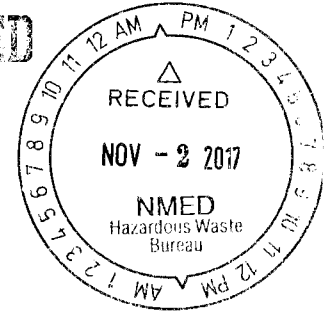




Department of Energy
 Carlsbad Field Office
 P. O. Box 3090
 Carlsbad, New Mexico 88221
OCT 31 2017

ENTERED



Mr. John E. Kieling, Bureau Chief
 Hazardous Waste Bureau
 New Mexico Environment Department
 2905 Rodeo Park Drive East, Building 1
 Santa Fe, New Mexico 87505-6303

Subject: Transmittal of the Mine Ventilation Rate Monitoring Annual Report

Dear Mr. Kieling:

The Mine Ventilation Rate Monitoring Annual Report, required by the Waste Isolation Pilot Plant Hazardous Waste Facility Permit No. NM4890139088—TSDf, is attached. This report satisfies the Permit Part 4, Section 4.6.4.2. and Permit Attachment O, Section O-5a requirements.

We certify under penalty of law that this document and all attachments were prepared under our direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on our inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of our knowledge and belief, true, accurate, and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

If you have questions regarding this submittal, please contact Mr. George T. Basabilvazo at (575) 234-7488.

Sincerely,

Todd Shrader
 Todd Shrader, Manager
 Carlsbad Field Office

Bruce C. Covert
 Bruce C. Covert, Project Manager
 Nuclear Waste Partnership LLC

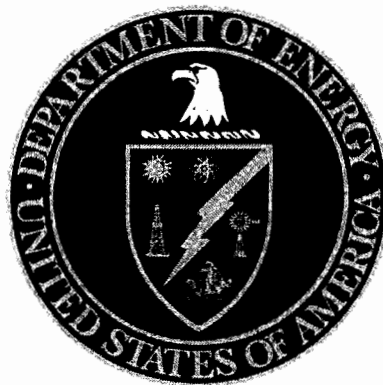
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Mine Ventilation Rate Monitoring Annual Report

United States Department of Energy
Carlsbad Field Office
Carlsbad, New Mexico

October 2017



**Mine Ventilation Rate Monitoring Annual Report
DOE/WIPP-17-3557**

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**Mine Ventilation Rate Monitoring Annual Report
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ABBREVIATIONS/ACRONYMS

acfm	actual cubic feet per minute
CMRO	Central Monitoring Room Operator
IVS	Interim Ventilation System
MVRMP	Mine Ventilation Rate Monitoring Plan
NMED	New Mexico Environment Department
Permit	Waste Isolation Pilot Plant Hazardous Waste Facility Permit
QA	Quality Assurance
QAPD	Quality Assurance Program Description
RPD	relative percent difference
scfm	standard cubic feet per minute
U/G	underground
UVS	Underground Ventilation System
WIPP	Waste Isolation Pilot Plant

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EXECUTIVE SUMMARY

The Waste Isolation Pilot Plant (**WIPP**) Hazardous Waste Facility Permit (**Permit**), Permit Number 4890139088-TSDF, Part 4, Section 4.6.4.1., requires the WIPP facility Permittees to implement the WIPP Mine Ventilation Rate Monitoring Plan (**MVRMP**) described in Permit Attachment O. Permit Part 4, Section 4.6.4.2., requires that an annual report be submitted every October with the results of the data and analysis of the MVRMP. The objective of the MVRMP is to describe how the ventilation requirement for maintaining a minimum of 35,000 standard cubic feet per minute (**scfm**) of air through the active rooms when waste disposal is taking place and when workers are present will be met. This report describes how the objective was met during the reporting period. The reporting period for this MVRMP is July 1, 2016, through June 30, 2017.

The underground (**U/G**) repository ventilation system operated in Filtration Mode for the reporting period. Recovery efforts continued during the first six months of the reporting period, and waste emplacement activities commenced in January 2017.

Permit Attachment O, Section O-3, describes the four basic processes that make up the MVRMP:

- Test and Balance, a periodic re-verification of the satisfactory performance of the entire underground ventilation system and associated components
- Monitoring of active room(s) to ensure a minimum flow of 35,000 scfm whenever waste disposal is taking place and workers are present in the room
- If an active room ventilation rate of 35,000 scfm cannot be met, actions as described in Section O-3c(1) shall be taken during waste disposal operations when workers are present
- Verification of the total mine airflow

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Results of the four processes that make up the mine ventilation rate monitoring plan are as follows:

- A Test and Balance of the Underground Ventilation System (**UVS**) incorporating the Interim Ventilation System (**IVS**) was conducted in September 2016. The next Test and Balance is scheduled for November 2017.
- No active room flow readings were recorded from July 2016 through December 2016 because no active waste emplacement occurred during the aforementioned time period.
- Waste emplacement activities commenced in January 2017. The monthly average active room ventilation readings are recorded in Table 2, *Summary of Total Mine and Active Disposal Room Ventilation Flow Rate Monitoring Data*. No waste emplacement occurred in March 2017. The lowest average active room ventilation rate of 46,412 actual cubic feet per minute (**acfm**) occurred in April 2017, while the highest average active room ventilation rate of 50,349 acfm occurred in June 2017.
- The active room ventilation rate of 35,000 scfm was met for all waste emplacement evolutions for this reporting period; therefore, actions as described in Section O-3c(1) were not implemented.
- Results of the verification of the total mine airflow are presented in Table 2, *Summary of Total Mine and Active Disposal Room Ventilation Flow Rate Monitoring Data*. The highest average monthly total mine airflow of 106,000 scfm occurred in May 2017. The lowest average monthly total mine airflow of 52,830 scfm occurred in August 2016.

