Zappe, Steve, NMENV

From: Zappe, Steve, NMENV
Sent: Friday, August 01, 2008 11:32 AM
To: 'Plum, Jody - DOE'
Cc: Hall, Timothy, NMENV; Most, Wille; 'Chavez, Rick'
Subject: NMED informal comments on WIPP Permit Draft Attachment Q
Attachments: Att-q.wpd; Att-q (draft).pdf; Attachment Q comments_TH_Aug08.doc

Jody -

Attached are NMED's informal comments on draft Attachment Q. I'm trying to remember the original format in which we received Attachment Q from the Permittees, but I believe I reformatted it to match the layout of the rest of the Permit. I've attached our WordPerfect version of draft Attachment Q, along with a PDF version so our references to page and line numbers in the comments match the document. Feel free to make any further improvements in Attachment Q as you see fit. Let me know if you have questions.

Steve

From: Hall, Timothy, NMENV
Sent: Friday, August 01, 2008 10:21 AM
To: Zappe, Steve, NMENV
Subject: Attachment Q comments_TH_Aug08.doc

Attachment Q
Mine Ventilation Rate Monitoring Plan
Comments and Questions

Ensure all references to the Permit are corrected based on recent Permit modifications, e.g., IV.F.4 instead of IV.F.3, etc.

Q-1 Definitions

- Discussion of acfm and scfm needs to be more precise, i.e., what assumptions and conversion factors are used in concluding that acfm must be 42,000 to achieve 35,000 scfm?
- The last sentence in the second definition ("Restricted Access") refers to a "log sheet." Which log sheet is this?

Q-2 Objective of Monitoring Plan

- The primary objective of the plan, as specified in 20.4.1.500 NMAC (incorporating 40 CFR §264.601(c)), should be the "prevention of any release that may have adverse effects on human health or the environment due to migration of waste constituents in the air…" This objective is achieved by implementation of the Plan.
- Second bullet: The objective should be to maintain 35,000 scfm, as required by the permit.

Q-4b Test and Balance

- Page Q-2, line 33: "The Test and Balance is conducted on 12 to 18-month intervals." Include a discussion of how this meets the requirements of 40 CFR 264.15(b)(4), which states, "…the frequency should be based on the rate of deterioration of the equipment and probability of an environmental or human health incident if the deterioration, malfunction, or any operator error goes undetected between inspections." Also discuss the guidelines that were used to determine the Test and Balance frequency. Consider moving this discussion to Q-4b(1) Test and Balance Schedule.
- Page Q-3, line 6-7: "Historic data supports this assertion that minor system changes do not affect the overall system." Elaborate on what historic data was used to make this assertion and whether this data is in the record.
- Page Q-3, line 21-22: "Multiple measurements are taken at each field location to assure accurate results. Field values must correlate within 5% to be acceptable." Is this "5%" the relative percent difference? Include the formula for calculating the precision. Where is this documented?

Q-4b(1) Test and Balance Schedule

- See comments/questions above regarding schedule.
- Page Q-4, lines 21-32: Consider moving this discussion to Q-4b Test and Balance.

Consider restructuring Q-4c Total Mine Airflow Monitoring Schedule and Q-4d Active Disposal Room Airflow Monitoring Schedule to be consistent with the Test and Balance Section (Q-4b)

Q-4e Quarterly Airflow Verification Check

- This section needs to explain what is being done:
  - How will the checks be conducted?
  - What equipment will be used?
  - Refer to Table Q-1.
- Include a section for Quarterly Airflow Verification Check Schedule:
  - When are quarterly checks conducted?
  - What are the scheduling concerns, if any?

Q-5a Monitoring and Calculation of Monthly and Annual Ventilation Rate for Total Mine Flow

- Consider moving this section to Q-4c
- On August 23, 2006, NMED staff observed a "real time" total mine ventilation flow rate in the Central Monitoring Room (CMR). On October 17, 2006, NMED staff was told this real time flow rate is measured by a FloSonic airflow sensor at the base of the exhaust shaft.
  - Are these "real time" flow rates part of the Mine Ventilation Rate Monitoring program?
  - How do these real time flow rates monitored in the CMR relate to the flow rates of the modes in Table Q-2?
  - Are these real time flow rates tracked in a database? If so, has that data been analyzed to determine if it correlates with the design flow rates?

