

Mine Ventilation Rate Monitoring Annual Report

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Mine Ventilation Rate Monitoring Annual Report
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TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS i

EXECUTIVE SUMMARY.....ii

1.0 INTRODUCTION 1

2.0 IMPLEMENTATION OF MINE VENTILATION MONITORING PROGRAM..... 1

 2.1 Total Mine Ventilation Rate Monitoring in the Underground Repository 2

 2.2 Ventilation Rate Monitoring in the Active Disposal Room 3

 2.3 Test and Balance 3

 2.4 Quarterly Airflow Verification Checks..... 4

3.0 MINE VENTILATION RATE MONITORING RESULTS..... 4

 3.1 Total Mine Ventilation Rate..... 4

 3.2 Active Disposal Room Ventilation Rate..... 5

 3.3 Test and Balance 5

 3.4 Quarterly Airflow Verification Checks..... 6

4.0 QUALITY ASSURANCE RESULTS 6

 4.1 Description of Mine Ventilation Rate Monitoring QA Program 6

5.0 SUMMARY OF MINE VENTILATION RATE MONITORING 6

6.0 REFERENCES..... 6

Attachment 1 – Monthly Summary of Mine Ventilation Rate Monitoring Data 8

LIST OF TABLES

Table 1 - Ventilation Operating Modes and Associated Flow Rate 2

Table 2 - Summary of Total Mine and Active Disposal Room Ventilation Flow Rate
Monitoring Data..... 5

ACRONYMS AND ABBREVIATIONS

acfm	actual cubic feet per minute
CMRO	Central Monitoring Room Operator
hp	horsepower
HWFP (WIPP)	Hazardous Waste Facility Permit
MVRMP	Mine Ventilation Rate Monitoring Plan
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
QA	quality assurance
QAPD	Quality Assurance Program Description
RPD	relative percent difference
scfm	standard cubic feet per minute
WIPP	Waste Isolation Pilot Plant
WTS	Washington TRU Solutions LLC

EXECUTIVE SUMMARY

Module IV of the Waste Isolation Pilot Plant (WIPP) Hazardous Waste Facility Permit (HWFP) requires WIPP to develop and implement a mine ventilation flow rate monitoring plan (MVRMP). The MVRMP requires ventilation flow rate measurements for the total underground repository and each active disposal room to ensure that the airflows meet HWFP conditions.

HWFP Condition IV.F.4.b requires that an annual report be submitted, beginning 12 (twelve) months after the issuance of the permit, that describes the implementation of the MVRMP and presents the results of the monitoring activities. This document was prepared to fulfill the annual reporting requirement for the period from July 1, 2009, to June 30, 2010.

During this report period, the lowest monthly annual running average total underground repository ventilation flow rate was 361,744 standard cubic feet per minute (scfm), which did not trigger any reporting requirements. Reporting would be required if the minimum annual running average total underground repository ventilation flow rate (calculated monthly) was under 260,000 scfm (HWFP Condition IV.F.4.c). The average ventilation flow rates were calculated for the total flow through the underground repository and for the flow through the active disposal room in accordance with the MVRMP.

In accordance with HWFP Condition IV.F.4.a, an MVRMP was developed and submitted to the New Mexico Environment Department (NMED) within ninety days of the issuance of the permit. The MVRMP documents compliance with the ventilation requirements described in HWFP Condition IV.E.4.b and Section M2-2a(3), for airflow rates for the total underground repository and the active disposal room. The original MVRMP was submitted to the NMED on November 2, 1999, and revised on May 18, 2000. The NMED issued a second Request for Supplemental Information on December 5, 2001, addressing several comments on the MVRMP. On February 1, 2002, the revised MVRMP was submitted to the NMED. This revision provided additional details concerning the content of the Test and Balance reports and this annual report; however, no changes were made to the manner in which mine ventilation rate monitoring data are collected.

