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REGULATION OF BLASTING PRACTICES
UNDER THE SURFACE MINING CONTROL
AND RECLAMATION ACT OF 1977

The permanent regulations1 implementing the Surface Mining Control and Reclamation Act of 19772 established minimum standards for the comprehensive control of the use of explosives in the surface mining industry. The statutory mandate for the Office of Surface Mining (OSM) to establish these regulations arises from section 515(b)(15) of the Act.3 The five subparts of this section each identify a separate area of regulatory concern. They direct OSM to promulgate regulatory provisions requiring (1) notice to persons who may be affected by blasting operations, (2) maintenance of a blasting log, (3) limitations on the size, timing and frequency of the blasts, (4) certification of blasters, and (5) pre-blasting surveys of structures in the vicinity of blasting operations. Additionally, section 507(g) of the Act4 and the regulations thereunder5 require the submission of a blasting plan at the time of the application for the surface mining permit.

Congressional concern for the safety of persons and property in the vicinity of surface mining blasting operations was raised in hearings before a House Subcommittee.6 At these hearings, the subcommittee received testimony and evidence from representatives of private industry, environmental groups, state governments and private citizens.

The subcommittee hearings revealed that the cumulative effects of the damage inflicted upon the victims of mine blasting had been enormous.7 It was estimated that property damage in Appala-
chia alone was 1.5 billion dollars for the years 1965 to 1975\textsuperscript{8} during which period an estimated 2.6 million tons of explosives were detonated.\textsuperscript{9} One witness pointed out that 30.7 tons per square mile of explosives were dropped on Viet Nam in the entire war by the United States while 35 tons per square mile of explosives were detonated in Appalachia since 1965.\textsuperscript{10} The committee's final report noted that the Veteran's Administration in one state had suspended home financing in certain strip mining regions because poorly regulated blasting practices of the area mines had diminished residential property values.\textsuperscript{11}

**Public Notice**

The regulations require notice of strip mining blasting operations at the time of the permit application\textsuperscript{12} and during the operational phase.\textsuperscript{13} As originally proposed the Act did not require any form of notice of blasting operations at the permit application stage.\textsuperscript{14} The bill, however, was amended in the Senate to require the submission of a blasting plan with the permit application.\textsuperscript{15} The sponsor of the amendment, Senator Birch Bayh, offered two reasons for the amendment. First, the regulatory authority needs this information to insure that the blasting plan provides adequate protection of health, property and the environment. Second, "a blasting plan will enable the public to gain a fuller understanding of the mining operation at the outset. Without question, the citizens who will be most affected by mining operations deserve the right to know exactly what the mining operation will entail."

The regulation implementing the statutory requirement of notice at the permit application stage requires the submission of a blasting plan with the permit application.\textsuperscript{16} The blasting plan must explain how the applicant intends to comply with the blasting regulations. It must include a description of the type and ap-

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\textsuperscript{8} Id.
\textsuperscript{9} *Hearings*, Part II, *supra* note 6, at 311.
\textsuperscript{10} Id. at 311, 312.
\textsuperscript{12} 44 Fed. Reg. 15,358 (1979) (to be codified in 30 C.F.R. § 780.13).
\textsuperscript{13} 44 Fed. Reg. 15,404 (1979) (to be codified in 30 C.F.R. § 816.64).
\textsuperscript{14} 123 CONG REC. S8,133 (daily ed. May 20, 1977).
\textsuperscript{15} Id.
\textsuperscript{16} Id. (remarks of Senator Bayh).
\textsuperscript{17} 44 Fed. Reg. 15,358 (1979) (to be codified in 30 C.F.R. § 780.13).
proximate amount of explosives to be used, applicant's record-keeping procedures for retention of technical data concerning each blast, technical data concerning blast monitoring equipment, and possible contingencies which would require deviation from the published blasting schedule.¹⁸

The present regulation seems to fulfill the first reason offered in support of the amendment requiring the submission of a blasting plan with the permit application, that being the opportunity for the regulatory authority to review the adequacy of the proposed blasting plan. What is conspicuously absent in the regulation is any requirement for submission of data that would enable citizens to gauge the effect of the blasting on their lives. The two facts which would be most useful to the public would be some indication of the approximate frequency of the blasts and the distance between the proposed blasting sites and nearby dwellings. The information presently required by the regulation would seem to be of little use to persons concerned about the impact of the blasting on their home or community. The regulations do require a description of the "types and approximate amounts of explosives to be used for each type of blasting operation . . ." but, from this data, it would be impossible to determine the approximate frequency of the blasts.