Q-5b Monitoring and Calculation of the Active Waste Disposal Room Flow

- Consider moving this section to Q-4d
- Page Q-6, line 1: The term correlate should be clarified or changed. McPherson (p. 179) says: "Traverses should be repeated until three readings are obtained that agree to within $\pm$ 5%." Again, does this mean the relative percent difference? Provide formula.

Q-6 Equipment Calibration and Maintenance

- Should this section be part of Q-4 Design of the Monitoring Program (Including Monitoring Schedule and *Monitoring Equipment*)?

Q-7a Evaluation of Monthly and Annual Average Total Mine Airflow Data

- In the formula for calculating the Monthly Average Flow Rate the denominator should be the total number of hours for the given month (which if not always 730).
- Add discussion of notification to NMED if Running Annual Average is not met.

Q-7b Verification of Daily and Monthly Active Disposal Room Ventilation Data

- To be consistent with other sections in Q-7, should this be "*Evaluation* of Daily and Monthly Active Disposal Room Ventilation Data?"

Q-7c Evaluation of Data for Quarterly Flow Verification Check

- It is not clear what data is being evaluated and how it is being evaluated. This section needs to explain the procedures used in evaluating the data.
- What is done with the results of the Quarterly Airflow Verification Check?
- What happens if the evaluation of the data suggests changes are needed to the system? Is this documented somewhere?
- Table D-1 of Attachment D of the Permit does not give any details on what is being done here.

Table Q-1

- What equipment is used for the underground facility flow rate readings referenced in Q-8 Reporting and Recordkeeping?

Table Q-2

- Do these flow rates correlate with the CMR flow rates measured by sensors at the base of the Exhaust Shaft? Is there historical data regarding these measurements?[1]
- Does filtration through HEPA filters cause enough resistance that the one 235 hp fan produces less than 60 kscfm?

Figures

- Figure Q-1 is not labeled as such.
- "ROOM NUMBER" is repeated on top of form; should one of these be "PANEL NUMBER"?
- Include samples of all forms, log sheets, etc, or references to where they can be found.
- Include a list of all procedures, forms, log sheets, etc.

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[1] *Evaluation of Different Airflow Sensors at the WIPP Facility* (McDaniel, K., Duckworth, I.J., and Prosser, B.S., 1999, 8th US Mine Ventilation Symposium, University of Missouri) states that real-time data from the WIPP Underground Ventilation Remote Monitoring and Control System (UVRMCS) is used for modeling in WIPPVENT.

ATTACHMENT Q

MINE VENTILATION RATE MONITORING PLAN

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ATTACHMENT Q

MINE VENTILATION RATE MONITORING PLAN

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ATTACHMENT Q

MINE VENTILATION RATE MONITORING PLAN

Q-1 Definitions

Compliance with the mine ventilation requirements set forth in Permit Module IV and Permit Attachment M2 requires the use and definition of the following terms:

- Actual cubic feet per minute (**acfm**) compared to standard cubic feet per minute (**scfm**): The Active Disposal Room Ventilation Rate Log Sheet (Figure Q-1) used to document ventilation flow rates is in acfm. The acfm reading is used because the vane anemometer measures actual air velocity. The top of the log sheet provides the minimum acfm flow needed to verify that there is 35,000 scfm in the active disposal room. The acfm to scfm conversion is needed to account for psychrometric changes in the air between sea level and the WIPP repository horizon. A 10% contingency is included in the converted value to account for accuracy of the instrumentation and sampling methodology. Based on these conversion calculations, and the addition of an additional 10% contingency, the acfm calculation must be at least 42,000 acfm to achieve the minimum 35,000 scfm flow rate required in the active disposal room(s). This conversion number allows the underground engineer to quickly determine if adequate flow is available in the room.

