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

Phase II Accident Investigation Board Briefing

April 16, 2015

Phase 1

Phase 1 focused on the release of radioactive material from underground to the environment, and the follow-on site response.

The cumulative effect of:

- inadequacies in ventilation system design and operability
- compounded by degradation of key safety management programs and safety culture

Resulted in the release of radioactive material and delayed/ineffective recognition and response.

The Phase 1 report was issued April 22, 2014.

Ineffective WIPP Safety Programs from Phase 1

- Nuclear Safety
- Emergency Management
- Conduct of Operations
- Maintenance
- Radiation Protection
- Safety Culture
- Contractor Assurance System (CAS)
- Federal Oversight

Board Purpose and Scope

Purpose

- Gather and analyze the facts
- Determine why the accident happened and if it was preventable
- Identify causal factors and conclusions
- Provide clear recommendations to prevent recurrence of the event

What it IS

- Disciplined process resulting in an Accident Investigation Report

What it IS NOT

- Not intended to affix blame

Direct and Root Causes

The AIB determined the accident was preventable.

Direct Cause: Exothermic reaction of incompatible materials in a LANL waste drum.

Local Root Cause: Failure of LANS to understand and effectively implement the LANL Hazardous Waste Facility Permit and Carlsbad Field Office directed controls.

Systemic Root Cause: Los Alamos Field Office and National Transuranic Program failure to ensure that LANL had adequately developed and implemented repackaging and treatment procedures.

Areas of Contributing Causes

- National TRU Program
- Central Characterization Program
- Hazard Identification and Controls
- LANS Procedures/Safety Programs
- Nuclear Safety
- LANS Contractor Assurance System
- Operator and Supervisor Training and Qualification
- Los Alamos Field Office Oversight
- Federal Management and Oversight
- Safety Culture and Stop Work
- WIPP Fire Hazard Analysis

Phase II Contributing Causes

National Transuranic Program (NTP): Failure of the Los Alamos Field Office and NTP/Carlsbad Field Office to ensure that LANS and the Central Characterization Program complied with Resource Conservation and Recovery Act requirements in the WIPP and LANL Hazardous Waste Permits, as well as the WIPP Waste Acceptance Criteria.

- National TRU Program certification audit process failed to include key elements of waste packaging and characterization processes.
- Unclear and inadequate federal oversight roles and responsibilities and program expectations.

- The NTP was established by EM as required by DOE M 435.1 to ensure that TRU waste generation, storage, treatment, and disposal needs are met and coordinated across the DOE complex.
- The NTP is responsible for the day-to-day management and direction of strategic planning and related activities associated with the characterization, certification, transportation, and disposal of TRU waste.

Phase II Contributing Causes

- **Central Characterization Program (CCP)**: Failure of CCP to develop Acceptable Knowledge (AK) for the mixed inorganic nitrate waste stream that adequately captured all available information regarding waste generation and subsequent repackaging activities.

  - Failed to adequately evaluate the potential impact of changes to the LANS Glovebox Operations Procedure on the waste stream when the AK summary report was revised.
  - Failed to identify the potential impact of the addition of secondary waste materials on the waste stream when reviewing and approving the AK summary report revisions.

- CCP was established to assist generator sites with characterization and certification activities.
- CCP maintains the waste stream Acceptable Knowledge.
- CBFO grants waste certification authority to CCP and generator sites.
- Generator sites are still responsible for certifying that their waste meets acceptance criteria.

Phase II Contributing Causes

- **Hazard Identification and Controls**: Failure of LANS to develop and implement adequate processes for hazard identification and control.
  - Review of the job hazard analysis against the proposed glovebox procedure change was ineffective in identifying the hazard created by mixing of organic absorbent with the nitrate salt waste.
  - Inadequate evaluation on the impact on the WIPP Waste Acceptance Criteria from the addition of secondary job wastes into TRU waste containers.
- **LANS Procedures/Safety Programs**: Failure of LANS to implement effective processes for procedure development, review, and change control.
  - Failed to ensure sufficient detail was provided in the WCRRF Glovebox Operations Procedure.
  - Records did not contain sufficient information to accurately describe the contents of the waste drums.
  - Failed to provide sound technical basis for decisions regarding repackaging procedures and processes.

Phase II Contributing Causes

- **LANS Contractor Assurance System (CAS)**: Failure of the LANS CAS to identify weaknesses in the processes for developing/changing procedures; analyzing and controlling hazards; performance of work to repackage nitrate salt wastes; and mechanisms for obtaining and utilizing feedback.
- **Los Alamos Field Office (LAFO) Oversight**: Failure of NA-LA to establish and implement adequate line management oversight programs and processes in accordance with DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*.
- **Federal Management and Oversight**: Failure of DOE Headquarters to perform adequate or effective line management and oversight required by DOE Order 435.1, *Radioactive Waste Management*, dated July 9, 1999.
- **Safety Culture and Stop Work**: Failure of LANS, the LANS subcontractor, and the Los Alamos Field Office to ensure that a strong safety culture existed within the Environmental and Waste Management Operations organization at LANL.