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1.0 INTRODUCTION

Permit Attachment O is the MVRMP. The MVRMP contains the methods and procedures for documenting compliance with the ventilation requirements identified in Permit Part 4, Section 4.5.3.2.

Permit Part 4, Section 4.6.4.2., specifies that an annual report be submitted to the Secretary of the NMED every October that describes the implementation of the MVRMP and presents the results of the monitoring activities. This document fulfills the annual reporting requirement for the period from July 1, 2016, through June 30, 2017.

The U/G repository ventilation system operated in Filtration Mode for the reporting period. Installation of the IVS was completed in October 2016. With the addition of the IVS, the total U/G Filtration Mode airflow capacity increased from a nominal 60,000 scfm to a nominal 106,000 scfm. The Underground Ventilation Filtration System consists of operating one of three 860 fans and the associated filtration system. The IVS consists of operating one or two 960 fans and their associated filtration systems.

The Filtration Mode airflow quantity is compatible with the capacity of the available HEPA filter units. With both the Underground Ventilation Filtration System and IVS in operation, three different levels of Filtration Mode ventilation provide three different airflow quantities:

- Minimum Filtration Ventilation: Filtration fans (two-960 fans or one-860 fan) operating to provide 43,000 or 60,000 scfm nominal filtered flow
- Intermediate Filtration Ventilation: Filtration fans (one-860 fan and one 960 fan) operating to provide 83,000 scfm nominal filtered flow
- Maximum Filtration Ventilation: Filtration fans (one-860 fan and two-960 fans) operating to provide 106,000 scfm nominal filtered flow

Waste emplacement occurs during the Maximum Filtration Ventilation Mode.

Waste disposal activities commenced in January 2017. Waste disposal activities did not occur during the periods of July 2016 through December 2016 or the month of March 2017.

The following sections describe the procedures that make up the MVRMP (Section 1), the results of the MVRMP monitoring (Section 2), and the Quality Assurance requirements (Section 3) associated with the MVRMP for the reporting period. The results of the MVRMP data analysis are contained in Section 4.

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1.1 Verification of Total Mine Airflow

The average total mine airflow is computed on a monthly basis. The monthly averages are based on run-times for the ventilation modes of operation, as documented in the Central Monitoring Room Operator (CMRO) Log. Run-time information is recorded each time the ventilation system configuration changes, including periods when there is no ventilation. The flow rates for various ventilation modes of operation are listed in Table 1.

Table 1 – Ventilation Operating Modes and Associated Flow Rate

Mode of Operation	Flow Rate (scfm) – Nominal Values	Test and Balance Summary (October 2016)
Normal (two main** fans) [not in use]	425,000	N/A*
Alternate (one main** fan) [not in use]	260,000	N/A*
Maintenance Bypass [parallel operation of main** fan(s) and filtration*** fan(s)] [not in use]	260,000 to 425,000	N/A*
Reduced (two filtration*** fans) [not in use]	120,000	N/A*
Minimum (one filtration*** fan) [not in use]	60,000	N/A
Filtration (one filtration fan or one IVS fan***)	60,000 or 23,000	N/A
Filtration (one filtration fan and one IVS fan or two IVS fans***)	83,000 or 43,000	±8.4%
Filtration (one filtration fan and two IVS fans***)	106,000	±5.9%

* Note: Testing and balancing of this mode of operation was not performed during the September 2016 Test and Balance because it was not in use during the reporting period.

** Note: The main fans are also referred to as the 700 fans and are restricted from being used.

*** Note: The filtration fans are also referred to as the 860 fans; the IVS fans are also referred to the 960 fans.

The calculation of the monthly average mine flow rate is computed using the run-times entered in the CMRO Log in accordance with the following equation:

$$(1) \quad \text{Monthly Average Flow Rate} = \frac{[(\text{Normal Mode Run-Time (hours)} \times 425,000 \text{ scfm}) + (\text{Alternate Mode Run-Time (hours)} \times 260,000 \text{ scfm}) + (\text{Maintenance Bypass Run-Time (hours)} \times 260,000 \text{ scfm}) + ((\text{Reduced Mode Run-Time (hours)} \times 120,000 \text{ scfm}) + (\text{Minimum Mode Run-Time (hours)} \times 60,000 \text{ scfm}) + (\text{Filtration Mode (1-860) Run-Time (hours)} \times 60,000 \text{ scfm}) + (\text{Filtration Mode (1-960) Run-Time (hours)} \times 23,000 \text{ scfm}) + (\text{Filtration Mode (2-960) Run-Time (hours)} \times 43,000 \text{ scfm}) + (\text{Filtration Mode (1-860 \& 1-960) Run-Time (hours)} \times 83,000 \text{ scfm}) + (\text{Filtration Mode (1-860 \& 2-960) Run-Time (hours)} \times 106,000 \text{ scfm})]}{730 \text{ hours per month}}$$