The monthly average ventilation rate in the active disposal room was 55,467 actual cubic feet per minute (acfm). A minimum of 42,000 acfm is required to meet the 35,000 scfm flow rate stipulated in the HWFP.

1.0 INTRODUCTION

The NMED issued the WIPP HWFP, NM4890139088-TSDF, on October 27, 1999. In accordance with HWFP Condition IV.F.4.a, an MVRMP was developed and submitted to the NMED within ninety calendar days of the issuance of the HWFP. The MVRMP contains the methods for documenting compliance with the ventilation requirements described in HWFP Condition IV.E.3.b and Section M2-2a(3) for airflow rates for the total underground repository and the active disposal room when workers are present.

The HWFP also specifies that an annual report be submitted, beginning twelve months after the issuance of the permit, that describes the implementation of the MVRMP, and presents the results of the monitoring activities. This document was prepared to fulfill the annual reporting requirement for the period from July 1, 2009, to June 30, 2010.

2.0 IMPLEMENTATION OF MINE VENTILATION MONITORING PROGRAM

WIPP began monitoring the active disposal room ventilation rate when waste was actively being emplaced beginning with the first receipt of waste (March 26, 1999). On October 22, 1999, WIPP began calculating the total underground repository ventilation flow rate by using Mode of Operation information obtained from the Central Monitoring Room Operator's (CMRO's) Log. With the issuance of the HWFP (October 27, 1999), an MVRMP was developed to provide for the collection of ventilation flow rate data to demonstrate compliance with HWFP Condition IV.E.3.b and Section M2-2a(3).

The original MVRMP was submitted to the NMED on November 2, 1999. In this plan, WIPP proposed to monitor ventilation flow rates in the active disposal rooms when waste was being emplaced. Comments on this MVRMP were received from the NMED on April 17, 2000.

WIPP revised the MVRMP to reflect the NMED's comments, and the plan was resubmitted to the NMED on May 18, 2000. At this time, the facility switched from monitoring only when wastes were actively being emplaced to monitoring the active disposal room prior to workers being present in the active room, any time there is an operational mode change, or if there is a change in the ventilation system's configuration whenever workers were present. If the minimum 35,000 scfm flow rate in the active disposal room could not be achieved, access to the disposal room was restricted.

On December 5, 2001, the NMED issued a second Request for Supplemental Information on the May 2000 MVRMP. To address the NMED comments, a second revised MVRMP was submitted to the NMED on February 1, 2002. This revision provided additional details concerning the content of the Test and Balance reports and this annual report; however, no changes were made to the manner in which mine ventilation rate monitoring data are collected. WIPP is currently operating to this February 1, 2002, revision.

2.1 Total Mine Ventilation Rate Monitoring in the Underground Repository

To comply with HWFP Module IV, the running annual average mine ventilation rate is computed on a monthly basis to assure that it exceeds the minimum value of 260,000 scfm. This running annual average is calculated based on monthly averages for run-times for WIPP's various modes of operation as tabulated in the CMRO Log. This information was recorded each time the ventilation system configuration changed, including periods when there was no ventilation. The operator used this logged runtime data for various modes of operation, multiplied by the flow-rates for the different modes presented in Table 1, to calculate the average monthly and annual flow rate for the facility.

Table 1 – Ventilation Operating Modes and Associated Flow Rate

Mode of Operation	Flow Rate (scfm) – Nominal Values	Test and Balance Summary (August 2009)
Normal (two 600 hp fans)	425,000	±4.1%
Alternate (one 600 hp fan)	260,000	±4.9%
Maintenance Bypass [parallel operation of 600 hp fan(s) and 235 hp fan(s)]	260,000 to 425,000	NA*
Reduced (two 235 hp fans)	120,000	NA*
Minimum (one 235 hp fan)	60,000	NA*
Filtration (one 235 hp fan)	60,000	±4.5%

* Note The modes of operations were not modeled in the August 2009 Test and Balance