- Restricted Access: If the required ventilation rate cannot be achieved, or cannot be supported due to operational needs, access to the room is restricted. If access is restricted workers will not be allowed in the active disposal room until the minimum ventilation rate has been verified. Access can be restricted in a number of ways. Barriers, sign and postings, or the posting of an individual(s) to restrict access are all appropriate methods for restricting access to the active disposal room when ventilation rates are below 35,000 scfm. Those periods when active disposal room access are restricted are documented on the log sheet.

- Shift: Those work shifts when there is normal access to the WIPP underground.

- Worker: It is the intent of this Plan to include all personnel, including members of the public, in the definition of worker as it applies to Permit Condition IV.E.3.b.

Q-2 Objective of the Monitoring Plan

The objective of this plan ~~as required by Permit Condition IV.J.1~~ is to document the process by which the Permittees demonstrate protection of workers and compliance with the following ventilation requirements described in Permit Condition IV.E.3.b, and Permit Attachment M2-2a(3):

- Maintain a minimum annual running average exhaust rate of 260,000 standard cubic feet of air per minute (scfm) through the underground repository ~~(Permit Condition~~.

- Maintain a minimum of 35,000 scfm (42,000 acfm) of air through the active disposal room when workers are present in the room.

~~In accordance with Permit Conditions IV.J.2 and IV.J.3, this plan contains the following elements: Objectives of the Monitoring Plan, Plan Implementation and Notification, Design of the Monitoring Program, Monitoring Procedures, Equipment Calibration and Maintenance, Data Evaluation, Reporting and Recordkeeping, and Quality Assurance.~~

Q-3 Plan Implementation ~~and Approval~~

As required by Permit Condition IV.F.3.a, the Permittees will implement this plan within 30 days of approval by the Secretary, and maintain the plan until certified closure of all Underground Hazardous Waste Disposal Units (**HWDUs**). ~~When the Secretary approves the Mine Ventilation Rate Monitoring Plan, the Secretary will modify the permit in accordance with Permit Condition I.B.1.~~

Q-4 Design of the Monitoring Program (Including Monitoring Schedule and Monitoring Equipment)

This section of the WIPP Ventilation Rate Monitoring Plan provides an overview of the four basic processes that make up the mine ventilation rate monitoring plan. These processes are:

- Test and Balance, which serves as a periodic re-verification of the satisfactory performance of the entire underground ventilation system and associated components.
- Monitoring and calculation of the Running Annual Average of the Total Mine Airflow to assure that it exceeds the 260,000 scfm minimum requirement.
- Monitoring of active disposal room(s) to assure a minimum flow of 35,000 scfm whenever workers are present in the room.
- Quarterly flow verification of the total mine air flow.

Q-4a Ventilation System Description

The WIPP ventilation system and the underground ventilation modes of operation are described in Permit Attachment M2-2a(3).

Q-4b Test and Balance

The Permittees verify underground ventilation system performance by conducting a periodic Test and Balance. The Test and Balance is a comprehensive series of measurements and adjustments designed to assure 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 on 12 to 18-month intervals.

Once completed, the Test and Balance data become the baseline for underground ventilation system operation until the next Test and Balance is performed. Test and Balance results are used

by the Permittees to accommodate varying operational conditions and to ensure adequate airflow in the mine.

The Test and Balance interval is sufficient to account for changes in the mine and verify system performance. The incremental changes to the ventilation system resistance due to minor system modifications (mining new entries or closure of formerly ventilated areas) or salt creep that occurs between tests produce insignificant changes to the overall system resistance. Historic data supports this assertion that minor system changes do not affect the overall system.

The "Test" portion of the process involves measuring the pressure drop and air quantity of every underground entry excluding alcoves or other dead end drifts. In addition, the tests verify resistance curves for each of the ventilation system's main regulators, measure shaft resistance, and measure main fan pressure and quantity. This is done at the highest achievable airflow to facilitate accurate measurements. From these measurements the frictional resistance of the system is determined. The testing of underground ventilation systems is described in Chapter 6 of McPherson, 1993.