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1.2 Ventilation Rate Monitoring in the Active Disposal Room

Ventilation rate monitoring in the active disposal room is performed to demonstrate compliance with Permit Part 4, Section 4.5.3.2, and Attachment A2, Section A2-2a(3). The Permit requires a minimum of 35,000 scfm of airflow through the active room when waste disposal is taking place and workers are present in the room. Permit Attachment O, Section O-1, defines 42,000 acfm as being equivalent to 35,000 scfm. Permit Part 4, Section 4.6.4.3., requires compliance to be evaluated monthly for the active disposal room.

A full-entry traverse using a calibrated Davis ball-bearing anemometer, as described in McPherson (2009), *Subsurface Ventilation Engineering*, is the standard method for measurement of airflow in the active waste disposal room. Airflow measurements are collected at an established location near the entrance of each active disposal room. The location is chosen by the operator to minimize airflow disturbances caused by system intersections and corners in accordance with McPherson (2009). The readings are used to verify that a minimum 35,000 scfm ventilation flow rate has been achieved through the active room prior to waste disposal taking place with workers present in the room. Multiple measurements are taken at each field location to ensure accurate results and correlated within 10 percent for acceptability. Data are collected, recorded, and verified by qualified operators. Additionally, the operator verifies proper ventilation flow rates any time there is an operational mode change or change in the U/G ventilation system configuration that could affect the active room ventilation flow rate. A momentary reduction in U/G ventilation caused by the realignment or switching of U/G ventilation fans is not an operational mode change and does not require verification of airflow in the active disposal room.

Once the ventilation flow rate is verified, the operator records the measured acfm value on the Active Disposal Room Ventilation Log Sheet. The operator compares the recorded acfm value with the minimum required acfm value provided at the top of the log sheet. As described in Permit Attachment O, 42,000 acfm is the minimum value needed to ensure that the 35,000 scfm minimum requirement is met. The operator checks and records the airflow through the active room during the shift whenever there is an operational mode change or a change in system configuration that could affect the active room ventilation flow rate. If the required ventilation rate is not achieved or cannot be supported due to operational needs, the Permittees will either restrict access to the room or take measures as described in Permit Attachment O, Section O-3c(1).

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1.3 Test and Balance

The Test and Balance is a comprehensive series of measurements and adjustments designed to ensure that the U/G ventilation system is operating within acceptable design parameters. The Test and Balance is an appropriate method of verifying U/G ventilation system flow because it provides consistent results based on good engineering practices. The Test and Balance is conducted on a 12- to 18-month interval, in accordance with Permit Attachment O, Section O-3a(2).

Once completed, the Test and Balance data become the baseline for U/G ventilation system operations until the next Test and Balance is performed. Test and Balance results are used to accommodate varying operational conditions and previously used to provide adequate airflow for recovery efforts in the underground.

The Test and Balance frequency interval is sufficient to account for changes in the mine configuration and to verify system performance. Minor system modifications that occur between tests produce small changes to the ventilation system resistance in comparison to the overall ventilation system resistance. Historic data indicate airflow changes can be attributed to additional or reduced linear feet of mined passage (i.e., mining new entries, closure of formerly ventilated portions of the mine, or reduction in drift size due to salt creep).

A Test and Balance of the mine ventilation system was performed in September 2016 and incorporated the IVS. A summary of the results of the September 2016 Test and Balance is presented in Table 1, in accordance with Permit Attachment O, Section O-5a.

The next Test and Balance is scheduled to be performed in November 2017.

1.4 Airflow Verification Checks

Verification checks of the total mine airflow were performed in accordance with Permit Attachment E, Table E-1. The 700 (main) fans were not operable during the reporting period; therefore, procedure IC041098, *U/G Exhaust Mass Flow Measurement System for Fans 700A, B & C*, was not performed.

Procedures IC413005, *Calibration of Flow Indicating Transmitters For U/G Exhaust Fans*, (860 fans) and IC041087, *Calibration of Suction Flow Transmitters for 41-B-956 and 41-B-957*, (960 fans) were used to perform semi-annual verification checks of the total mine airflow from the filtration fans.

The verification checks require the measurement of airflow induced by each of the fans during various modes of operation using a standard pitot tube traverse. The flow measurement instrument indications are compared to the standard pitot tube traverse. If the relative percent difference (RPD) is greater than ± 5 percent, the instrument sensors are cleaned and the instrument is calibrated. After calibration, an additional pitot tube traverse is performed to verify an RPD of less than ± 5 percent.

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The equipment used to perform the airflow verification checks is controlled and calibrated through the WIPP Metrology Program. The WIPP Metrology Program ensures that maintenance and test equipment used in the performance of maintenance activities meets the WIPP Quality Assurance Program Description (**QAPD**) requirements and is traceable to National Institute of Standards and Technology standards. The frequency and method of equipment calibration are governed by the WIPP Metrology Program using the manufacturer's recommendations and the equipment reliability.

