

ILLINOIS POLLUTION CONTROL BOARD
January 18, 1979

IN THE MATTER OF:)
)
PROPOSED AMENDMENT OF THE) R76-16
NOISE REGULATIONS, RULE 209(f))

OPINION OF THE BOARD (by Mr. Goodman):

On July 19, 1976, the Institute for Environmental Quality and the Mining Industry Task Force on Impulsive Noise and Vibration (Task Force) filed a regulatory proposal before the Board seeking to extend by two years the deadline by which mining and quarrying operations conducting explosive blasting activities were to comply with Rule 206 of the Noise Regulations (Chapter 8 of the Board's Rules and Regulations). The proposal, which was docketed R76-16, was later amended to extend the compliance date by three years to August 9, 1979. Rule 206 limits the emission of impulsive sound.

The Board conducted four hearings on this proposal in the following locations:

December 8, 1976	Chicago
January 26, 1976	Edwardsville
May 2, 1977	Chicago
July 12, 1977	Springfield

The last two hearings were economic impact hearings conducted pursuant to Section 27(b) of the Environmental Protection Act.

On August 3, 1978, the Board proposed a final draft Order, subject to a 60-day public comment period. In its final draft Order, the Board proposed to extend the Rule 209(f) compliance date to January 1, 1980, subject to those regulated complying with a "Code of Standard Practices" detailed in the Rule. However, based upon the public comment received and for reasons which will be detailed, the Board on November 30, 1978, adopted an extension of compliance to January 1, 1981, without the proposed "Code of Standard Practices" included in the draft Order.

The Board wishes to express its appreciation for the excellent work done in this matter by Roberta Levinson, Administrative Assistant to the Board and Hearing Officer herein.

The Board's Noise Regulations, Chapter 8 of the Board's Rules and Regulations, became effective in 1973. In Rule 209 (f), the Board allowed the mining and quarrying industries three years, to August 9, 1976, to comply with the impulsive sound standards of Rule 206. The three year delay was allowed because no method was known at the time for bringing blasting operations into compliance with the Rule 206 limits.

In 1975, the Institute for Natural Resources (Insitute) (then known as the Institute for Environmental Quality) contracted with Kamperman and Associates to conduct a study of the blasting noise problem in Illinois, the results of which were reported in a report entitled "Quarry Blast Noise Study" (Ex. 1, Att. D). The study concludes, in part, that the A-weighted sound measuring scale of Rule 206 is not a proper descriptor for blast noise produced by quarry and surface mining operations and that more research is needed to determine the proper descriptor. In early 1976, the Institute formed the Mining Industry Task Force on Impulsive Noise and Vibration to recommend meaningful and enforceable regulations. The Task Force requested an extension of the Rule 209(f) compliance date in order to allow additional research to be done into the appropriate descriptor for human response to blasting noise as well as into methods for control of blasting noise.

Testimony was presented during the hearings on the inadequacy of the A-weighted scale for describing human response to quarry and surface mining blast noise (R. 101). Until recently, air blast energy from confined explosives was thought to be concentrated in the audible spectrum ranging from 20 to 20,000 hertz and was measured with conventional sound level meters equipped with A, B or C weighting functions. However, several years ago wide band transducers and recording equipment revealed that a large portion of the air blast was concentrated in the frequency range below 20 hertz because of the large dimensions of the rock being blasted. Furthermore, the preceptible blast noise inside structures was found to be primarily associated with the vibration of various parts and objects within a structure. Noise was generated not only by air-borne waves, but by ground waves which cause structures to vibrate (R.102). In many instances, the noise measured within a dwelling may be greater than that measured outside because a building resonates and amplifies the interior noise level (Ex. 1, Att. D, pp.7, 9).

One Agency witness described his involvement with investigation of citizen complaints (R.298) and his resulting conclusion that dB(A) fast was an inappropriate descriptor. He noted that sound measured as dB(A) fast consists predominantly of higher audio frequencies not generally associated with window rattling and house shaking. However, annoyance to many of the complainants

was the shaking of their houses and the shock of the blast (R.299, 304, 305, 306, 309, 310). In the examples cited, there appeared to be little relationship between the dB(A) fast reading and the perceived annoyance. For example, in one instance the blasts monitored did not register on the dB(A) fast meters, yet four families sent in complaint forms to the Agency due to indoor effects. The blasts were perceptible due to ground vibration or low frequency air blast (R.301). In another instance, complainants found one blast registering 74 dB(A) fast more annoying than a blast registering 80 dB(A) fast. The blast resulting in the smaller dB(A) reading involved a much larger amount of explosive material. The witness also indicated that no blast greater than 90 dB(A) had been recorded (R.303).

The Board agrees with industry, the Institute and the Agency that more research is needed to determine the proper descriptor for human response to blasting noise. The Task Force included with its initial request a summary of research programs recently completed as well as those which are currently being conducted (Ex. 1). A witness from the U.S. Bureau of Mines (USBM) testified at the hearing about a study being conducted by USBM to determine levels of blast noise and blast-induced ground and structure vibration which are perceptible, annoying and intolerable to humans (R.180). The witness also discussed other USBM research projects aimed at preventing damage to structures (R.179, 183). The Illinois Coal Operators Association described a measurement program in which it is engaged (P.C. #17). The Board expects such research to be completed far enough in advance of the extended compliance date to allow meaningful, substitute regulations to be promulgated, if necessary.