Pressure is measured using the Gage-and-Tube method. This method measures the pressure drop between two points using a calibrated pressure recording device and Pitot tubes. The resistance of the shafts is measured either by calibrated barometers at the top and bottom of shafts or by the gage and tube method. Airflow is measured using a calibrated vane anemometer to take a full entry traverse between system junctions. Fan pressure is measured using a calibrated pressure recording device and Pitot tube to determine both static and velocity pressure components for various settings of the fan inlet vanes.

Multiple measurements are taken at each field location to assure accurate results. Field values must correlate within 5% to be acceptable. These data are verified during the testing process to establish that:

- The sum of air flows entering and leaving a junction is equal to zero.
- The sum of pressure drops around any closed loop is equal to zero.

Once the measurements are taken, data are used to calculate the resistance of every underground drift, as well as shafts and regulators. This is done using Atkinson's Square Law:

$$P=RQ^2$$

Where the pressure drop of an entry is equal to a resistance (R) times the square of the quantity of air flowing (Q) through the circuit.

The "Balance" portion of the process involves adjusting the settings of the system fans and regulators to achieve the desired airflow distribution in all parts of the facility for each mode of operation. Particular emphasis is given to the active disposal room in the Waste Disposal Circuit to assure that a minimum airflow of 35,000 scfm is achieved. The system's baseline settings for the current Balance are established from the previous Test and Balance. Adjustments are then made to account for changes in system resistance due to salt creep, approved system modifications, or operational changes.

The Permittees use a commercially available ventilation simulator to process Test and Balance field data. The simulator uses the Hardy-Cross Iteration Method (Section 7.3.2 [page 220], McPherson, 1993) to reduce field data into a balanced ventilation network, including the

appropriate settings necessary to achieve proper airflow distribution for the various operating modes. These same models can also be used to project future development and evaluate system modification before they are implemented.

The Test and Balance and subsequent modeling provide the information necessary to update ventilation system operating procedures. Once procedures have been updated and the underground regulators set appropriately for any given mode of operation, the system will self balance. These procedures provide the operator sufficient flexibility to adjust system settings to accommodate varying psychrometric conditions and assure that airflow distribution is adequate to support daily operational needs.

Q-4b(1) Test and Balance Schedule

Based on changes within the WIPP mine, the Permittees will evaluate the need for and schedule another Test and Balance within 12 to 18 months of the previous Test and Balance. The Permittees will select the specific time to conduct the Test and Balance based on the following operational considerations:

- Available testing window
- Ongoing operational considerations
- Ongoing or upcoming system modification considerations
- Scheduling of testing personnel

Additional tests will be scheduled and conducted every 12 to 18 months thereafter. In no case shall the time between Test and Balance performance be greater than 18 months.

The Test and Balance process culminates in a final report which is retained in the site Engineering File Room. Within 60 days of the receipt of the final Test and Balance Report, the Permittees revise the WIPP surface and underground ventilation system procedures to incorporate any required changes to the ventilation system configuration defined in the Test and Balance Report. The Test and Balance data are used to adjust the operating range of fan controls, waste tower pressure, auxiliary air intake tunnel regulator settings, underground regulator louver settings, and door configurations. The model data and procedure changes are used to establish normal configuration settings to achieve the desired airflow in the underground. These settings may be modified by operations personnel throughout the year to compensate for system fluctuations caused by seasonal changes in the air psychrometric properties, and meet specific operations needs. This assures that the facility is operated at the design airflow rate for each ventilation mode.

Q-4c Total Mine Airflow Monitoring Schedule

As described in Section Q-5a, the Permittees will monitor the Total Mine Airflow daily and whenever operating modes change, and calculate the Monthly average and the Running Annual Average to assure that there is a minimum of 260,000 scfm as required in Permit Condition IV.E.3.b.

