

EFFECTIVE DATE: 04/30/2012
LAST VALIDATED: 03/29/2024

EXPIRATION DATE: 3/31/2026

PROCEDURE INSTRUCTION LETTER NO. I12-V-11

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SUBJECT: Reissue of I10-V-09 - Procedures for Evaluation of Requests to
Make Extended Cuts with Remote Controlled Continuous Mining
Machines

Scope

This Procedure Instruction Letter (PIL) applies to all Coal Mine Safety and Health enforcement personnel. This PIL replaces PIL I10-V-09 with the same subject line.

Purpose

This PIL provides direction in evaluating requests for approval of extended cuts. It also provides direction for the reevaluation of previously approved extended cut plans in accordance with the requirements of other inspection guideline documents. These procedures deal with the evaluation of plans and include supplemental information to assist inspectors and specialists in plan evaluation.

Procedure Instructions

A. DEFINITION

An extended cut (deep cut) is defined as any cut in which the on-board manual controls of the continuous mining machine are advanced in by the last row of permanent roof supports or any cut in which the mining machine is advanced more than 20 feet in by the last row of permanent roof supports. This measurement is made from the last fully completed row of undisturbed roof bolts to the point of deepest penetration of the working face.

B. PLAN PROCESSING

Coordination between the groups responsible for roof control and ventilation plan review is essential to eliminate inconsistencies between plans.

These procedures provide a systematic approach for evaluating new extended-cut approval requests. An on-site evaluation will be made to assess the adequacy of a proposed plan to determine if extended cuts can be made without adversely affecting the health and safety of miners.

C. MINE HISTORY EVALUATION

The following factors should be considered when reviewing the mine history:

1. coal seam characteristics;
2. roof falls;
3. remote-control machinery accidents;
4. ignitions;
5. face methane liberation; and
6. ventilation, noise and respirable dust compliance.

Much of the history for the mine will be available through the MSHA Standardized Information System (MSIS) and the Part 50 Operator and Contractor System databases. Since not all roof falls are reportable and part of the computer record, it is important to solicit input from inspectors who regularly inspect the mine to assess the extent of non-reportable falls. This information should be considered during the evaluation process.

Methane liberation may be a limiting factor for some mines. In some instances, the improved air distribution achieved using scrubbers, spray fans or diffuser fans may alleviate some of the dust or methane control problems. Evaluation of these factors on a standard cut should be made before considering approval of an extended cut.

D. PLAN PROVISIONS

The following information, specific to extended cuts (if different than for standard cuts), should be included in the appropriate plan.

1. All face ventilation systems used, including sketches illustrating system use, and minimum air quantities and velocities in the working place.
2. A sketch that shows the standard sequence of mining entries and crosscuts on an advancing working section including the air quantity in the last open crosscut and at the working face (if greater than the minimum quantities required by the regulations), face ventilation controls in the working place being mined, and any other working place where face ventilation controls are required.

The following information should also be included on the sketch:

- a. maximum cut depth, width, and sequence of lifts taken when mining the extended cut;
 - b. the maximum distance that line brattice or tubing will be maintained from the point of deepest penetration of the face (setback) in entries, rooms and crosscuts;
 - c. number, location, orientation, flow rate, and pressure of water sprays;
 - d. inlet and discharge locations and capacity of dust collectors; and
 - e. inlet and discharge locations and capacity of diffuser fans.
3. A sketch showing the width, length and sequence of pillar lifts, supplemental roof support to be installed, and ventilation quantities and controls for retreating working sections if applicable.
 4. Method used to make the 20-minute gas test.
 5. Method used to make the methane test before other equipment (i.e., roof bolting machine) enters the extended cut.
 6. Provision for safe positioning of continuous mining machine operator and helper during all cut sequences.
 7. Procedure to be followed when adverse roof conditions are encountered during the extended cut.

