CR 86-153

RULES CERTIFICATE

STATE OF WISCONSIN)
) SS
DEPT. OF INDUSTRY,)
LABOR & HUMAN RELATIONS)

TO ALL TO WHOM THESE PRESENTS SHALL COME, GREETINGS:

I, John T. Coughlin, Secretary of the Department of Industry, Labor and Human Relations, and custodian of the official records of said department, do hereby certify that the annexed rule(s) relating to blasting resultants (Subject) were duly approved and adopted by this department on 4/7/87 (Date).

I further certify that said copy has been compared by me with the original on file in this department and that the same is a true copy thereof, and of the whole of such original.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the official seal of the department at 11:00 am in the city of Madison, this 7th day of April A.D. 1987.

John T. Coughlin
Secretary

RECEIVED
APR 8 1987
1:00pm
Revisor of Statutes
Bureau

DILHR-ADM-6056(N.04/80)

6-1-87

ORDER OF ADOPTION

Pursuant to authority vested in the Department of Industry, Labor and Human Relations by section 101.15 (2) (e), Stats., the Department of Industry, Labor and Human Relations hereby [X] creates; [ ] amends; [ ] repeals and recreates; and [ ] repeals and adopts rules of Wisconsin Administrative Code chapter :

ILHR 7 (*Number*) Explosive Materials (*Title*)

The attached rules shall take effect on the first day of the month following publication in the Wisconsin Administrative Register, pursuant to section 227.026, Stats.

Adopted at Madison, Wisconsin, this 7th day of April, A.D., 1987.

DEPARTMENT OF INDUSTRY, LABOR AND HUMAN RELATIONS

John T. Coughlin
Secretary

State of Wisconsin \ Department of Industry, Labor and Human Relations

RULES in FINAL DRAFT FORM

Rule: Chapter ILHR 7, Subchapter VII

Relating to: Blasting Resultants

Clearinghouse Rule No.: 86-153

AN ORDER to renumber ILHR 7.04 (1); and to create ILHR 7.04 (intro), 7.04 (1), (8m), (10m), (19h), (19r), (27m), (28m) and (32), chapter ILHR 7 Subchapter VII, and ILHR 7.37 (3) (p) and (q), relating to blasting resultants.

* *

Analysis of Proposed Rules

Section 101.15 (2) (e) of the Wisconsin Statutes, as created by 1985 Wisconsin Act 29, directs the Department of Industry, Labor and Human Relations to promulgate rules relating to noise and vibration resulting from the use of explosive materials. The proposed rules have been developed in response to the mandate of 1985 Wisconsin Act 29.

The proposed rules establish uniform limits on permissible levels of airblast, flyrock and ground vibration resulting from blasting operations. The proposed limits are based on regulations of the U.S. government Office of Surface Mining (OSM) and recommendations of the U.S. Bureau of Mines.

The airblast limits in the proposed rules specify peak decibel levels based on the lower frequency limit of the measuring system. The flyrock rules prohibit flyrock from being cast more than one-half the distance to the nearest dwelling, as well as remaining within the boundary of the controlled blasting site area. The requirements covering ground vibration allow the blaster the option of using one of three methods of compliance. The maximum allowable peak particle velocity method specifies particle velocity limits based on the type of construction of the structure and whether the frequency is above or below 40 Hz. Under the second option, the blaster may use the scaled-distance equation method to determine the maximum weight of explosives to be detonated, without seismic monitoring. The third option allows the use of modified OSM alternative blasting level criteria, in which the maximum allowable particle velocity varies with blast vibration frequency.

The proposed rules also include minimum requirements related to preblasting surveys, blasting schedules, instrumentation and blasting logs. These requirements are also based on OSM regulations.