The calculation of the running average annual total mine flow rate was computed monthly using the times entered in the CMRO Log in accordance with the following formula:

$$\text{Monthly Average Flow Rate} = \frac{[(\text{Normal Mode Run-Time (hours)} \times 425,000 \text{ scfm}) + (\text{Alternate Mode Run-Time (hours)} \times 260,000 \text{ scfm}) + (\text{Maintenance Bypass Run-Time (hours)} \times 260,000 \text{ scfm minimum}) + ((\text{Reduced Mode Run-Time (hours)} \times 120,000 \text{ scfm}) + (\text{Minimum Mode Run-Time (hours)} \times 60,000 \text{ scfm}) + (\text{Filtration Mode Run-Time (hours)} \times 60,000 \text{ scfm}))]}{730 \text{ hours per month}}$$

The annual average flow rate was calculated using the times entered in the CMRO Log by the following formula:

$$\text{Annual Average Flow Rate} = \frac{\sum \text{Monthly Average for Previous 12 Months}}{12}$$

2.2 Ventilation Rate Monitoring in the Active Disposal Room

The ventilation flow rate in the active waste disposal room was measured at the entrance to the room to demonstrate compliance with HWFP Condition IV.E.3.b and Section M2-2a(3), which requires a minimum of 35,000 scfm of airflow through the active waste room when workers are present. HWFP Condition IV.F.4.c requires compliance to be assessed monthly for the active disposal room.

A calibrated Davis ball-bearing anemometer and full-entry traverse, as described in *Subsurface Ventilation Engineering*, (McPherson 2009), is the standard method for measurement of airflow in the active waste disposal room. Airflow measurements were collected at an established location near the entrance of each active disposal room chosen by the operator to minimize airflow disturbances caused by system intersections and corners in accordance with McPherson (2009). The operator used a calibrated anemometer and the completion of a full-entry traverse. These readings verified that a minimum of 35,000 scfm ventilation flow through the active disposal room was achieved. Multiple measurements were taken at each field location to ensure accurate results and correlated within 10 percent to be acceptable. Data were collected and recorded by qualified operators, and the data were verified. The facility operator verified proper ventilation when workers were going to be present in the active room, any time there was an operational mode change, or if there was a change in the system's configuration that could affect the ventilation system. A momentary reduction in underground ventilation caused by the realignment or switching underground ventilation fans is not an operational mode change and does not require verification of airflow in the active disposal room.

Once the ventilation is verified, the operator records the acfm value on the log sheet. The operator compares the recorded acfm value with the minimum acfm value provided at the top of the Active Disposal Room Ventilation Rate Log Sheet. The HWFP states that the actual airflow of at least 42,000 acfm is 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 ventilation system. If the required ventilation rate is not achieved, or cannot be supported due to operational needs, access to the room is restricted.

2.3 Test and Balance

The Test and Balance is a comprehensive series of measurements and adjustments designed to ensure that the system is operating within acceptable design parameters. The Test and Balance is an appropriate method of verifying system flow because it provides consistent results based on good engineering practices. The Test and Balance is conducted at 12-to-18-month intervals, as required by the MVRMP, Section Q-4b.

Once completed, the Test and Balance data are the baseline for underground ventilation system operations until the next Test and Balance is performed. Test and

Balance results were used to accommodate varying operational conditions and to provide adequate airflow in the mine.

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

The most recent Test and Balance of the mine ventilation system was performed in August 2009. The next Test and Balance will be due no later than February 2011.

2.4 Quarterly Airflow Verification Checks

Quarterly verification checks of the total mine airflow were performed in accordance with the inspection requirements identified in the HWFP (Attachment D), procedure IC041098 (U/G Exhaust Mass Flow Measurement System for Fans 700A, B & C). These 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 indicators (e.g., central monitoring system, Flosonic) are then compared to the standard pitot traverse. If the relative percent difference (RPD) was greater than ± 5 percent, sensors were cleaned and calibrated. Another pitot tube traverse was performed to verify an RPD of less than ± 5 percent.