Q-4d Active Disposal Room Airflow Monitoring Schedule

As described in Section Q-5b, the Permittees will monitor the airflow through the Active Disposal Room(s) to verify proper ventilation at the start of each shift, any time there is an operational mode change, or if there is a change in the systems configuration that could affect the ventilation system to assure that there is a minimum of 35,000 scfm flow whenever workers are present as required in Permit Condition IV.E.3.b.

Q-4e Quarterly Airflow Verification Check

The Permittees will perform a Quarterly Airflow Verification Check of the Total Mine Airflow to assure that rates established by the Test and Balance for various operational modes are accurate. These checks for deterioration and calibration of Mine Ventilation Rate Monitoring equipment are required by Permit Attachment D, Table D-1, and are performed at the Exhaust Shaft Duct Work on the surface.

Q-5 Monitoring Procedures

Q-5a Monitoring and Calculation of Monthly and Annual Ventilation Rate for Total Mine Flow

Compliance with Permit Condition IV.E.3.b requires the Permittees to compute the running annual average mine ventilation rate on a monthly basis to assure that it meets/exceeds the established value of 260,000 scfm.

The Permittees calculate this running annual average based on monthly averages using data from the Central Monitoring Room Operator's (CMRO) Log. Run-times for WIPP's various modes of operation are tabulated in the CMRO Log. For example, if the CMRO Log indicates that the ventilation system was configured for Alternate Mode (one - 600 hp fan) at 8:00 am, and that this configuration was maintained until 11:30 am, a total of 3.5 hours of run-time would be recorded. Run times are recorded to the nearest quarter hour. The Permittees record this information each time the ventilation system configuration is changed, including periods when there is no ventilation. This calculation is illustrated in greater detail in Section Q-7a.

Q-5b Monitoring and Calculation of the Active Waste Disposal Room Flow

The Permittees monitor the underground airflow at the entrance to the active disposal waste room to assure compliance with Permit Condition IV.E.3.b and Attachment M2-2a(3), which requires a minimum of 35,000 scfm of air flow through the active waste room when workers are present. Permit Condition IV.F.3.c requires the Permittees to assess compliance on a monthly basis for the active disposal room.

The standard method for measurement of air flow using a calibrated anemometer and full entry traverse are described in Section 6.2.2 (page 178) of McPherson (1993). Air flow measurements will be collected at an appropriate location near the entrance of each active disposal room. This location will be chosen by the operator to minimize airflow disturbances caused by system intersections and corners in accordance with Section 6.2.2 (page 179) of McPherson (1993). The readings from this full entry traverse are used to verify a minimum of 35,000 scfm ventilation flow through the active disposal room(s). Multiple measurements are

taken at each field location to assure accurate results. Field values must correlate within 10% to be acceptable. Data are collected and recorded by qualified operators, and the data is verified. The facility operator will verify that proper ventilation at the start of each shift, any time there is an operational mode change, or if there is a change in the systems configuration that could affect the ventilation system.

Once the ventilation has been 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 actual airflow must be at least 42,000 acfm to meet the 35,000 scfm minimum requirement. The operator shall recheck and record 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. Once the ventilation rate has been recorded and verified to be at least 35,000 scfm, personnel access to the room is unrestricted in accordance with normal underground operating procedures. If the required ventilation rate cannot be achieved, or cannot be supported due to operational needs, access to the room is restricted. Those periods when active disposal room access is restricted are documented on the log sheet(s) for each active waste disposal room.

Q-6 Equipment Calibration and Maintenance

Equipment used for the periodic Test and Balance, quarterly flow verification checks (on the main fans), and daily verification of active disposal room flow rate is calibrated in accordance with WIPP Calibration and Control of Measurement and Data Collection Procedure, WP 10-AD3029 (see Attachment P for description). In the event that the Test and Balance is conducted by a subcontract vendor, any equipment they provide shall be calibrated in accordance with the WIPP Quality Assurance Program. Equipment is inspected before each use to assure that it is functioning properly and that the equipment calibration is current. Maintenance of equipment is completed by qualified individuals or by qualified off-site service vendors.