E. TRAINING REQUIREMENTS

Training plans should be reviewed and revised, if necessary, to ensure that they emphasize the purpose of safeguards required due to extended cut mining and proper operation and maintenance of the special equipment used to make these cuts. All affected persons should receive this instruction prior to beginning extended cut mining, and it should be included in the annual refresher training and task training for those miners assigned to extended cut mining sections.

F. ON-SITE EVALUATION

On-site evaluation of each proposed extended cut system must be conducted before granting full approval. The proposed extended cut system can only be utilized during the time MSHA is performing the on-site evaluation prior to the District Manager granting approval or indicating disapproval of the proposed ventilation plan. The Mine Safety and Health Administration (MSHA) will initially grant approval for the operator

to use an acceptable extended cut plan only during the time MSHA personnel are present at the mine-site to conduct the evaluation of the proposed plan. At all other times, the mine operator must follow the standard cut plan included in the currently approved ventilation plan which should require that the ventilation curtain/tubing be maintained to not more than 20 feet from the deepest point of penetration the face has been advanced.

The on-site evaluation of an extended cut mining system will require the cooperative effort of the regular inspector and specialists. Each specialist must be fully aware of each of the areas of concern (roof control, noise, dust and ventilation) during an investigation. This will require good communication by the specialists.

When conducting an evaluation of an extended cut section, the inspectors and/or specialists should make the following observations and measurements for comparison with plan requirements and for evaluating the adequacy of the plan.

1. Measure the air quantity as close as practicable to the inby end of the line brattice or ventilation tubing with the scrubber (if utilized) turned off.
2. Determine the mean entry air velocity in places using exhaust ventilation systems.
3. Check the number, type, location and direction of discharge of sprays used for spray fan systems.
4. Measure the operating spray pressure for all water spray systems (dust suppression and air moving).
5. Check the exhaust of dust scrubbers (a dirty or extremely wet exhaust may indicate improper scrubber operation).
6. Observe scrubber maintenance procedure, if a scrubber is utilized.
7. Ensure that the ventilation parameters (including dust control parameters) for the working section specified in the plan are in place and operational. The dust controls for the standard cut must have been evaluated and approved prior to conducting this evaluation for a deep cut system.
8. Determine that the necessary equipment to make gas tests is available.
9. Observe the method used to make the 20-minute gas check.
10. Observe the section cut sequence.

11. Observe the positioning of the continuous mining machine operator and helper and the foreman relative to permanent support, machine movements, and scrubber discharge, if applicable.
12. Determine compliance of entry/crosscut widths, pillar dimensions, depth of cut, and roof support spacing.
13. Observe the following during a complete roof bolting cycle:
 - a. method used to measure methane prior to entering place to be bolted;
 - b. support installation sequence;
 - c. drilling of test holes; and
 - d. location of roof bolting machine operator(s) and helper during the roof bolting cycle.
14. Evaluate roof and rib conditions and look for:
 - a. changes in roof strata;
 - b. changes in roof stress as evidenced by cutters or rib spalling;
 - c. geologic discontinuities such as faults, kettlebottoms, sand channels, and clay veins;
 - d. change in joint spacing or direction; and
 - e. presence of water.
15. Evaluate the effectiveness of the existing support methods, including Automated Temporary Roof Support (ATRS) systems, for the roof/rib conditions observed as they relate to extended cuts.
16. Evaluate respirable dust controls:
 - a. Collect respirable dust samples on all occupations over a sufficient number of shifts (minimum of 2 shifts) to evaluate all normal mining. Normal mining must include: production equal to or greater than 100% of the average of the last 30 production shifts, miners working in normal positions and the full mining cycle (including turning of multiple crosscuts).

