prevent entry
- Falls that have occurred were in closed, barricaded areas,
  - These were expected and posed no danger to personnel, the mission, or the restart effort
- Safety of our workers is paramount and working areas of the mine are evaluated and determined to be safe prior to entry

WIPP Ground Control

John VandeKraats,

Sr. Technical Advisor

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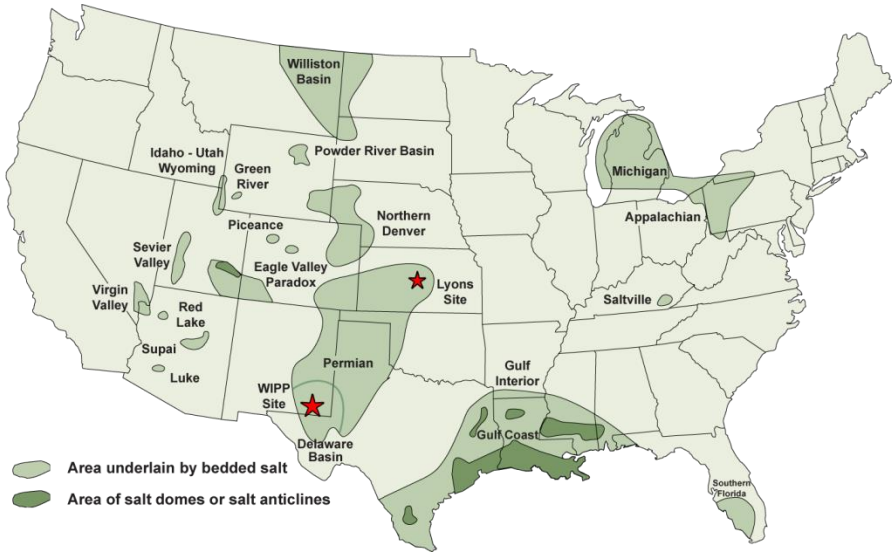
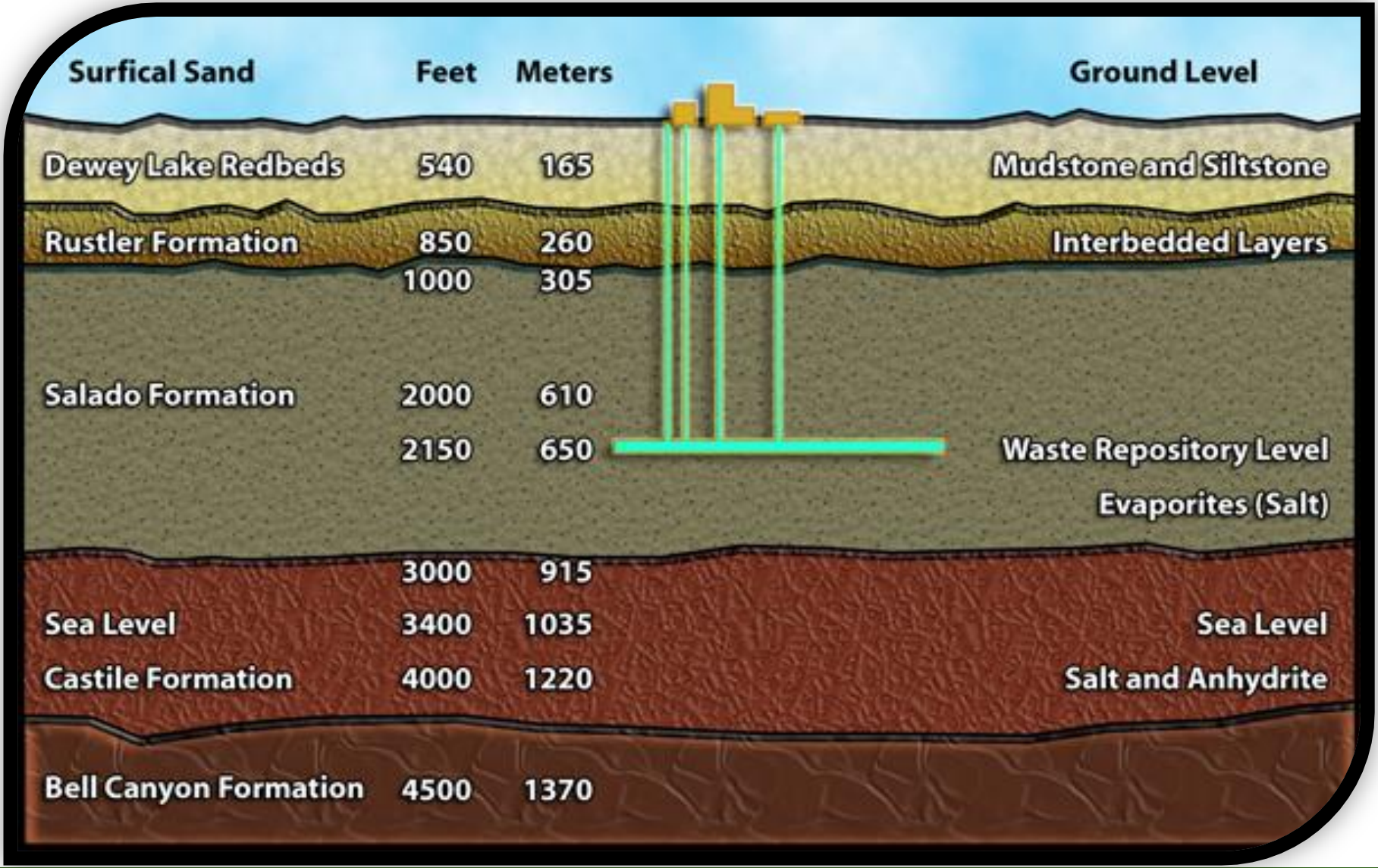
Salt Geology