The proposed rules have been developed with the assistance of a Blasting Resultants Project Committee. The members of that citizen advisory committee are as follows:

Member Name	Representing
Peter F. Bayer	Society of Explosives Engineers
Kenneth Clark	Town of Cottage Grove
Thomas P. Dowling	Institute of Makers of Explosives
Fred C. Drury	Econex Incorporated
Henry G. Fitzsimmons	Wausau Insurance Companies
Professor M.P. Gronbeck	U.W. Mining Engineering Department
Edward J. Hayden	Associated General Contractors of Greater Milwaukee
William J. Kraemer	Wisconsin Road Builders Association
Oscar A. Laper	Village of Rock Springs
Spencer W. Lucole	Lucole Consulting Engineering
William Murphy	Wisconsin Ready Mixed Concrete Association
Richard W. Reiter	Wisconsin Fire Chief's Association
Harry Samsa	City of Milwaukee

* *

Pursuant to the authority vested in the State of Wisconsin Department of Industry, Labor, and Human Relations by s. 101.15 (2) (e), Stats., as repealed and recreated by 1985 Wisconsin Act 29, and s. 227.11 (2), Stats., the department hereby creates rules interpreting s. 101.15 (2) (e), Stats., as repealed and recreated by 1985 Wisconsin Act 29 as follows:

SECTION 1. ILHR 7.04 (intro.) is created to read:

ILHR 7.04 (intro.) The following definitions shall apply in this chapter. Terms not herein defined shall be understood to have their usual and ordinary dictionary meaning.

SECTION 1M. ILHR 7.04 (1) is renumbered 7.04 (1m).

SECTION 2. ILHR 7.04 (1), (8m), (10m), (19h), (19r), (27m), (28m) and (32) are created to read:

ILHR 7.04 (1) "Airblast" means an airborne shock wave resulting from the detonation of explosives.

(8m) "Blasting resultants" means the physical manifestations of forces released by blasting, including but not limited to projectile matter, vibration and concussion, which might cause injury, damage or unreasonable annoyance to persons or property located outside the controlled blasting site area.

(10m) "Controlled blasting site area" means the area that surrounds a blasting site and:

(a) Is owned by the operator; or

(b) With respect to which, because of property ownership, an employment relationship or an agreement with the property owner, the operator can take reasonably adequate measures to exclude or to assure the safety of persons and property.

(19h) "Flyrock" means rock that is propelled through the air from a blast.

(19r) "Ground vibration" means a shaking of the ground caused by the elastic wave emanating from a blast.

(27m) "Particle velocity" means any measure of ground vibration describing the velocity at which a particle of ground vibrates when excited by a seismic wave.

(28m) "Powder factor" means any ratio between the amount of powder loaded and the amount of rock broken.

(32) "Unreasonable annoyance" means an excessive, repeated noise, action or other disturbance that is not justified by reason.

SECTION 3. ILHR 7.37 (3) (p) and (q) are created to read:

(p) Powder factor.

(q) Seismographic and airblast records, if required, which shall include:

1. Type of instrument and last laboratory calibration date;

2. Exact location of instrument and the date, time, and distance from the blast;

3. Name of the person and firm taking the reading;

4. Name of the person and firm analyzing the seismographic record; and

5. The vibration and airblast levels recorded.

SECTION 4. Chapter ILHR 7, Subchapter VII is created to read:

Subchapter VII
Blasting Resultants

ILHR 7.60 REGULATION OF BLASTING RESULTANTS. Pursuant to s. 101.15 (2) (e), Stats., the purpose of this subchapter is to provide for the establishment of uniform limits on permissible levels of blasting resultants to reasonably assure that blasting resultants do not cause injury, damage or unreasonable annoyance to persons or property outside any controlled blasting site area.

ILHR 7.61 PREBLASTING NOTIFICATION. At least 24 hours before initiation of blasting, the operator shall notify all residents or owners of affected dwellings or other structures on how to request a preblasting survey. Affected dwellings or other structures shall be determined based on the scaled-distance equation specified in s. ILHR 7.64 (4) (c) 1. Using a scaled-distance factor (D_s) of 100, affected dwellings or other structures shall be those located within the distance (D) of the controlled blasting site area for the weight per delay (W) of explosives to be used.