Scorecard of Judgments of Need

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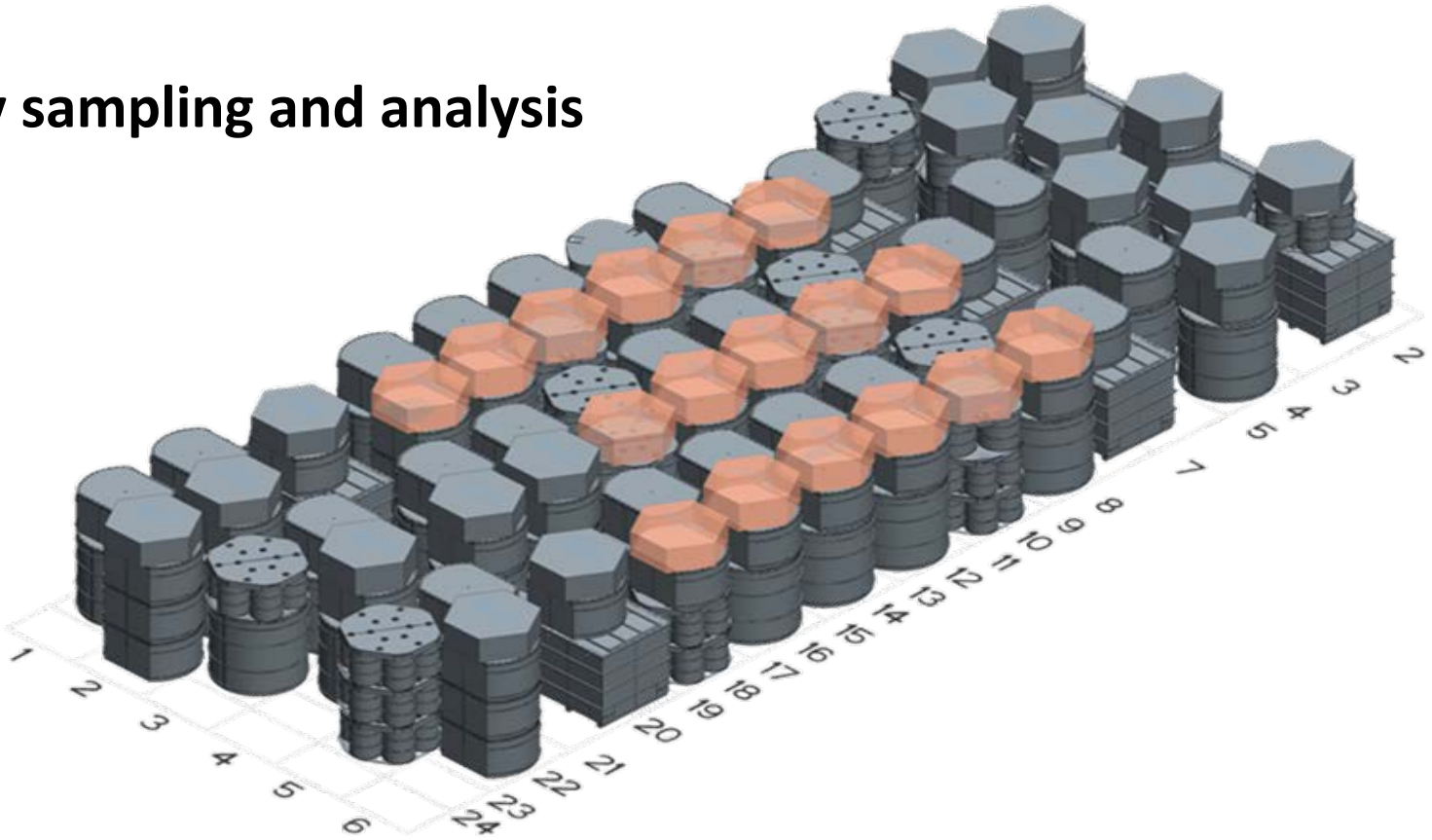
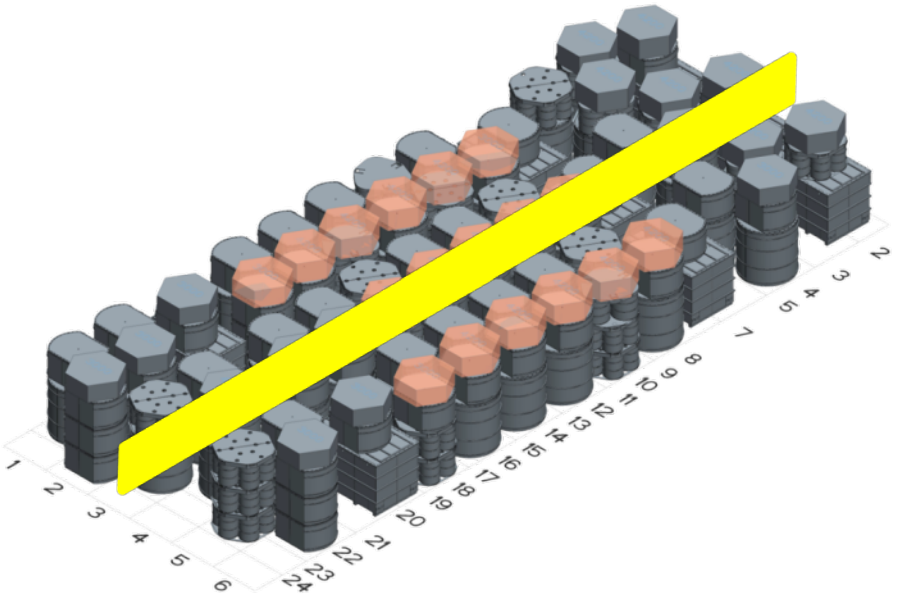
SUBJECT	CONS	JONS	NWP	CBFO	LANS	NA-LA	HQ
National TRU Program	4	8		7		1	2`
Central Characterization Program	3	3	3				
Hazard Identification and Controls	3	3			3		
LANS Procedures/Safety Programs	4	7		1	6		
Nuclear Safety	2	6			5	1	
LANL /ES Contractor Assurance System	1	1			1		
Operator and Supervisor Training and Qualification	1	1			1		
NNSA Los Alamos Field Office Oversight	2	3				3	
Federal Management and Oversight	1	1					1
Safety Culture and Stop Work	2	2			1	1	1
WIPP Fire Hazard Analysis (FHA)	1	5	4				1
Forensics							
Totals	**24**	**40**					