Equipment used to conduct the Test and Balance, Quarterly Flow Verification Checks on surface fans, and to measure the airflow through the active disposal room(s) are provided in Table Q-1.

Q-7 Data Evaluation

Q-7a Evaluation of Monthly and Annual Average Total Mine Airflow Data

The Permittees will calculate the running average flow rate on a monthly basis as required in Permit Condition IV.E.3.b. After one year, the calculations that encompass the previous 12 months data become the running annual average. The operator will use the logged runtime data for various modes of operation (as described in Section Q-5a) multiplied by the flow-rates for the different modes presented in Table Q-2 to calculate the average monthly and annual flow rate for the facility.

Calculation of the running average annual flow rate shall be computed monthly using the times entered in the CMRO log in accordance with the following formula:

Monthly Average Flow Rate = {(Normal Mode Run-time (hrs.) x 425,000 scfm] + [Alternate Mode Run-time (hrs.) x 260,000 scfm] + [Maintenance Bypass Run-time (hrs.) x 260,000 scfm minimum] + [(Reduced Mode Run-time (hrs.) x 120,000 scfm] + [Minimum Mode Run Time (hrs.) x 60,000 scfm] + [Filtration Mode Run-time (hrs.) x 60,000 scfm)}/ 730 Hours per month.

The annual average flow rate shall be computed using the times entered in the CMRO log by the following formula:

Annual Average Flow Rate = å Monthly Average for Previous 12 Months
12*

*The average flow rate is calculated on a monthly basis as required in Permit Condition IV.F.3.c. During the first year of operation under this plan, this number will be the actual number of months of operation. Hours are calculated to the nearest 0.25 hour for this calculation. All hours are calculated from the times entered in the CMRO Log.

Q-7b Verification of Daily and Monthly Active Disposal Room Ventilation Data

The Permittees evaluate compliance with the minimum active ventilation rate specified in Permit Condition IV.E.3.b on a monthly basis as required by Permit Condition IV.F.3.c. The facility operator will verify that proper ventilation at the start of each shift, any time there is an operational mode change, or if there is a change in the systems configuration that could affect the ventilation system. The operator records the acfm value on the log sheet. The operator shall recheck and record the airflow through the active room during the shift whenever there is an operational mode change, or if there is a change in the systems configuration that could affect the ventilation system. Once the ventilation rate has been verified to be at least 35,000 scfm and recorded, personnel access to the room is unrestricted in accordance with normal WIPP underground operations procedures. If the required ventilation rate cannot be achieved, or cannot be supported due to operational needs, access to the room is restricted. Those periods when active disposal room access is restricted are documented on the log sheet. This information is summarized from the Active Disposal Room Ventilation Rate Log Sheet as described in Section Q-5b of this Plan. The Permittees shall evaluate compliance with the minimum active room ventilation rate specified in the permit Condition IV.E.3.b on a monthly basis. Whenever the evaluation of the mine ventilation monitoring program data identifies that the ventilation rates specified in Permit Condition IV.E.3.b have not been achieved, the Permittees shall notify the Secretary in writing within five (5) working days.

Q-7c Evaluation of Data for Quarterly Flow Verification Check

The data generated from the Quarterly Flow Verification Check will be evaluated in accordance with Table D-1 of Attachment D of the Permit. Under this procedure, airflow measurements are compared the value presented by the airflow sensors. If the relative percent difference between these values is greater than five percent, then the system will be adjusted.

Q-8 Reporting and Recordkeeping

As required by Permit Condition IV.F.3.b, as a part of the Annual Report to the Secretary required under Permit Condition IV.F.2.b, the Permittees shall describe the implementation and present the results of the data and analysis of the Mine Ventilation Rate Monitoring Plan. In accordance with these requirements, the Permittees will submit to the Secretary an annual report, beginning twelve (12) months after issuance of the permit, October 27, 1999. This report shall include information and data collected from July 1 of the previous year to June 30 of the report year. At a minimum, this report will include the following information:

- Discussion on the Implementation of this Plan. (IV.F.3.b)
- Summary of the results and evaluation of the following ventilation monitoring activities:
- Total Mine Ventilation (monthly and running annual averages) (Q-5a)
- Active Disposal Room Ventilation (workers present and monthly average) (Q-5b)
- Test and Balance, if performed during the report year (Q-4b)
- Quarterly Airflow Verification Checks.(Table D-1, Q-4e)
- A summary of the Ventilation Program Results.