Testimony was also presented on recently available techniques for mitigating both air blast and ground vibration effects. Witnesses described the use of sequential timers which, in conjunction with delay electric blasting caps, subdivide the blast into a large number of small explosions timed to detonate at precise times determined by the geometry and size of the blast. The recent advent of non-electric, low noise explosive delay devices has also provided means for obtaining delays (R.103-104, 387). These techniques are currently being employed throughout the country (R.112-113).

In addition to these systems, specific procedures for reducing noise and vibration were described (R.104). These techniques, many of which were outlined in the "Code of Standard Practices" which were described at hearing and agreed to by industry, include the following:

1. Maintain accurate drilling and use setbacks to determine burden on the following shot;
2. Use drill patterns having nearly equal spacing-to-burden ratios;
3. Use proper stemming height, which is about equal to the burden at the bottom of the stemming, and proper stemming materials;
4. Avoid the use of uncovered explosives such as detonating cord;
5. Use a longer delay interval between rows than between holes in a row and avoid long delays between holes;
6. Keep the rate of blast progression along the face subsonic, preferably less than 500 feet per second, to eliminate beam formation;
7. Avoid blasting under inclement weather conditions or early or late in the day when temperature inversions may be present; and
8. Be sure the blast proceeds in the proper sequence (R.104-113, Ex. 4).

One witness describing these techniques indicated that in most instances (80-90% of the time) the noise level could be brought below 130 dB (R.133).

Several citizens who reside near blasting operations testified at the hearings. Much of the testimony concerned damage to homes caused by ground vibration, including the cracking of concrete block foundations (R.75, 82, 87, 200), basement floors (R.87), porches (R.216), plaster walls (R.216), and panelling (R.213). Windows were shattered (R.200), fixtures came loose (R.214), and wells ran dry (R.87). Citizens described the noise as very disturbing (R.73), creating nervousness (R.210, 219), causing apprehension due to the constant possibility of an unexpected blast (R.211), having a startling effect (R.211), and causing sleep and communication interference (R.88). Citizens also indicated they had no advance notice of when blasts would occur (R.204, 225, 243) and received little or no cooperation from the owners or operators of the sites (R.222). Witnesses felt the situation had worsened in recent years (R.75, 205, 222). The Board also received written public comments from persons residing near quarries and surface mines, many of whom were opposed to an extension of the compliance date (Public Comment Numbers 1, 2, 4, 6, 7, 8, 9, 10, 12, 14, 15).

The Agency presented testimony on complaints it received. The Agency indicated that, since adoption of the Act in 1970, it had received complaints against 31 open pit surface mining operations in Illinois by a total of over 425 residents residing throughout the State (R.259). The number of complaints had definitely decreased in 1975 and 1976, the last two years for which complaints were submitted. The Agency submitted for the record a summary of all complaints received (Ex. 8) as well as the actual complaint file (Ex. 12).

Section 6 of the Act requires the Institute to prepare an economic impact study of all proposed regulations, and Section 27(b) requires the Board to conduct economic impact hearings. In this case, however, the Institute concluded that no economic impact study could be conducted until the methodology for measurement and control of blasting noise is further developed (Ex. 21). The Board, nevertheless, conducted the requisite economic impact hearings. Industry presented evidence during the technical hearings on expenditures it has made in the last few years in an effort to understand and reduce the impact of blasting noise (R. 15, 342-346, 380, 395-399), but no cost/benefit analysis of the compliance date extension has been performed. We note that extending the compliance date undoubtedly has some economic impact on the people of the State of Illinois. The Board agrees, however, with the Institute's conclusion that until human response to blasting noise is understood and techniques to control the noise to a tolerable level are developed, no meaningful cost/benefit analysis can be performed.

The Board recognizes that blasting noise does seriously interfere with the lives of many Illinois citizens residing near open pit surface mining or quarrying operations. However, we find that more research is needed before meaningful, enforceable regulations can be promulgated. The Board had included in its proposed final draft Order a "Code of Standard Practices" to which industry has agreed to comply (See Supplementary Statement filed by the Task Force on February 6, 1972). However, as the Agency pointed out, this Code is difficult to enforce. Furthermore, Rule 102, which prohibits the emission of noise which unreasonably interferes with the enjoyment of life, is still fully available to citizens injured by blasting noise. Finally, protection will be provided by recently adopted federal legislation, the Surface Mining Control and Reclamation Act of 1977, 32 U.S.C. §1201, and Regulations promulgated thereunder, which provide limits on decibels linear-peak and maximum peak particle velocity. The Board also notes that under Rule 209(f) industry has been and remains required to conduct its blasting activities between 8:00 a.m. and 5:00 p.m. at specified hours previously announced to the local public. Any deviation from this requirement triggers a requirement of compliance with Rule 206.

The Agency indicated in its public comment on the proposed draft Order that it intends by February, 1979 to submit, along with the Task Force, a comprehensive noise regulatory proposal for noise emitted from explosive blasting operations described in Rule 209(f). The Board notes that this extension is the second delay in compliance since Chapter 8 was adopted, the first delay having been included in Rule 209(f) as originally adopted. We have extended the date until January 1, 1981, to allow for submittal and promulgation of appropriate regulations prior to that time. It is incumbent upon industry to develop the necessary information and submit a regulatory proposal without any delay. It is also incumbent upon industry in the interim to employ all available techniques to reduce the impact of blasting noise on the citizens of the State of Illinois.

I, Christan L. Moffett, Clerk of the Illinois Pollution Control Board, hereby certify the above Opinion was adopted on the 18th day of January, 1978 by a vote of 4-0.



Christan L. Moffett, Clerk
Illinois Pollution Control Board