

Citizen's Guide to Coal Mine Blasting

in New Mexico

(Revised February 23, 2017)

Introduction

If you live within a mile or two of a large surface coal mine, you will probably hear and feel the effects of blasting. It is common, and understandable, for people to be very concerned about the effects that airblast and ground shaking will have on the biggest investment of their life, their home. The good news is that even repeated blasting done within regulatory limits, will not cause structural damage to your home. The bad news is that even if a mine is blasting well within legal limits, your home may noticeably shake, and your windows and plates in the china cabinet may rattle. While the regulations were designed to prevent damage, they were not intended to prevent nuisance.

Role of the New Mexico Mining and Minerals Division

The New Mexico Mining and Minerals Division (MMD) is responsible for regulating coal mining and associated reclamation on non-Indian lands in the State of New Mexico. These regulations are called the "State of New Mexico Surface Coal Mining Regulations 19.8 NMAC" and include substantial requirements and limitations regarding blasting.

Before an operator can begin mining, MMD must issue a permit. The permit must include, among many other things, details about how coal will be mined and the proposed blasting operation. Once a mine is permitted, MMD conducts monthly inspections of the mine and records associated with the operations, including the blasting, to make sure the mine is in compliance with the regulations and the approved permit. A failure to comply with any regulation will result in MMD issuing a Notice of Violation (NOV). Depending on the type and severity of a violation, enforcement actions can include a monetary fine, or, for extremely serious infractions, the closure of all or part of the mining operation.

The Regulations

Before an operator can begin mining, a mine plan must be submitted to MMD that addresses blasting. The following are just some of the details that need to be included in the plan:

- The types and approximate amount of explosives to be used; -A description of procedures and plans for recording and retention of information on the following during blasting: -Drill patterns, including size, number, depth and spacing of holes; -Charge and packing of holes; -Types of fuses and detonation controls; and -Sequence and timing of firing holes.
- A description of blast warning and site access control equipment and procedures;
- A description of types, capabilities, sensitivities, and location of use of any blast monitoring equipment and procedures to be used;
- A description of plans for recording and reporting to the Director of the Mining and Minerals Division, the results of preblasting surveys;
- A description of unavoidable hazardous conditions for which deviations from the blasting schedule will be needed.

The regulations also require, in part, the following:

- A certified blaster must conduct all blasting operations. (To be certified, a blaster must have at least one year of practical experience with the use of explosives, complete an approved training course, and pass a comprehensive test on blasting and blast regulations.)
- A record of all blasts, including required seismograph recordings and reports, must be maintained for a minimum of three years from the date of the blast. These records are available, upon request, for public inspection.
- The operator must conduct a preblast survey for any resident or owner of a dwelling or structure within $\frac{1}{2}$ mile of the permit area, if requested by the resident or owner;

-Annually, the operator must publish and distribute copies of the blasting schedule to local governments and public utilities and residences within ½ mile of the proposed blasting site described in the schedule;

There are also numerous regulations regarding the control of adverse effects from blasting. These will be discussed in the following section.

Control of the Adverse Effects of Blasting

All blasting must be conducted to prevent injury to persons, damage to public or private property outside the permit area, adverse impacts on any underground mine, and changes in the course, channel, or availability of surface or ground water outside the permit area.

The possible adverse effects from blasting include flyrock, airblast (air overpressure), and ground vibration. The regulations address all of these possible adverse effects in some detail.

Flyrock

Flyrock is broken rock that is propelled through the air as a result of a blast. The obvious dangers of flyrock include having these projectiles hit a person, home, vehicle or other object. Typically, blasts at a mine will result in flyrock being thrown a considerable distance (50-100+ yds) from the blast site (One of many good reasons that one should not sneak onto a mine site to see what's happening!!). The regulations, however, require in part, that flyrock cannot travel more than one-half the distance to the nearest dwelling and in no case beyond the permit boundary.

Airblast

Airblast is an airborne shock wave resulting from the detonation of explosives and can be measured in pounds per square inch or decibels. The "loudness" of the airblast does not necessarily indicate the energy of the shock wave since the human ear can only hear frequencies in the range of about 16-20,000 Hz. Therefore, you can have a blast that sounds loud, but has relatively low shock wave energy, or you can have a blast that is virtually inaudible, yet registers as a very high airblast event.

Window breakage is usually the only damage that will result from excessive airblast. Any other structural damage from airblast is very rare, and usually minor. It is important to note that a blast can sound very loud and rattle windows even if the blast is well below levels set in the regulations or levels that would cause structural damage.

The airblast limits that a mine operator must not exceed range between 129 and 134 decibels, depending on the sensitivity of the equipment being used to monitor the blast. Typically, windows will not break under 140 decibels.