Note 1: An example calculation to determine D is as follows: For 4 pounds of explosives, $D = D_s(W)^{1/2} = 100(4)^{1/2} = 200$ feet.

Note 2: A resident or owner of an affected dwelling or other structure may request a preblasting survey. The operator or a person selected by the resident or owner may conduct a preblasting survey of the dwelling or structure and prepare a report of the survey. A preblast survey provides a baseline record of the condition of a structure against which the effects of blasting can be assessed. When combined with a postblast survey, this will help assure equitable resolution of blast damage claims. While striving to minimize airblast, flyrock and ground vibrations, the blaster should inform local residents of the need for and the importance of blasting. A preblast

survey increases communications between the public and the blaster, helps the blaster to maintain good community relations, and may provide protection against later legal claims of damage or nuisance.

ILHR 7.62 BLASTING SCHEDULES. All surface blasting shall be conducted between sunrise and sunset, unless:

(1) More restrictive time periods are specified by the department; or

(2) Nighttime blasting is approved by the department based on a showing by the operator that the public will not be adversely affected by noise and other impacts.

ILHR 7.63 INSTRUMENTATION. All seismographs used for compliance with this subchapter shall meet the following minimum specifications:

(1) Seismic frequency range: 2 to 200 Hz (±3 Hz).

(2) Acoustic frequency range: 2 to 200 Hz (±1 dB)

(3) Velocity range: 0.02 to 4.0 inches/second.

(4) Sound range: 110 to 140 dB linear.

(5) Transducers: Three mutually perpendicular axes.

(6) Recording: Provide time-history of waveform.

(7) Calibration: Be laboratory calibrated as often as necessary, but at least once every 12 months according to manufacturer's recommendations.

ILHR 7.64 CONTROL OF ADVERSE EFFECTS. (1) GENERAL REQUIREMENTS. Blasting shall be conducted so as to prevent injury and unreasonable annoyance to persons and damage to public or private property outside the controlled blasting site area.

(2) AIRBLAST. (a) Limits. Airblast shall not exceed the maximum limits listed in Table 7.64-1 at the location of any dwelling, public building, place of employment, school, church, or community or institutional building outside the controlled blasting site area.

Table 7.64-1
AIRBLAST LIMITS

Lower frequency limit of measuring system, in Hz	Maximum level, in dB
2 Hz or lower -- flat response	133 peak
6 Hz or lower -- flat response	129 peak

(b) Monitoring. 1. The operator shall conduct periodic monitoring with such frequency as is necessary to ensure compliance with the airblast standards. The department may require airblast measurement of any or all blasts and may specify the locations at which such measurements are taken.

2. The measuring systems used shall have an upper-end flat frequency response of at least 200 Hz.

(3) FLYROCK. Flyrock travelling in the air or along the ground:

(a) Shall remain within the controlled blasting site area; and

(b) Shall not be cast from the blasting site more than one-half the distance to the nearest inhabited building within or outside of the controlled blasting site area.

(4) GROUND VIBRATION. (a) General. 1. The maximum ground vibration at the location of any dwelling, public building, place of employment, school, church, or community or institutional building outside the controlled blasting site area shall be established in accordance with either the maximum peak-particle-velocity limit of par. (b), the scaled-distance equation of par. (c), the blasting-level chart of par. (d), or by the department under sub. (5).

2. All structures in the vicinity of the blasting area, not listed in subd. 1, such as water towers, pipelines and other utilities, tunnels, dams, impoundments and underground mines shall be protected from damage by establishment by the operator of a maximum allowable limit on the ground vibration. The operator shall establish the limit after consulting with the owner of the structure.

(b) Maximum peak particle velocity. 1. An operator may use the maximum ground vibration limits listed in Table 7.64-2.