The preceding suggestion that information concerning the frequency and proximity of blasting operations be submitted with the permit application can be met with the argument that the regulations do require this very information to be personally delivered to all persons living within a one-half mile radius of the mine site before blasting is actually conducted.²⁰ At that point, however, time restrictions greatly reduce the opportunity for public input.²¹ There appears to be no sound reason for the incorporation of the first rationale offered in support of the amendment to the exclusion of the second rationale of informed public input at the application stage. If any weight is to be given to the legislative history of the amendment to the Act upon which this regulation is based then some information in a form useful to the public, should have been required by this regulation. This lack of needed information should

¹⁸ Id.
¹⁷ 44 Fed. Reg. 15,358 (1979) (to be codified in 30 C.F.R. § 780.13(a)).
²⁰ 44 Fed. Reg. 15,404 (1979) (to be codified in 30 C.F.R. § 816.64(a)(2)).
be considered in regulations promulgated by state regulatory agencies.

Public notice during the operational phase of the blasting operation is mandated by section 515 of the Act.\textsuperscript{22} The Act requires:

(1) advance written notice to local governments and residents who might be affected by the blasting operation by publication of the proposed blasting schedule,

(2) the mailing of the blasting schedule to every person within one-half mile of the blasting site, and

(3) daily notice to resident-occupiers within one-half mile of the blast site.

The regulations implementing this section of the Act set forth the details of what must be contained in the notice and when this notice must be given.\textsuperscript{23} The notice of the blasting schedule must be published in a newspaper of general circulation in the locality of the blasting site at least ten days but not more than twenty days before the beginning of actual blasting.\textsuperscript{24} In addition to the statutory requirement that this same notice be mailed to local governments and resident-occupiers within one-half mile of the blast site, the regulations require the schedule to be mailed to local utilities.\textsuperscript{25} The regulations also expand the class of resident-occupiers that must be notified by mail from those residing within one-half mile of the blast site, to residents within one-half mile of the permit area.\textsuperscript{26}

The blasting schedule is required to identify the date, time and specific location of each blast, and the type of audible warning signals to be used before and after each blast.\textsuperscript{27} The regulations leave the number and the length of scheduled time increments for blasts open, but restrict the aggregate length of the time increments to four hours per day.\textsuperscript{28} The statutory requirement of daily notice to resident-occupiers within one-half mile of the blasting site\textsuperscript{29} is apparently met by the regulatory requirement that warning

\textsuperscript{23} 44 Fed. Reg. 15,404 (1979) (to be codified in 30 C.F.R. § 816.64).
\textsuperscript{24} Id. at § 816.64(a)(1).
\textsuperscript{25} Id. at § 816.64(a)(2).
\textsuperscript{26} Id.
\textsuperscript{27} Id. at § 816.64(b)(2)(iv).
\textsuperscript{28} Id. at § 816.64(b)(2)(ii).
and all-clear signals that are audible within one-half mile from the point of blast be given and that each person who resides or regularly works within one-half mile of the permit area be notified of the meaning of these warning signals.  

**Preblasting Survey**

Section 515 of the Act also gives the resident or owner of a dwelling or structure within one-half mile of the permit area the right to request a preblasting survey of such structures. The survey is to be conducted by the holder of the strip mining permit. In order to inform persons of this right, the regulations require information concerning the right to a preblasting survey to be included in the blasting schedule that is mailed to resident-occupiers within one-half mile of the permit area. There are two objectives of the preblasting survey. One is to increase communication between the mining entity and the public about blasting operations. The second is to provide for the establishment of a preblasting record as to the existing condition of structures and other facilities within the survey area.