Ground Vibration

Ground vibrations are caused by elastic waves emanating from a blast and are the most frequently cited cause (both real and imagined) of damage to structures. The most common type of damage associated with excessive ground vibration is lengthening of existing minor cracks.

The ground vibration limits set in the New Mexico regulations were derived from considerable research conducted by the United States Bureau of Mines and the Office of Surface Mining. Through this research, it was determined that the **peak particle velocity** was the best measure of ground vibration as an indicator of potential impacts to structures. This research is the best technical resource for predicting blast impacts on structures.

The peak particle velocity is the **speed** at which a particle of earth moves, and not the distance. There are three different methods a mine can use to determine the maximum allowable peak particle velocity. One method uses a scale distance formula, another method uses a maximum allowable peak particle velocity based on distance, and a third method allows a maximum peak particle velocity based on the frequency of the vibrations. Depending on the method used and the frequency of the vibration, the maximum allowable peak particle velocity will range between 0.75 and 2 inches per second.

Studies have shown that even repeated blasting conducted within the legal limits will not be a threat to public safety or structurally weaken buildings. The limits basically protect against even cosmetic damage (Cosmetic damage is damage that does not structurally weaken a building, such as hairline cracks in paint, plaster or drywall.) Although minor cosmetic damage is possible when blasting within legal limits, it is considered unusual. The regulations do recognize that in rare cases, these limits will not protect all structures from threshold (cosmetic) damage due to the age, condition or construction of a structure. In this case, the Director can specify lower vibration limits to insure protection of the structure.

This does not mean that people living near a mine will not feel vibrations from a blast. The laws were not intended to eliminate annoyance caused by mines. Humans are very sensitive to ground motion and can perceive vibration levels far below legal limits. Also, the perception of ground vibrations can vary greatly. A person sitting in the house may experience a far greater sensation of ground movement than a person standing in the front yard.

It is very common for people to believe that their home was damaged by blasts that were far below legal limits. Often the reason for this is that the homeowner does not notice or look for hairline cracks in their home until after they experience a blast. Careful examination by the homeowner will then reveal previously unnoticed hairline cracks in drywall, plaster and stucco.

Most homes develop hairline cracks over time. These can be caused by a number of environmental factors including humidity and temperature changes, settlement from consolidation, freeze-thaw cycles, variations in ground moisture and wind. Sometimes structural problems exist, such as building a portion of the house on improperly compacted fill, improperly sized footings or other structural elements not being built to building code requirements. Having inadequate drainage away from the home, or not having rain gutters to carry runoff from the roof away from the home, can also cause settling and cracking.

Preblast Surveys

The purpose of a preblast survey is to determine the condition of a dwelling or structure and document any preblast damage or other physical factors that could reasonably be affected by blasting. The survey can also be used to document that damage occurred after the survey was conducted.

At least 30 days before the initiation of blasting at a new mine, the operator must notify, in writing, all residents and owners of existing dwellings or other structures located within ½ mile of the permit area how to request a preblasting survey.

Any resident or owner of a dwelling (including homes built since the mine has begun mining) within ½ mile of the permit area may request a preblast survey. The request shall be made in writing, directly to the operator or the Director of MMD, who shall promptly notify the operator. The operator shall promptly conduct a preblast survey (at their expense) and prepare a written report of the survey. Copies of the report shall promptly be provided to the Director and to the person requesting the survey. The operator shall perform an updated survey of any additions, modifications, or renovations to the structure, if requested by the resident or owner.

We recommend that anyone eligible to receive a preblast survey request this service. Requests should be made in writing to the mining company or to the Director and should also include your name, address, telephone number and the name of the company and mine.

Complaints

Formal complaints about blasting, or any other aspects of a coal mining and reclamation operation, can be sent directly to MMD. You can either write a letter describing your concerns or contact James Smith, P.E., Coal Program Manager at (505) 476-3416 or, Patrick Castillo, P.E., Mining Engineer at (505) 476-3412. Please state the name of the mine, dates and times of the blast (if known) and your name, address and telephone number. A representative from MMD will follow-up your complaint with an inspection of the activities in question and respond to you in writing.

In the case of blast damage complaints, MMD will interview the person involved, locate the structure, determine the distance and direction to the blasts, check the preblast survey, check the blast and seismic records and consider the probable or actual measured levels of energy from blasting at the structure.

If it is determined that blasting has caused damage, a Notice of Violation will be written. The notice will require action to prevent the recurrence of the violation.

Please note, however, MMD has no jurisdiction over monetary reparation for damage. This is a matter to be settled between the mine operator and the citizen.

We recommend that people concerned about blasting keep a record of the date and time of any blast that produces unusually high airblast or ground vibration. It would also be helpful to record the date that you notice any damage to your structure that may be blasting related.

If you have any questions, feel free to contact James Smith or Patrick Castillo.