

Example Blasting Plan, 2013

General

Safety is the priority during all phases of blasting operations. We will follow all local, state and federal regulations related to transportation and use of explosives on the Project. An overview of procedures for pre-blast surveys, explosives use, blast security, and monitoring are described below.

Pre-Blast Surveys/Notifications

Pre-blast surveys and Water Quality/Flow Testing will be offered to all property owners, where a permanent structure and/or a well is located within a 600 ft. radius from blast locations. Appropriate notices will be given and appointments arranged for those property owners who desire a survey. Pre-blast surveys will be conducted by a qualified firm. Results of those surveys will be documented through video or still photographs and appropriate narration or written reports. A follow up post-blast survey will be conducted for each property following blasting operations in that area.

A public information meeting will be conducted approximately one month prior to the commencement of blasting in each Town.

Blast Monitoring

All blasts will be monitored by a representative of a qualified firm, who has been properly trained in the setup and use of seismic monitoring equipment. At least one seismograph will be in use at all times. Placement of monitoring equipment will be at the nearest structure to the blast site.

Sequence of Blasting

All blasting operations will be strictly coordinated with ____ on-site representative, and local Fire Departments. Emphasis will be on the safe and efficient removal of the rock existing on this project without impact to surrounding structures. Blasts will be developed so as to create minimal ground vibrations and offer the greatest protection possible to the surrounding structures.

Blasting Procedures

1. Blasting operations shall be conducted Monday through Friday between the hours of 9 a.m. to 5:00 p.m., except on state holidays; and all blasting within 300-feet of roads and road crossings will be limited to the hours of 9 a.m. to 3 p.m.
2. Blasting will not be conducted at times different from those announced in the blasting schedule except in emergency situations, such as in electrical storms or when public safety considerations require a detonation outside of the approved blasting hours.
3. Warning and all-clear signals of different character that are audible within a range of one-quarter mile from the point of the blast shall be given. All persons within the permit area shall be notified of the meaning of the signals through appropriate instructions and signs posted. Access will be restricted within 300-feet of the point of the blast.
4. Access to the blasting area shall be regulated to protect the public from the effects of blasting. Access to the blasting area shall be controlled to prevent unauthorized entry

before each blast and until the perimeter's authorized representative has determined that no unusual circumstances exist after the blast. Access to and travel in or through the area can then safely resume.

5. Areas in which charged holes are awaiting firing shall be guarded, barricaded and posted, or flagged against unauthorized entry.
6. Blasting mats shall be used for all blasts to prevent fly rock.

Blast Security and Warning Whistles

Each blast will be preceded by a security check of the affected area and then a series of warning whistles. Communications will be made with job site supervisors and local officials as required to ensure the safest possible operation. All personnel in the vicinity closest to the blast area will be warned. The warning whistles will follow the following sequence:

3 Long Whistles Blown – 5 Minutes to Blast

2 Long Whistles Blown – 1 Minute to Blast

1 Long Whistle Blown – All Clear

No blast will be fired until the area has been secured and determined safe. The blast site will be examined by the blaster prior to the all-clear signal to determine that it is safe to resume work.

Explosives

All explosives will be delivered to the blast site on a daily basis. There will be no overnight storage on site. Only the amount of explosives required to perform the day's work will be brought to the site. All explosives will be stored in approved magazines when not in use.

All blasting materials will be perchlorate free.

Blaster Qualifications

The blaster in charge of this project will be licensed in the State of Vermont and have received various amounts of training in the safe use and handling of explosives. All blasters must be familiar with all OSHA Regulations, State Regulations, and Federal Regulations regarding construction site safety, including transportation, use and handling of explosive materials. Weekly safety meetings are to be held on site by the General Contractor, with a record of that meeting returned to the ___ on-site representative.

Blasting Personnel

All blasting operations shall be conducted by experienced, trained and competent persons who understand the hazards involved. Persons working with explosive materials shall:

1. Have demonstrated a knowledge of, and a willingness to comply with, safety and security requirements.

2. Be capable of using mature judgment in all situations.
3. Be of good physical condition and not addicted to intoxicants, narcotics, or other similar type of drugs.
4. The person(s) responsible for the explosives shall possess current knowledge of the local, State and Federal laws and regulations applicable to his work.
5. The person(s) responsible for the explosives shall have obtained a Certificate of Competency or a license as required by State law.

Licenses and Permits

The drilling and blasting contractor shall be fully licensed and insured for the transportation, use, and handling of explosives. Blasting permits, as required, will be obtained from the local authorities by the drilling and blasting contractor when blasting is about to begin.

Blast Vibration

Blast vibration will be monitored at the structure closest to the blast site. Vibration limits will follow industry limits as outlined in US Bureau of Mines (USBM) RI 8507 Appendix B. Blast designs will be modified as required to stay within the guidelines. Blasting operations will be modified accordingly when approaching buildings and utilities.

Airblast overpressure level not to exceed 133 peak dB (linear) two Hertz high –pass system.

All blasting shall be performed in accordance with all applicable laws and regulations including, but not limited to, the Vermont Occupational Safety and Health Administration regulations. Vermont has adopted by reference, Code of Federal Regulations (“CFR”) OSHA regulations regarding explosives and blasting, and CVR 24 050 013 (Secretary of State Rule Log #92-041) (Rules Pertaining to VOSHA- Process Safety Management of Highly Hazardous Chemicals; Explosives and Blasting Agents). Specifically, Vermont has incorporated by reference 29 CFR Part 1910.109 Explosives and Blasting Agents and 29 CFR Part 1910.119 Process Safety Management of Highly Hazardous Chemicals. In addition, blasting will be conducted in accordance with the “Best Management Practices for Blasting to Avoid Environmental Contamination” included in Appendix A of this document.

