

## CONTROLLED BLASTING AT QUARRIES

*Government guidelines set limits for noise and vibration produced by blasting at Ontario quarries. Blasts are monitored to ensure that these limits are adhered to.*



## BLASTS ARE SCHEDULED AND MONITORED

Quarries remove bedrock from the ground to produce aggregate materials for use in the construction industry. The first step in this process is the blasting of the rock. Explosive charges are placed within holes drilled into the rock and detonated to break and dislodge the rock. This technique is also used in mining, road construction, utility installations, and even residential basement excavations.

Once broken apart by the explosive forces, the fragmented rock can be easily handled, transported and processed to produce the range of aggregate materials required by the construction industry.

### **Blasts are controlled and regulated**

Blasting is no longer the common perception of several sticks of red dynamite connected to a plunger which sets off the blast. Today's blasting professionals are trained and experienced. Blasting has become a science with courses in explosives technology being taught in colleges and universities.

Blasting professionals must comply with a range of federal and provincial laws which regulate and control their activities. Every aspect of the industry from production, storage, transportation, and detonation is regulated.

*Blasts are monitored and carried out in accordance with blast design studies.*

In Ontario, the two most relevant pieces of legislation are:

- the Occupational Health and Safety Act, administered by the Ministry of Labour (MOL), and
- Guideline NPC-119, administered by the Ministry of Environment (MOE). These guidelines set limits for noise and vibration produced by blasting and are among the most stringent in North America.

### **Effects of blasting**

The two effects of a blast that may be felt at an offsite location are:

- vibration in the ground, and
- concussion in the air (noise).



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Both of these effects are regulated by MOE limits and all blasts at the quarry must be controlled so that these limits are not exceeded at an offsite residence or other sensitive land use. Precise and detailed record keeping for each individual blast is required.



The noise and vibration levels produced when a blast is let off are based on two factors:

- The technical specifics of the blast, such as size and depth of drilled holes, and the type and amount of explosive used. This can be controlled by the blasting professional.

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*No structural damage will occur due to noise or vibration within the Ministry of Environment's limits.*

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- Atmospheric (such as wind direction, humidity, temperature inversions, cloud cover etc.) and geologic conditions (such as soil types, bedrock, water table level, freeze/thaw conditions, etc.).

Blasting will generate noise and vibration that may be heard and felt on properties around a quarry. The vibration levels that will be experienced are normally lower and no more adverse than those caused by common household events, such as a door

slamming. Seismographs set up to monitor at a home often record higher vibration from activity in the home than from nearby blasting operations. No structural damage will occur due to noise or vibration within the MOE limits.

Physical breaking or cracking of the rock is limited to a localized area

around each blast hole. These micro cracks only occur usually within several metres of the blast hole. Offsite rock structure, aquifers, or well installations are not affected.

## **Blasts are designed to reduce effects**

There are a number of techniques commonly used throughout the industry to control impacts. In order to ensure that vibration and noise levels are within the MOE guidelines, blasts are monitored and carried out in accordance with blast design studies. These reports are prepared by specialists prior to any blasting taking place. Historical background data collected from quarry operations throughout the province as well as data from scientific research organizations are used. This

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data, combined with information supplied by explosives manufacturers, is applied to the site of the proposed blasting activity.

The most critical blast design factor affecting ground vibration or sound is the amount of explosive detonated at any one instance during the blast. As a result, holes are detonated sequentially, a few milliseconds apart, in order to control the overall impact.

### **Blasts are scheduled and monitored**

A siren or horn is sounded a few minutes in advance of every blast at the site. The purpose of this siren is to warn employees and workers in the quarry and allow the working area to be cleared. This siren will be audible at some offsite locations and provides advance notice of an upcoming blast. In addition to sounding warnings at the site, quarry staff can contact residents within 500 m of the blast area who have requested that they receive advance notice of the blast.

Instrumentation called seismographs are used to measure vibration and sound pressure. The

seismographs are tested and calibrated when they are set up to ensure accurate measurements.

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*Blasts are designed and controlled to meet provincial limits so that structural damage does not occur.*

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*Derived from P. Berger and Associates Inc. and GeoSonics Inc. by MHBC Planning, Aercoustics Engineering, and Explotex Engineering.*

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