2.0 MINE VENTILATION RATE MONITORING RESULTS

This section presents the data from implementation of the MVRMP for the reporting period. The data presented were collected in accordance with Permit Attachment O.

2.1 Total Mine Airflow

Total mine airflow monthly averages were calculated using Equation 1 (Section 1.1). The data used to perform the calculations were obtained from the CMRO Log and from Permit Attachment O, Table O-1.

Table 2 provides a summary of the total mine airflow monthly averages. The monthly summaries showing the calculation of the total mine airflow are presented in Attachment 1.

Table 2 – Summary of Total Mine and Active Disposal Room Ventilation Flow Rate Monitoring Data

	Total Mine Ventilation Flow Data (avg scfm)	Active Disposal Room Ventilation Flow Data (avg acfm)
Jul 16	59,760	N/A
Aug 16	52,830	N/A
Sep 16	71,100	N/A
Oct 16	100,730	N/A
Nov 16	105,960	N/A
Dec 16	87,310	N/A
Jan 17	75,910	49,250
Feb 17	98,560	48,545
Mar 17	82,530	N/A
Apr 17	97,090	46.412
May 17	106,000	48,673
Jun 17	100,880	50,349

N/A – No TRU mixed waste handling occurred during the month indicated.

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2.2 Active Disposal Room Ventilation Rate

TRU mixed waste handling activities commenced in January 2017. Table 2 provides the monthly averages for active disposal room ventilation rate monitoring for the reporting period.

An active room ventilation rate of 35,000 scfm (42,000 acfm) was consistently maintained during the reporting period; therefore, actions described in Permit Attachment O, Section O-3c(1), were not required to be taken.

2.3 Test and Balance

The most recent Test and Balance of the mine ventilation system was performed in September 2016, which was before the facility commenced waste handling operations. These results are listed in Table 1. The next Test and Balance is due no later than March 2018 and is currently scheduled to be performed in November 2017.

2.4 Airflow Verification Checks

Airflow verification checks of the total mine airflow were not performed for the 700 (main) fans. Since the U/G remains in Filtration Mode, the 700 (main) fans were not operated.

Airflow verification checks were performed on the 860 and 960 filtration fans. The data sheets showing the as-left results of the verification checks are maintained at the facility.

3.0 QUALITY ASSURANCE PROGRAM

This section describes the Quality Assurance Program as it relates to the MVRMP.

3.1 Description of Mine Ventilation Rate Monitoring Quality Assurance Program

Quality Assurance (**QA**) associated with the MVRMP consists of several elements. The qualifications of personnel conducting ventilation flow measurements are maintained through a training qualification process. The ventilation simulation software program is controlled in accordance with the Managing and Operating Contractor's QAPD and the computer software QA plans.

Data generated by the MVRMP, as well as records and procedures to support the MVRMP, are maintained and managed in accordance with the QAPD. Nonconformance or conditions adverse to quality are addressed and corrected in accordance with applicable QA procedures.

Instrumentation used to implement the MVRMP is of known precision and accuracy. The information regarding precision and accuracy is recorded in the instrumentation calibration documentation.

**Mine Ventilation Rate Monitoring Annual Report
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4.0 SUMMARY OF MINE VENTILATION RATE MONITORING

Mine ventilation rate monitoring of the U/G repository and active disposal rooms is conducted at predetermined frequencies. The following is an analysis of the data from this program:

- A Test and Balance of the UVS incorporating the IVS was conducted in September 2016. The next Test and Balance is scheduled for November 2017.
- No active room flow readings were recorded from July 2016 through December 2016 because no active waste emplacement occurred during the aforementioned time period.
- Waste emplacement activities commenced in January 2017. The monthly average active room ventilation readings are recorded in Table 2, *Summary of Total Mine and Active Disposal Room Ventilation Flow Rate Monitoring Data*. No waste emplacement occurred in March 2017. The lowest average active room ventilation rate of 46,412 acfm occurred in April 2017, while the highest average active room ventilation rate of 50,346 acfm occurred in June 2017.
- The active room ventilation rate of 35,000 scfm was met for all waste emplacement evolutions for this reporting period; therefore, actions as described in Section O-3c(1) were not implemented.
- Results of the verification of the total mine airflow are presented in Table 2, *Summary of Total Mine and Active Disposal Room Ventilation Flow Rate Monitoring Data*. The highest average monthly total mine airflow of 106,000 scfm occurred in May 2017. The lowest average monthly total mine airflow of 52,830 scfm occurred in August 2016.

