Pre-decisional Draft

WIPP Underground
Radiological Event Investigation Summary
February 14, 2014

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Chairman, Accident Investigation Board
March 2014

Pre- Decisional Draft

On Friday, February 14, 2014, at approximately 11:14 PM (MST), a high radiation alarm was received in the Central Monitoring Room (CMR) at the DOE Waste Isolation Pilot Plant (WIPP) east of Carlsbad, New Mexico.

Continuous Air Monitor (CAM)

The alarm was from a Continuous Air Monitor (CAM) in the underground that was monitoring an active transuranic (TRU) waste panel.

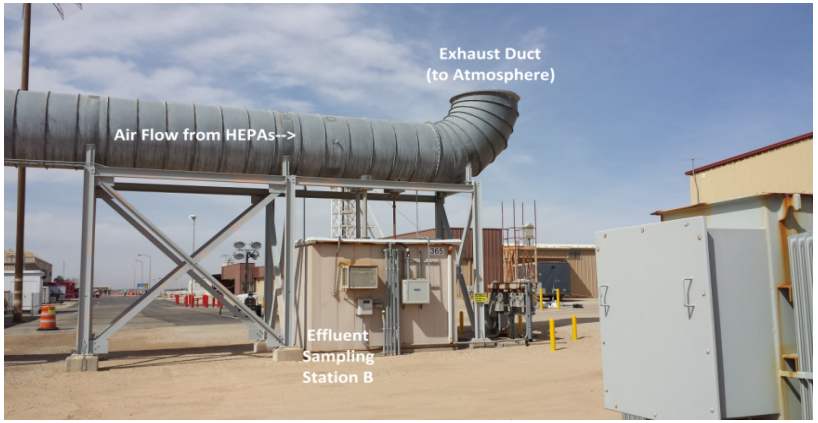
The Event

- In response to the alarm, the Underground Ventilation System (UVS) automatically initiated a switch to High Efficiency Particulate Air (HEPA) filtration mode.
- Contaminated air was then directed through two HEPA filter banks and then to the atmosphere.
- There were no employees working in the underground. There were 11 personnel working on the surface.
- Upon receiving the alarm, the CMR operator attempted to call the on-call radcon technicians. Two hours later, the CMR operator contacted the Operations and Radiological Controls Managers who were offsite.

