



Ohio Administrative Code

Rule 1501:14-3-04 Use of explosives in industrial minerals operations.

Effective: December 18, 2017

(A) General.

- (1) The provisions of this rule shall apply to all surface blasting operations, including surface blasting operations incidental to underground mining, on all industrial minerals mining and reclamation operations. For box or contour cuts associated with development of underground mine entries, this rule shall apply to all material above the final floor level of the cut. For vertical shafts and drift or slope entries associated with underground mining, this rule shall apply only to the first twenty-five feet of material excavated below or beyond the original ground surface or point of entry.
- (2) Blasting operations shall be conducted in accordance with all applicable state and federal laws and regulations.
- (3) For purposes of this rule, "certified blaster" shall mean a blaster who possesses a valid certificate obtained pursuant to rule 1501:13-9-10 of the Administrative Code and "blaster-in-charge" shall mean, for each blast, the certified blaster responsible for the loading of the blastholes (including delay detonator connections), detonation of the blast, and completion of the blast record required under paragraph (E) of this rule.
- (4) Blasting operations shall be conducted only under the supervision of a certified blaster. Only a certified blaster, or a member of the blasting crew under the direct supervision of the certified blaster, may detonate a blast. Any certified blaster who is responsible for conducting blasting operations at a blasting site shall give direction and on-the-job training to persons who are not certified and who are assigned to the blasting crew or assist in the use of explosives at that site.
- (5) Certified blasters, and other persons responsible for blasting operations at a blasting site, shall review and know the permittee's blasting plan and site-specific blasting requirements. The permittee shall keep a copy of the current blasting plan and permit map at the permit site for use by employees, contract blasters, and any other persons responsible for blasting operations.



(B) Blasting times.

(1) Blasts may be detonated only between sunrise and sunset. The chief may further limit the time periods for blasting if necessary and reasonable in order to protect the public health and safety.

(2) Blasts may be detonated at other times only in emergency situations where rain, lightning, other atmospheric conditions, or operator or public safety so requires. When a blast is detonated under any of those circumstances, the blaster-in-charge shall document the reason for the late or unscheduled blast in the blast record required under paragraph (E) of this rule.

(C) Blasting signs, warnings, and access control.

(1) All blasting signs required to be posted shall be of uniform design throughout the operation, easily visible, and made of durable material. These signs shall be maintained during all operations to which they pertain and shall conform to local ordinances and codes.

(2) The permittee shall conspicuously place signs reading "BLASTING AREA" along the edge of any blasting area that comes within one hundred feet of any public road right-of-way, and at the edge of blasting areas along access and haul roads within the permit area. In addition to "BLASTING AREA," such signs may include supplemental words or phrases such as "danger" or "do not enter."

(3) At all entrances to the permit area from any road, the permittee shall conspicuously place signs that state "WARNING! EXPLOSIVES IN USE" which clearly explain the meaning of the audible warning and all-clear signals in use.

(4) For each blast, the blaster-in-charge shall determine the limits of the blasting area and communicate those limits to the certified mine foreperson or to his or her designee. The certified mine foreperson or his or her designee shall be responsible for controlling access to the blasting area to prevent the presence of livestock or unauthorized persons at least ten minutes before each blast, and until the blaster-in-charge has determined that no unusual hazards, such as imminent slides or undetonated charges, exist, and access to and travel within the blasting area can safely resume. The certified mine foreperson or his or her designee shall not allow anyone to re-enter the blasting area



until the blaster-in-charge has confirmed that the all-clear signal has been sounded. "Blasting area" means the area in which airblast (concussion or shock wave), flyrock, or other blasting hazards might cause injury to persons or damage to property. In determining the blasting area, the following factors shall be considered:

- (a) Geology of the material to be blasted;
- (b) Orientation of the blast bench and rock face(s);
- (c) Blast pattern layout, delay system and timing;
- (d) Burden, depth, diameter and angle of the blastholes;
- (e) Blasting experience of the mine;
- (f) Powder factor and pounds of explosives per delay;
- (g) Type and amount of explosive material;
- (h) Type and amount of stemming;
- (i) Atmospheric conditions; and
- (j) Topography.

(5) At least one minute, but not more than two minutes before the detonation of a blast, the blaster-in-charge, or someone directed by the blaster-in-charge, shall give an audible warning signal. If the blast is not detonated within two minutes of the audible warning signal, the warning signal shall be repeated as required by this paragraph before the blast is detonated. After the blast has been detonated and the blaster-in-charge has confirmed that the blast area is safe to re-enter, an audible all-clear signal shall be given.

(6) Warning and all clear signals, to be produced by an airhorn, siren or similar device, shall be



audible to at least one thousand feet in all directions from the blast site. "Blast site" means the area formed by the perimeter of the loaded blastholes and fifty feet in all directions from loaded blastholes. The warning signal shall consist of three long sounds, each lasting at least five seconds. The all-clear signal shall consist of one long sound lasting at least ten seconds.