**Mine Ventilation Rate Monitoring Annual Report
DOE/WIPP-17-3557**

5.0 REFERENCES

DOCUMENT NUMBER AND TITLE
Waste Isolation Pilot Plant Hazardous Waste Facility Permit, EPA Identification No. NM4890139088-TSDF
McPherson, Malcolm J., 2009, Subsurface Ventilation Engineering, Omnipress, Second Edition
IC041098, <i>U/G Exhaust Mass Flow Measurement System for Fans 700A, B & C</i>
IC413005, <i>Calibration of Flow Indicating Transmitters for U/G Exhaust Fans</i>
IC413000, <i>Station B Mass Flow Measurement System Loop 41A001W2001</i>
IC041087, <i>Calibration of Suction Flow Transmitters for 41-B-956 and 41-B-957</i>

**Mine Ventilation Rate Monitoring Annual Report
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Attachment 1 – Monthly Summary of Mine Ventilation Rate Monitoring

SURFACE				
MODE OF OPERATION	RUNTIME (min)	RUNTIME (hours)	FLOW RATE (kscfm)	TOTAL FLOW (kscfmhr)
NORMAL VENTILATION (2-700 FANS)	0	0.00	425	0.00
ALTERNATE VENTILATION (1-700 FAN)	0	0.00	260	0.00
MAINTENANCE BYPASS (1-700 FAN w/ 1-860 FAN)	0	0.00	260	0.00
MAINTENANCE BYPASS (1-700 FAN w/ 2 860-FANS)	0	0.00	260	0.00
MAINTENANCE BYPASS (2-700 FANS w/ 1-860 FAN)	0	0.00	260	0.00
MAINTENANCE BYPASS (2-700 FANS w/ 2-860 FANS)	0	0.00	260	0.00
REDUCED VENTILATION (0-700 FANS w/ 2-860 FANS)	0	0.00	120	0.00
MINIMUM VENTILATION (0-700 FANS w/ 1-860 FAN)	0	0.00	60	0.00
FILTRATION 1-860 FAN thru HEPA)	44460	741.00	60	44460.00
NO VENTILATION	180	3.00	0	0.00
TOTAL		744.00		
SUM OF FLOW(kscfm-hr)				44460.00
MONTHLY AVERAGE FLOW RATE(kscfm)				59.76

CALENDAR MONTH -July 2016

COMMENTS:
No active room status due to fire and radiological events.
No limited access to the U/G

ACTIVE ROOM		
MONTHLY AVERAGE FLOW (kacfm)	MINIMUM = 35K scfm = 42K acfm	0.000
NUMBER OF DATA POINTS USED IN CALCULATION OF AVERAGE		0.00

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Attachment 1 – Monthly Summary of Mine Ventilation Rate Monitoring

SURFACE				
MODE OF OPERATION	RUNTIME (min)	RUNTIME (hours)	FLOW RATE (kscfm)	TOTAL FLOW (kscfmhr)
NORMAL VENTILATION (2-700 FANS)	0	0.00	425	0.00
ALTERNATE VENTILATION (1-700 FAN)	0	0.00	260	0.00
MAINTENANCE BYPASS (1-700 FAN w/ 1-860 FAN)	0	0.00	260	0.00
MAINTENANCE BYPASS (1-700 FAN w/ 2 860-FANS)	0	0.00	260	0.00
MAINTENANCE BYPASS (2-700 FANS w/ 1-860 FAN)	0	0.00	260	0.00
MAINTENANCE BYPASS (2-700 FANS w/ 2-860 FANS)	0	0.00	260	0.00
REDUCED VENTILATION (0-700 FANS w/ 2-860 FANS)	0	0.00	120	0.00
MINIMUM VENTILATION (0-700 FANS w/ 1-860 FAN)	0	0.00	60	0.00
FILTRATION 1-860 FAN thru HEPA)	44640	744.00	60	44640.00
NO VENTILATION	6058	100.97	0	0.00
TOTAL		844.97		
SUM OF FLOW(kscfm-hr)				44640.00
MONTHLY AVERAGE FLOW RATE(kscfm)				52.83

CALENDAR MONTH -August 2016

COMMENTS:
No active room status due to fire and radiological events.
No limited access to the U/G

ACTIVE ROOM		
MONTHLY AVERAGE FLOW (kacfm)	MINIMUM = 35K scfm = 42K acfm	0.000
NUMBER OF DATA POINTS USED IN CALCULATION OF AVERAGE		0.00

**Mine Ventilation Rate Monitoring Annual Report
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Attachment 1 – Monthly Summary of Mine Ventilation Rate Monitoring

SURFACE				
MODE OF OPERATION	RUNTIME (min)	RUNTIME (hours)	FLOW RATE (kscfm)	TOTAL FLOW (kscfmhr)
ALIGNMENT 1 (41-B-860 A, B, C)	9477	157.95	60	9477.00
ALIGNMENT 2 (41-B-960A AND 41-B-960B)	5820	97.00	43	4771.00
ALIGNMENT 3 (41-B-860A, B, OR C; AND 41-B-960A OR B)	5278	87.97	83	7301.23
ALIGNMENT 4 (41-B-860 A, B, OR C; AND 41-B-960A AND B)	9565	159.42	106	16898.17
ALIGNMENT 5 (41-B-960A OR 41-B-960B)	0	0.00	23	0.00
	0	0.00	260	0.00
	0	0.00	120	0.00
	0	0.00	60	0.00
FILTRATION 1-860 FAN thru HEPA)	11520	192.00	60	11520.00
NO VENTILATION	0	0.00	0	0.00
TOTAL		694.33		
SUM OF FLOW(kscfm-hr)				49367.40
MONTHLY AVERAGE FLOW RATE(kscfm)				71.10