Active Waste Face at Panel 7, Room 7

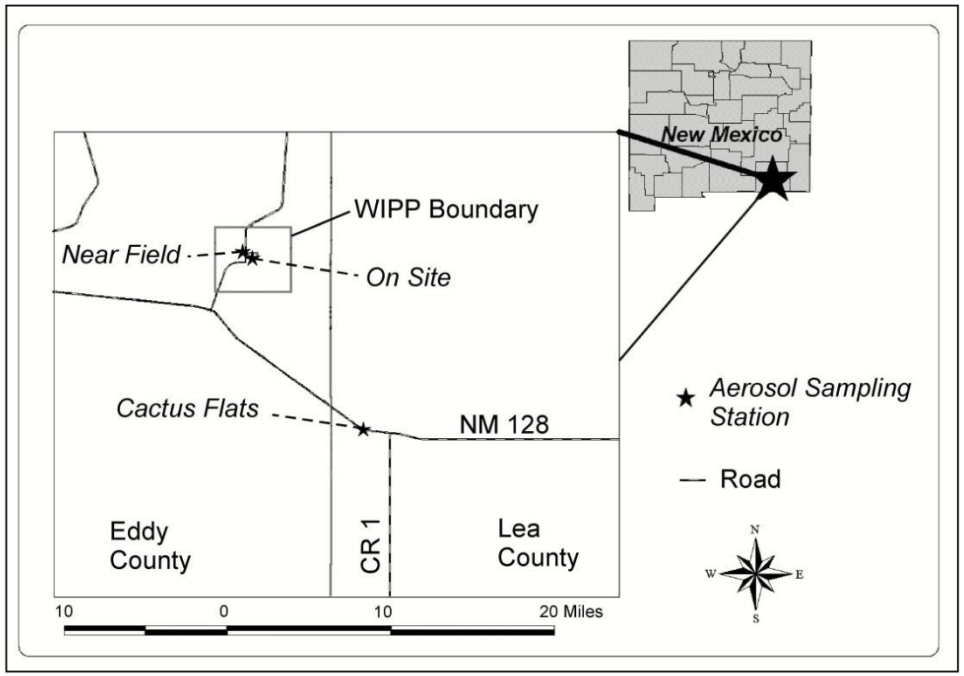
The Day After the Event

- On Saturday at 7:15 AM, February 15, the Radiological Controls Manager reported 4.4 million disintegrations per minute (dpm) alpha contamination on filters from effluent monitoring Station A upstream from the HEPAs and indicative of transuranics (TRU).
- Test results of filters from effluent monitoring Station B downstream from the HEPAs, and at the discharge to the atmosphere, were reported at 9:15 AM and indicated ~28 thousand dpm alpha and ~5.9 thousand beta contamination.
- Site Personnel were sheltered-in-place from 9:34 AM to 4:35 PM, then site access was restricted to essential personnel.



The Days Following

- On February 19, Carlsbad Environmental Monitoring and Research Center (CEMRC) reported radiological results from the CEMRC air sampling station located approximately 0.6 miles northwest of the site on the WIPP access road.
- The filter counted was installed at the station prior to the event (on Tuesday, February 11) and was removed on Sunday, February 16.