- Halite or “salt” is usually formed as the result of ocean water evaporating
- The WIPP formation was formed as the result of what used to be the Permian Sea
- WIPP is located in an approximately 2,000 ft. thick salt formation, beginning 850 ft. below the surface
- At that depth salt “creeps” - which is a primary reason why the WIPP location was selected as a repository
- Eventually, the salt will encapsulate the buried waste and permanently isolate from the biosphere



WIPP Stratigraphy

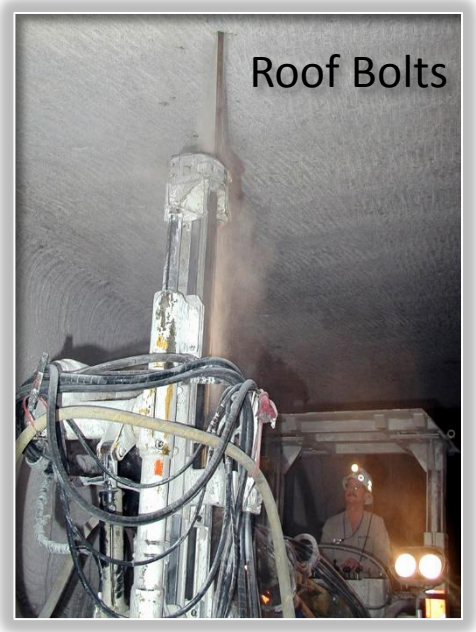


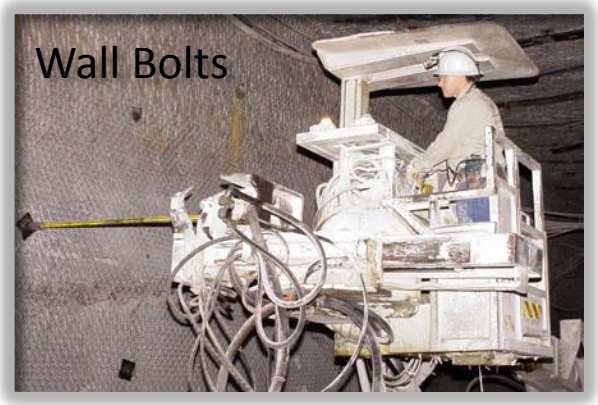
WIPP Characteristics

- Salt “creep” on average closes openings at the rate of 2-5 inches per year
- Eventually, salt creep will close openings and permanently isolate the waste