Forensics

- Visual surveillance to complete and document a systematic and comprehensive inspection of the Panel 7, Room 7 array
- Radiological sampling and analysis; and source term modeling
- Chemistry sampling and analysis



AIB Visual Surveillance/Forensics

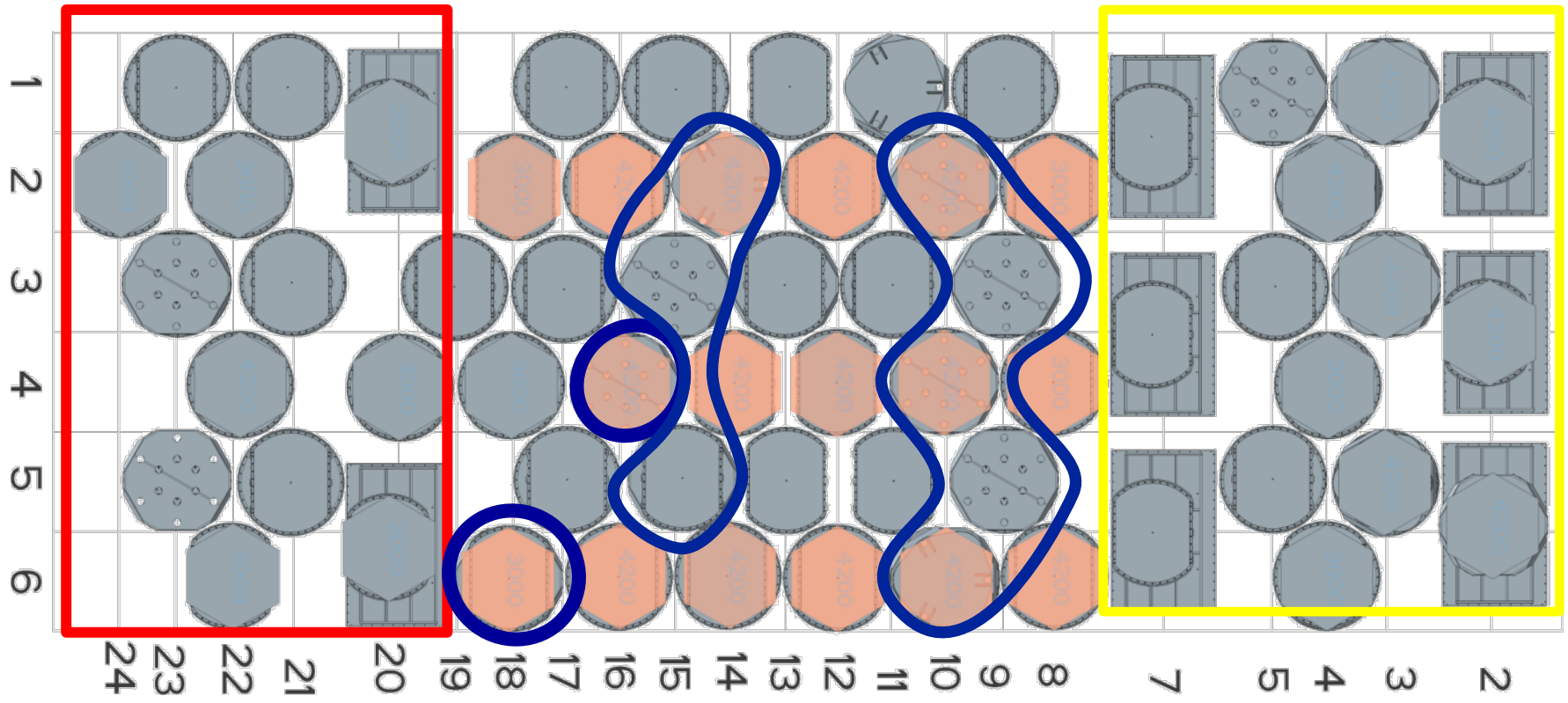


Underground Inspection Activities

- **Radiological PPE**
  - Powered Air Purifying Respirator
  - 2 pair coveralls

