Discussion of Recovery-Driven Ventilation Changes and Regulatory Strategy

Presented to the EPA in Washington DC

October 9, 2014

Steve Kouba and Brent Blunt
Contents for Discussion

• Provide update on Recovery-Driven Ventilation Changes Summary to the EPA

• Detailed Discussions on
  – Interim Ventilation
  – Supplemental Ventilation
  – Permanent Ventilation (New Shaft)
Recovery-Driven Ventilation Changes

Summary

Assumption: All potentially contaminated exhaust is HEPA filtered

- **Interim** – Two skid-mounted HEPA filters adding ~54,000 additional cfm to current 60,000 cfm system
- **Supplemental** – increased flow in clean air circuit using an underground booster fan (preliminary design)
- **Permanent Shaft** – new shaft with new surface facilities for filtration and monitoring
Standards that Apply

- 40 CFR Part 191, Subparts A & B
- 40 CFR Part 61, Subparts A & H
  - National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities
  - EPA determined that Subpart H is not applicable to WIPP
    - Subpart H exempts facilities subject to Part 191, Subpart B
    - 1998 memorandum confirms EPA’s position
  - 1995 EPA/DOE MOU
    - DOE Policy that WIPP will implement the requirements of Subpart H
Summary of Requirements

• 40 CFR 61.15
  – Increase in emissions is a modification
  – Modified source is a new source

• 40 CFR 61.96
  – If estimated effective dose equivalent (EDE) from modification is less than 0.1 mrem/yr and facility is in compliance, then the modification is exempt for Approval to Construct

• EPA 402-R-97-001
  – If estimated EDE from construction or modification is less than 0.25 mrem/yr, then prior notification is not required
Summary of Requirements (continued)

What about accident assumptions

Chloric: Definition of member of public

• 40 CFR 61.93(f)
  – Monitoring/sampling requirements based on Potential EDE (normal operations assuming no control equipment)

• 40 CFR 61.93(e)
  – If estimated Potential EDE is greater than 0.1 mrem/yr then continuous sampling/monitoring
  – Otherwise periodic confirmatory measurements (reg. does not specify)

? Ability to discontinue after a year
Summary of Requirements (continued)

- 40 CFR 61.93(c)
  - New sources monitor/sample per ANSI/HPS N13.1-1999
- EPA 402-R-97-001
  - Monitor/sample per ANSI N13.1-1969
- Methods in the 1999 version of N13.1 provide a more representative sample than the 1969 version
## Summary of Requirements (continued)


<table>
<thead>
<tr>
<th>PIC Category</th>
<th>Potential fraction of allowable limit</th>
<th>Based on 10 mrem limit (mrem/yr)</th>
<th>Sampling, monitoring and analysis requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Continuous sampling for retrospective analysis. Real time monitoring with alarm capability. Possible separate accident monitoring system.</td>
</tr>
<tr>
<td>1</td>
<td>&gt;0.5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>&gt;0.01 and ≤0.5</td>
<td>&gt;0.1 and ≤5</td>
<td>Continuous sampling with retrospective off-line analysis.</td>
</tr>
<tr>
<td>3</td>
<td>&gt;0.0001 and ≤0.01</td>
<td>&gt;0.001 and ≤0.1</td>
<td>Periodic confirmatory sampling with off-line analysis.</td>
</tr>
<tr>
<td>4</td>
<td>≤0.0001</td>
<td>≤0.001</td>
<td>Annual administrative review.</td>
</tr>
</tbody>
</table>

Environmental Management

For more information, visit [www.em.doe.gov](http://www.em.doe.gov)
INTERIM VENTILATION SYSTEM
Interim Ventilation System

- Planned as part of the recovery operations
- Doubles the HEPA filtered ventilation
  - Add ~54,000 additional cfm
  - Result: an “increase in emissions” for Station B
  - Therefore a new source (40 CFR 61.15)
- Monitor at the existing Station B exhaust point
Preliminary Interim Ventilation
(Preliminary Plan View)

~54,000 additional cfm
Preliminary Interim Ventilation
(Preliminary Section B - B)

"Geometrically similar method" = 6 in. testing to qualify a new stack at 45° away matches a stack at Hanford that is already qualified.