The equipment used to perform the quarterly airflow verification checks was 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 calibration are governed by the WIPP Metrology Program using the manufacturer's recommendations and the equipment's reliability.

3.0 MINE VENTILATION RATE MONITORING RESULTS

This section presents the results of implementing the mine ventilation rate monitoring program. The data presented in this section were collected in accordance with the latest revision of the MVRMP submitted to the NMED on February 1, 2002, in response to the second request for supplemental information dated December 5, 2001.

3.1 Total Mine Ventilation Rate

A summary of the monthly total mine ventilation rate flow data is provided in Table 2. This table shows that the running annual average total mine ventilation flow was 412,307 scfm for the reporting period. In addition, it shows that the lowest running annual average mine ventilation flow rate in the underground repository occurred in

Mine Ventilation Rate Monitoring Annual Report
DOE/WIPP-10-3369

July 2009, when the running annual average flow rate was 361,744 scfm. This running annual average was above the 260,000 scfm range required in HWFP Condition IV.F.4.c.

The data sheets showing the calculation of the mine ventilation rate monitoring data monthly averages 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)	Running Annual Average Total Mine Ventilation Flow Data (avg scfm)*	Active Disposal Room Ventilation Flow Data (avg acfm)	Running Annual Active Disposal Room Annual Average (acfm)
Jul 09	414,120	361,744	53,755	52,894
Aug 09	406,790	363,604	53,254	52,850
Sep 09	418,490	366,009	53,518	52,812
Oct 09	414,260	366,859	53,924	52,713
Nov 09	397,480	370,493	60,664	52,956
Dec 09	372,890	384,058	50,834	52,918
Jan 10	422,260	394,044	55,298	53,203
Feb 10	418,160	393,928	52,654	53,306
Mar 10	417,420	393,751	56,402	53,684
Apr 10	421,390	398,437	61,186	54,421
May 10	423,130	412,065	58,294	55,111
Jun 10	421,290	412,307	55,824	55,467

*Note: Running Annual Average is calculated based on the twelve previous months and includes data not presented in this table.

3.2 Active Disposal Room Ventilation Rate

Monitoring was performed at the start of each shift, any time there was an operational mode change, or if there was a change in the system's configuration whenever workers were present. If the minimum 35,000 scfm flow rate in the active disposal room could not be achieved, access to the disposal room was restricted.

Table 2 shows that the running annual average active disposal room ventilation flow rate was 55,467 acfm for the reporting period. In addition, it shows that the lowest average monthly ventilation rate in the active disposal room occurred in December 2009, when the average flow rate was 50,834 acfm.

3.3 Test and Balance

The most recent Test and Balance of the mine ventilation system was performed in August 2009. The next Test and Balance has been scheduled for October 2010.

3.4 Quarterly Airflow Verification Checks

Maintenance Operations performs a quarterly airflow verification check of the total mine airflow to document that the flow measurement indicators are accurate. The data sheets showing the as-left condition quarterly verification checks are available from Maintenance Operations.

4.0 QUALITY ASSURANCE RESULTS

This section describes the Quality Assurance (QA) program as it relates to the MVRMP.

4.1 Description of Mine Ventilation Rate Monitoring QA Program

QA associated with the MVRMP consists of several elements. The qualifications of personnel conducting ventilation flow measurements are maintained through a prescribed training qualification process. The ventilation simulation software program is controlled in accordance with the Washington TRU Solutions LLC (WTS) Quality Assurance Program Description (WP 13-1), and WIPP computer software QA plans.

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

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

5.0 SUMMARY OF MINE VENTILATION RATE MONITORING

WIPP conducts regular mine ventilation rate monitoring of the underground repository and active disposal room. The following is an analysis of the data from this program:

- Permit requirements related to mine ventilation rate monitoring have been met.
- Data quality is acceptable.
- Ventilation through the mine was maintained above permit stipulated levels.
- Reporting/notification requirements were not triggered.