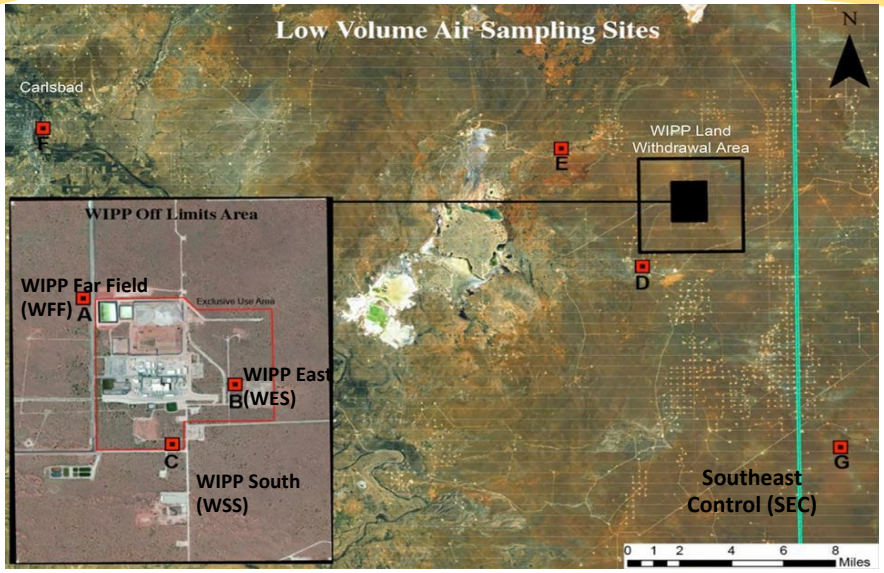


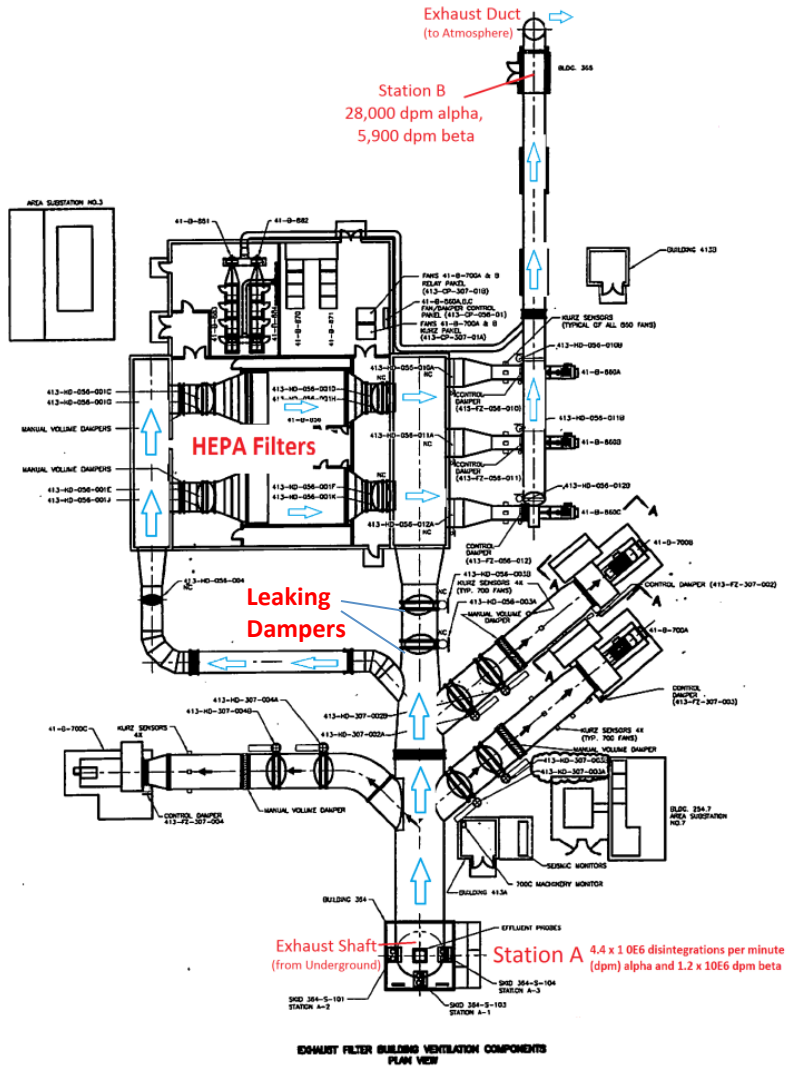
- The levels were higher than the normal background levels of radioactivity from transuranic elements commonly found at WIPP and indicated a small release of radioactive particles from the WIPP site.

The Days Following

- On February 24, results of off-site environmental monitoring samples (Far Field) were received and indicted slightly elevated levels of $Pu^{239/240}$ and Am^{241}. These levels were also well below a public or environmental hazard.
- On March 6, high-density foam was applied to seal the two ventilation system dampers which leaked and allowed contaminated air to bypass the HEPA filters.
- Manned entry into the underground to collect samples, assess conditions, and gather information, necessary to determine the physical cause for the release, is underway with great progress to date, but challenges ahead.
- Personnel bioassay was subsequently performed on 150 personnel to determine it there was any uptake of contamination.