CALENDAR MONTH -SEPTEMBER 2016

COMMENTS:
No active room status due to fire and radiological events.
No limited access to the U/G
IVS started 09/10/16

ACTIVE ROOM		
MONTHLY AVERAGE FLOW (kacfm)	MINIMUM = 35K scfm = 42K acfm	0.000
NUMBER OF DATA POINTS USED IN CALCULATION OF AVERAGE		0.00

**Mine Ventilation Rate Monitoring Annual Report
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Attachment 1 – Monthly Summary of Mine Ventilation Rate Monitoring

SURFACE				
MODE OF OPERATION	RUNTIME (min)	RUNTIME (hours)	FLOW RATE (kscfm)	TOTAL FLOW (kscfmhr)
ALIGNMENT 1 (41-B-860 A, B, C)	430	7.17	60	430.00
ALIGNMENT 2 (41-B-960A AND 41-B-960B)	3420	57.00	43	2451.00
ALIGNMENT 3 (41-B-860A, B, OR C; AND 41-B-960A OR B)	0	0.00	83	0.00
ALIGNMENT 4 (41-B-860 A, B, OR C; AND 41-B-960A AND B)	40790	679.83	106	72062.33
ALIGNMENT 5 (41-B-960A OR 41-B-960B)	0	0.00	23	0.00
	0	0.00	260	0.00
	0	0.00	120	0.00
	0	0.00	60	0.00
FILTRATION 1-860 FAN thru HEPA)	0	0.00	60	0.00
NO VENTILATION	0	0.00	0	0.00
TOTAL		744.00		
SUM OF FLOW(kscfm-hr)				74943.33
MONTHLY AVERAGE FLOW RATE(kscfm)				100.73

CALENDAR MONTH -OCTOBER 2016

COMMENTS:
 No active room status due to fire and radiological events.
 No limited access to the U/G
 IVS started 09/10/16

ACTIVE ROOM		
MONTHLY AVERAGE FLOW (kacfm)	MINIMUM = 35K scfm = 42K acfm	0.000
NUMBER OF DATA POINTS USED IN CALCULATION OF AVERAGE		0.00

**Mine Ventilation Rate Monitoring Annual Report
DOE/WIPP-17-3557**

Attachment 1 – Monthly Summary of Mine Ventilation Rate Monitoring

SURFACE				
MODE OF OPERATION	RUNTIME (min)	RUNTIME (hours)	FLOW RATE (kscfm)	TOTAL FLOW (kscfm-hr)
ALIGNMENT 1 (41-B-860 A, B, C)	0	0.00	60	0.00
ALIGNMENT 2 (41-B-960A AND 41-B-960B)	30	0.50	43	21.50
ALIGNMENT 3 (41-B-860A, B, OR C; AND 41-B-960A OR B)	0	0.00	83	0.00
ALIGNMENT 4 (41-B-860 A, B, OR C; AND 41-B-960A AND B)	43170	719.50	106	76267.00
ALIGNMENT 5 (41-B-960A OR 41-B-960B)	0	0.00	23	0.00
	0	0.00	260	0.00
	0	0.00	120	0.00
	0	0.00	60	0.00
FILTRATION 1-860 FAN thru HEPA)	0	0.00	60	0.00
NO VENTILATION	0	0.00	0	0.00
TOTAL		720.00		
SUM OF FLOW(kscfm-hr)				76288.50
MONTHLY AVERAGE FLOW RATE(kscfm)				105.96

CALENDAR MONTH -NOVEMBER 2016

COMMENTS:
No active room status due to fire and radiological events.
No limited access to the U/G
IVS started 09/10/16

ACTIVE ROOM		
MONTHLY AVERAGE FLOW (kacfm)	MINIMUM = 35K scfm = 42K acfm	0.000
NUMBER OF DATA POINTS USED IN CALCULATION OF AVERAGE		0.00

**Mine Ventilation Rate Monitoring Annual Report
DOE/WIPP-17-3557**

Attachment 1 – Monthly Summary of Mine Ventilation Rate Monitoring

SURFACE				
MODE OF OPERATION	RUNTIME (min)	RUNTIME (hours)	FLOW RATE (kscfm)	TOTAL FLOW (kscfmhr)
ALIGNMENT 1 (41-B-860 A, B, C)	2275	37.92	60	2275.00
ALIGNMENT 2 (41-B-960A AND 41-B-960B)	5630	93.83	43	4034.83
ALIGNMENT 3 (41-B-860A, B, OR C; AND 41-B-960A OR B)	15498	258.30	83	21438.90
ALIGNMENT 4 (41-B-860 A, B, OR C; AND 41-B-960A AND B)	20237	337.28	106	35752.03
ALIGNMENT 5 (41-B-960A OR 41-B-960B)	0	0.00	23	0.00
	0	0.00	260	0.00
	0	0.00	120	0.00
	0	0.00	60	0.00
FILTRATION 1-860 FAN thru HEPA)	0	0.00	60	0.00
NO VENTILATION	0	0.00	0	0.00
TOTAL		727.33		
SUM OF FLOW(kscfm-hr)				63500.77
MONTHLY AVERAGE FLOW RATE(kscfm)				87.31