- b. Ensure all control measures utilized during evaluation are included in the proposed plan. Controls being used that are not listed in the plan must be included before the plan can be approved. This includes any special supervision of miners' work position, increased frequency of control cleaning, limitations on miners working downwind, etc.
- c. Conduct a full pitot tube traverse of the scrubber if utilized. The MSHA determination of the scrubber quantity will be established in the plan as the scrubber quantity. Care must be taken to ensure that the scrubber ducts are clean, the screen is clean, and the sump/demister is clean before the traverse is conducted. A determination by MSHA of a scrubber quantity less than the manufacturer's rated capacity is an indication that the scrubber is not being maintained. The evaluation of the extended cut plan will be suspended until the operator repairs the scrubber to produce at least the rated quantity.
- d. Evaluate location, type and flow for all water sprays. Ensure the plan specifies the type, flow and location of all sprays in the plan. The actual number of sprays used in each location must be included in the plan. The plan must document the number or percent of sprays that must be operating in each spray block at all times.
- e. Specify the scrubber screen size (layers) and type in the plan.

17. Evaluation of noise:

Miners should not be exposed to a greater noise dose than what is present during the standard cut unless such increase remains below the allowable limit.

G. VENTILATION PLAN APPROVAL

District Managers are strongly encouraged to consider whether approval of an extended cut plan is appropriate if MSHA collected respirable dust samples indicate a dust concentration greater than the applicable standard or quartz concentration that exceeds $100 \mu\text{g}/\text{m}^3$.

H. SUPPLEMENTAL INFORMATION

The following information, subdivided into the areas of cut depth, ventilation, respirable dust, methane and roof control, is included to assist inspectors and specialists in plan evaluation.

1. CUT DEPTH

- a. Investigations have shown that a maximum depth of cut should be established as well as a maximum curtain setback. Given present technology, experience indicates that maximum cut depth should not exceed 40 feet. Beyond this distance, it becomes

difficult for the machine operator to judge height, depth and width, and the operator may be likely to go beyond supports to see and hear better. Roof evaluation by visual observation becomes extremely difficult, if not impossible, at distances greater than 40 feet. The deeper the cut, the more roof is exposed and the probability of undermining bad roof without detection increases. If plans for depths greater than 40 feet are considered for approval, significantly better methods of control should be provided for the machine operator. Some form of roof assessment should be required to detect slips and other geologic anomalies that can trigger falls. Laser guidance, electronic distance measuring devices, and other high-technology tools may be considered.

- b. The methane release of the working places is critical. Each face ventilation system has a limited amount of methane that it can dilute. This limit is a function of several variables, including the quality and quantity of intake air provided, the curtain setback, and the mixing capabilities of the supplemental ventilation system being used.
- c. The section cut sequence should match depth of cut with entry and crosscut spacing when practicable. Cut sequences that encourage mining extended cuts greater than approved in the plan should be avoided; for example, a cut sequence that leaves a final lift of less than 5 feet.

2. VENTILATION

- a. Cut sequence proposed - sump cuts should be limited to 20 feet unless in-mine investigations show that deeper sumps can be effectively ventilated at all times.
- b. Cut sequences should be planned so cut-throughs are from intake to return. If cut-throughs are performed contrary to this, additional controls must be included in the plan to minimize dust roll-back on all face workers (miner operator, shuttle car operator, roof bolter operator, etc.).
- c. Scrubber maintenance is important in maintaining the rated capacity of the scrubber system. Increased maintenance above that recommended by the manufacturer is necessary when the scrubber is used in conjunction with an extended cut system. As an example, one major manufacturer recommends the following for a flooded-bed dust collector:
 - 1) Twice each shift: Clean filter with water.
 - 2) Each shift: Replace filter; back flush dirty filter with water; allow to dry; when dry, shake remaining dirt from filter before re-using.
 - 3) Daily: Wash inlets and duct work with water.
 - 4) Weekly: Wash venturi, sump and de-mister module.

