

Methane alarm signals must be distinguishable from other signals.

(5) Automatically provide an alarm signal that can be seen and heard by miners in other locations as specified in the approved program of instruction (§ 75.1502) when the carbon monoxide, smoke, or methane concentration at any sensor reaches the alarm level as specified in paragraph (i) of this section.

(6) Identify at the designated surface location the operational status of all sensors.

(d) *Location and installation of AMS sensors.* (1) All AMS sensors, as specified in paragraphs (e) through (h) of this section, must be located such that measurements are representative of the atmosphere.

(2) Carbon monoxide or smoke sensors must be installed near the center of the entry, as near the roof as feasible in a location that would not expose personnel working on the system to unsafe conditions. Sensors must not be located in abnormally high areas or in other locations where air flow patterns do not permit products of combustion to be carried to the sensors.

(3) Methane sensors must be installed near the center of the entry, at least 12 inches from the roof, ribs, and floor, in a location that would not expose personnel working on the system to unsafe conditions.

(e) *Location of sensors—belt air course.* In addition to the requirements of paragraph (d) of this section, any AMS used to monitor belt air courses under § 75.350(b) must have sensors to monitor for carbon monoxide or smoke located:

(1) At or near the working section belt tailpiece in the air stream ventilating the belt entry. In longwall mining systems the sensor must be located upwind in the belt entry at a distance no greater than 150 feet from the mixing point where intake air is mixed with the belt air at or near the tailpiece;

(2) Upwind, a distance no greater than 50 feet from the point where the belt air course is combined with another air course or splits into multiple air courses;

(3) At intervals not to exceed 1,000 feet along each belt entry in areas where air velocities are maintained at 50 feet per minute or higher. In areas along each belt entry where air velocities are less than 50 feet per minute, the sensor spacing must not exceed 350 feet;

(4) Not more than 100 feet downwind of each belt drive unit, each tailpiece transfer point, and each belt take-up. If the belt drive, tailpiece, and/or take-up are installed together in the same air course they may be monitored with one

sensor located not more than 100 feet downwind of the last component; and

(5) At other locations in any entry that is part of the belt air course as required and specified in the ventilation plan.

(f) *Locations of sensors—the primary escapeway.* If used to monitor the primary escapeway under § 75.350(b)(4), carbon monoxide or smoke sensors must be located in the primary escapeway within 500 feet of the working section and within 500 feet in by the beginning of the panel. The point-feed sensor required by § 75.350(c)(1) may be used as the sensor at the beginning of the panel if it is located within 500 feet in by the beginning of the panel.

(g) *Location of sensors—return air splits.* (1) If used to monitor return air splits under § 75.362(f), a methane sensor must be installed in the return split of air between the last working place, or longwall or shortwall face, ventilated by that split of air and the junction of the return air split with another air split, seal, or worked out area.

(2) If used to monitor a return air split under § 75.323(d)(1)(ii), the methane sensors must be installed at the following locations:

(i) In the return air course opposite the section loading point, or, if exhausting auxiliary fan(s) are used, in the return air course no closer than 300 feet downwind from the fan exhaust and at a point opposite or immediately out by the section loading point; and

(ii) Immediately upwind from the location where the return air split meets another split of air or immediately upwind of the location where a split of air is used to ventilate seals or worked-out areas.

(h) *Location of sensors—electrical installations.* When monitoring the intake air ventilating underground transformer stations, battery charging stations, substations, rectifiers, or water pumps under § 75.340(a)(1)(ii) or § 75.340(a)(2)(ii), at least one sensor must be installed to monitor the mine atmosphere for carbon monoxide or smoke, located downwind and not greater than 50 feet from the electrical installation being monitored.

(i) *Establishing alert and alarm levels.* An AMS installed in accordance with the following sections must initiate alert and alarm signals at the specified levels, as indicated:

(1) For § 75.323(d)(1)(ii) alarm at no more than 1.5% methane.

(2) For §§ 75.340(a)(1)(ii), 75.340(a)(2)(ii), 75.350(b), and 75.350(c), alert at 5 ppm carbon monoxide above the ambient level and alarm at 10 ppm carbon monoxide above the ambient level when carbon monoxide sensors are

used; and alarm at a smoke optical density of 0.022 per meter when smoke sensors are used. Reduced alert and alarm settings approved by the district manager may be required for carbon monoxide sensors identified in the mine ventilation plan, § 75.371(mm).

(3) For § 75.362(f), alert at no more than 1.0% methane and alarm at no more than 1.5% methane.

(j) *Establishing carbon monoxide ambient levels.* Carbon monoxide ambient levels and the means to determine these levels must be approved in the mine ventilation plan (§ 75.371(hh)) for monitors installed in accordance with §§ 75.340(a)(1)(ii), 75.340(a)(2)(ii), 75.350(b), and 75.350(c).

(k) *Installation and maintenance.* An AMS installed in accordance with §§ 75.323(d)(1)(ii), 75.340(a)(1)(ii), 75.340(a)(2)(ii), 75.350(b), 75.350(c), or 75.362(f) must be installed and maintained by personnel trained in the installation and maintenance of the system. The system must be maintained in proper operating condition.

(l) *Sensors.* Sensors used to monitor for carbon monoxide, methane, and smoke must be either of a type listed and installed in accordance with the recommendations of a nationally recognized testing laboratory approved by the Secretary; or these sensors must be of a type, and installed in a manner, approved by the Secretary.

(m) *Time delays.* When a demonstrated need exists, time delays may be incorporated into the AMS. These time delays must only be used to account for non-fire related carbon monoxide sensor signals. The use and length of any time delays, or other techniques or methods which eliminate or reduce the need for time delays, must be specified and approved in the mine ventilation plan. These time delays are limited to no more than three minutes.

(n) *Examination, testing, and calibration.* (1) At least once each shift when belts are operated as part of a production shift, sensors used to detect carbon monoxide or smoke in accordance with § 75.350(b) and alarms installed in accordance with § 75.350(b) must be visually examined.

(2) At least once every seven days, alarms for AMS installed in accordance with §§ 75.350(b) and 75.350(c) must be functionally tested for proper operation.

(3) At intervals not to exceed 31 days—

(i) Each carbon monoxide sensor installed in accordance with §§ 75.340(a)(1)(ii), 75.340(a)(2)(ii), 75.350(b), or 75.350(c) must be calibrated in accordance with the manufacturer's calibration specifications. Calibration must be done