

# WP 12-IH1828

Revision 3

## Permit Mandated Air Quality Monitoring and Sampling

Technical Procedure

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Tom Ferguson  
APPROVED FOR USE

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## INTRODUCTION<sup>1</sup>

This procedure specifies the methods for monitoring and testing the air in the underground in accordance with the conditions of the Waste Isolation Pilot Plant (WIPP) Hazardous Waste Facility Permit (HWFP), Attachment E-2g. HWFP Attachment E-2g requires that Underground Services perform air quality monitoring/checking for oxygen, carbon monoxide, and atmospheric flammability (O<sub>2</sub>/CO/LEL) on a daily basis in the underground. Daily O<sub>2</sub>/CO/LEL monitoring also provides compliance with the Mine Safety and Health Administration (MSHA) requirement to check for oxygen deficiency (30 CFR §57.5015, "Oxygen Deficiency").

HWFP Attachment E-2g also requires air quality sampling/testing for a number of air contaminants to be performed "as often as needed to assure safe working conditions," specifically including methane (CH<sub>4</sub>), hydrogen sulfide (H<sub>2</sub>S), sulfur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), and chlorine (Cl<sub>2</sub>). This procedure addresses methods by which Industrial Safety & Hygiene (ISH) conducts this sampling.

This procedure specifies the methods for compliance with the calibration requirements of HWFP Attachment E-2g, and Attachment D, Table D-1, regarding daily air quality monitoring and air quality sampling. See WP 12-IH.02, WIPP Industrial Hygiene Program Manual, regarding requirements for confined space entry.

## RECORDS

Data generated by daily O<sub>2</sub>/CO/LEL air checks are retained by Facilities Operations and archived in conformance with Records Inventory and Disposition Schedule (RIDS) requirements.

Data generated by HWFP Attachment E-2g mandated sampling may be directly entered into the industrial hygiene (IH) sampling database, or initially recorded on a current blank layout from that database. The IH sampling database and its backups reside on a backup-protected server on the WIPP intranet. Contact ISH for the current intranet address for this database. Sampling data generated by this procedure will be retained permanently, and will be archived in conformance with RIDS requirements.

Performance of the functional check portion of this procedure produces the following record:

- Attachment 1, Air Quality Monitoring Equipment Functional Check Data Sheet

## **RESPONSIBILITIES**

### **Underground Services**

Underground Services (Underground Facility Operations) is responsible for performing daily O<sub>2</sub>/CO/LEL monitoring as described above. Underground Services personnel performing daily monitoring shall hold current WIPP Ops-08 gas monitoring qualification cards.

### **Industrial Safety & Hygiene**

ISH is responsible for conducting HWFP Attachment E-2g mandated sampling, as needed. ISH professional staff, a Certified Industrial Hygienist (CIH), or a Certified Safety Professional (CSP) is also responsible for determining frequency of sampling. Drivers for determining frequency of sampling shall include employee concerns, introduction of new materials or processes into the underground, professional judgment of the CIH/CSP responsible for this work, and direction of management.

### **Technical Training**

Technical Training is responsible for providing administrative support for development and implementation of qualification cards for instruments used for this work.

## **REFERENCES**

### **BASELINE DOCUMENTS**

- 29 CFR Part 1910, Subpart Z, "Toxic and Hazardous Substances"
- 30 CFR §57.5001, "Exposure Limits for Airborne Contaminants"
- 30 CFR §57.5015, "Oxygen Deficiency"
- 30 CFR §57.8518, "Main and Booster Fans"
- 30 CFR §57.8534, "Shutdown or Failure of Auxiliary Fans"
- 30 CFR Part 57, Subpart D, "Air Quality, Radiation, Physical Agents, and Diesel Particulate Matter"
- 30 CFR Part 57, Subpart T, "Safety Standards for Methane in Metal and Non-Metal Mines"

- *"OSHA Analytical Methods,"* U.S. Department of Labor Occupational Safety and Health Administration, Directorate of Technical Support, OSHA Technical Center, Salt Lake City, Utah  
(<http://www.osha-slc.gov/dts/slhc/methods/index.html>)
- Hazardous Waste Facility Permit issued to the Waste Isolation Pilot Plant, Identification No. NM4890139088 - TSDf by the New Mexico Environment Department, Attachment D, Table D-1
- Hazardous Waste Facility Permit issued to the Waste Isolation Pilot Plant, Identification No. NM4890139088 - TSDf by the New Mexico Environment Department, Attachment E-2g
- *"Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices,"* American Conference of Governmental Industrial Hygienists

#### REFERENCED DOCUMENTS

- WP 12-IH.02, WIPP Industrial Hygiene Program Manual
- The operation and maintenance manual for the instrumentation in use

#### EQUIPMENT

##### MONITORING EQUIPMENT - O<sub>2</sub>/CO/LEL Monitoring

- Real time O<sub>2</sub>/CO/LEL instrument as identified in WIPP Ops-08 gas monitoring qualification cards. Instruments are kept on charge in the calibration laboratory.