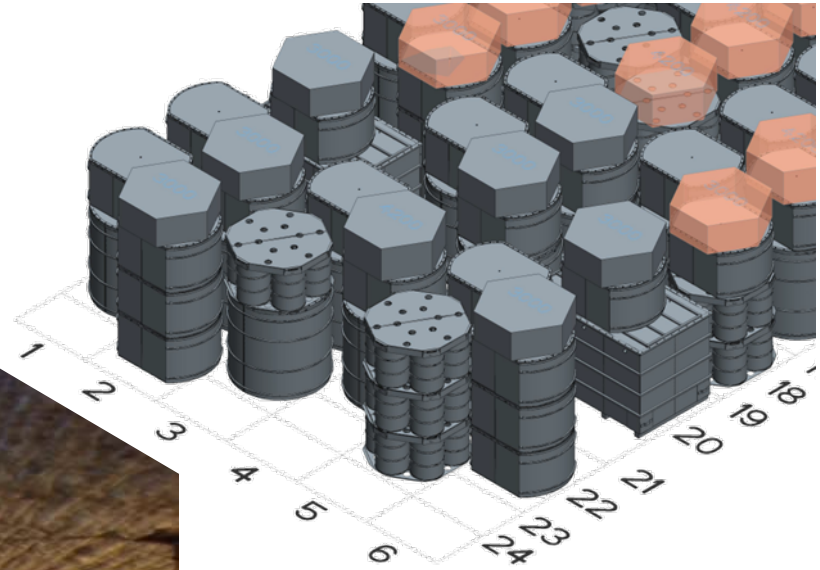
Inspection Results Overview

- Rows 19 – 24
- Back & Ribs
- Rows 2 – 7
- Rows 8 - 18



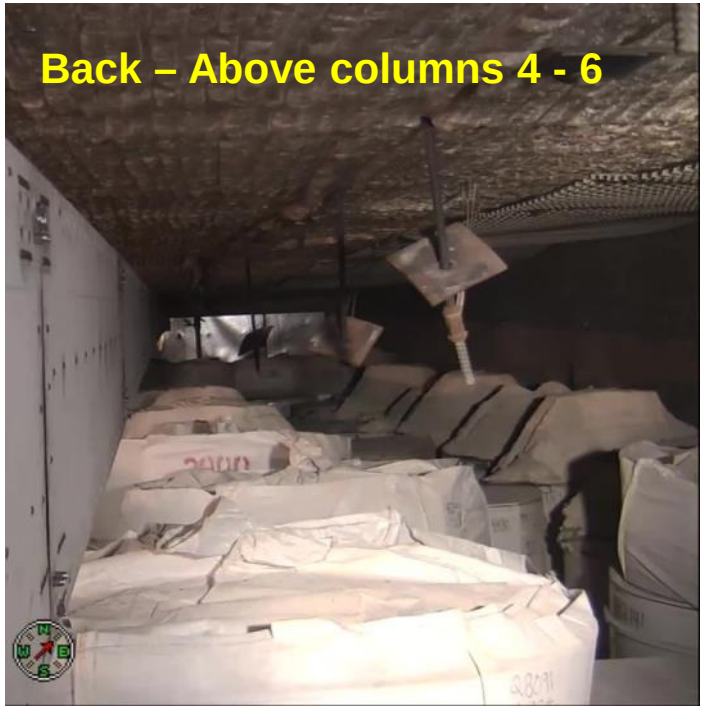
Waste Face & Rows 19 - 24

- **No damage**
  - Waste containers
  - MgO super sacks
  - Emplacement materials

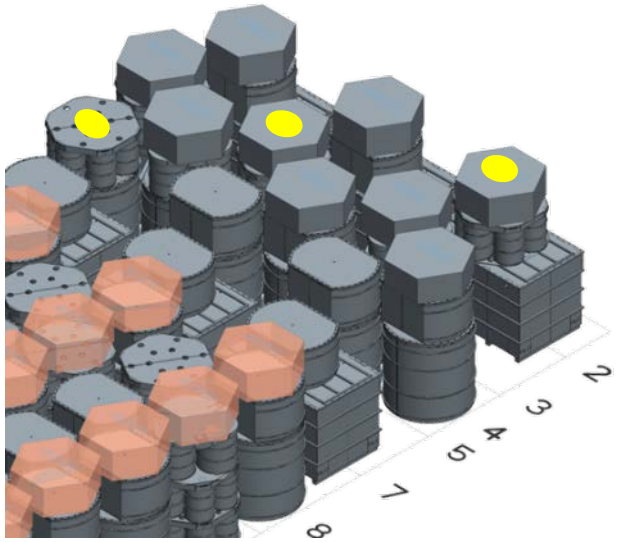


Back & Ribs

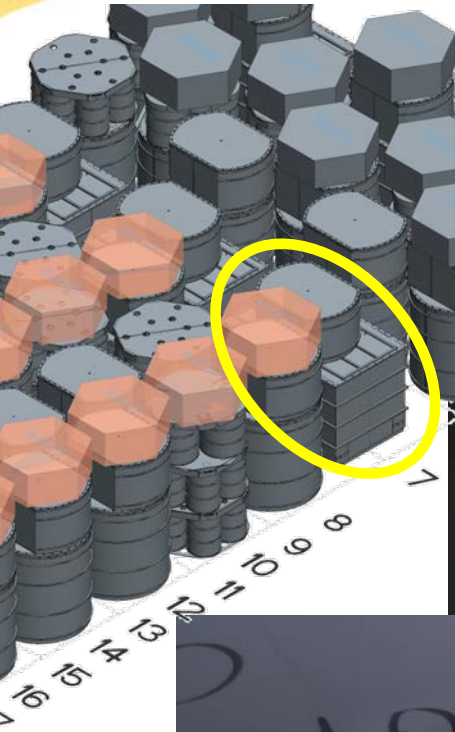
- Back - No damage
- North Rib – No damage
- South Rib – Minor color changes