The regulations require the person conducting the survey to document any preblasting damage and other physical features that could be affected by blasting. Special attention must be given to the preblasting condition of wells and other water systems with emphasis on the quantity and quality of the water. A signed written report of the survey findings must be submitted to the regulatory authority and to the person who requested the survey.

The preblasting survey regulation states that "[i]f the person requesting the survey disagrees with the results of the survey, he or she may notify, in writing, both the permittee and the regulatory authority of the specific areas of disagreement." Although the regulation clearly gives persons dissatisfied with the results of the

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30 44 Fed. Reg. 15,404 (1979) (to be codified in 30 C.F.R. § 816.65(c)).
32 Id.
33 44 Fed. Reg. 15,404 (1979) (to be codified in 30 C.F.R. § 816.64(a)(2)).
35 Id.
36 44 Fed. Reg. 15,404 (1979) (to be codified in 30 C.F.R. § 816.62(b)).
37 Id.
38 Id. at § 816.62(c).
39 Id.
survey the right to register their dissent, the regulations offer no suggestions as to how this dissatisfaction should be resolved or even if the problem should be resolved. Looking to the dual objects of the survey of increasing the communication between the public and the permittee and the establishment of a preblasting evidentiary record, additional procedures to resolve disputes over the survey results may not be needed as the public relations attempt has obviously failed and the landowner has been given his opportunity to “make the record” with his objections to the survey. It is at this point, however, when objections to the survey results are first filed, that the regulatory agency may learn of special conditions which may justify a modification of a blasting plan that has already been approved. It would seem that the routine filing of landowners’ complaints about the results of preblasting surveys without any further review by the regulatory agency would seriously undermine the overall purpose of the blasting regulations of safeguarding persons and property from adverse effects of blasting. Thus, some form of additional review of complaints concerning the results of preblasting surveys should be contemplated by regulatory agencies functioning under these regulations. These reviews might be included in the regulatory programs of those states who wish to promulgate their own regulations in lieu of the federal regulations.

Although the increased communication objective of the preblasting survey requirement is laudatory, the most profound impact of this regulation could be the reduction of the permittee’s exposure to liability for property damage caused by blasting. The regulation gives the permittee two opportunities to reduce his exposure. By utilizing a thorough preblasting survey procedure conducted by qualified personnel, the permittee may discover special or fragile conditions in either structures or sources of water supply. Being so forewarned, adjustments may then be made in the blasting procedures to prevent damage to delicate structures or water supplies. Additionally, the permittee has an excellent opportunity to document preexisting damage in structures and water supplies. A complete set of detailed photographs of preexisting foundation cracks, properly labelled water samples and measurements of the level of the water table would be valuable evidence in a blasting damage case. Since section 806 of the regulations requires all permittees to be bonded and to carry public liability insurance “in an

\[^n\text{Supra, note 34.}\]
amount adequate to compensate all persons injured or property damaged as a result of surface coal mining and reclamation operations, including the use of explosives and the damage to water wells,41 additional impetus to conduct effective preblast surveys may come from bonding companies and liability insurance carriers.

Blasting Limitations

The Act provides that the size, timing and location of the blasts be limited so as to prevent injury to persons, damage to property, adverse impact on underground mines and change in the course or the availability of ground or surface water.42 The inherent dangers associated with blasting operations are: 1) geologic and structural damage caused by excessive ground motion, 2) structural damage and annoyance caused by excessive air blast, and 3) the danger to persons and property from flyrock (the flying debris generated by the blast).43

The regulatory approach to reducing these dangers has been to limit the amount of explosives that can be detonated at one time. Additional protection is provided by regulations limiting blasting to daylight hours44 and prohibition of blasting within minimum distances to certain structures and facilities.45

In addition, the regulations establish maximum limits as to particle velocity. Blasting causes large amounts of energy to be released in the form of vibrations or shockwaves radiating from the site of the blast. As the shockwaves travel or propagate, they stabilize and become seismic waves. These seismic waves displace the rock and soil particles of which the earth is composed, causing these particles to oscillate. The oscillation or movement of soil particles is measured in inches per second and is termed particle velocity.46

