

Report:

**Review of Station B Qualification
and
Observation of Station B Coefficient of Variation Testing**

**AT THE
WASTE ISOLATION PILOT PLANT**

April 26-27, 2016

U. S. ENVIRONMENTAL PROTECTION AGENCY

Office of Radiation and Indoor Air

Center for Waste Management and Regulations

1200 Pennsylvania Avenue, NW

Washington, DC 20460

June 2016

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1.0 Executive Summary

Exhaust from waste handling areas at the Department of Energy’s (DOE) Waste Isolation Pilot Plant (WIPP) is sampled for radionuclides to demonstrate compliance with U.S. Environmental Protection Agency (EPA) standards. Since the February 2014 radiological release, the WIPP has operated with all exhaust from the underground facility undergoing HEPA filtration, which limits the volume of air that can pass through the mine. The Interim Ventilation System (IVS) adds filtered volume capacity to the existing Underground Ventilation and Filtration System (UVFS), allowing greater operational flexibility.

The EPA’s primary concern regarding the ventilation system is that the site continues to collect samples that accurately reflect the concentration of radionuclides in the facility exhaust, for the purpose of demonstrating compliance with public dose limits. The addition of the IVS alters the duct configuration upstream of Station B, which is the designated sampling point when HEPA filtration is operating. The main purpose of the April site visit was to observe testing that was performed to demonstrate that Station B sampling equipment remains able to collect representative aerosol samples after the modification. The visit also afforded EPA staff an opportunity to observe both the IVS and preliminary work towards the Supplemental Ventilation System (SVS), which would establish a separate air circuit in the underground for the purpose of mining.

The DOE provided the EPA with draft and final copies of the report, “Evaluation of Duct Mixing and Sampling System for Interim Ventilation System at the Waste Isolation Pilot Plant,” which describes the steps that the site took to qualify sampling Station B, including the analysis of data collected during the site visit. At the EPA’s request, the DOE also provided reference materials, including test data from a geometrically similar stack, which allowed a complete review of the report. The EPA found that the DOE has taken appropriate steps to qualify Station B as a sampling point under the updated ANSI/HPS N13.1-1999 standard, and that with the added IVS, samples taken at Station B will continue to accurately represent facility exhaust.

2.0 Participants

EPA staff participating the visit were Nick Stone of EPA Region 6 and Jonathan Walsh of the EPA Office of Radiation and Indoor Air (ORIA). They were joined by Ricardo Maestas and William Teeter of the New Mexico Environment Department (NMED).

Several DOE and contractor staff participated:

Participant	Affiliation
Larry Madl	Regulatory and Environmental Services (RES), Visit Coordinator
Yen Kiang	RES, Observer
Russ Patterson	Carlsbad Field Office (CBFO) Observer

Anderson Ward	CBFO, Observer
Jacqueline Davis	Nuclear Waste Partnership (NWP)
Jill Farnsworth	NWP
John Van de Kraats	NWP
Wes Boatwright	RES
Ty Zimmerly	RES
Dirk Robertson	RES
Brent Blunt	Subcontractor to AECOM

3.0 Activities Observed

Underground tour and Supplemental Ventilation System (SVS)

On April 26, 2016, Coefficient of Variation (COV) testing was delayed due to weather, and the team entered the underground to observe progress on facility recovery and the SVS. The SVS fan unit has been emplaced in the underground, installed in the air intake drift and configured to pull a nominal 130,000 cfm of additional air in through the current air intake shaft. A reconfiguration of underground bulkheads will then allow a separate air circuit for mining and ventilating the northern experimental area, with the air exhausted through the salt handling shaft. Pressures would be managed in the repository so that air only leaked from these circuits into the waste handling (filtered air) circuit, and work has begun to install upgraded pressure and flow sensors throughout the underground, new continuous radiological monitoring of the underground and interlocks to prevent the SVS fan from operating if the facility exhaust fans are not running. There is no immediate plan to implement the SVS. While underground, EPA staff were able to observe bulkheads and regulators that are under construction as part of the facility recovery, and a Canberra iCAM equipped with a movable filter detection head, intended to replace the RADOS CAMs for remote radiological monitoring of the underground.

Intake side of SVS Fan in S-90 air intake drift



Recently replaced ventilation bulkhead



Canberra iCAM with moveable filter head attachment



Differential pressure gauges in E-140



Observation of Interim Ventilation System (IVS)

Following the underground tour, the EPA and NMED team observed the filtration units and ductwork of the IVS. Testing of the IVS was postponed on the afternoon of April 26 due to high winds, and the work resumed on the morning of April 27.

The IVS system consists of two additional fans and filter banks that have been tied into the existing ductwork in place of fan 700A. They are called fans 960A and B.