APENDIX A

Best Management Practices for Blasting to Avoid Environmental Contamination

Best Management Practices (BMP's) include preparing, reviewing and following an approved blasting plan; proper drilling, explosive handling and loading procedures; observing the entire blasting procedures; evaluating blasting performance; and handling and storage of blasted rock.

Note These BMP's are based on Blasting BMP's developed by the state of New Hampshire and the Institute of Makers of Explosives

1. **Drilling and Loading practices.** The blasting contractor shall utilize the following drilling and loading practices to minimize environmental effects.
 - a. Blasthole boring logs shall be maintained by the driller and communicated directly to the blaster. The logs shall indicate depths and lengths of voids, cavities, and fault zones or other weak zones encountered as well as any groundwater conditions the driller notes (This is not a formal assessment of groundwater).
 - b. Blastholes shall be within five (5) degrees of the intended orientation.
 - c. Blastholes shall be drilled within one foot of the intended blast pattern.
 - d. Explosive products shall be managed on-site so that they are either used in the borehole, returned to the delivery vehicle, or placed in secure containers for off-site disposal.
 - e. Unpackaged/unsleeved ANFO and emulsions shall not be used if artesian or water flowing conditions are encountered.
 - f. Loaded explosives shall be detonated as soon as possible and shall not be left in the blastholes overnight unless weather or other safety concerns reasonably dictate that detonation should be postponed.
 - g. Loading equipment shall be cleaned in an area where wastewater can be properly contained and handled in a manner that prevents release of contaminants to the environment.

2. **Explosive Selection.** The following BMPs shall be followed to reduce the potential for groundwater contamination when explosives are used:
 - a. Explosive products shall be selected that are appropriate for site conditions and safe blast execution.
 - b. Explosive products shall be selected that have the appropriate water resistance for the site conditions present to minimize the potential for hazardous effect of the product upon groundwater.

3. **Ammonium Nitrate and Fuel Oil (ANFO).** The following BMP's shall be followed to reduce nitrate or other impacts when ANFO is used:
 - a. Identify blastholes containing water and remove water prior to loading with ANFO.

- b. Water resistant ANFO (ANFO-WR) shall be used in blastholes that recharge with groundwater and remain wet even after pumping.
 - c. ANFO should be handled in a manner to avoid spills.
 - d. If spills of ANFO or other blasting agents occur at the ground surface around the blasthole collars, these shall be cleaned up promptly and the ANFO either reused or taken off site for appropriate handling or disposal.
 - e. Adequate unloaded collar lengths shall be established to reduce both "blowback" when loading pneumatically and blasthole proximity effects.
 - f. Proper "standoff" distance and loading vessel pressure shall be maintained to reduce "blowback" during pneumatically loading ANFO.
 - g. Partially used bags of ANFO shall be resealed and returned to the explosive magazine.
 - h. Loading equipment shall be cleaned in an area where the water can be properly contained and handled in a manner that prevents releases.
 - i. Explosives shall only be delivered to the site in approved magazine trucks and should not be stored overnight on-site unless there is a demonstrated need for an on-site explosives magazine.
4. **Bulk emulsions and slurry/watergel explosives.** The following BMP's shall be followed to reduce nitrate or other impacts when bulk emulsions or slurry/watergel explosives are used:
- a. Spills of the product shall be removed from the spillage area, and either reused or taken off site for disposal.
 - b. Proper loading techniques shall be followed when loading a bulk product into a wet blasthole. The bulk liquid product should be extruded into itself from the bottom of the blasthole and not into the standing water above the product.
 - c. If groundwater conditions are severe, e.g., artesian/flowing conditions, packaged explosives (emulsions, watergels, slurries, blends, cartridged, etc.) shall be used instead of bulk products or as required by the Blasting Engineer.
5. **Blasthole stemming.** The following BMP's shall be followed when placing stemming in blastholes:
- a. Blastholes shall be cleaned out thoroughly using the compressed air stream from the drill to remove the drill cuttings.
 - b. Drill cuttings shall not be used as stemming.
 - c. Stemming shall be placed to prevent bridging, and shall be appropriately sized for the blasthole diameter.
 - d. Blastholes shall be completely stemmed to prevent incomplete detonation.
 - e. Weak zones, voids, and cavities shall be stemmed as decks to prevent the loss of explosive products into the bedrock.

6. **Misfires.** One or more of the following BMP's can be followed to help prevent misfires
 - a. Redundant surface delays to connect blastholes if shifting mats, uneven terrain or other conditions could cause cut-offs shall be used.
 - b. Double or triple priming of the blastholes shall be done as applicable depending on the depth of the hole.
 - c. Using electric detonating systems shall be considered.
 - d. Using programmable electronic detonating systems shall be considered.

7. **Muck Pile Management.** Muck piles (the blasted pieces of rock) and rock piles shall be managed in a manner to reduce the potential for contamination by implementing the following measures:
 - a. Remove the muck pile from the blast area as soon as reasonably possible.
 - b. Manage the interaction of blasted rock piles and storm water to prevent contamination of water supply wells or surface water.