CALENDAR MONTH -DECEMBER 2016

COMMENTS:
 No active room status due to fire and radiological events.
 No limited access to the U/G
 IVS started 09/10/16

ACTIVE ROOM		
MONTHLY AVERAGE FLOW (kacfm)	MINIMUM = 35K scfm = 42K acfm	0.000
NUMBER OF DATA POINTS USED IN CALCULATION OF AVERAGE		0.00

**Mine Ventilation Rate Monitoring Annual Report
DOE/WIPP-17-3557**

Attachment 1 – Monthly Summary of Mine Ventilation Rate Monitoring

SURFACE				
MODE OF OPERATION	RUNTIME (min)	RUNTIME (hours)	FLOW RATE (kscfm)	TOTAL FLOW (kscfmhr)
ALIGNMENT 1 (41-B-860 A, B, C)	0	0.00	60	0.00
ALIGNMENT 2 (41-B-960A AND 41-B-960B)	10140	169.00	43	7267.00
ALIGNMENT 3 (41-B-860A, B, OR C; AND 41-B-960A OR B)	2740	45.67	83	3790.33
ALIGNMENT 4 (41-B-860 A, B, OR C; AND 41-B-960A AND B)	24030	400.50	106	42453.00
ALIGNMENT 5 (41-B-960A OR 41-B-960B)	7730	128.83	23	2963.17
	0	0.00	260	0.00
	0	0.00	120	0.00
	0	0.00	60	0.00
FILTRATION 1-860 FAN thru HEPA)	0	0.00	60	0.00
NO VENTILATION	0	0.00	0	0.00
TOTAL		744.00		
SUM OF FLOW(kscfm-hr)				56473.50
MONTHLY AVERAGE FLOW RATE(kscfm)				75.91

CALENDAR MONTH - JANUARY 2017

COMMENTS:
IVS started 09/10/16

ACTIVE ROOM		
MONTHLY AVERAGE FLOW (kacfm)	MINIMUM = 35K scfm = 42K acfm	49.250
NUMBER OF DATA POINTS USED IN CALCULATION OF AVERAGE		6.00

**Mine Ventilation Rate Monitoring Annual Report
DOE/WIPP-17-3557**

Attachment 1 – Monthly Summary of Mine Ventilation Rate Monitoring

SURFACE				
MODE OF OPERATION	RUNTIME (min)	RUNTIME (hours)	FLOW RATE (kscfm)	TOTAL FLOW (kscfmhr)
ALIGNMENT 1 (41-B-860 A, B, C)	0	0.00	60	0.00
ALIGNMENT 2 (41-B-960A AND 41-B-960B)	0	0.00	43	0.00
ALIGNMENT 3 (41-B-860A, B, OR C; AND 41-B-960A OR B)	12950	215.83	83	17914.17
ALIGNMENT 4 (41-B-860 A, B, OR C; AND 41-B-960A AND B)	27070	451.17	106	47823.67
ALIGNMENT 5 (41-B-960A OR 41-B-960B)	0	0.00	23	0.00
	0	0.00	260	0.00
	0	0.00	120	0.00
	0	0.00	60	0.00
FILTRATION 1-860 FAN thru HEPA)	0	0.00	60	0.00
NO VENTILATION	0	0.00	0	0.00
TOTAL		667.00		
SUM OF FLOW(kscfm-hr)				65737.83
MONTHLY AVERAGE FLOW RATE(kscfm)				98.56

CALENDAR MONTH - FEBRUARY 2017

COMMENTS:

ACTIVE ROOM		
MONTHLY AVERAGE FLOW (kacfm)	MINIMUM = 35K scfm = 42K acfm	48.545
NUMBER OF DATA POINTS USED IN CALCULATION OF AVERAGE		3.00

**Mine Ventilation Rate Monitoring Annual Report
DOE/WIPP-17-3557**

Attachment 1 – Monthly Summary of Mine Ventilation Rate Monitoring

SURFACE				
MODE OF OPERATION	RUNTIME (min)	RUNTIME (hours)	FLOW RATE (kscfm)	TOTAL FLOW (kscfmhr)
ALIGNMENT 1 (41-B-960 A, B, C)	0	0.00	60	0.00
ALIGNMENT 2 (41-B-960A AND 41-B-960B)	1980	33.00	43	1419.00
ALIGNMENT 3 (41-B-860A, B, OR C; AND 41-B-960A OR B)	40120	668.67	83	55499.33
ALIGNMENT 4 (41-B-860 A, B, OR C; AND 41-B-960A AND B)	2540	42.33	106	4487.33
ALIGNMENT 5 (41-B-960A OR 41-B-960B)	0	0.00	23	0.00
	0	0.00	260	0.00
	0	0.00	120	0.00
	0	0.00	60	0.00
FILTRATION 1-860 FAN thru HEPA)	0	0.00	60	0.00
NO VENTILATION	0	0.00	0	0.00
TOTAL		744.00		
SUM OF FLOW(kscfm-hr)				61405.67
MONTHLY AVERAGE FLOW RATE(kscfm)				82.53