6.0 REFERENCES

New Mexico Environment Department, October 27, 1999, Waste Isolation Pilot Plant Hazardous Waste Facility Permit, Identification No. NM4890139088-TSDF

New Mexico Administrative Code (NMAC) 20.4.1.500, "Adoption of 40 CFR § 264.73"

McPherson, Malcolm J., 2009, *Subsurface Ventilation Engineering*, Omnipress, Second Edition

WP 04-VU1612, WIPP Mine Ventilation Rate Monitoring

WP 13-1, Washington TRU Solutions LLC Quality Assurance Program Description

WP 15-RM, WIPP Records Management Program

IC041098, U/G Exhaust Mass Flow Measurement System for Fans 700A, B & C

Mine Ventilation Rate Monitoring Annual Report
DOE/WIPP-10-3369

Attachment 1 – Monthly Summary of Mine Ventilation Rate Monitoring Data

SURFACE				
MODE OF OPERATION	RUNTIME (min)	RUNTIME (hours)	FLOW RATE (kscfm)	TOTAL FLOW (kscfmhr)
NORMAL VENTILATION (2-700 FANS)	43271	721.18	425	306502.92
ALTERNATE VENTILATION (1-700 FAN)	83	1.38	260	359.67
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)	193	3.22	260	836.33
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)	407	6.78	60	407.00
NO VENTILATION	686	11.43	0	0.00
TOTAL		744.00		
SUM OF FLOW(kscfm-hr)				308105.92
MONTHLY AVERAGE FLOW RATE(kscfm)				414.12

CALENDAR MONTH -July, 2009

COMMENTS:

ACTIVE ROOM		
MONTHLY AVERAGE FLOW (kacfm)	MINIMUM = 35K scfm = 42K acfm	53.755
NUMBER OF DATA POINTS USED IN CALCULATION OF AVERAGE		64.00

Mine Ventilation Rate Monitoring Annual Report
DOE/WIPP-10-3369

Attachment 1 – Monthly Summary of Mine Ventilation Rate Monitoring Data

SURFACE				
MODE OF OPERATION	RUNTIME (min)	RUNTIME (hours)	FLOW RATE (kscfm)	TOTAL FLOW (kscfmhr)
NORMAL VENTILATION (2-700 FANS)	36077	601.28	425	255545.42
ALTERNATE VENTILATION (1-700 FAN)	813	13.55	260	3523.00
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)	855	14.25	260	3705.00
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)	30	0.50	60	30.00
FILTRATION 1-860 FAN thru HEPA)	799	13.32	60	799.00
NO VENTILATION	306	5.10	0	0.00
TOTAL		648.00		
SUM OF FLOW(kscfm-hr)				263602.42
MONTHLY AVERAGE FLOW RATE(kscfm)				406.79

CALENDAR MONTH -August, 2009

COMMENTS:

ACTIVE ROOM		
MONTHLY AVERAGE FLOW (kacfm)	MINIMUM = 35K scfm = 42K acfm	53.254
NUMBER OF DATA POINTS USED IN CALCULATION OF AVERAGE		78.00

Mine Ventilation Rate Monitoring Annual Report
DOE/WIPP-10-3369

Attachment 1 – Monthly Summary of Mine Ventilation Rate Monitoring Data

SURFACE				
MODE OF OPERATION	RUNTIME (min)	RUNTIME (hours)	FLOW RATE (kscfm)	TOTAL FLOW (kscfmhr)
NORMAL VENTILATION (2-700 FANS)	42003	700.05	425	297521.25
ALTERNATE VENTILATION (1-700 FAN)	7	0.12	260	30.33
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)	826	13.77	260	3579.33
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)	184	3.07	60	184.00
NO VENTILATION	180	3.00	0	0.00
TOTAL		720.00		
SUM OF FLOW(kscfm-hr)				301314.92
MONTHLY AVERAGE FLOW RATE(kscfm)				418.49