Underground Ventilation and Filtration System and Interim Ventilation System

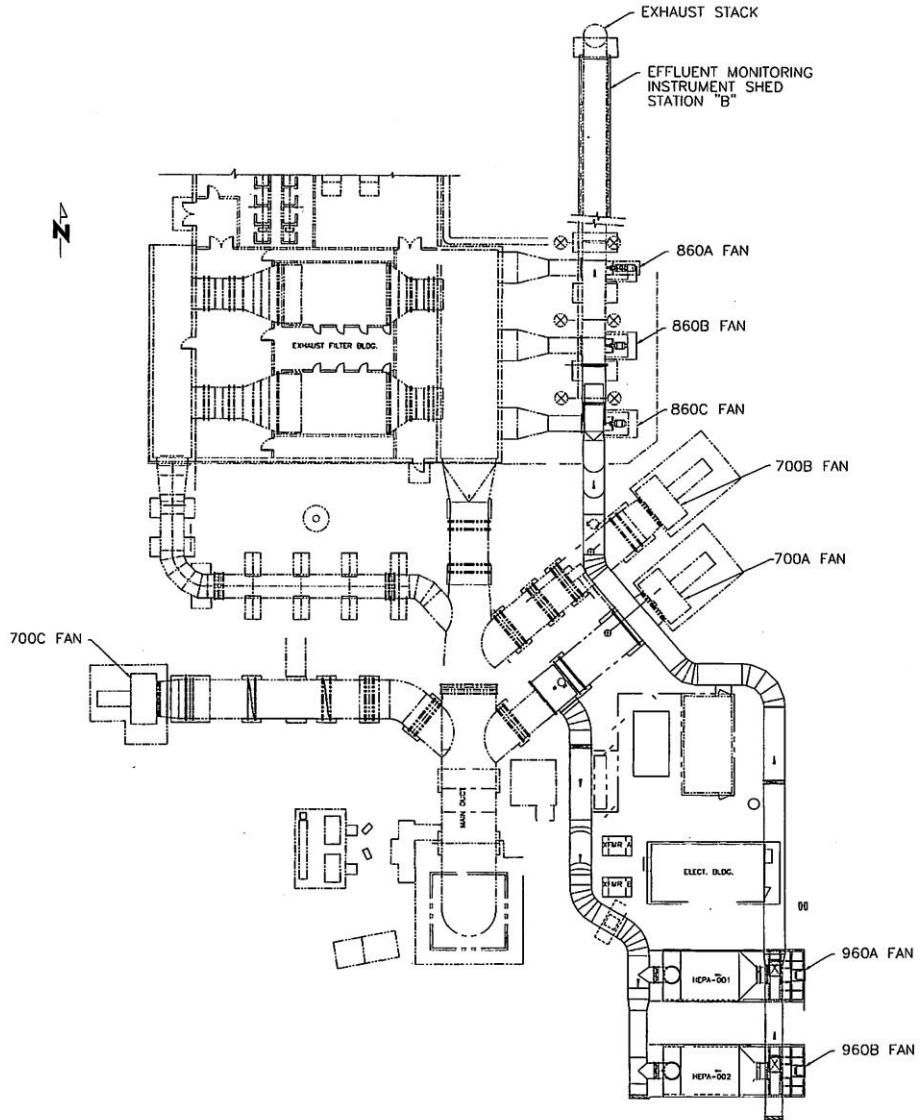


Figure 1 - Emission Point (Exhaust Stack), Station B and Fans

View looking down on new duct work and filter units and fans 960A and B



Side view of duct work, filter and fan unit



Ductwork currently open for purposes of testing and “cold start-up,” as described in CBFO’s letter dated January 29, 2016



A 45 degree tie-in was used to mimic the geometry of a previously qualified exhaust stack, simplifying the testing requirements



Coefficient of Variation (COV) Testing

The primary purpose of the site visit was for EPA staff to observe testing to demonstrate that Station B continues to collect representative aerosol samples, with the addition of the IVS. Per EPA regulations, the exhaust duct must be qualified using ANSI/HPS Standard N.13.1-1999, “Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities.” In the case of Station B, the site has elected to demonstrate that the WIPP underground ventilation system has similar geometric proportions as a previously qualified exhaust stack. Under this qualification method, testing must be conducted to confirm that the variation in the air velocities at different points across the duct is similar to that of the previously qualified duct. EPA observed the velocity measurements from which the coefficient of variation was calculated.

Site representatives provided the EPA with a copy of Work Order 1617480, Station B Stack COV Testing with IVS and UVFS (Attachment C). Fan 860A was powered off and fan 860C placed into service at approximately 9 am, and fans 960 A and B were also turned on. With the assistance of site Radiation Control (RadCon), engineering personnel followed the procedure and took a series of air velocity measurements across a vertical and horizontal cross section of the exhaust duct. Work was completed by 11 am.

Using a pitot tube to take velocity measurements of a horizontal traverse of the duct



EPA personnel observed one set of COV tests. In filtration mode, only one 850 fan can be operated at a time, which means that three ventilation configurations are possible. The same procedure was repeated on subsequent days for ventilation configurations using fans 850B, and 850A, each of which enter the exhaust duct in a different location.

