

How to Operate a VAM-RTO System on a Bituminous Coal Mine

A workgroup was convened by the Bureau of Mine Safety at the request of the Pennsylvania Coal Alliance to develop guidance on how to safely operate a VAM-RTO system on a bituminous coal mine. Participation included individuals from Alliance Coal, Core Natural Resources (formerly CONSOL Energy), Iron Senergy, Rosebud Mining Company and the Pennsylvania Bureau of Mine Safety.

This document was developed by this workgroup with the intent that the information pertaining to the following areas shall be included in MSHA ventilation plan submittals addressing VAM-RTO systems:

- 1.) System Description (Summary)
 - a. Overview of the equipment to be installed, purpose of system, and installation location
 - b. Ventilation plan submittal will address VAM abatement system impact on mine ventilation under possible operating conditions. Any calculations, models, etc., used to arrive at this conclusion shall be presented at request.
- 2.) System Design and Components
 - a. Description of significant system components including VAM oxidation chamber, interface with the mine ventilation system, safety and monitoring equipment, isolation dampers, controls.
- 3.) Operating Parameters
 - a. Narrative on equipment operations and sequencing
 - b. Throughput capacity (scfm)
 - c. VAM concentration range (%)
 - d. Operating temperature range
- 4.) Safety Considerations
 - a. Startup and shutdown procedures
 - i. Any safety shutdown shall require on-site human intervention to clear the alarm and restart the system
 - b. Emergency shutdown procedure sequence
 - c. Mechanism(s) and control system that prevents high concentrations of methane from reaching the RTO combustion chamber and isolates the mine fan and critical RTO components
 - i. The system shall have redundant CH₄ monitoring on the intake side of the isolation damper to verify permissible conditions before initiating start-up of the system.
 - d. Description of mine ventilation air offtake
 - e. RTO Isolation valves or dampers
 - i. The system shall have a fail-safe isolation damper that can be manually operated.
 - f. Fresh air dampers (if applicable)
 - g. Maximum allowable methane concentration of process VAM
 - i. The system shall have a hard shutdown at a CH₄ level of 2% that requires on-site human intervention to clear the alarm and restart the system.
 - h. Procedure to exhaust high methane concentration in ductwork
 - i. System bypass dampers (if applicable)
 - j. Method to alert responsible mine official of all safety system related alarms and conditions
 - k. Vam abatement equipment must comply with NFPA 86 standards at the time of construction
- 5.) Training Requirements
- 6.) Manufacturer and model designation

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- 7.) The Operator shall implement a policy to maintain the current Equipment Operation and Maintenance Manual on-site
 - a. An inspection and calibration log shall be kept on-site and readily available for review
- 8.) The Operator shall comply with the manufacturer's safety system related O&M requirements
- 9.) Policy to maintain current RTO manual on site
- 10.) Conceptual design layout
 - a. Drawings depicting conceptual equipment, layout, proximity to ventilation outlet
 - b. Conceptual Drawings of ventilation offtake design

MEMO

TO All Commonwealth Bituminous Operators

FROM Richard A. Wagner, P.E.
Director
Bureau of Mine Safety

DATE February 12, 2025

RE VAM-RTO Systems

MESSAGE:

At the request of the Pennsylvania Coal Alliance, the Bureau of Mine Safety (BMS) recently convened a workgroup to develop guidance for the safe implementation of VAM-RTO systems. The document produced by this workgroup contains provisions that are to be included with an operator's ventilation plan submission to MSHA as well as provided to the BMS per Section 230(f) of the Bituminous Coal Mine Safety Act.

Should you have any questions, please contact Chas Washlack, Bituminous Electrical Program Manager at 724.404.3145 or cwashlack@pa.gov.