CALENDAR MONTH -MARCH 2017

COMMENTS:
NO ACTIVE ROOM ENTRANCE FOR MARCH

ACTIVE ROOM		
MONTHLY AVERAGE FLOW (kacfm)	MINIMUM = 35K scfm = 42K acfm	0.000
NUMBER OF DATA POINTS USED IN CALCULATION OF AVERAGE		0.00

**Mine Ventilation Rate Monitoring Annual Report
DOE/WIPP-17-3557**

Attachment 1 – Monthly Summary of Mine Ventilation Rate Monitoring

SURFACE				
MODE OF OPERATION	RUNTIME (min)	RUNTIME (hours)	FLOW RATE (kscfm)	TOTAL FLOW (kscfmhr)
ALIGNMENT 1 (41-B-860 A, B, C)	0	0.00	60	0.00
ALIGNMENT 2 (41-B-960A AND 41-B-960B)	2790	46.50	43	1999.50
ALIGNMENT 3 (41-B-860A, B, OR C; AND 41-B-960A OR B)	9090	151.50	83	12574.50
ALIGNMENT 4 (41-B-860 A, B, OR C; AND 41-B-960A AND B)	31320	522.00	106	55332.00
ALIGNMENT 5 (41-B-960A OR 41-B-960B)	0	0.00	23	0.00
	0	0.00	260	0.00
	0	0.00	120	0.00
	0	0.00	60	0.00
FILTRATION 1-860 FAN thru HEPA)	0	0.00	60	0.00
NO VENTILATION	0	0.00	0	0.00
TOTAL		720.00		
SUM OF FLOW(kscfm-hr)				69906.00
MONTHLY AVERAGE FLOW RATE(kscfm)				97.09

CALENDAR MONTH - APRIL 2017

COMMENTS:

ACTIVE ROOM		
MONTHLY AVERAGE FLOW (kacfm)	MINIMUM = 35K scfm = 42K acfm	46.412
NUMBER OF DATA POINTS USED IN CALCULATION OF AVERAGE		2.00

**Mine Ventilation Rate Monitoring Annual Report
DOE/WIPP-17-3557**

Attachment 1 – Monthly Summary of Mine Ventilation Rate Monitoring

SURFACE				
MODE OF OPERATION	RUNTIME (min)	RUNTIME (hours)	FLOW RATE (kscfm)	TOTAL FLOW (kscfmhr)
ALIGNMENT 1 (41-B-860 A, B, C)	0	0.00	60	0.00
ALIGNMENT 2 (41-B-960A AND 41-B-960B)	0	0.00	43	0.00
ALIGNMENT 3 (41-B-860A, B, OR C; AND 41-B-960A OR B)	0	0.00	83	0.00
ALIGNMENT 4 (41-B-860 A, B, OR C; AND 41-B-960A AND B)	44640	744.00	106	78864.00
ALIGNMENT 5 (41-B-960A OR 41-B-960B)	0	0.00	23	0.00
	0	0.00	260	0.00
	0	0.00	120	0.00
	0	0.00	60	0.00
FILTRATION 1-860 FAN thru HEPA)	0	0.00	60	0.00
NO VENTILATION	0	0.00	0	0.00
TOTAL		744.00		
SUM OF FLOW(kscfm-hr)				78864.00
MONTHLY AVERAGE FLOW RATE(kscfm)				106.00

CALENDAR MONTH - MAY 2017

COMMENTS:

ACTIVE ROOM		
MONTHLY AVERAGE FLOW (kacfm)	MINIMUM = 35K scfm = 42K acfm	48.673
NUMBER OF DATA POINTS USED IN CALCULATION OF AVERAGE		6.00

**Mine Ventilation Rate Monitoring Annual Report
DOE/WIPP-17-3557**

Attachment 1 – Monthly Summary of Mine Ventilation Rate Monitoring

SURFACE				
MODE OF OPERATION	RUNTIME (min)	RUNTIME (hours)	FLOW RATE (kscfm)	TOTAL FLOW (kscfmhr)
ALIGNMENT 1 (41-B-860 A, B, C)	0	0.00	60	0.00
ALIGNMENT 2 (41-B-960A AND 41-B-960B)	3510	58.50	43	2515.50
ALIGNMENT 3 (41-B-860A, B, OR C; AND 41-B-960A OR B)	0	0.00	83	0.00
ALIGNMENT 4 (41-B-860 A, B, OR C; AND 41-B-960A AND B)	39690	661.50	106	70119.00
ALIGNMENT 5 (41-B-960A OR 41-B-960B)	0	0.00	23	0.00
	0	0.00	260	0.00
	0	0.00	120	0.00
	0	0.00	60	0.00
FILTRATION 1-860 FAN thru HEPA)	0	0.00	60	0.00
NO VENTILATION	0	0.00	0	0.00
TOTAL		720.00		
SUM OF FLOW(kscfm-hr)				72634.50
MONTHLY AVERAGE FLOW RATE(kscfm)				100.88

CALENDAR MONTH - JUNE 2017

COMMENTS:

ACTIVE ROOM		
MONTHLY AVERAGE FLOW (kacfm)	MINIMUM = 35K scfm = 42K acfm	50.349
NUMBER OF DATA POINTS USED IN CALCULATION OF AVERAGE		5.00