

**DEPARTMENT OF ENVIRONMENTAL PROTECTION  
BUREAU OF MINING AND RECLAMATION**

**DOCUMENT NUMBER:** 562-2112-504

**TITLE:** Blasting Complaint Protocol

**EFFECTIVE DATE:** September 18, 1997

**AUTHORITY:** 1937 and 1957 Explosives Safety Acts, Surface Mining Conservation and Reclamation Act, and Non-Coal Surface Mining Conservation and Reclamation Act.

**POLICY:** This guidance will provide direction for responding to blasting complaints.

**PURPOSE:** To establish a standard procedure to respond to blasting complaints promptly and satisfactorily, identify blast damage, provide a technical basis for this procedure, and to clarify the Department's authority with respect to damage.

**APPLICABILITY:** This guidance would apply to District Mining Offices and would be implemented in response to blasting complaints.

**DISCLAIMER:** The policies and procedures outlined in this guidance document are intended to supplement existing requirements. Nothing in the policies or procedures shall affect more stringent regulatory requirements.

The policies and procedures herein are not an adjudication or a regulation. There is no intent on the part of the Department to give these rules that weight or deference. This document establishes the framework, within which the Department will exercise its administrative discretion in the future. The Department reserves the discretion to deviate from this policy statement if circumstances warrant.

**PAGE LENGTH:** 7

**LOCATION:** Vol. 12, Tab 34a (BMR PGM Section I, Part 5, Subpart 5)

## **DEFINITIONS:**

*Threshold Damage* - Loosening of paint, small cracks in plaster and drywall at joints between construction elements, lengthening of old cracks.

*Minor Damage* - Loosening and falling of plaster, cracks in masonry around openings near partitions, hairline to 3 millimeters thick (0 to 1/8 inch), fall of loose mortar.

*Major Damage* - Cracks several millimeters in thickness in walls, structural weakening, broken glass, fall of masonry, e.g., chimneys, and load support ability affected.

## **TECHNICAL GUIDANCE:**

### **I. BACKGROUND**

Several statutes and regulations govern the use of explosives within the Commonwealth. These statutes and regulations authorize the Department to insure that blasting is performed in a manner which does not damage property. The U.S.B.M., in R.I. 8507, has recommended very conservative vibration levels for the prevention of structural damage from blasting, based on peak particle velocity and vibration frequency. When complied with, these recommendations provide a "safe" limit from even threshold type structure damage. Other types of damage, such as minor and major damage, would require significantly higher levels of energy than regulatory limits allow. Research, including R.I. 8507 however, has suggested that some threshold type damage is possible within compliance standards.

If damage does result from blasting, it is considered a violation and a public nuisance. The Department should take action against the operator for causing damage and may require changes as to how the blasting is being performed. The Department has no authority to require repair of or compensation for the damage. Repair and compensation are strictly a civil matter between the property owner and the operator.

### **II. PROCEDURES**

#### **STRUCTURAL DAMAGE**

The procedures described in this section are shown in outline form in the Blasting Complaint Flow Chart at the end of this document.

1. When a complaint is received about a blasting operation, the Department will first contact the complainant and inform them that an investigation will be conducted. The initial step of the investigation will be a complete review of records and any other information which may be available by the blasting inspector. If blasting records are not available or are incomplete, or if violations exist, enforcement action will be taken.
2. The second step will be to evaluate damage, if so claimed. This evaluation should consider not only the alleged damage, but should additionally focus on areas of the structure where damage from vibration typically occurs.

If the type of damage observed in the structure is feasible; i.e., characteristic of damage caused by vibration, additional investigation may be necessary. If the damage observed cannot be attributed to vibration, the complainant will be notified in writing of the conclusion that the damage was not caused by blasting.