The Days Following

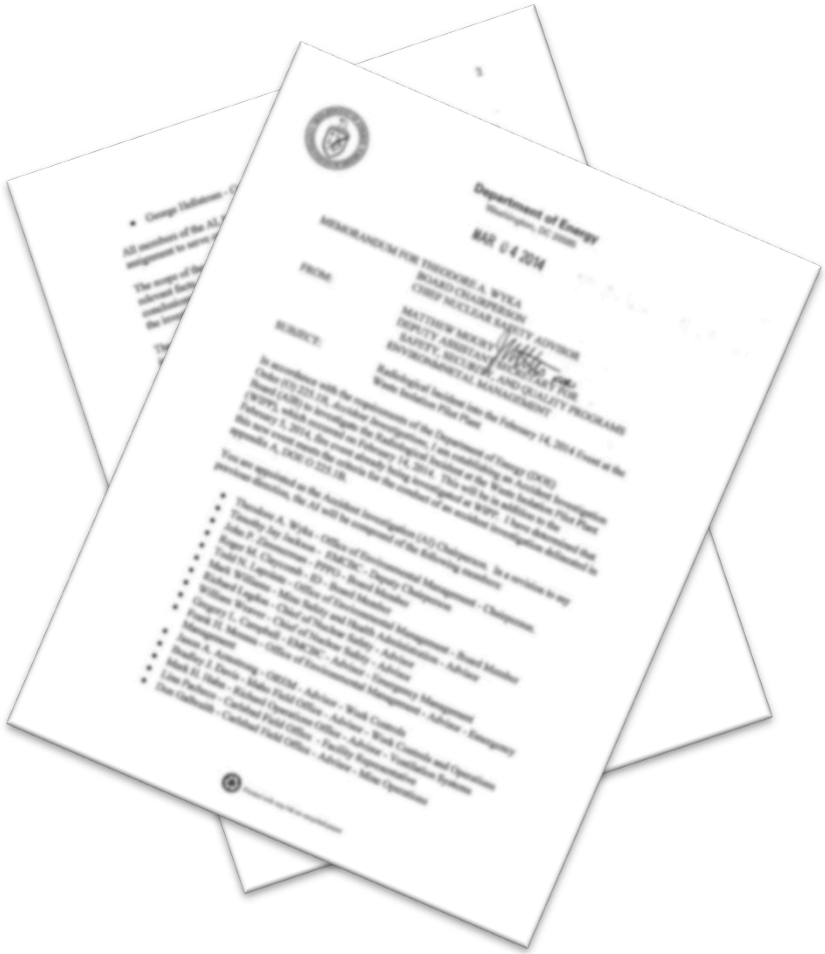




Appointment of the Accident Investigation Board

On February 27, 2014, the Deputy Assistant Secretary Safety, Security, and Quality Program, Environmental Management, appointed an Accident Investigation Board (the Board) to determine the cause and of the accident and to develop recommendations for corrective actions to prevent recurrence.

The Board started the investigation on Monday, March 3, 2014.



The Board's Actions

As the underground was inaccessible, the Board was unable to determine the physical mechanism of container(s) failure, e.g., back (roof) or rib (wall) fall, puncture by a failed roof bolt, over pressurization, etc. is unknown at this time and must be determined once access to the U/G is restored.

- Phase 1 focused on the release of radioactive material from underground to the environment, and the follow-on response to the release.
  - Board reviewed the adequacies of the safety management programs and systems.
  - Important to report on Phase 1 to maintain transparency and move quickly on the corrective actions.
- Phase 2 will be focused on determining the direct cause of the release of the material.
  - A Judgment of Need (JON) has been developed to investigate and determine the mechanism of release and determine the related conditions and causal factors, reach conclusions, and identify Judgments of Need.
  - Phase 2 will also evaluate the impact on worker protection in the underground.
  - A supplemental report will be issued following Phase 2.

Phase 1 Root Cause

Root Cause of the release of radioactive material from underground to the environment (Phase 1)

The Board identified the root cause of Phase 1 to be NWP's and CBFO's management failure to fully understand, characterize, and control the radiological hazard. 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 from the underground to the environment; and the delayed/ineffective recognition and response to the release.

Scorecard of Conclusions and Judgments of Need

SUBJECT	Conclusions	Judgments of Need			
		NWP	CBFO	HQ	Total
Nuclear Safety Program	8	7	3	2	12
Emergency Management	3	7	2	1	10
NWP Conduct of Operations	1	1	1	0	2
Maintenance Program	2	2	2	2	6
Radiation Protection Program	2	4	1	0	5
Safety Culture and Oversight	2	1	1	2	4
NWP Contractor Assurance System	5	2	0	0	2
CBFO Oversight	4	0	4	0	4
Headquarters Oversight	3	0	0	4	4
Totals	**30**	**24**	**14**	**11**	**49**

Conclusions

Nuclear Safety Program

- NWP does not have an effective nuclear safety program in accordance with Federal nuclear safety basis requirements.
- The CBFO review and approval process of the nuclear safety basis and safety evaluation reports also had weaknesses.
- Hazard analysis did not drive the appropriate classification of the underground ventilation system and Continuous Air Monitors.
- General reduction in the level of conservatism in the Documented Safety Analysis, hazard/ accident analysis and Technical Safety Requirement safety controls.
- Documentation rigor inconsistent with a Hazard Category 2 nuclear facility.

Maintenance program

- Not effective in ensuring the operability and reliability of key components and equipment, e.g., Continuous Air Monitors, the filtration system, effluent monitoring equipment (on and offsite), etc.

Radiation protection program

- Not effective in ensuring timely and effective response, including collection and analysis of radiological data, contamination control, personnel and site surveys, equipment, training, etc.

Conclusions

Emergency management program

- Not effective in ensuring prompt categorization and classification, timely implementation of protective actions, and required notifications and reporting.

Conduct of Operations

- Key elements of the NWP Conduct of Operations program were ineffective in driving safe and compliant operation of a Hazard Category 2 facility.

Safety Culture and Oversight

- Nuclear Facility versus Mine Culture: Difference in expectations between operation of a Hazard Category 2 nuclear facility and a mine.
- The safety culture does not fully embrace and implement the principles of the Department's Integrated Safety Management Policy and Guides.
- Execution of the NWP Contractor Assurance System (CAS) and CBFO Oversight were ineffective.
- Headquarters line management ownership and oversight was inadequate.


Questions?