(D) Control of adverse effects.

(1) Blasting shall be conducted in a manner that prevents injury to persons and damage to public or private property outside the area for which a permit was issued.

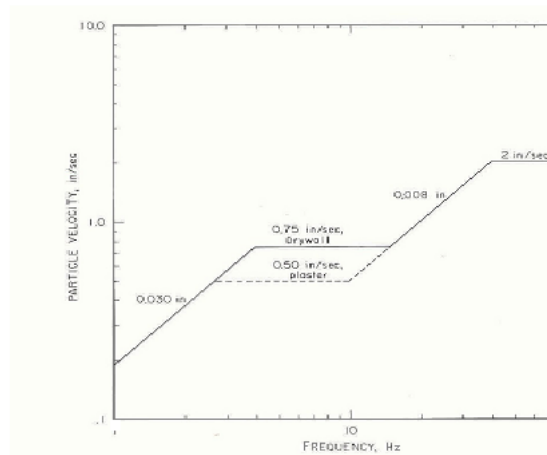
(2) "Flyrock," defined as rock, mud or debris (excluding dust) ejected from the blast site by the force of a blast, shall not be cast beyond the permit boundary.

(a) If flyrock is cast beyond the permit boundary, the blaster-in-charge shall notify the division of mineral resources management by telephone within two hours after learning of the flyrock incident, and submit a flyrock incident report to the division within three business days after learning of the incident. Neither the permittee nor the certified blaster shall conduct another blast directly beside or behind the blast site where the flyrock originated until the report is properly completed and the division of mineral resources management has acknowledged its receipt. The report shall be signed by the blaster-in-charge who conducted the blast. The report shall include, at a minimum, a copy of the blast record and all available seismographic data, a sketch of the blast site and rock deposition area, and a detailed explanation of: how the blasts were designed and loaded; who witnessed the blast and where they were located and what they observed; the location and nature of the flyrock deposition (including property owners, type and approximate number of rocks, size and distance range), property damages (if any) and personal injuries (if any); what measures have been taken to repair all property damages (if any) and address all personal injuries (if any); the probable cause of the flyrock incident; and the corrective measures to be taken to prevent another flyrock incident.

(3) Ground vibration, when measured at any dwelling, public or commercial building, school, church, or community or institutional building located outside the permit area and not owned by the permittee, shall not exceed the frequency-dependent particle velocity limits illustrated below, from the "Report of Investigations 8507, Appendix B: Alternative Blasting Level Criteria (1980)," published by the former U.S. Bureau of Mines. When applying the frequency-dependent particle



velocity limits, the lower plateau at 0.50 inches per second shall apply at its corresponding frequencies to the nearest dwelling or building listed above, unless the permittee submits to the chief site-specific technical evidence to support application of the higher plateau at 0.75 inches per second, and the chief approves a blast plan modification to that effect.



[Figure]
Maximum Allowable Particle Velocities Based on Blast Vibration Frequencies, from EI 8507 (1980).

(4) Airblast, when measured at any dwelling or building listed in paragraph (D)(3) of this rule shall not exceed one hundred thirty-three decibels.

(5) A seismograph shall be used beside the nearest dwelling or building in paragraph (D)(3) of this rule to demonstrate compliance with the ground vibration and airblast limits of paragraphs (D)(3) and (D)(4) of this rule. As an alternative to seismographic monitoring, the blast shall comply with the scaled distance equation, $W = (D/90)^2$, where W is the maximum weight of explosives, in pounds, that can be detonated within any period less than eight milliseconds, D is the distance, in feet, from the nearest blasthole to the nearest dwelling or building in paragraph (D)(3) of this rule, and ninety is the applicable scaled distance factor.

(6) For structures not listed in paragraph (D)(3) of this rule, such as oil or gas wells, oil or gas transmission and distribution lines, high-voltage steel transmission towers, public water lines, dams, silos, and unoccupied barns and pole buildings, located outside the permit area and not owned by the permittee, a seismograph shall be used beside the nearest structure to demonstrate that the peak particle velocity did not exceed 2.0 inches per second. As an alternative to seismographic



monitoring, the blast shall comply with the scaled distance equation, $W = (D/40)^2$, where W is the maximum weight of explosives, in pounds, that can be detonated within any period less than eight milliseconds, D is the distance, in feet, from the nearest blasthole to the nearest structure, and forty is the applicable scaled distance factor. A higher peak particle velocity limit may be approved for a specific structure if the permittee submits to the chief site-specific technical evidence to support the higher limit, and the chief approves a blast plan modification to that effect.

(7) Any or all of the ground vibration and airblast limits in paragraphs (D)(3), (D)(4) and (D)(6) of this rule may be waived by the current owner or controlling authority of the dwelling, building or structure, provided such waiver is in the form of a written consent, submitted to the division of mineral resources management upon application for a new permit or an amendment to add acreage to an existing permit, or with a request to modify a mining and reclamation plan, and approved by the chief.