##### FUNCTIONAL CHECK EQUIPMENT - Daily O<sub>2</sub>/CO/LEL Monitoring

- Calibration fitting as provided by the instrument manufacturer

A calibration gas combining known concentrations of oxygen, carbon monoxide, and methane may be used in place of separate gases. All gases must have the gas manufacturer's certificate of analysis (on the bottle, or separate documentation on file).

##### SAMPLING EQUIPMENT - Hazard Driven Colorimetric Tube Sampling

- Draeger bellows-style pump, Draeger Accuro 2000 automatic pump, or other pump approved by Draeger for use with Draeger grab sample tubes

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**NOTE**

Should Draeger brand colorimetric tubes not be reasonably available, generic equivalent colorimetric tube systems (e.g., Matheson/Kitagawa) may be substituted. Tubes and pumps are a system, and must be from the same manufacturer.

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- Draeger grab sample colorimetric indicating tubes sensitive to the following concentrations:
  - Carbon monoxide to 2 parts per million (ppm)
  - Chlorine to 0.2 ppm
  - Hydrogen sulfide to 0.2 ppm
  - Nitrogen dioxide to 0.5 ppm
  - Sulfur dioxide to 0.1 ppm

**PRECAUTIONS AND LIMITATIONS**

- Hearing protection is required in areas where the eight-hour average noise exposure could be expected to exceed 85 decibels (dB), or where required by site administrative controls, such as signs.
- Gases in high concentrations that have a specific gravity greater than 1 will accumulate at low levels, while those with a specific gravity of less than 1 will accumulate at the top of an enclosure. For low concentrations such as those which are usually being measured for safety reasons, the gases in question evenly distribute due to normal dispersion. The following conditions may cause a false reading:
  - Low battery
  - Equipment out of calibration
  - Temperature and humidity extremes (reference the manufacturer's documentation)
  - Faulty equipment (e.g., equipment that has been dropped)
- Adequate ventilation is required to prevent accumulation of gas or vapors.
- Smoking is prohibited in the area where the functional check is performed, since this can affect the measurements of the instruments.

- Should any instrumentation fail the functional test or operate improperly in the field, immediately stop this procedure and obtain help from Instrumentation and Controls Maintenance (for instrumentation within the scope of Ops-08), or the ISH professional staff (for any other instrument).

**PERFORMANCE**

1.0 DAILY O<sub>2</sub>/CO/LEL UNDERGROUND AIR QUALITY MONITORING

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**NOTE**

This procedure outlines the steps to be taken to confirm proper functioning of the applicable instrumentation, followed by collection of measurements.

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- 1.1 Perform functional check/calibration as required per the applicable qualification card.
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**NOTE**

The instrument should respond to within the allowable parameters of Attachment 1 or the parameters specified in the manufacturer's operating manual.

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- 1.2 Proceed to each appropriate open drift.
- 1.3 If air quality readings are normal, enter a checkmark (✓) on the Underground Services Rounds Sheet, form UGLSx4.
- 1.4 **IF** air quality instrument alarms (Attachment 2, Action Levels), **THEN** immediately move away from area and notify Central Monitoring Room Operator (CMRO).
- 1.5 Post area against entry.
- 1.6 Return instrument.

2.0 COLORIMETRIC TUBE SAMPLING - HWFP ATTACHMENT E-2G MANDATED SAMPLING

- 2.1 Pump Check
  - 2.1.1 Place unopened tube in pump.
  - 2.1.2 Compress the bellows once and set aside.
  - 2.1.3 If the bellows remain compressed for several minutes with no visible expansion, the pump may be used.