CALENDAR MONTH -September, 2009

COMMENTS:
None

ACTIVE ROOM		
MONTHLY AVERAGE FLOW (kacfm)	MINIMUM = 35K scfm = 42K acfm	53.518
NUMBER OF DATA POINTS USED IN CALCULATION OF AVERAGE	78.00	

Mine Ventilation Rate Monitoring Annual Report
DOE/WIPP-10-3369

Attachment 1 – Monthly Summary of Mine Ventilation Rate Monitoring Data

SURFACE				
MODE OF OPERATION	RUNTIME (min)	RUNTIME (hours)	FLOW RATE (kscfm)	TOTAL FLOW (kscfmhr)
NORMAL VENTILATION (2-700 FANS)	41848	697.47	425	296423.33
ALTERNATE VENTILATION (1-700 FAN)	30	0.50	260	130.00
MAINTENANCE BYPASS (1-700 FAN w/ 1-860 FAN)	170	2.83	260	736.67
MAINTENANCE BYPASS (1-700 FAN w/ 2 860-FANS)	0	0.00	260	0.00
MAINTENANCE BYPASS (2-700 FANS w/ 1-860 FAN)	2512	41.87	260	10885.33
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)	33	0.55	60	33.00
NO VENTILATION	47	0.78	0	0.00
TOTAL		744.00		
SUM OF FLOW(kscfm-hr)				308208.33
MONTHLY AVERAGE FLOW RATE(kscfm)				414.26

CALENDAR MONTH -October, 2009

COMMENTS:
None

ACTIVE ROOM		
MONTHLY AVERAGE FLOW (kacfm)	MINIMUM = 35K scfm = 42K acfm	53.924
NUMBER OF DATA POINTS USED IN CALCULATION OF AVERAGE		90.00

Mine Ventilation Rate Monitoring Annual Report
DOE/WIPP-10-3369

Attachment 1 – Monthly Summary of Mine Ventilation Rate Monitoring Data

SURFACE				
MODE OF OPERATION	RUNTIME (min)	RUNTIME (hours)	FLOW RATE (kscfm)	TOTAL FLOW (kscfmhr)
NORMAL VENTILATION (2-700 FANS)	36584	609.73	425	259136.67
ALTERNATE VENTILATION (1-700 FAN)	10	0.17	260	43.33
MAINTENANCE BYPASS (1-700 FAN w/ 1-860 FAN)	0	0.00	260	0.00
MAINTENANCE BYPASS (1-700 FAN w/ 2 860-FANS)	1655	27.58	260	7171.67
MAINTENANCE BYPASS (2-700 FANS w/ 1-860 FAN)	4505	75.08	260	19521.67
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)	307	5.12	60	307.00
FILTRATION (1-860 FAN thru HEPA)	13	0.22	60	13.00
NO VENTILATION	127	2.12	0	0.00
TOTAL		720.02		
SUM OF FLOW(kscfm-hr)				286193.33
MONTHLY AVERAGE FLOW RATE(kscfm)				397.48

CALENDAR MONTH -November, 2009

COMMENTS:
None

ACTIVE ROOM		
MONTHLY AVERAGE FLOW (kacfm)	MINIMUM = 35K scfm = 42K acfm	60.664
NUMBER OF DATA POINTS USED IN CALCULATION OF AVERAGE		91.00

