
General Guidelines for Blasting [DRAFT April, 2007]

Blasting maybe required to construct access roads, wind turbine foundations, power transmission poles, substations or related facilities, and if so the construction shall be conducted in accordance with the minimum specification outlined in the following blasting plan. Maine Drilling and Blasting have reviewed this draft and will provide advice surrounding specific regulatory and safety guidelines for blasting in the State of Maine and blasting within the project site.

BLASTING PLAN

I. PRE-BLASTING SURVEY / PROCEDURE:

The construction contractor / blasting subcontractor shall submit a detailed Pre-Blasting Survey / Procedure to TransCanada for approval prior to the start of any blasting operations. The Pre-Blasting Survey / Procedure shall include locations and site plans for areas known to require blasting and the scope of blasting required.

The Pre-Blasting Survey / Procedure must include, but not limited to, the following information:

1. Explosive type
2. Type of detonation
3. Delay type and interval
4. Initiating methods
5. Delay pattern
6. Maximum shot hole depth and diameter
7. Maximum charge per hole
8. Maximum charge per delay
9. Distance to nearest below ground structures including existing buried pipelines, cables, etc... if any
10. Distance to nearest above ground structures including existing buildings, utility poles, etc... if any
11. Peak particle velocity monitoring and control
12. Proposed fly-rock control method
13. Wet sand cover
14. Matting (type - construction)
15. Other
16. Safety - Reference to Federal, State, County and Local requirements including the documents referenced in section IV
17. Environmental - Reference to Federal, State, County and Local requirements including the documents listed in section IV
18. Mitigation methods
19. Contingency planning

The construction contractor / blasting subcontractor to conduct pre-blast inspections on all properties within and abutting all blast sites and present it to TransCanada. Five hundred (500) feet will be considered the minimum distance.

Inspections cover interior and exterior conditions and include cosmetic as well as structural findings. These inspections are for the benefit of the property owner as well as the construction contractor / blasting subcontractor.

Acceptance of the Survey/Procedure by TransCanada shall not relieve the construction contractor / blasting subcontractor of responsibility for harmful consequences of its blasting operations, whether performed in accordance with the Procedure or not.

II. TRANSPORTATION, STORAGE AND USE OF EXPLOSIVES

The construction contractor / blasting subcontractor shall ensure that transportation, storage and use of explosives is in accordance with Federal and State regulations and the stipulations contained in the applicable Permits.

The construction contractor / blasting subcontractor shall provide TransCanada with all copies of permits obtained by the construction contractor / subcontractors prior to its commencement of blasting operations.

(1) TRANSPORTATION:

- A. Vehicles used for the transportation shall not be loaded beyond rated capacity for the vehicle.
- B. Explosives shall be transported in vehicle(s) with covered body(s) to prevent dislodgment from the vehicle.
- C. Explosives vehicles shall be marked with reflective signs on both sides, front and rear, bearing the word EXPLOSIVES in red letters on a white background in addition to the diamond-shaped signs listing the class of explosives.
- D. When blasting caps are transported on the same vehicle as explosives, the blasting caps shall be contained in a cap magazine designed for that purpose as defined in 49 CFR177.835(g).
- E. No spark producing materials will be transported in the truck bed with explosives.
- F. Vehicles used to transport explosives shall be inspected prior to each use. A record of inspections will be kept with the vehicle.

- G. Explosives vehicles shall be operated in a safe and prudent manner.
 - H. No person shall smoke within fifty (50) feet of explosives.
 - I. All vehicles transporting explosives shall have two (2) ABC fire extinguishers of ten (10) pound size location in the cab of the vehicle.
- (2) STORAGE:
- A. Magazines shall comply with ATF regulations and placed no closer than 100 feet of each other.
 - B. The area around each magazine shall be kept free of combustible materials for a distance of 25 feet.
- (3) USE:
- A. Drilling and loading operations shall not occur within 50 feet of one other.
 - B. Drilling equipment will be equipped with a suitable dust control apparatus and will be kept in repair and use during all drilling operations.
 - C. Tamping of explosives shall be done using a wooden tamping pole.
 - D. Blast mats will be utilized when deemed necessary. The number of mats and the position of the mats used on any one shot will be at the discretion of the blaster; however, whenever a question occurs of whether or not to use mats, the blaster will always decide to go with the safest procedure. If necessary, depending upon encountered conditions, every shot could be matted.
 - E. Prior to each blast, the person responsible for shooting shall determine that the area is clear of personnel and equipment and that a TransCanada Representative is on site and aware of the conditions and procedures.
 - F. The TransCanada Representative shall be advised of the time of each planned shot as far in advance as possible.
 - G. The following blast signals shall be used:
 - 3 Blasts - 5 minutes to shot
 - 2 Blasts - shot imminent
 - 1 long Blast - all clear
 - H. Signs shall be posted warning of the blast signals.
 - I. The blaster shall determine after each blast that no misfire has occurred.