The maximum peak particle velocity established by the regulations is one inch per second.47 This limit is based on a Depart-

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44 44 Fed. Reg. 15,404 (1979) (to be codified in 30 C.F.R. § 816.65(a)).
45 Id., at § 816.65(f).
46 See, Preamble, supra note 7. For a further discussion of the physical properties of ground motion incident to blasting operations, see 43 Fed. Reg. 41,757 (1978).
47 44 Fed. Reg. 15,405 (1979) (to be codified in 30 C.F.R. § 816.65(i)).
ment of Mines study which concluded that peak particle velocity was more closely associated with damage to structures than any other single measurement. The one inch per second standard is a departure from the standard of the industry which, prior to the interim regulations, generally followed a two inch per second standard. However, the OSM noted that at least one of the largest coal producing states adopted a one inch per second standard prior to enactment of the Act.

The Bureau of Mines study concluded that a two inch per second maximum peak particle velocity was a "safe vibration criterion." That same study, however, cautioned that "the safe vibration criterion is not a value below which damage will not occur and above which damage will occur." Because damage to structures could still occur under the two inch per second standard, the OSM established the one inch per second standard.

Under the regulations the one inch per second standard can be achieved in either of two ways. First, blasting will be deemed in compliance with the standard if conducted according to a standard equation which is a function of the total weight of the explosives to be detonated within an eight millisecond period and the distance of the blast site from the nearest structure. In addition to the standard equation, the regulations contain a chart showing the maximum weight of explosives for distances between 300 and 5000 feet as solved by the standard equation.

The alternative to the scaled distance formula equation or chart is actual measurement of the peak particle velocity with a seismograph to ensure that the standard is not exceeded at the specified distances. If this option is chosen a seismographic record must be made of each blast unless the regulatory agency approves

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9 See, Preamble, supra note 7, 44 Fed. Reg. 15,196 at X(B)(13).
11 Nicholls, Johnson & Duvall, supra note 48, at p.23.
12 Id.
13 44 Fed. Reg. 15,405 (1979) (to be codified in 30 C.F.R. § 816.65 (i)).
14 Id. at § 816.65(1)(1).
15 Id. at § 816.65(1)(2).
16 Id. at § 816.67(a).
a modified equation based upon a review of a report of test blasting containing seismographic records of the site.\textsuperscript{57}

Another consequence arising from the detonation of explosives is air blast.\textsuperscript{58} Air blast is a compression wave that travels through the atmosphere much like a sound wave. It is caused when energy from an explosion is released directly into the atmosphere or by movement of the ground surface after blasting. Air blast causes a change in the atmospheric pressure which can be measured in pounds per square inch or in decibels.\textsuperscript{59}

Air blast can cause both structural damage and annoyance. The most common effects of air blast are: 1) cracks in external masonry and internal plaster, 2) damage to windows, 3) annoyance caused by the rattling of windows, panels and doors which give the impression that the structure is vibrating, and 4) generation of loud noise which may be beyond human tolerance.\textsuperscript{60}

The regulations control air blast by requiring that air blast not exceed a decibel peak standard.\textsuperscript{61} Although all air blast measuring equipment measure in decibel units, various units respond to different frequency spectra in measuring air blast. Therefore, the regulations contain a table which allows for the variations in instruments.\textsuperscript{62}

Prior to the Act only one state prescribed air blast standards.\textsuperscript{63} The OSM has suggested that current industry practice may well tolerate air blasts in a decibel range that exceeds the limits set in the regulation.\textsuperscript{64} However, the OSM has indicated that it believes the industry is capable of meeting the air blast values if proper blast designs are utilized, noting that without additional care by the operators the values can easily be exceeded.\textsuperscript{65}

Despite the acknowledgement by the OSM that current industry practice may exceed the newly established standards and the recognition that without additional care some blasts can easily