Mine Ventilation Rate Monitoring Annual Report
DOE/WIPP-10-3369

Attachment 1 – Monthly Summary of Mine Ventilation Rate Monitoring Data

SURFACE				
MODE OF OPERATION	RUNTIME (min)	RUNTIME (hours)	FLOW RATE (kscfm)	TOTAL FLOW (kscfmhr)
NORMAL VENTILATION (2-700 FANS)	31130	518.83	425	220504.17
ALTERNATE VENTILATION (1-700 FAN)	7956	132.60	260	34476.00
MAINTENANCE BYPASS (1-700 FAN w/ 1-860 FAN)	0	0.00	260	0.00
MAINTENANCE BYPASS (1-700 FAN w/ 2 860-FANS)	168	2.80	260	728.00
MAINTENANCE BYPASS (2-700 FANS w/ 1-860 FAN)	4937	82.28	260	21393.67
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)	326	5.43	60	326.00
NO VENTILATION	123	2.05	0	0.00
TOTAL		744.00		
SUM OF FLOW(kscfm-hr)				277427.83
MONTHLY AVERAGE FLOW RATE(kscfm)				372.89

CALENDAR MONTH -December, 2009

COMMENTS:
None

ACTIVE ROOM		
MONTHLY AVERAGE FLOW (kacfm)	MINIMUM = 35K scfm = 42K acfm	50.834
NUMBER OF DATA POINTS USED IN CALCULATION OF AVERAGE		36.00

Mine Ventilation Rate Monitoring Annual Report
DOE/WIPP-10-3369

Attachment 1 – Monthly Summary of Mine Ventilation Rate Monitoring Data

SURFACE				
MODE OF OPERATION	RUNTIME (min)	RUNTIME (hours)	FLOW RATE (kscfm)	TOTAL FLOW (kscfmhr)
NORMAL VENTILATION (2-700 FANS)	43933	732.22	425	311192.08
ALTERNATE VENTILATION (1-700 FAN)	299	4.98	260	1295.67
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)	379	6.32	260	1642.33
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)	29	0.48	60	29.00
NO VENTILATION	0	0.00	0	0.00
TOTAL		744.00		
SUM OF FLOW(kscfm-hr)				314159.08
MONTHLY AVERAGE FLOW RATE(kscfm)				422.26

CALENDAR MONTH -January, 2010

COMMENTS:
None

ACTIVE ROOM		
MONTHLY AVERAGE FLOW (kacfm)	MINIMUM = 35K scfm = 42K acfm	55.298
NUMBER OF DATA POINTS USED IN CALCULATION OF AVERAGE		65.00

Mine Ventilation Rate Monitoring Annual Report
DOE/WIPP-10-3369

Attachment 1 – Monthly Summary of Mine Ventilation Rate Monitoring Data

SURFACE				
MODE OF OPERATION	RUNTIME (min)	RUNTIME (hours)	FLOW RATE (kscfm)	TOTAL FLOW (kscfmhr)
NORMAL VENTILATION (2-700 FANS)	39382	656.37	425	278955.83
ALTERNATE VENTILATION (1-700 FAN)	460	7.67	260	1993.33
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)	54	0.90	60	54.00
NO VENTILATION	424	7.07	0	0.00
TOTAL		672.00		
SUM OF FLOW(kscfm-hr)				281003.17
MONTHLY AVERAGE FLOW RATE(kscfm)				418.16

CALENDAR MONTH -February, 2010

COMMENTS:
None

ACTIVE ROOM		
MONTHLY AVERAGE FLOW (kacfm)	MINIMUM = 35K scfm = 42K acfm	52.654
NUMBER OF DATA POINTS USED IN CALCULATION OF AVERAGE		73.00

Mine Ventilation Rate Monitoring Annual Report
DOE/WIPP-10-3369

Attachment 1 – Monthly Summary of Mine Ventilation Rate Monitoring Data

SURFACE				
MODE OF OPERATION	RUNTIME (min)	RUNTIME (hours)	FLOW RATE (kscfm)	TOTAL FLOW (kscfmhr)
NORMAL VENTILATION (2-700 FANS)	43718	728.63	425	309669.17
ALTERNATE VENTILATION (1-700 FAN)	3	0.05	260	13.00
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)	15	0.25	60	15.00
FILTRATION 1-860 FAN thru HEPA)	860	14.33	60	860.00
NO VENTILATION	44	0.73	0	0.00
TOTAL		744.00		
SUM OF FLOW(kscfm-hr)				310557.17
MONTHLY AVERAGE FLOW RATE(kscfm)				417.42