- J. In the event of misfire, the area shall be cleared for not less than thirty minutes after which the blaster shall take appropriate steps to determine the cause of the misfire. All misfires shall be reported to the safety engineer.
- K. Detonation of each shot will be by means of a non-electric system. Each series of holes will be delayed for a minimal fly rock and ground concussion using millisecond interval delays.
- L. Blasting operations will be restricted to daylight hours.
- M. The blasting operation will be under the direction of a blasting foreman. The blaster and driller are experienced at both drilling and blasting.
- N. Drilling patterns will depend upon the depth of the rock and its condition.
- O. Test Blast Program will be performed in accordance with the typical blasting plan and typical loaded hole for determination of shot design performance relative to required job specifications. Plans will be adjusted relative to meeting desired performance.

(3A) VIBRATION CONTROL:

- A. When a blast is being planned, the following information will be documented in a blasting log to be kept by the person responsible for blasting operations.
 - 1. Location
 - 2. Depth and patterns of holes
 - 3. Number of holes
 - 4. Amount and type of explosives per hole per delay
 - 5. Type of detonation
 - 6. Scaled distance as defined in EM385-1-1 25.COB as a scaled factor (ft/lb units) of the potential damage to a structure, based on the distance from the nearest structure to the blast site and the weight of explosives per delay. When scaled distance is less than 70, seismograph(s) will be used to monitor and record vibration.
 - 7. Time and date of shot.
 - 8. Location of closest structure (building and/or utility pole).

In addition, the blasting log shall include the following information as outlined in 38 MRSA 490-Z(14)(L).

- L. A record of each blast, including seismographic data, must be kept for at least one year from the date of the last blast, must be*

available for inspection at the development or at the offices of the owner or operator if the development has been closed, completed or abandoned before the one-year limit has passed and must contain at a minimum the following data:

- (1) Name of blasting company or blasting contractor;*
- (2) Location, date and time of blast;*
- (3) Name, signature and social security number of blaster;*
- (4) Type of material blasted;*
- (5) Number and spacing of holes and depth of burden or stemming;*
- (6) Diameter and depth of holes;*
- (7) Type of explosives used;*
- (8) Total amount of explosives used;*
- (9) Maximum amount of explosives used per delay period of 8 milliseconds or greater;*
- (10) Maximum number of holes per delay period of 8 milliseconds or greater;*
- (11) Method of firing and type of circuit;*
- (12) Direction and distance in feet to the nearest dwelling, public building, school, church or commercial or institutional building neither owned nor controlled by the developer;*
- (13) Weather conditions, including factors such as wind direction and cloud cover;*
- (14) Height or length of stemming;*
- (15) Amount of mats or other protection used;*
- (16) Type of detonators used and delay periods used;*
- (17) The exact location of each seismograph and the distance of each seismograph from the blast;*
- (18) Seismographic readings;*
- (19) Name and signature of the person operating each seismograph; and*
- (20) Names of the person and the firm analyzing the seismographic data.*

Documentation of seismograph and other instrumentation calibration must be presented to the TransCanada representative prior to blasting

Copies of all blasting logs and seismic records shall be submitted to the TransCanada representative on a weekly basis.

- B. All shots that will produce a maximum of 2 inches per second peak particle velocity at 250' or less and a peak air over pressure of 129 dB. Ground vibration will be controlled by use of delays and loading patterns.

III. MONITORING

All shots that could affect structures will be monitored by seismographs. The units will be set and operated by the blaster and will be positioned between the

blast and the nearest structure. These units not only record the results of each blast for the logs, but they also serve as indicators to help guide in determining the type, size, and patterns of the shots.

IIIV. REFERENCE DOCUMENTS

Code and Federal Regulations (CFR):

49 CFR Part 177

29 CFR, Part 1910.109 – Explosives and Blasting Agents OSHA

US Army Corps of Engineers: Manual No. 385-1-1, Safety and Health Requirements.

Maine Revised Statues Annotated (MRSA):

38 MRSA 490-Z(14)(L), Performance Standards for Quarries.

Office of Surface Mining Reclamation and Enforcement (OSMRE)

Maine Department of Environmental Protection (MDEP)

Maine Department of Transportation (MDOT)

US Bureau of Mines