Table 7.64-2
PEAK PARTICLE VELOCITY LIMITS

Type of structure	Maximum allowable peak particle velocity for ground vibration, in/sec	
	At frequencies below 40 Hz[1]	At frequencies of 40 Hz and greater
Modern homes and structures with drywall interiors	0.75	2.0
Older homes and structures with plaster on wood lath construction for interior walls	0.50	2.0

[1]All spectral peaks within 6 dB (50 pct) amplitude of the predominant frequency must be analyzed.

2. Ground vibration shall be measured as the particle velocity. Particle velocity shall be recorded in 3 mutually perpendicular directions. The maximum allowable peak particle velocity shall apply to each of the 3 measurements and the vector sum of the 3 measurements.

3. A seismographic record shall be provided for each blast.

(c) Scaled-distance equation. 1. An operator may use the scaled-distance equation, $W = (D/D_s)^2$, to determine the allowable charge-weight of explosives to be detonated in any 8-millisecond period, without seismic monitoring; where W = the maximum weight per delay of explosives, in pounds; D = the distance, in feet, from the blasting site to the nearest structure listed in par. (a) 1; and D_s = the scaled-distance factor listed in Table 7.64-3.

2. The development of a modified scaled-distance factor may be authorized by the department on receipt of a written request by the operator, supported by seismographic records of blasting at the site. The modified scaled-distance factor shall be determined such that the particle velocity of the predicted ground vibration will not exceed the prescribed maximum allowable peak particle velocity of par. (b) at a 95-percent confidence level.

Table 7.64-3
SCALED-DISTANCE FACTOR LIMITS

Distance (D) from the blasting site, feet	Scaled-distance factor (D_s) to be applied without seismic monitoring
0 to 300	50
301 to 5,000	55
5,001 and beyond	65

(d) Blasting level chart. 1. An operator may use the ground vibration limits found in Figure 7.64 to determine the maximum allowable ground vibration.

2. If the Figure 7.64 limits are used, a seismographic record including both particle-velocity and vibration-frequency levels shall be provided for each blast. The method of analysis shall be subject to discretionary review by the department.