CALENDAR MONTH -March, 2010

COMMENTS:
None

ACTIVE ROOM		
MONTHLY AVERAGE FLOW (kacfm)	MINIMUM = 35K scfm = 42K acfm	56.402
NUMBER OF DATA POINTS USED IN CALCULATION OF AVERAGE		86.00

Mine Ventilation Rate Monitoring Annual Report
DOE/WIPP-10-3369

Attachment 1 – Monthly Summary of Mine Ventilation Rate Monitoring Data

SURFACE				
MODE OF OPERATION	RUNTIME (min)	RUNTIME (hours)	FLOW RATE (kscfm)	TOTAL FLOW (kscfmhr)
NORMAL VENTILATION (2-700 FANS)	42772	712.87	425	302968.33
ALTERNATE VENTILATION (1-700 FAN)	2	0.03	260	8.67
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)	426	7.10	60	426.00
NO VENTILATION	0	0.00	0	0.00
TOTAL		720.00		
SUM OF FLOW(kscfm-hr)				303403.00
MONTHLY AVERAGE FLOW RATE(kscfm)				421.39

CALENDAR MONTH -April, 2010

COMMENTS:
None

ACTIVE ROOM		
MONTHLY AVERAGE FLOW (kacfm)	MINIMUM = 35K scfm = 42K acfm	61.186
NUMBER OF DATA POINTS USED IN CALCULATION OF AVERAGE		82.00

Mine Ventilation Rate Monitoring Annual Report
DOE/WIPP-10-3369

Attachment 1 – Monthly Summary of Mine Ventilation Rate Monitoring Data

SURFACE				
MODE OF OPERATION	RUNTIME (min)	RUNTIME (hours)	FLOW RATE (kscfm)	TOTAL FLOW (kscfmhr)
NORMAL VENTILATION (2-700 FANS)	44437	740.62	425	314762.08
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)	44	0.73	60	44.00
NO VENTILATION	159	2.65	0	0.00
TOTAL		744.00		
SUM OF FLOW(kscfm-hr)				314806.08
MONTHLY AVERAGE FLOW RATE(kscfm)				423.13

CALENDAR MONTH -May, 2010

COMMENTS:
None

ACTIVE ROOM		
MONTHLY AVERAGE FLOW (kacfm)	MINIMUM = 35K scfm = 42K acfm	58.294
NUMBER OF DATA POINTS USED IN CALCULATION OF AVERAGE		72.00

Mine Ventilation Rate Monitoring Annual Report
DOE/WIPP-10-3369

Attachment 1 – Monthly Summary of Mine Ventilation Rate Monitoring Data

SURFACE				
MODE OF OPERATION	RUNTIME (min)	RUNTIME (hours)	FLOW RATE (kscfm)	TOTAL FLOW (kscfmhr)
NORMAL VENTILATION (2-700 FANS)	42529	708.82	425	301247.08
ALTERNATE VENTILATION (1-700 FAN)	221	3.68	260	957.67
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)	254	4.23	260	1100.67
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)	6	0.10	60	6.00
FILTRATION 1-860 FAN thru HEPA)	14	0.23	60	14.00
NO VENTILATION	176	2.93	0	0.00
TOTAL		720.00		
SUM OF FLOW(kscfm-hr)				303325.42
MONTHLY AVERAGE FLOW RATE(kscfm)				421.29

CALENDAR MONTH -June, 2010

COMMENTS:
None

ACTIVE ROOM		
MONTHLY AVERAGE FLOW (kacfm)	MINIMUM = 35K scfm = 42K acfm	55.824
NUMBER OF DATA POINTS USED IN CALCULATION OF AVERAGE	99.00	