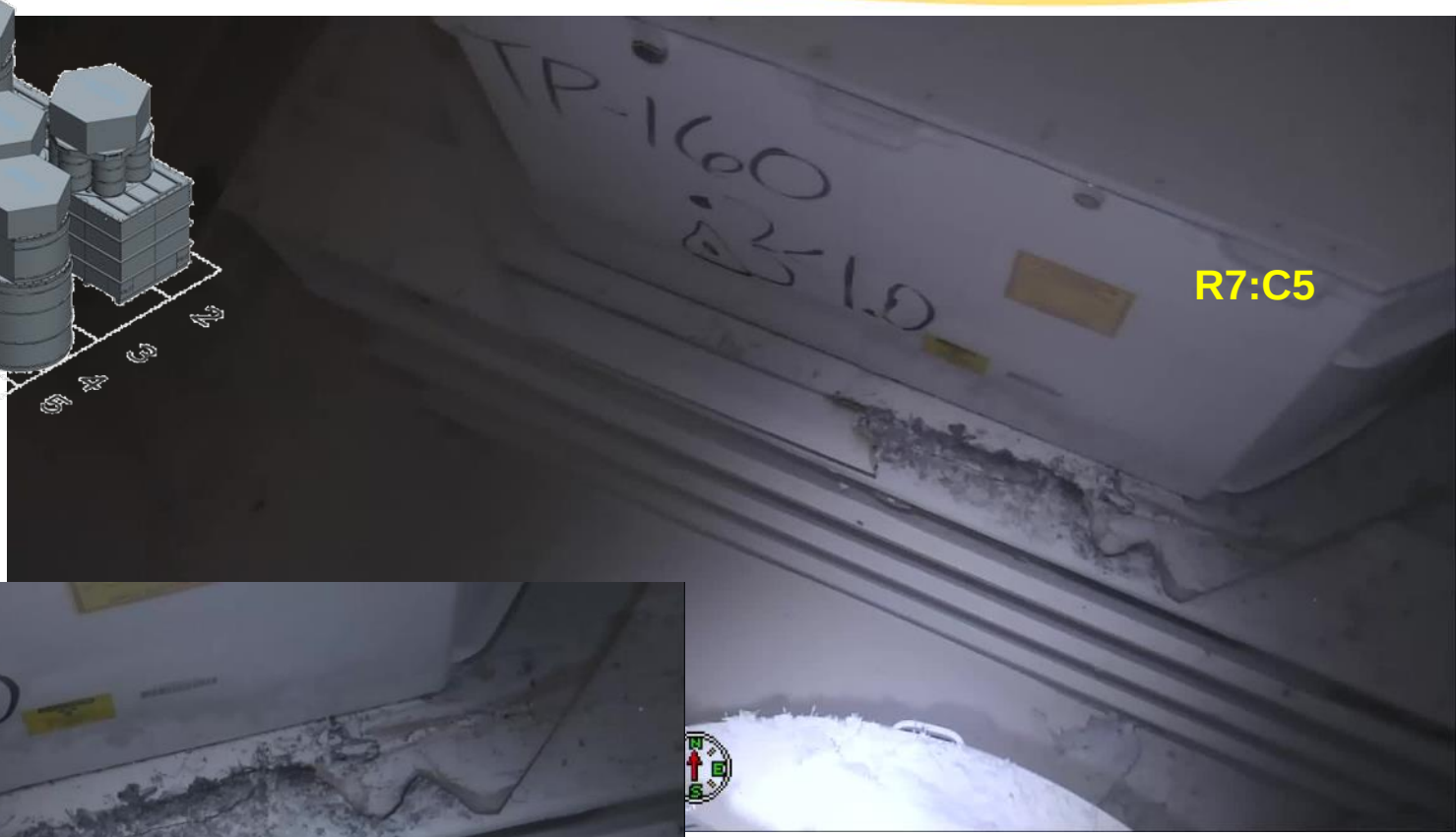


No Damage to Plastics Rows 2 - 7

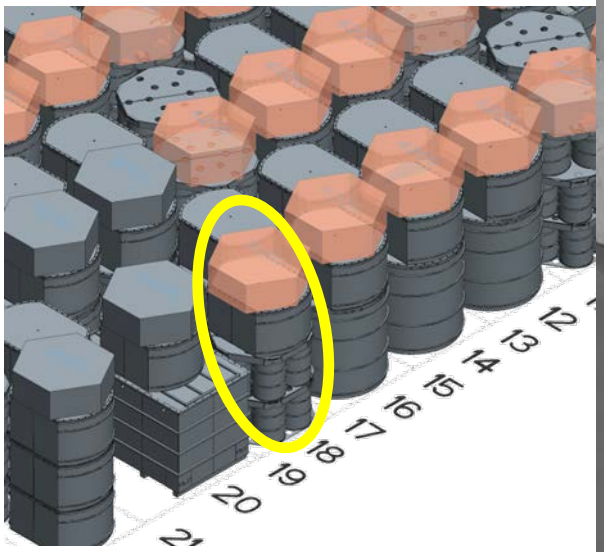


Isolated Damage at R7:C5

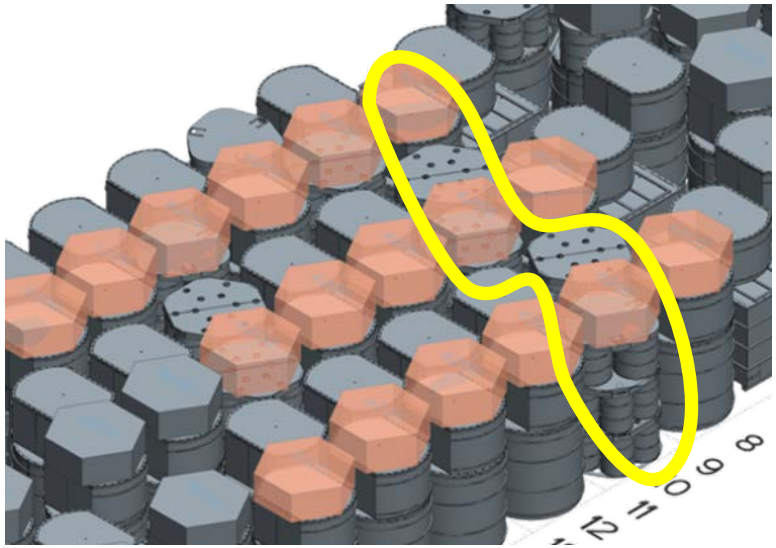


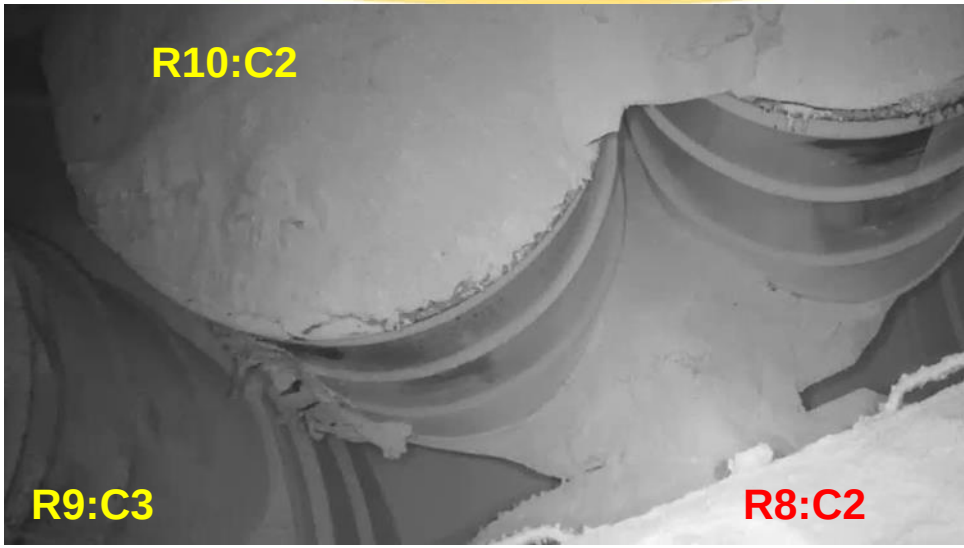


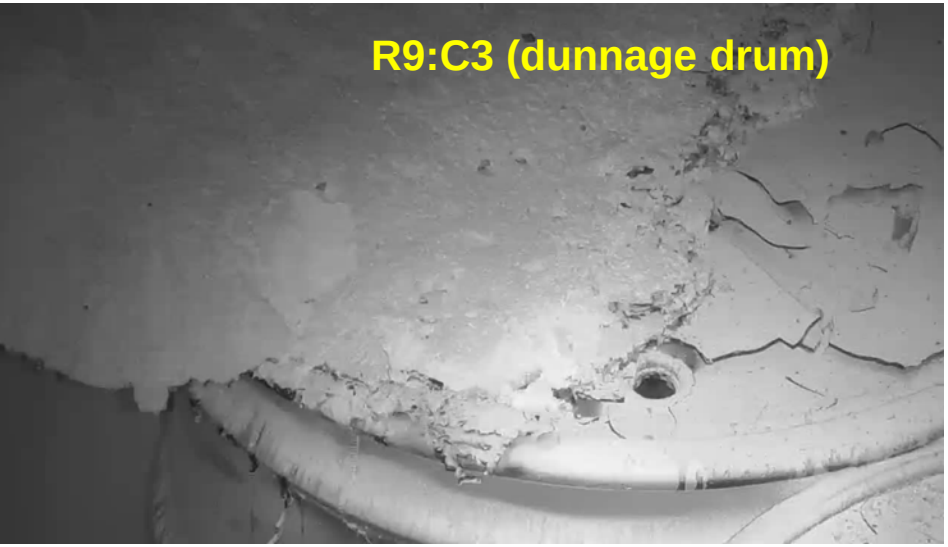