(8) All seismographs used to prove compliance with the ground vibration and airblast limits required by this rule shall have seismic and acoustic systems with a minimum frequency range of two to two hundred fifty hertz, with accuracies that meet or exceed the performance specifications for blasting seismographs adopted by the international society of explosives engineers, "ISEE Performance Specifications for Blasting Seismographs, 2011 Edition," available as a digital download from the "International Society of Explosives Engineers" at the website www.isee.org. The ground vibration shall be measured as the particle velocity and recorded in three mutually perpendicular directions. The maximum allowable frequency-dependent particle velocity limits and peak particle velocity limits in this rule shall apply in each of the three directions of measurement. Whenever possible, the seismographic measurement shall be made within ten feet of the building or structure being monitored, on the side of the building or structure closest to the blast site.

(9) Any person who operates a seismograph for the purpose of demonstrating compliance with the ground vibration and airblast limits of this rule shall have received appropriate training, for the specific seismograph model(s) in use, in: programming the seismograph(s) to record the blast; positioning the geophone and microphone; coupling the geophone to the ground; extracting the data after the blast in digital and printed form; and understanding the results. Such training shall be received from a representative of the seismograph manufacturer or distributor, or other competent person. A record of such training shall be maintained by the seismograph operator or his or her



employer, and made available for inspection by the chief or his or her authorized representative upon request.

(E) Blast records.

(1) The permittee shall retain a record of all blasts for at least three years, and shall make those records available for inspection upon request by the chief or an authorized representative of the chief.

(2) Where blast records are normally kept at an office of the permittee not located on the permit site, the record for each blast shall be on file at that office within five business days after the blast is detonated.

(3) Blast records shall be accurately completed at the mine site by the blaster-in-charge, and shall contain the following data for each blast:

(a) Name of the permittee and permit number;

(b) Name of the firm conducting the blast, if different from the permittee;

(c) Location, date, and time of blast;

(d) Printed name, signature, and certification number of the blaster-in-charge, and the name of each person on the blasting crew;

(e) Relative to the nearest blasthole, the identification of, distance to, direction to, and method used to determine the distance and direction to, the nearest dwelling, public or commercial building, school, church, or community or institutional building outside the permit area that is not owned by the permittee. The direction shall be stated in degrees, as an azimuth from zero to three hundred sixty degrees. The distance shall be stated in feet, as derived from an aerial photo, a topographic map, conventional field measurement devices (e.g., measuring tape or transit), or electronic devices (e.g., laser-ranging or global positioning system units);



- (f) Weather conditions, including temperature and approximate wind direction and velocity;
- (g) Type of material blasted;
- (h) Number, diameter, and depth of holes;
- (i) Depth of subdrilling, where applicable;
- (j) Burden and spacing dimensions;
- (k) Type, manufacturer, and amount of explosives used, including bulk, bagged, or cartridged explosives, detonating cord, primers, and surface and in-hole delay detonators;
- (l) Total weight of explosives used;
- (m) Weight of explosives used per hole;
- (n) Maximum number of holes and maximum weight of explosives detonated within any period less than eight milliseconds;
- (o) The actual scaled distance factor, expressed as the distance from the nearest blasthole to the nearest dwelling or building in paragraph (E)(3)(e) of this rule, divided by the square-root of the maximum weight of explosives detonated in any period less than eight milliseconds;
- (p) Type of initiation system used, including the type of blasting machine or other power source, and the types of trunkline and downline systems, if not readily apparent from other information in the blast record;
- (q) Sequential timer setting, in milliseconds, if applicable;
- (r) Type and length of stemming used per hole;
- (s) Sketch of the blast pattern showing all holes, delay pattern (including initiation hole, hole-to-hole



and row-to-row delay detonator locations and periods, where applicable, or electronically programmed hole and deck firing times, where applicable), location of free faces and previously blasted material, and a north arrow;

(t) Sketch of a typical blasthole cross-section showing the depth and location of stemming and explosive decks, primers, and delay detonators;

(u) Mats or other special protections used;

(v) Seismographic records, when required for compliance, shall be attached to the blast record within five business days of the blast, and shall include:

(i) Make, model and serial number of the seismograph, seismic and acoustic trigger levels, and most recent annual calibration date;

(ii) Exact location of the seismograph and distance from the blast, and the date and time of the recorded blast event;

(iii) Name of the person and firm operating the seismograph;

(iv) Full waveform printout, including: three mutually perpendicular channels of ground vibration and an airblast channel; dynamic calibration results; a plot of particle velocity versus frequency with a comparison to the frequency-dependent blast vibration limits in paragraph (D)(3) of this rule, based on a half-cycle zero-crossing analysis method; and the peak particle velocity and airblast levels; and

(v) If the seismograph fails to be triggered by the blast, a printout showing the date and time the seismograph was armed and ready to record a blast and the date and time the seismograph was disarmed or shut down, or a written statement including the above information, signed by the seismograph operator and attached to the blast record; and

(w) Reasons and conditions for a late or unscheduled blast.