New 66" exhaust air from new HEPA filters to existing horizontal stack.

New 72" x 60" flanged double WYE branch connection to 72" dia duct.

B-B
Regulatory Analysis
(Interim Ventilation)

• Estimated EDE = 1E-04 mrem/yr per failed drum
  - 40 CFR 61 Appendix D Calculation
  - Exempt from Approval to Construct (40 CFR 61.96)

• Potential EDE = 1E-02 mrem/yr per failed drum
  - PIC 3 Source (with 10 mrem/yr Standard from 40 CFR 61 Subpart H)
  - Periodic Confirmatory Measurements

• ANSI/HPS N13.1-1999 PIC 3 compliant sampling System
• ANSI/HPS N13.1-1999 PIC 3 compliant sampling Location

To: what is PEC of the ruptured drum?

Station B is currently PIC-1
Three options to qualify the sampling location per ANSI/HPS N13.1-1999

1. Geometrically Similar Design (Selected Option) (low cost, low impact to schedule)
2. Scale Model Testing (medium cost, high impact to schedule)
3. Air Blender Option (high cost, medium impact to schedule)  
   Would have required bigger fans to handle - AP
Option #1
Geometrically Similar Design

• Design to conform to an existing model stack that has been qualified and is also geometrically similar
• Validate the installation per Section 5.2.2.2 of Standard: “The arithmetic difference between the velocity coefficient of variation (COV) in the proposed stack and the geometrically similar stack must be within 5%”
• Prepare a qualification report
• High probability of success
• The basis of Scale Model Testing (option 2)

- Station B Probe meets the Aspiration Ratio (<1.5) and Transmission Ratio (0.8 to 1.3) criteria at all anticipated flow rates.
- Current system design minimizes sample loss (50% transmission of 10 μM particle limit).
- Sample flow rate continuously measured.
- Exhaust flow rate continuously measured.
# Compliance Activities for Interim Ventilation

<table>
<thead>
<tr>
<th>Activity</th>
<th>Start Date</th>
<th>Finish Date</th>
<th>Duration (working days)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select Design Option from Three Available Options</td>
<td></td>
<td>Completed</td>
<td>NA</td>
<td>Draft submitted for CBFO review on 8/16/2014.</td>
</tr>
<tr>
<td>Collect Data Needed to Qualify Station B and Prepare Draft Qualification Report</td>
<td></td>
<td>Completed</td>
<td>NA</td>
<td>This qualifies Station B for the increase in air flow in the filtration mode from 60,000 cfm to ~114,000 cfm. Tied to duct design; dimensions and distances.</td>
</tr>
<tr>
<td>Discuss Scope and Regulatory Approach with EPA Region 6 and ORIA</td>
<td>9/9/2014</td>
<td>12/1/2014</td>
<td>60</td>
<td>Defines a window to initiate discussions. First meeting – 10/9/2014.</td>
</tr>
<tr>
<td>Perform Velocity COV Testing</td>
<td>4/2/2015</td>
<td>4/3/2015</td>
<td>1</td>
<td>Testing is tied to Startup Testing, but can be done once system is operational.</td>
</tr>
<tr>
<td>Issue the Qualification Report to CBFO</td>
<td>4/24/2015</td>
<td>NA</td>
<td></td>
<td>Milestone</td>
</tr>
</tbody>
</table>

- Parallel process w/NMED
- Planned Change Notice to NMED 9/2/14
- Permit issued scheduled by 12/12 (ventilation regulations) (260K annual average ventilation)

Would like EPA approval, but not legally required.
SUPPLEMENTAL VENTILATION SYSTEM
Supplemental Ventilation