Damage at R18:C6



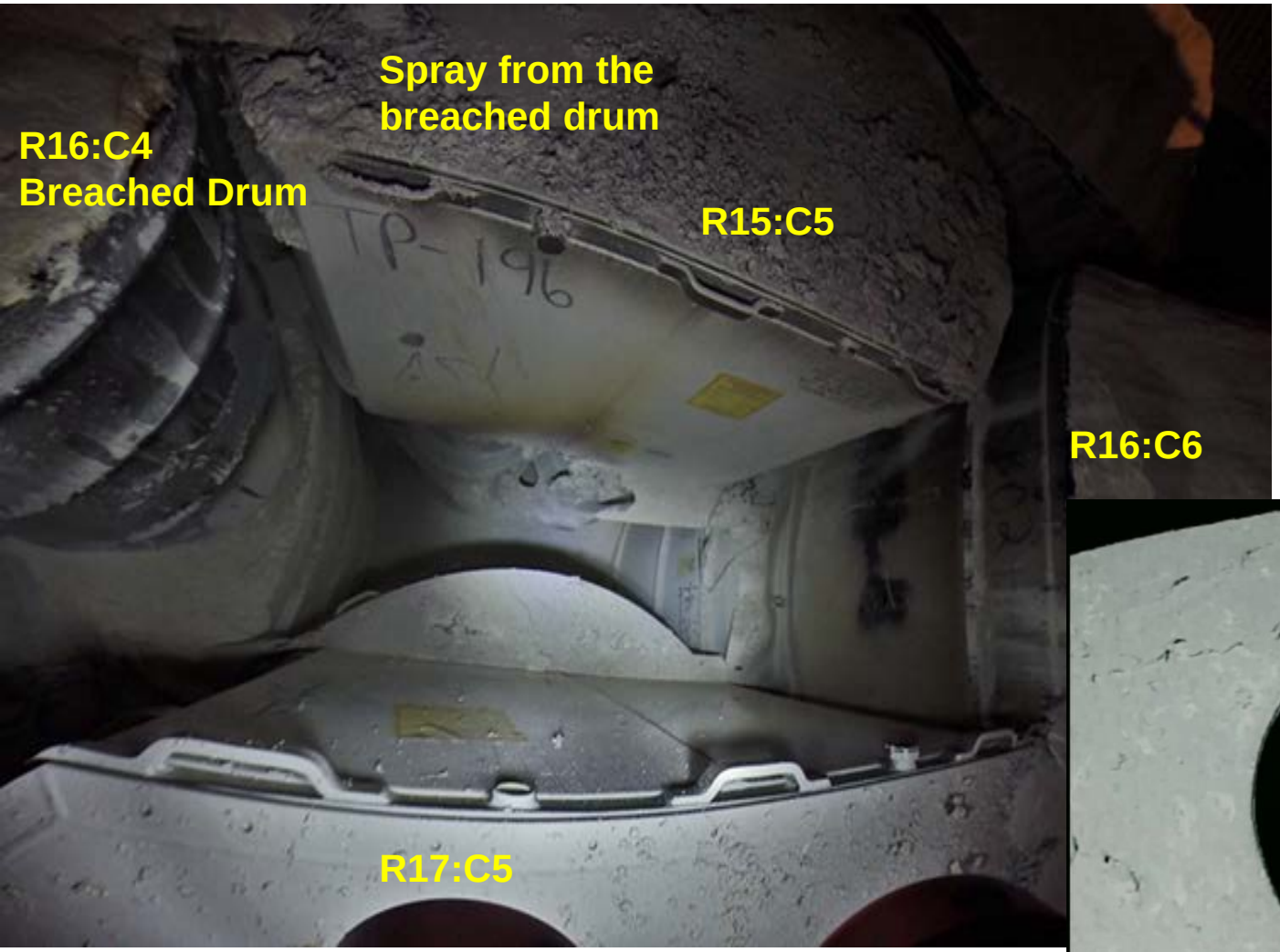
Damage in Rows 9 & 10

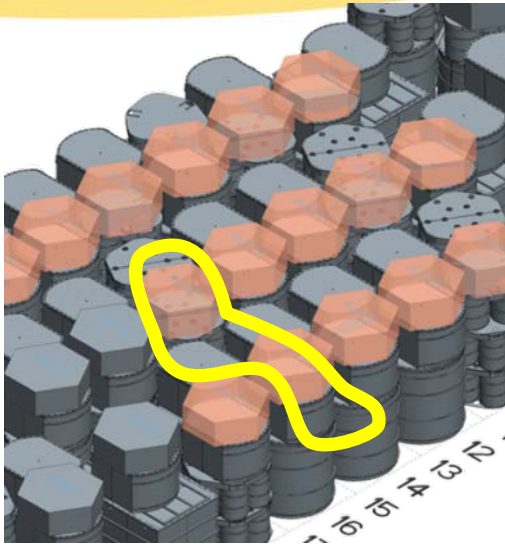






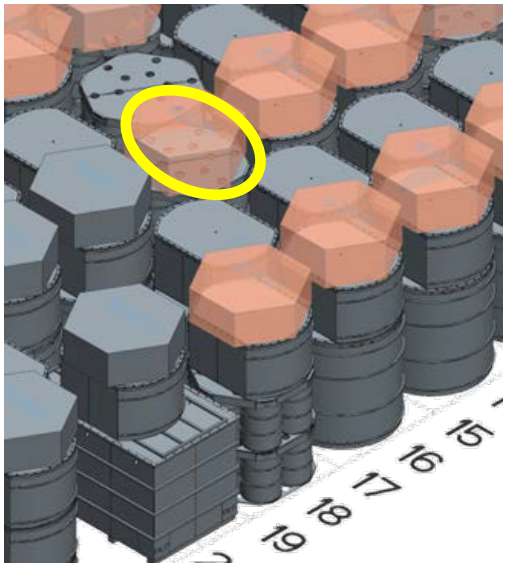
Damage in Rows 15 & 16





Drum 68660

R16:C4
68660
R17:C5