Addressing Operational Challenges

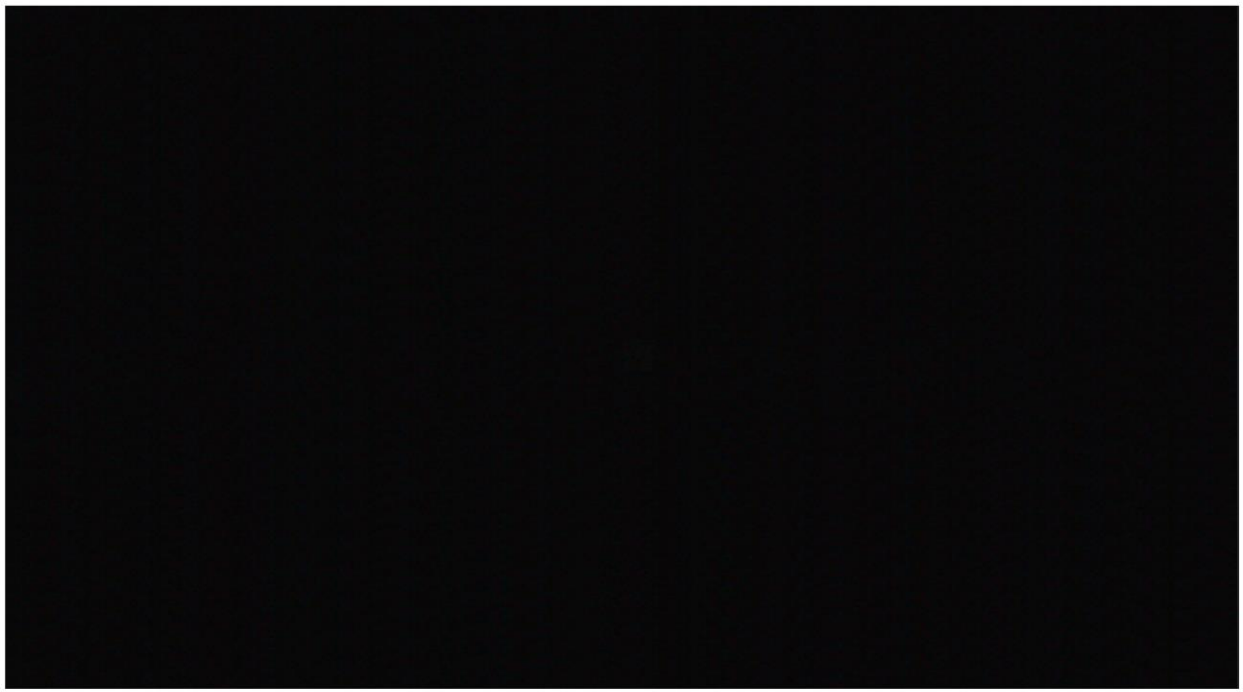
- Maintaining openings requires constant effort
  - As part of the salt creep process, fractures will develop near openings
  - These must be monitored and controlled
- The Ground Control Program includes
  - Inspections
  - Instrumentation
  - Data Collection
  - Analysis
  - Results





Worker Inspections

- Workers inspect their work area before beginning each shift and on scheduled weekly inspections throughout the underground
  - Visual inspection
  - Physical inspection



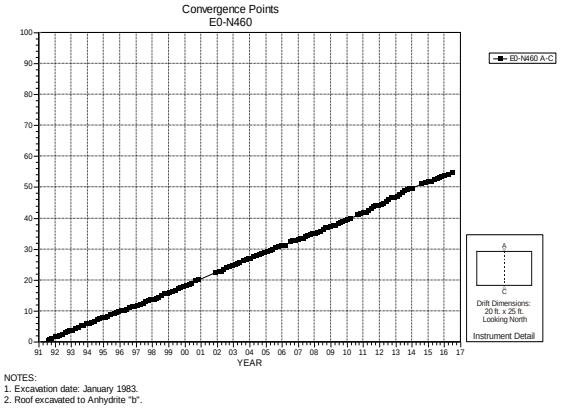
Geotechnical Inspections

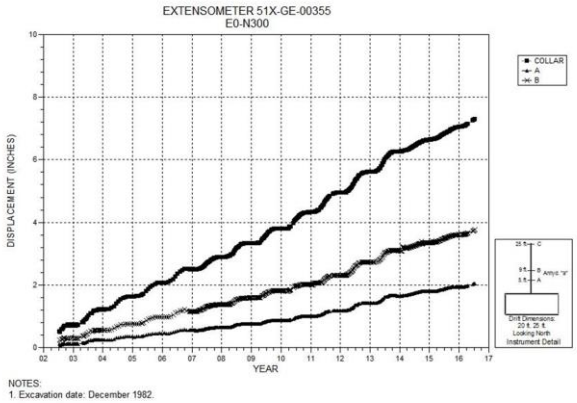
- Geotechnical Engineering perform inspections based on ground conditions
  - Weekly inspections are performed on all non-restricted/non-contaminated areas
  - Bi-Monthly/Monthly inspections are performed to collect data in restricted/contaminated areas using geomechanical instruments
- Accessible (non-prohibited) areas of the underground are graded on a bi-annual or annual basis depending on ground conditions
- Random inspections are performed when requested by Mine Operations
  - Employee observations and feedback