This recommended maintenance schedule may be sufficient when performing a normal cut system and little or no rock (and /or quartz) is being cut. Field investigations have shown that more frequent cleaning of the filter, ducts and sump/demister may be necessary when operating with an extended cut system. To ensure the scrubber is functioning as expected, the plan should specify periodic checks of the scrubber air quantity by the operator conducting full traverse readings. The full traverse can be correlated to a centerline reading that can be established as a more frequent check, i.e. at the beginning of each shift.

d. When a supplemental system such as a dust scrubber or spray fan fails to perform as designed and/or stated in the approved plan, the extended cut is no longer considered to be adequately ventilated. For mining to continue, the operator must revert to a previously approved standard cut plan that does not require the supplemental system to be functional.

e. Each spray fan system should be checked with a water pressure gauge at the spray nozzle. It is important to determine operating pressure as opposed to static pressure on water sprays. Systems should also have a means for adjusting the pressure to the desired level. Filters should be maintained to prevent plugging that would decrease the water pressure and flow rate.

f. When diffuser fans are used, consider the following:

- 1) air flow capacity of the diffuser fan;
- 2) location of the diffuser fan on the continuous mining machine; and
- 3) direction of discharge and whether a single or dual system will be used.

3. RESPIRABLE DUST

a. Exhausting face ventilation is the preferred method of face ventilation to provide the greatest degree of protection from dust exposure, whether using a supplemental system such as a scrubber or not.

b. Shuttle car operators should not be located in the direct discharge of the dust collector.

c. When practicable, the machine operator and helper should remain in intake air during the mining cycle.

d. Section cut sequence will affect the positioning of the roof bolting machine relative to the continuous mining machine. The roof bolting machine operator's exposure

downwind of the miner should be restricted to one time during each complete mining cycle.

4. METHANE

- a. Methane tests are required at the face. On sections using a blowing ventilation system, tests should be made on the side of the entry opposite the line brattice or ventilation tubing. An extendable probe is an effective method for accurate evaluation.
- b. The alarm/warning system for machine-mounted methane monitors should be located so it is always visible to the machine operator. This can be accomplished through enlarged or magnified displays and high-intensity warning lights on the machine or displays and warning lights on the remote control panel.
- c. Sensors for machine mounted methane monitors should be positioned to detect the peak methane concentration in the face area. Studies have shown that for most ventilation systems this occurs on the off brattice side immediately behind the cutter head. However, for some systems the maximum methane concentration occurs in the scrubber discharge. In mines where methane is more prevalent and requires special consideration, the use of a dual sensor system increases the likelihood of detecting the peak methane concentration and its use should be encouraged. Proper sensor location could be determined through field investigation for each system.
- d. Before the roof bolting machine enters a deep cut and during the bolting operation, tests for methane are required. The use of an extendable probe is an acceptable method.

5. ROOF SUPPORT

a. The technology currently available to make extended cuts possible is also sufficient to provide permanent full overhead support for all personnel. Special situations may occur in which full compliance with this provision is not possible. Under no circumstances should these exceptions be used as a means to provide a routine working location beyond the protection of permanently supported roof or a fully functional ATRS. The following provisions could be considered. No person shall proceed beyond the last full row of permanent supports except to:

- 1) install roof supports;
- 2) repair equipment according to procedures outlined in the roof control plan; or
- 3) extend ventilation controls when these controls must be extended to repair equipment. In this case the procedures outlined in the roof control plan must have been implemented. When ventilation controls are extended as part of the

normal mining cycle, they should be extended remotely from under permanently supported roof.

- b. When extended cuts are made, test holes that extend above the anchorage zone of the roof bolts being used can help identify changes in roof strata.
- c. The criteria provision of 30 C.F.R. § 75.222(e) addresses unsupported openings at intersections and specifies a minimum of one row of temporary support across the opening in lieu of permanent supports. The extent of unsupported roof possible when these openings involve extended cuts combined with other roof characteristics may dictate more support in these situations.

Authority

Sections 302 and 303 of the Federal Mine Safety and Health Act of 1977, as amended, and 30 U.S.C. §§ 862-863; 30 C.F.R. Part 70 and §§ 75.220 and 75.370.

Filing Instructions

This PIL should be filed behind the tab marked "Procedure Instruction Letters" in the binder for Program Policy Handbooks and Procedure Instruction Letters.

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