R15:C5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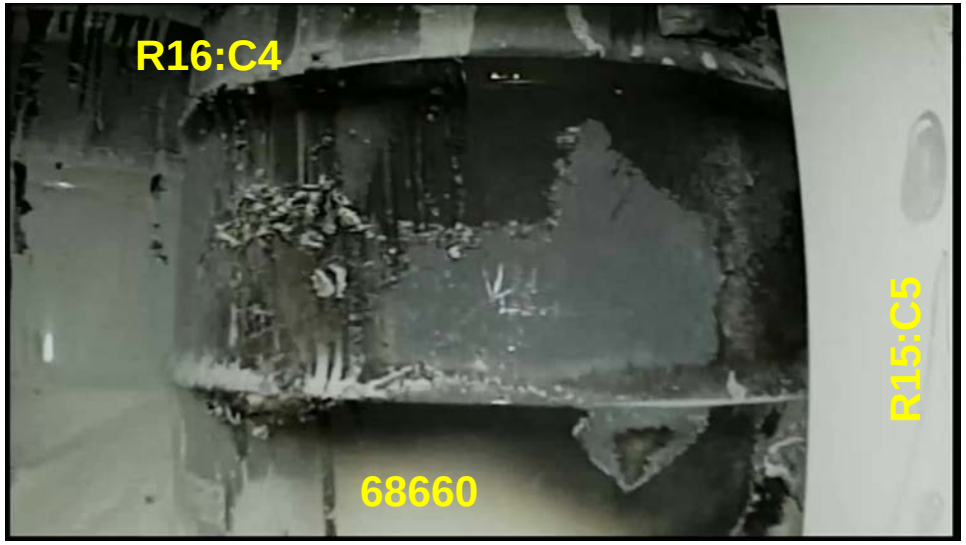
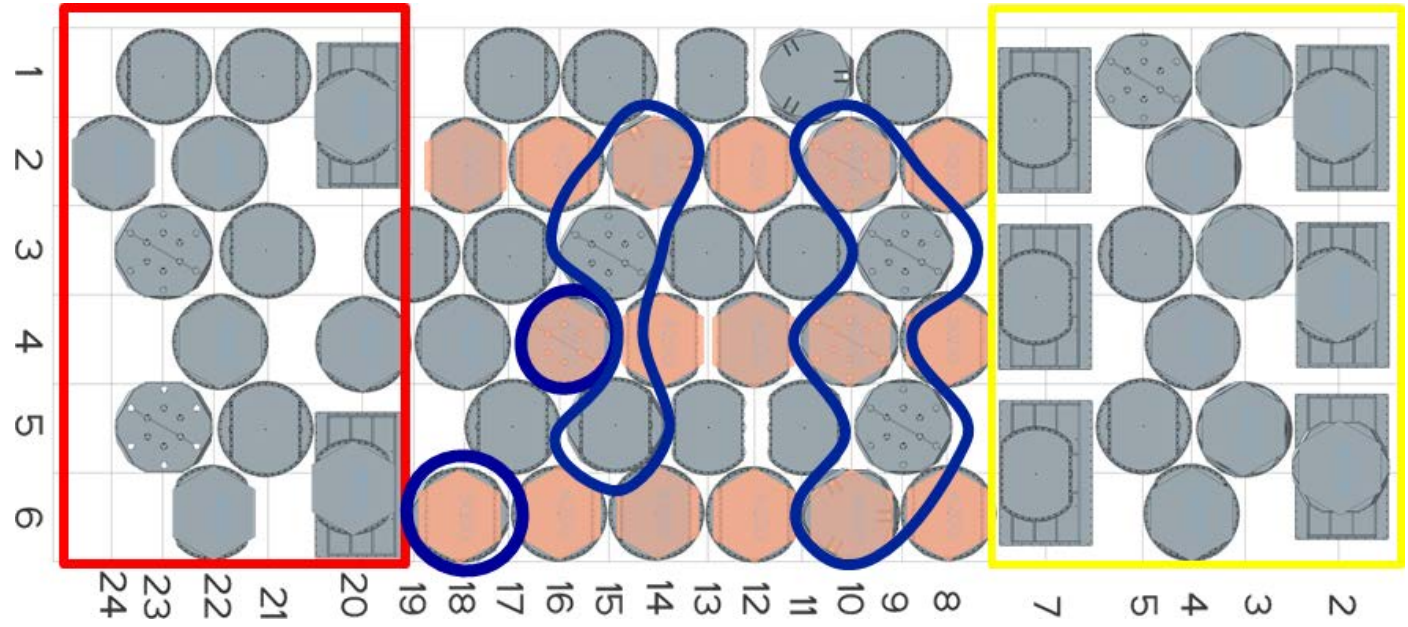
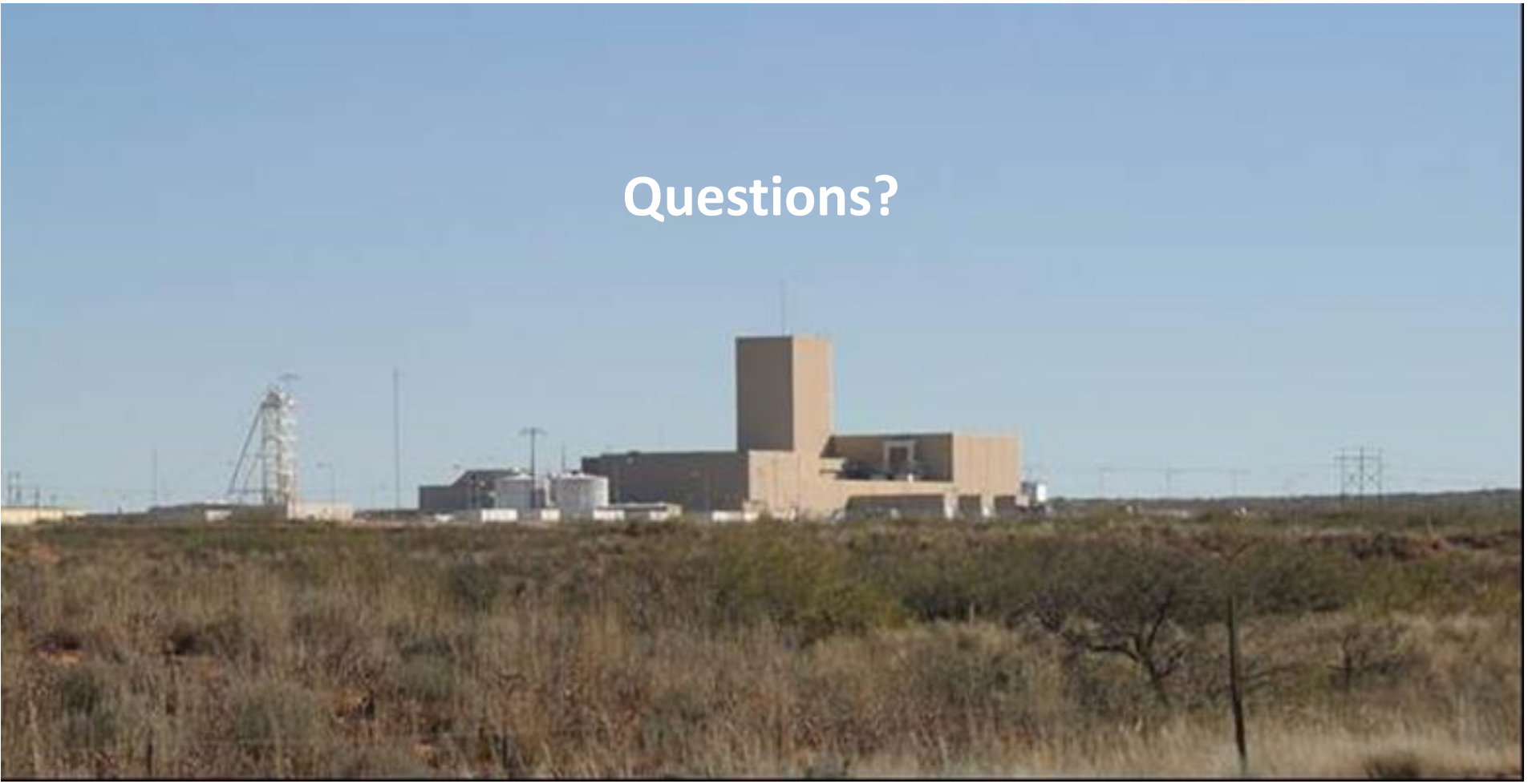

R16:C4
R15:C5
68660

Forensics Summary

- Event initiated at R16:C4 – Drum 68660
- Ruled out initiation in R15:C5
- Ruled out other start locations
- Greatest damage at areas with most exposed combustibles
- Demonstrated importance of ember transfer propagation
- Radiological and chemical analyses were similar to the TAT results




Questions?