- Increased clean air circuit using an underground booster fan
- Uses separate ventilation circuit for mining and maintenance
- Upcasting through Air Intake Shaft or Salt Shaft (one intake, one exhaust)
- Temporary system until Permanent Ventilation system is operational
Supplemental Ventilation
(Contamination Control Principles)

• Negative room pressure design principles
• Common design for contamination control at nuclear facilities
• Clean air circuit at positive pressure with respect to contaminated air side
• Engineering evaluating design considerations to monitor delta pressure
• Use CAM to ensure no cross-contamination
• No source term

---

Interim Ventilation

Positive pressure clean side/ negative pressure cont. side

Contaminated Air

Clean Air

HEPA

Clean Air

Clean Air

Positive Pressure

Underground Booster Fan

Negative Pressure

Do we trust bulkhead configuration?

Do we trust ESP alarm?
Regulatory Analysis
(Supplemental Ventilation)

- Estimated EDE <<< 1E-05 mrem/yr
  - Clean Air from uncontaminated activities
  - Exempt from Approval to Construct (40 CFR 61.96)
- Potential EDE <<< 1E-05 mrem/yr
  - PIC 4 Source (with 10 mrem/yr Standard form 40 CFR 61 Subpart H)
  - Administrative Review
    - Continuous Air Monitors (CAMs)
    - Delta Pressure indication being considered
- Continuous Sampling not required
Compliance Activities for Supplemental Ventilation

<table>
<thead>
<tr>
<th>Activity</th>
<th>Start Date</th>
<th>Finish Date</th>
<th>Duration (working days)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discuss Scope and Regulatory Approach with EPA Region 6 and ORIA</td>
<td>9/9/2014</td>
<td>12/1/2014</td>
<td>60</td>
<td>Defines a window to initiate discussions. First meeting – 10/9/2014</td>
</tr>
</tbody>
</table>

Project teams have just started

RCRA - are there regulated materials in the clean air circuit?
PERMANENT VENTILATION SYSTEM
Permanent Ventilation

• New shaft with new surface facilities for filtration and monitoring (potentially return to clean facility)
• SNL to conduct an Impact Analysis of the new shaft on long term repository performance
• DOE to submit PCN to EPA to mine a new access drift and to drill shaft ~ half-mile drift, ~ S-90, U-2500
• DOE to submit a second PCN to EPA for new surface filtration and monitoring systems

Sandia is working on Impact Analysis
2 PCNs 24 — two drifts + one shaft — surface facilities
Compliance Activities for Permanent Ventilation

<table>
<thead>
<tr>
<th>Activity</th>
<th>Start Date</th>
<th>Finish Date</th>
<th>Duration (working days)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discuss Scope and Regulatory Approach with EPA Region 6 and ORIA</td>
<td>9/8/2014</td>
<td>7/24/2017</td>
<td></td>
<td>Defines a window to initiate discussions. First meeting – 10/9/2014</td>
</tr>
<tr>
<td>SNL to Conduct a Impact Analysis</td>
<td>8/15/2014</td>
<td>11/17/2014</td>
<td>61</td>
<td></td>
</tr>
<tr>
<td>Submit PCN to ORIA to Mine New Access Drift and Drill Shaft</td>
<td>2/19/2015</td>
<td>NA</td>
<td></td>
<td>Milestone</td>
</tr>
<tr>
<td>Submit PCN to EPA ORIA for New Surface Filtration and Monitoring Systems</td>
<td>11/30/2015</td>
<td>NA</td>
<td></td>
<td>Milestone</td>
</tr>
</tbody>
</table>

Nick: is this a Class 2 or 3 permit mod (2 mo. vs. 3 years)
Summary

- Continue design, installation and startup of the Interim Ventilation System
- Select approach for the Supplemental Ventilation system to allow for clean air exhaust and reduce the spread of underground contamination
- Impact Analysis for Permanent Ventilation

*Sheet in 2017/2018 no earlier than 2016*

*Russ: drift in 2014
Sheet in 5/17, 6/18*