4.0 Report Review and Conclusions

The final results of COV testing were transmitted to the EPA in the report, “Evaluation of Duct Mixing and Sampling System for Interim Ventilation System at the Waste Isolation Pilot Plant,” (URS-PS-TR-16-0002) on June 3, 2016. The report details the DOE’s work to establish compliance with Subpart H of the National Emissions Standards for Hazardous Air Pollutants after the modifications to the exhaust and filtration system. Specifically, to continue single point sampling using the shrouded probe at Station B, the requirements of ANSI/HPS standard N13.1-1999, “Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities” must be met. The standard provides methods for demonstrating that the exhaust air and entrained aerosols are uniformly mixed at the point of sampling, and that the sampling equipment itself collects representative samples of the exhaust.

As described above, the site elected to qualify Station B based on an existing qualified stack with similar geometry, which is allowed by the standard. As depicted in the photographs, new duct work was specifically designed to enter the existing stack at a 45 degree angle, so that this method could be used. At the EPA’s request, the DOE provided data from the testing of the similar stack, as well as specifications of the modified WIPP exhaust. The EPA was able to verify that the DOE used the appropriate criteria from the standard to correctly identify a geometrically similar stack.

When a geometrically similar stack is used, testing must verify that the COV (the ratio of the standard deviation to the mean value, expressed as a percentage) of air velocity within the center two-thirds of the stack does not differ arithmetically by more than 5% between the model stack and the stack that is being qualified. The model stack had a velocity COV of 4.4%, therefore, the measured COV in velocity at Station B must be between zero and 9.4% to qualify. Testing resulted in COVs of 4.4%, 5.1%, and 5.3% for the three possible fan configurations for the WIPP exhaust. The site procedure and the EPA’s observations provide objective evidence that this testing was performed correctly, demonstrating that the facility exhaust is well-mixed at the Station B sampling point and that single-point sampling with a shrouded probe is appropriate.

The DOE report also addresses requirements set by the ANSI/HPS standard for the sampling efficiency of the probe and sample transport system, and calculates potential wall losses within the sample lines. The sampling environment has not been changed by the modifications to the exhaust system, and these calculations are additionally supported by testing performed at the time the system and the WIPP shrouded probe were designed, building confidence that the Station B sampling apparatus is able to collect representative aerosol samples.

The EPA finds that the report, observed test activities and supporting materials demonstrate that the DOE has qualified Station B as a sampling point under the updated ANSI/HPS N13.1-1999 standard, and samples collected at that point are adequately representative of facility exhaust.

Attachment A: Testing schedule

Attachment B: Work Order 1617480, Station B Stack COV Testing with IVS and UVFS

Attachment C: Field notes

April 26, 2016:

0700 Arrived at the site. Reviewed safety video and received training in donning rescue breathers and SCSRs.

0810 Lamp room, tour briefing.

0830 Entered the underground.

0845 In S-90 at W-170, observed the SVS unit. Exact location notated on map.

Nominal 130k cfm. Regulators 302, 521 control flow to north end of mine. Flowsonic flowmeter installed in S-90, downstream of AIS and upstream of fan.

SVS unit is not designed to operate without full IVS capacity, engineering interlocks and manual shut-offs designed to prevent independent operation.

0915 Observed permanent bulkhead at RBA in W-30 at S-1950. Bladewerx CAM 240-R1-000-1631 (battery operated) in use. Calib. 11/6/15, valid 1 year. Reading .07 DAC-hr Pu239.

Discussion of mine phones and new wireless repeaters.

0930 Observed CAMs at E-130 S-1950. Canberra iCAM ser. 240-R1-000-1801, calib. 11/13/15, 1.0 cfm, 0 DAC-hr alpha. Hi-Q gooseneck low-vol as backup, 1.0 cfm

Observed RBA in S-1950 at E-140, former decon location during April 2015. Transition area has been rolled back to W-170. Walls have been sprayed with water, radiation release required to work above 8ft on ribs and back.

At S-100- and E-140, observed regulator R313 under reconstruction.

0945 Observed Differential pressure gauging station in E140, south of waste hoist and north of airlock

Omega instrument read -.34, units unspecified; Magnaheli0x backup read -.6 in H2O. Both calibrated 2/11/16. Upgrade to Rosemont instrumentation is planned to increase accuracy.

1000 Exited underground.

1030 Observed Station B, both skids operating within calibration. Observed IVS from Station A scaffolding and took pictures.

1430 COV testing postponed to following day due to high winds. Met with Eric Rodriguez, underground ventilation. Walked down IVS and discussed system operation.

1500 General Employee Training examination.

April 27:

0700 Arrived at the site. Walked down IVS ductwork and took photographs.

0900 Ventilation system configured for IVS testing.

0930 Flow rates and stability confirmed by CMR.

0945 First pitot traverse begun.

1015 Measurements complete.