## 2.2 Sampling

- 2.2.1 Choose tube for contaminant to be sampled.
- 2.2.2 Check tube box to ensure tubes are not out-of-date (If box of tubes are out-of-date, do not use).
- 2.2.3 Dispose of out-of-date tubes (contact Site Environmental Compliance for specific instructions).
- 2.2.4 Proceed to the sampling area.
- 2.2.5 Read and follow the instructions on the direction sheet included with the tubes.
- 2.2.6 Break off ends of tube using pump fixture.
- 2.2.7 Carefully insert tube with arrow pointing towards pump.
- 2.2.8 Perform number of pumps per tube instruction sheet.
- 2.2.9 **IF** Draeger tubes exceed alarm set points (Attachment 2), **THEN** move away from area and notify CMRO.
- 2.2.10 Post area against entry.

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### **NOTE**

Blank IH sampling database layouts may be used to record data, or data may be entered directly into the WIPP IH sampling database. IH sampling layouts may be obtained on the WIPP intranet. ISH maintains the current intranet address for this database.

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- 2.2.11 Record test results.
- 2.2.12 Dispose of used tubes in accordance with Site Environmental Compliance instructions.

## Attachment 1 - Air Quality Monitoring Equipment Functional Check Data Sheet

EQUIPMENT NUMBER	MODEL NUMBER		DATE	TIME	TEMPERATURE	CALIBRATION DUE DATE	
APPLIED GAS	GAS CONCENTRATION		ACCEPTABLE RANGE		ALARM SETTING	AS FOUND ALARM READING	AS FOUND SPAN GAS READING
	TARGET	ACTUAL	ALLOWABLE	CALCULATED			
Oxygen	20.9% O <sub>2</sub>		± 0.5% O <sub>2</sub>		NA	NA	
Oxygen	19.0% O <sub>2</sub>		± 0.5% O <sub>2</sub>		19.5% O <sub>2</sub>		
Oxygen	23.5% O <sub>2</sub>		± 0.5% O <sub>2</sub>		23.0% O <sub>2</sub>		
20.9% O <sub>2</sub> (For CO zeroing)	0 ppm CO	0 ppm CO	±1 ppm CO	NA	NA	NA	
Carbon Monoxide	40 ppm CO		± 5%*		25 ppm CO		
20.9% O <sub>2</sub> (For LEL, CH <sub>4</sub> , C <sub>3</sub> H <sub>8</sub> zeroing)	0% LEL, CH <sub>4</sub> , C <sub>3</sub> H <sub>8</sub>	0% LEL, CH <sub>4</sub> , C <sub>3</sub> H <sub>8</sub>	None	NA	NA	NA	
Methane/Pentane	0.4% CH <sub>4</sub> , 0.1% C <sub>3</sub> H <sub>8</sub>		± 3%		5% LEL, 0.25% CH <sub>4</sub> , 0.07% C <sub>3</sub> H <sub>8</sub>		
20.9% O <sub>2</sub> (For H <sub>2</sub> S zeroing)	0 ppm H <sub>2</sub> S	0 ppm H <sub>2</sub> S	None	NA	NA	NA	
Hydrogen Sulphide	13 ppm H <sub>2</sub> S		± 5%* or 1 ppm**		10 ppm H <sub>2</sub> S		
20.9% O <sub>2</sub> (For SO <sub>2</sub> zeroing)	0 ppm SO <sub>2</sub>	0 ppm SO <sub>2</sub>	None	NA	NA	NA	
Sulfur Dioxide	3 ppm SO <sub>2</sub>		± 5%* or 1 ppm**		2 ppm SO <sub>2</sub>		
20.9% O <sub>2</sub> (For NO <sub>2</sub> zeroing)	0 ppm NO <sub>2</sub>	0 ppm NO <sub>2</sub>	None	NA	NA	NA	
Nitrogen Dioxide	1.5 ppm NO <sub>2</sub>		± 5%* or 1 ppm**		1 ppm NO <sub>2</sub>		
20.9% O <sub>2</sub> (For Cl <sub>2</sub> zeroing)	0 ppm Cl <sub>2</sub>	0 ppm Cl <sub>2</sub>	None	NA	NA	NA	
Chlorine	2 ppm Cl <sub>2</sub>		± 5%*		0.5 ppm Cl <sub>2</sub>		

\* of reading

\*\* whichever is greater

FUNCTIONAL CHECK ACCEPTABLE? YES NO

SIGNATURE \_\_\_\_\_

Attachment 2 - Action Levels

Oxygen	Low Alarm 19.5%	High Alarm 23%
Explosivity (LEL)	5% LEL	
Carbon Monoxide	25 ppm	
Chlorine	0.5 ppm	
Hydrogen Sulfide	10 ppm	
Nitrogen Dioxide	1 ppm	
Sulfur Dioxide	2 ppm	