\textsuperscript{57} Id., at § 816.67(b).
\textsuperscript{58} See, Preamble, supra note 7, 43 Fed. Reg. 41,753 (1978).
\textsuperscript{59} Id. at 41,755.
\textsuperscript{60} Id.
\textsuperscript{61} Id. at 41,765 (1979) (to be codified in 30 C.F.R. § 816.65(e)(1)).
\textsuperscript{62} See, Hearings, Part IV, supra note 6, at 303 (indicating that Virginia was the only state to set air blast standards).
\textsuperscript{64} Id.
exceed the standards, the regulations do not require the operator to monitor his blasts unless specifically requested to do so by the regulatory agency.\textsuperscript{64} It seems that such a regulatory approach gives the operator little incentive to conscientiously seek to meet the standards. The air blast standards could easily be exceeded without the operator's knowledge, and until a complaint is brought to the attention of the regulatory authority monitoring would not be required. Thus the incentive to comply would not arise until complaints are raised, and the possibility of air blast damage has already occurred. In order for the air blast standards to be effectuated under such a system the regulatory authority should freely exercise its option to require at least some initial air blast monitoring of test blasts to insure compliance with the regulations.

The most dramatic consequence of blasting is the generation of the flying debris, rocks, dust, and other materials which, during the blast can be lofted in the air and dropped on persons and property near the blast site. The drafters' commentary to the proposed permanent regulations documents instances of personal injury and property damage from flyrock.\textsuperscript{67}

The regulations state that flyrock shall not be cast more than half the distance between the blast site and the nearest dwelling and in no case beyond the operator's property line.\textsuperscript{68} Recognizing that rolling rocks cast from blast sites are as dangerous as flying rock, the regulations include blasted material travelling along the ground in the flyrock regulation.\textsuperscript{69}

Additional protection for dwellings and other structures near blasting operations is provided by a requirement that blasting shall not be conducted within 1,000 feet of any building used as a dwelling, school, church, hospital or nursing facility except where lesser distances are approved by the regulatory agency.\textsuperscript{70} The regulation states that approval of a lesser distance must be based upon a preblast survey, seismic investigation, or other appropriate investigation.\textsuperscript{71}

This provision is the same as that which first appeared in the interim regulations and which resulted in a court challenge of the

\textsuperscript{64} 44 Fed. Reg. 15,405 (1979) (to be codified in 30 C.F.R. § 816.65(e)(4)).
\textsuperscript{68} 44 Fed. Reg. 15,405 (1979) (to be codified in 30 C.F.R. § 816.65 (g)).
\textsuperscript{69} Id.
\textsuperscript{70} 44 Fed. Reg. 15,405 (1979) (to be codified at 30 C.F.R. § 816.65(f)).
\textsuperscript{71} Id.
authority of the OSM to promulgate the regulation.\textsuperscript{72} The challengers argued that the 1,000 foot limitation was stricter than section 522 (e) of the Act\textsuperscript{73} which prohibited surface mining within 300 feet of dwellings, churches and public buildings. The court rejected the argument, holding that the OSM does have the authority to establish the 1,000 foot distance limitation as the regulation does not absolutely prohibit mining, since blasting operations may be permitted within the specified limits upon approval of the regulatory authority.\textsuperscript{74}

**Conclusion**

The SMCRA and the regulations published under it have created a body of federal law regulating the use of explosives incident to surface mining. West Virginia, as well as every other state which desires to maintain the right to engage in surface mining, is now faced with the task of amending its own blasting laws and regulations to bring them in line with the new federal requirements by 1980. Those states choosing to promulgate their own regulations rather than operate under the federal regulations may wish to consider the suggestions made in this Note. Specifically, the increased opportunity for citizen participation at the permit application stage and the formulation of an agency review procedure for citizen complaints concerning the written preblasting survey report should be considered. Regardless of which body, state or federal, eventually regulates surface mining and blasting in a given state, the enactment of SMCRA is a critical development in promoting the reasonable use of blasting in the coal fields.

*Ralph C. Young*


\textsuperscript{74} 452 F. Supp. at 341-42.