As required by Permit Condition IV.F.3.c, the Permittees shall calculate the running annual average mine ventilation exhaust rate on a monthly basis. A quarterly check of total mine flow will be performed to assure that the system is functioning as anticipated. In addition, the Permittees shall evaluate compliance with the minimum active room ventilation rate specified in the Permit Condition IV.E.3.b on a monthly basis. Whenever the evaluation of the mine ventilation monitoring program data identifies that the ventilation rates specified in Permit Condition IV.E.3.b have not been achieved, the Permittees shall notify the Secretary in writing within five (5) working days.

The Permittees retain information in a number of documents that are a part of the Operating Record to implement this plan. These Operating Records include:

- The CMRO Log documents the ventilation system operating mode, and is retained as an operating record by Facility Operations.
- The underground facility flow rate readings are maintained as an operating record by Facility Operations.
- Active disposal room ventilation flow rate readings are documented on the Active Disposal Room Ventilation Rate Log Sheet, and are maintained as an operating record by Underground Operations.
- The quarterly flow verification check and associated documentation are maintained as an operating record by Maintenance Operations.

These records will be maintained at the facility for a period of three years.

Q-9 Quality Assurance

Quality assurance associated with the Mine Ventilation Rate Monitoring Plan consists of several elements. The Permittees verify the qualification of personnel conducting ventilation flow measurements. The instrumentation used for monitoring both underground and active disposal

is calibrated in accordance with the applicable provisions of the WIPP Quality Assurance Program Description (QAPD). See Attachment P for the most current version of the QAPD. The software used to calculate the monthly and annual running averages and the ventilation simulation software programs are controlled in accordance with the WIPP QAPD and WIPP computer software quality assurance plans.

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

Instrumentation used in this Plan will be of known precision and accuracy. This information will be recorded in the instrumentation calibration documentation.

Q-10 References

McPherson, Malcolm J. "Subsurface Ventilation and Environmental Engineering", Chapman & Hall, London, First Edition, 1993.

Test and Balance of the WIPP Underground Ventilation System, January 2000.

Active Disposal Room Ventilation Rate Log Sheet

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TABLES

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TABLE Q-1
MINE VENTILATION RATE TESTING EQUIPMENT

Equipment Used to Conduct Test	**Ventilation Test Performed**		
	Test and Balance	Active Disposal Room(s)	Quarterly Flow Verification Check
Calibrated Anemometer	X	X	
Calibrated Differential Pressure Sensor	X		X
Pitot Tubes	X		X
Tubing	X		X
Temperature Sensing Device	X		X
Relative Humidity Sensor	X		X
Calibrated Barometers	X		X

TABLE Q-2
VENTILATION OPERATING MODES AND ASSOCIATED FLOW RATES

Mode of Operation	Flow Rate (scfm) – Nominal Values
Normal (two 600 hp. fans)	425,000
Alternate (one 600 hp. fan)	260,000
Maintenance Bypass [parallel operation of 600 hp fan(s) and 235 hp. Fan(s)]	260,000 to 425,000
Reduced (two 235 hp. fans)	120,000
Minimum (one 235 hp. fan)	60,000
Filtration (one 235 hp. fan)	60,000

1 **FIGURES**

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ACTIVE DISPOSAL ROOM VENTILATION RATE LOG SHEET

ROOM NUMBER _____ ROOM NUMBER _____

NOTE: When airflow reading is below 42,000 ACFM, access will be restricted.

DATE	TIME	AIRFLOW READING	WAS 42,000 ACFM ACHIEVED?		ROOM ACCESS WAS RESTRICTED?		SIGNATURE	VERIFIED BY
			YES	NO	YES	NO		