Instrumentation

- Instrumentation is installed throughout the underground
- Types of measurements
  - Convergence Points – measure the closure of underground openings
    - Typically installed approximately every 75ft. in main drifts
    - Installed in cross cuts based on ground conditions
    - Measurements made monthly, bi-monthly or as required
  - Extensometer Point – measures actual expansion and sag of roof beam
    - Typically installed in panel rooms and access drifts
    - Measurements typically made on weekly basis
  - Crack Meters – measure expansion of the width of a crack
    - Measurements typically made on a bi-monthly basis

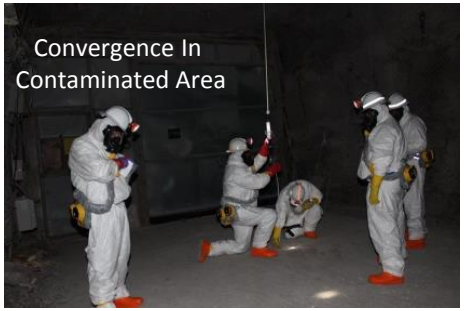
Geotechnical Analysis





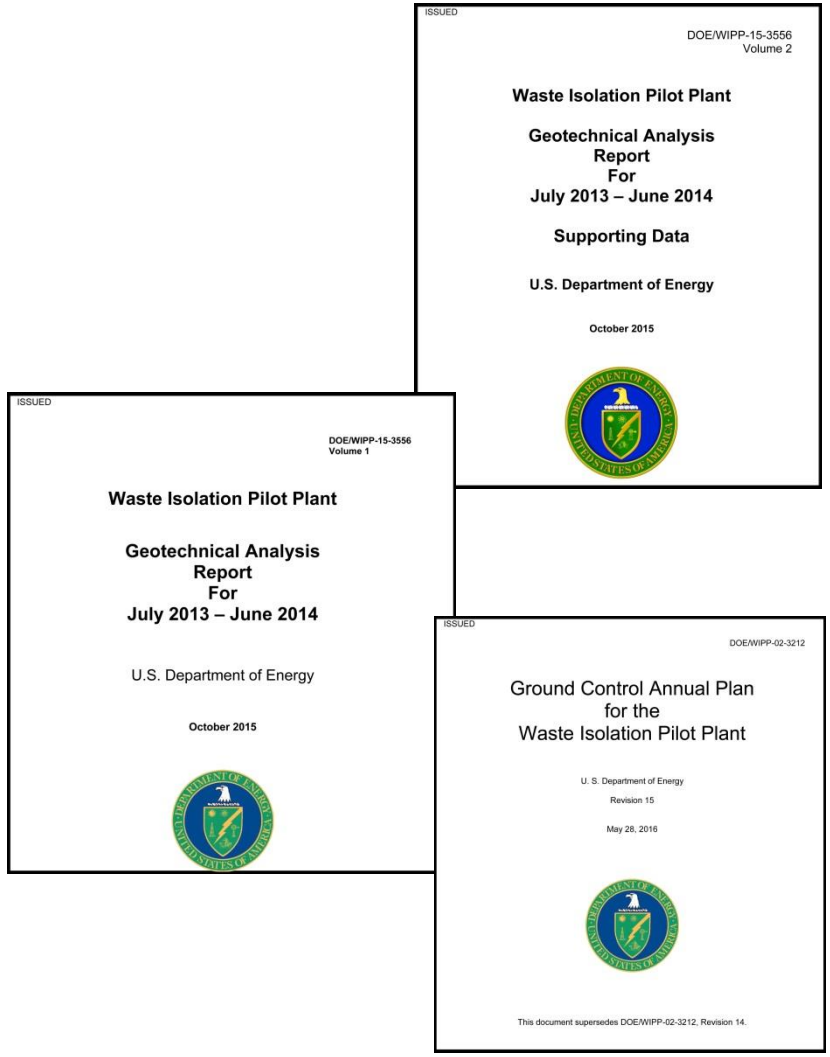
- Convergence points measure the closure of the roof to the floor
  - Spacing of the points through the mine is approximately 75 ft.
  - An increase in closure rate may indicate either increased roof beam sag (expansion) and/or floor heave

- Wire Extensometers extends 25 ft. into the back to measure roof beam expansion
  - An increase in rate of roof beam expansion may signal instability