3. Further investigation should determine if the damage is timely, i.e., occurred during the time when blasting was taking place. Pre-blast surveys, if available, may assist with this determination. Other information can be obtained from homeowner interviews and personal

observations. If it is determined that the damage could have occurred during the time when blasting occurred, the investigation should continue and focus on the amount of energy to which the structure was subjected. If it is determined that the damage did not occur when blasting occurred, the investigation will conclude and the complainant notified.

4. A determination of the maximum energy experienced by the structure can be accomplished in several ways. The best method is direct seismic measurement at the affected structure. Direct measurements also document the vibration from sources other than blasting. Next best are measurements taken at structures closer to the blasts. These measurements are normally proportionately greater than measurements taken further from the blasts. Seismic monitoring should be done by the blasting inspector to insure this is the case. Finally, energy levels can be estimated from scaled distance equations, regression analysis, or other methods. Regardless of the method used to determine the energy which affected the structure, the predominant frequency of the ground vibration should also be determined.

Energies determined by the above methods will be used to predict the probability of damage based on U.S.B.M. research. U.S.B.M. R.I. 8507 establishes recommendations using a combination of velocity and frequency. This recommendation is often referred to as the "Z" curve. The blasting inspector should compare the energy determination at the affected structure to this "Z" curve.

If the damage can be attributed to vibration, it is timely, and the "Z" curve has been exceeded, an enforcement action will be taken against the operator for failing to conduct blasting in a manner which protects private or public property.

5. If the damage appears to be vibration related, is timely and the energy is below the "Z" curve, an analysis of the structure may be necessary. Typical structures are those which are sited on a firm foundation, do not exceed 2 stories, and have usual dimensions.

Non-typical structures may require a response analysis. This will provide information on how that specific structure responds to blasts and other environmental conditions. This analysis will be conducted by the blasting inspector using at least two seismographs. From the seismic information, both frequency response and structural amplification data can be obtained. R.I. 8507 provides ranges of responses and amplifications which are considered typical.

If it is determined that this structure responds as expected in R.I. 8507, then the Department will assume the "Z" curve is appropriate for the protection of this structure, and the homeowner will be so informed. If the structure responds unusually, then Central Office will arrange for a special study to determine the validity of the allegations.

6. An evaluation by a structural engineer may be utilized for additional information if it has been determined that the damage is feasible, or when unusual circumstances exist. The purpose of the engineer's evaluation is to identify all possible causes of the damage, whatever they may be.

#### **NON-STRUCTURAL DAMAGE:**

The vibration portions of the regulations are designed to prevent damage to a structure. The standards on which they are based are intended to control damage to the structure. In cases where non-structural damage is claimed, the inspector should fully describe the allegations and note any witnesses to the event on the inspection report. Copies of the report are to be supplied to the operator and homeowner. Compensation for any damages remains a civil matter.

### **WATER SUPPLY AND HYDROLOGIC COMPLAINTS RELATED TO BLASTING:**

Any complaints dealing with water supplies or hydrogeologic conditions related to blasting will be jointly investigated by a blasting inspector and hydrogeologist. Any degradation or diminution of water supplies will be handled in accordance with the regulations.