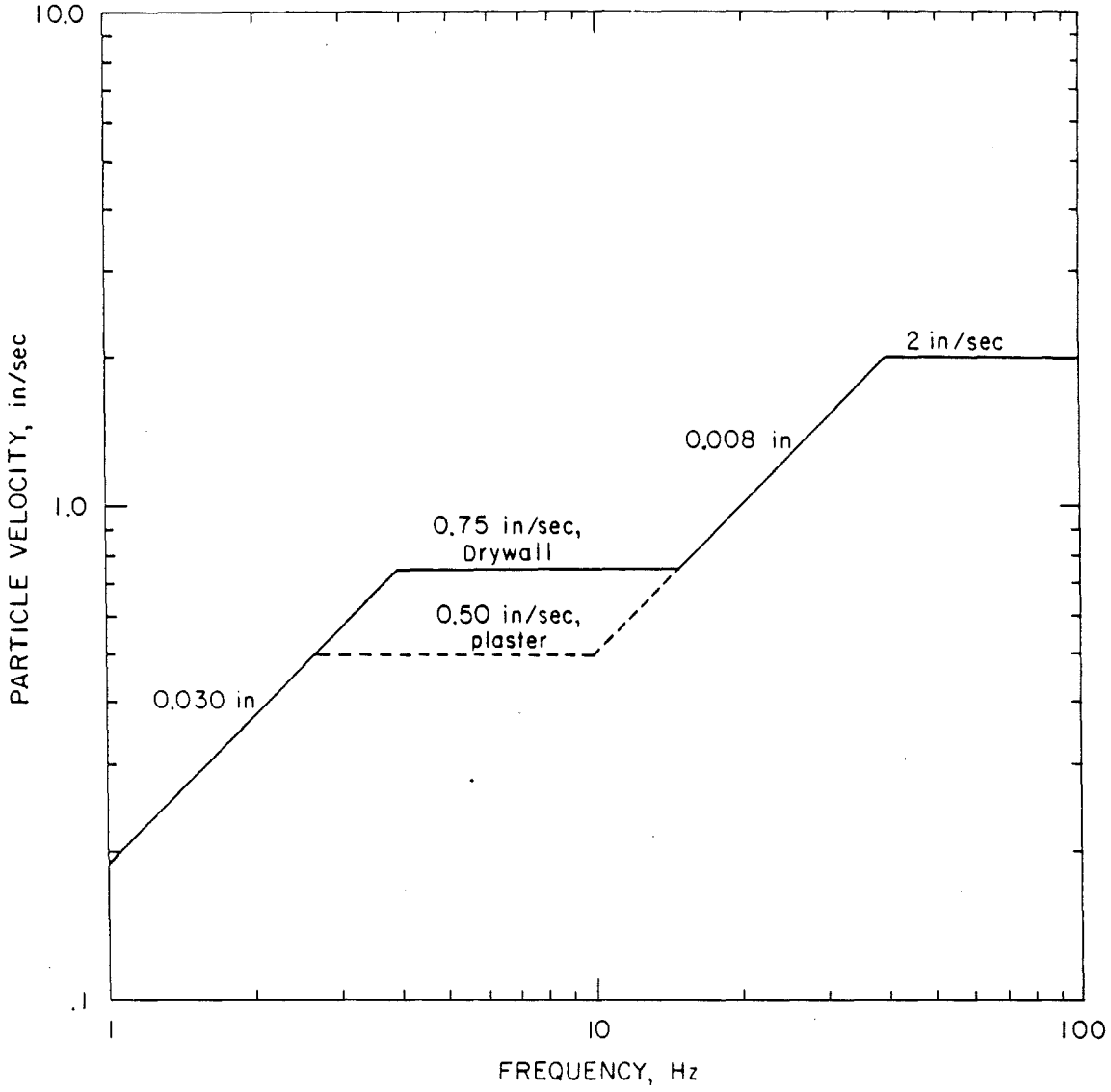

Figure 7.64
BLASTING LEVEL CHART

(e) Seismic monitoring. The department may require an operator to conduct seismic monitoring of any or all blasts and may specify the location at which the measurements are taken and the degree of detail necessary in the measurement.

(5) EXCEPTIONS. (a) Exempt area. The maximum ground vibration and airblast standards of subs. (2) and (4) shall not apply within the controlled blasting site area.

(b) More restrictive limits. If necessary to ensure that blasting resultants at a particular blasting site do not cause injury, damage or unreasonable annoyance to persons or property outside any controlled blasting site area, more restrictive limits shall be established by the department.

Note: Local municipalities may have more restrictive regulations than the department.

(END)

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Pursuant to s. 227.22 (2) (intro.), Stats., these rules shall take effect on the first day of the month following publication in the Wisconsin Administrative Register.

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State of Wisconsin \ Department of Industry, Labor and Human Relations

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April 7, 1987

Gary Poulson
Assistant Revisor of Statutes
Suite 904
30 West Mifflin Street
Madison, Wisconsin 53703

Douglas LaFollette
Secretary of State
Room 271, GEF-1
201 East Washington Avenue
Madison, Wisconsin 53702

Dear Messrs. Poulson and LaFollette:

TRANSMITTAL OF RULE ADOPTION

CLEARINGHOUSE RULE NO. 86-153

RULE NO. Ch. ILHR 7, Subch. VII

RELATING TO Blasting Resultants

Pursuant to section 227.20, Stats., agencies are required to file a certified copy of every rule adopted by the agency with the offices of the Secretary of State and the Revisor of Statutes.

At this time, the following material is being submitted to you:

1. Order of Adoption.
2. Rules Certificate Form.
3. Rules in Final Draft Form.

Pursuant to section 227.114, Stats., a summary of the final regulatory flexibility analysis is also included.

Respectfully submitted,

John T. Coughlin

John T. Coughlin
Secretary

ADM-7239(R.01/87)