Reporting

- Reports
  - Weekly
    - Geomechanical Mine Stability Surveillance Report
  - Annual
    - Ground Control Annual Plan
    - GAR Geotechnical Analysis Report



Results

- Based on Ground Control Result we take the following actions
  - Remediate the ground
    - Install bolts/mesh
    - Scaling ribs/roof
    - Mill/mine floor
  - Control Areas
    - Restricted
    - Prohibited

Our Strategy to Protect the Workers

- Ground control priorities are established from information gathered and then categorized as High, Medium or Low. Sources include:
  - Evaluation of physical observations
  - Collection and analysis of geotechnical instrumentation data
  - Evaluation of the performance of installed ground support systems
  - WIPP-specific experience
- In addition, we factor in where people are routinely located
- Areas where ground control does not meet standards are controlled (restricted or prohibited)

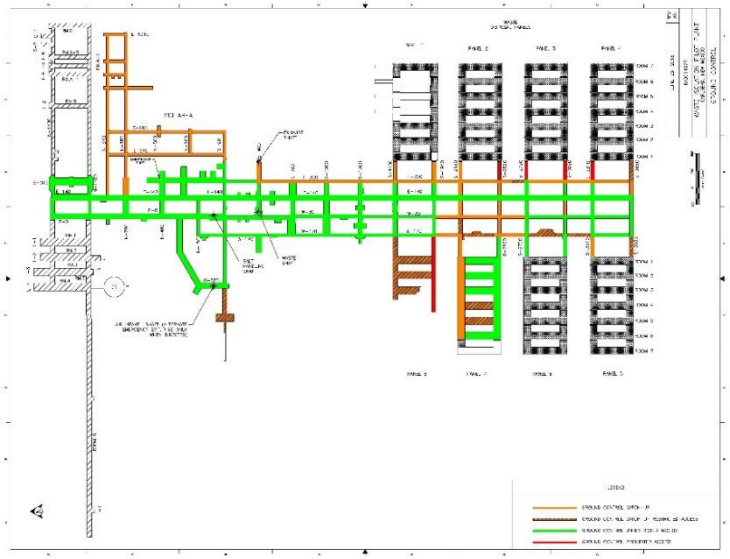
Controlled Underground Areas

- Restricted areas have controlled access due to ground control concerns
- Access to these areas is limited to
  - Geotechnical Engineering (inspections and taking instrument readings)
  - Mine Operations (bolting and inspections)
  - Personnel requiring access to perform essential duties must be accompanied by a qualified individual(s) capable of recognizing ground control hazards

- Prohibited areas have been barricaded to prevent entry due to potential imminent hazards
- Personnel may not enter a Prohibited Area

Ground Control Status

- Radiological release event in February 2014
  - Prevented ground control activities for nine months
  - Required “catch-up” bolting in areas of the underground that could not be maintained during that period
  - Created radiologically contaminated areas
    - Required protective clothing and respirators
    - Complicated all operations including ground control and other support activities
- Recovery efforts are now focused mainly in the radiologically contaminated areas