### **CONCLUSION:**

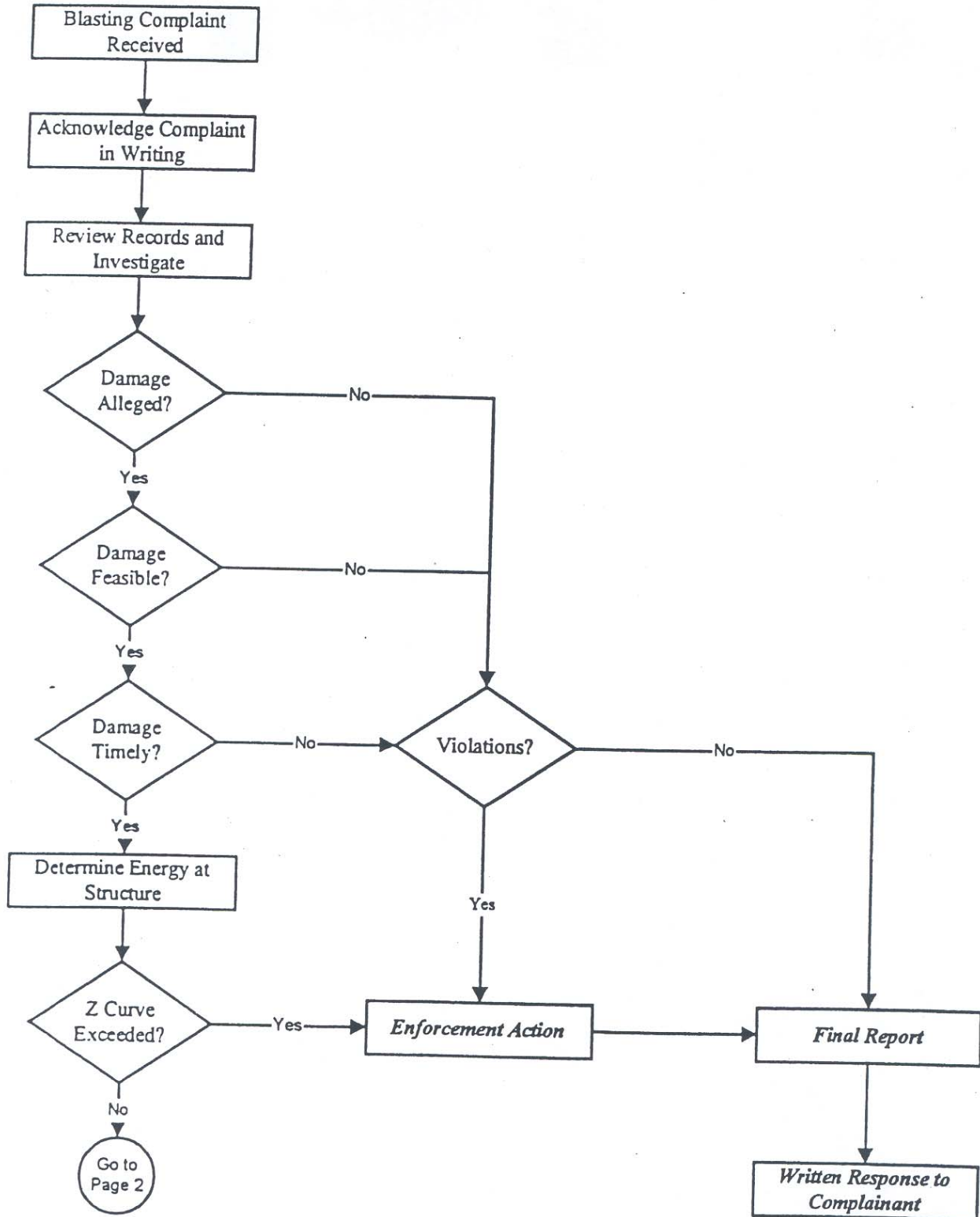
If it is determined, after a complete review of all available information that blasting was more probable than not the cause of the damage, the Department must issue an order to the operator. The order should note that a violation occurred because blasting was more probable than not the cause of the structural damage. Blasting should cease on the operation until measures are taken to bring blasting into conformance with all regulatory requirements. No additional blasting may be conducted until revised procedures are approved by the Department.

The complainant in this case should be informed that the Department believes that blasting was more probable than not the cause of the damage. We should further inform the complainant that our records and testimony are available to support any civil action they initiate. This same information is available to the operator.

At the conclusion of the investigation the complainant will be notified in writing of the findings. Copies of all materials which were provided to the citizen will also be provided to the person alleged to be in violation, and maintained in the permit file at the District Mining Office.

# Blasting Complaint Protocol Flow Chart

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# Blasting Complaint Protocol Flow Chart

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