Recent Rock Falls in Controlled Areas

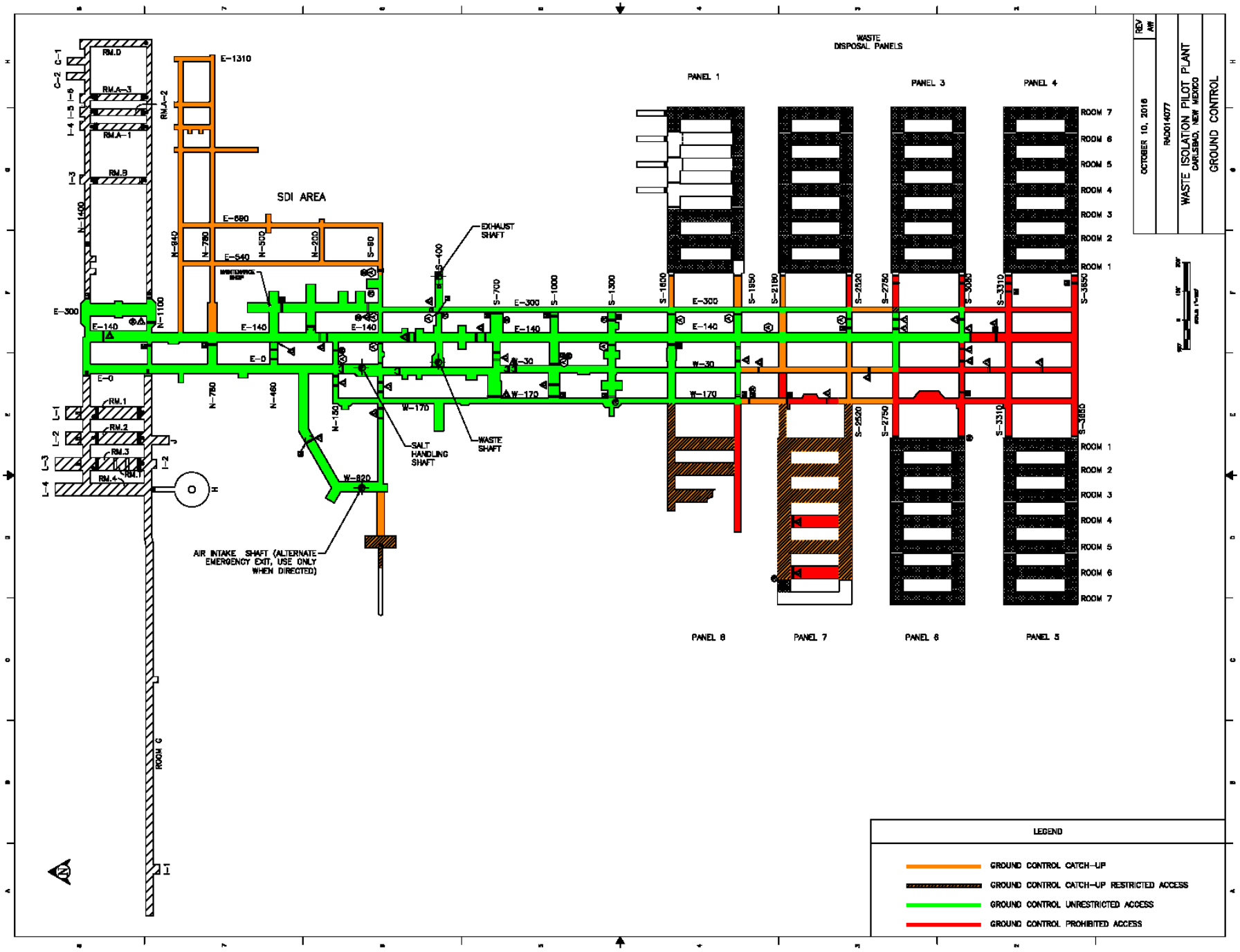
- Panel 3 exhaust drift
  - This drift was restricted in 2013
  - Initial fall was discovered on January 19, 2015
  - The area was then prohibited
  - Subsequent falls were discovered on February 3 and October 3, 2016 in the prohibited area
  - Restricted November 4, 2014 and prohibited February 23, 2015
  - This area did not have any ground support installed

- Panel 4 inlet drift
  - Area was restricted in March 8, 2016
  - Area was prohibited on September 13, 2016
  - Initial fall discovered September 9, 2016
    - Additional fall discovered September 27, 2016
  - Initial roof/wall fall occurred, causing damage to the bulkhead
  - Subsequent fall later occurred in same area

- Panel 7, Room 5
  - Restricted April 5, 2016
  - Unstable ground was identified
    - Mining equipment was used to bring the ground down
    - Part of normal mining operations

Conclusion

- We are committed to safe operations at WIPP
  - Changes in radiological conditions resulting from the 2014 event have made ground control much more difficult
- Our highest priority is improving ground control conditions and we have taken aggressive actions
- We have a robust ground control monitoring program and process in place to protect workers


WASTE DISPOSAL PANELS
PANEL 1
PANEL 3
PANEL 4
PANEL 8
PANEL 7
PANEL 6
PANEL 5
SDI AREA
EXHAUST SHAFT
SALT HANDLING SHAFT
WASTE SHAFT
AIR INTAKE SHAFT (ALTERNATE EMERGENCY EXIT, USE ONLY WHEN DIRECTED)
ROOM C
REV AW
OCTOBER 10, 2016
RAD014077
WASTE ISOLATION PILOT PLANT
CARLSBAD, NEW MEXICO
GROUND CONTROL
LEGEND
GROUND CONTROL CATCH-UP
GROUND CONTROL CATCH-UP RESTRICTED ACCESS
GROUND CONTROL UNRESTRICTED ACCESS
GROUND CONTROL PROHIBITED ACCESS

Questions
&
Answers