

**VERMONT AGENCY OF NATURAL RESOURCES
DRINKING WATER AND GROUNDWATER PROTECTION DIVISION
WATER RESOURCES SECTION
PRACTICE FOR REVIEW OF
A GROUNDWATER MONITORING PLAN
FOR BLASTING ACTIVITIES AT QUARRIES
UNDER ACT 250 CRITERIA 1, 3, AND 9E
MARCH 2017**

In Vermont, groundwater is protected as a public trust in accordance with 10 V.S.A. Chapter 48, the Groundwater Protection Rule and Strategy, the Water Supply Rule, and the Groundwater Withdrawal Reporting and Permitting Rule. This Practice provides the steps needed for an Act 250 applicant to develop a Groundwater Monitoring Plan for Blasting Activities when greater than 5,000 yd³ of undisturbed rock will be removed within one year using explosives. The Water Resources Section of the Drinking Water and Groundwater Protection Division will review the applicant's Groundwater Monitoring Plan and will provide the Agency of Natural Resources (Agency) Office of Planning and Policy a finding as to whether the applicant has or has not successfully met Criterion 1 and 9E. Additional information or modifications may be requested based on the particular aspects (size and nature) of the individual project.

CRITERION 1: "WATER. A permit will be granted for the extraction or processing of mineral and earth resources, including fissionable source material when it is demonstrated by the applicant that the project or facility will not result in undue water pollution."

CRITERION 3: IMPACT TO OTHER WATER SUPPLIES. A permit will be granted when it is demonstrated by the applicant that the project "will not cause an unreasonable burden on an existing water supply, if one is to be utilized."

CRITERION 9E: "Extraction of Earth Resources. A permit will be granted for the extraction or processing of mineral and earth resources, including fissionable source material:

- (1) when it is demonstrated by the applicant that, in addition to all other applicable criteria, the extraction or processing operation and the disposal of waste will not have an unduly harmful impact upon the environment or surrounding land uses and development; and
- (2) upon approval by the district commission or the board of a site rehabilitation plan which insures that upon completion of the extracting or processing operation the site will be left by the applicant in a condition suited for an approved alternative use or

development. A permit will not be granted for the recovery or extraction of mineral or earth resources from beneath natural water bodies or impoundments within the state, except that gravel, silt and sediment may be removed pursuant to the regulations of the water resources board, and natural gas and oil may be removed pursuant to the rules of the natural gas and oil resources board."

Be aware that other permits or procedures may be needed or apply such as a Multi-Sector General Permit, Storm Water Permit, Underground Injection Control, in addition to local or municipal ordinances. The **VGS Practice for Review of Rock Extraction – Quarries under Act 250 Criteria 9D and 9E** also applies and needs to be followed.

BEST MANAGEMENT PRACTICES FOR BLASTING

If explosives are planned as part of the project operation, the applicant must follow the **DEC Best Management Practices for Blasting to Avoid Environmental Contamination**.

SUBMITTAL OF A GROUNDWATER MONITORING PLAN AT ROCK QUARRIES

If the project proposes to disturb more than 5,000 yd³ of bedrock in one year using explosives a groundwater monitoring plan needs to be developed by the applicant. The purpose of the groundwater monitoring plan is to establish baseline pre-blast groundwater quality for existing groundwater drinking water (Public and Non-Public) sources (wells and springs) located within an Area of Concern 2,000 feet of the proposed final boundary of the blasting area. The Area of Concern may be increased (e.g. karst or known fracture zones, areas of low yield or interference) or decreased (e.g. area with many water sources where fewer representative sources may be used, high yield source or lack of hydraulic connection can be shown) based on site specific information provided by the applicant.

Step 1:

Identify all groundwater sources, including names and addresses, within 2,000 feet of the site. This should be done after each year of blasting. Mark the groundwater sources locations on maps of appropriate scale.

The great majority of groundwater sources will be groundwater wells. These can be located using:

- The Agency's [Natural Resources Atlas](#)¹ (This includes all drillers logs for the state and **estimated** locations – including public and potable water supplies).

The Atlas may be referenced for planning purposes only. Its use does not relieve the applicant of having to perform a field assessment by a qualified consultant(s) of existing infrastructure and potential environmental impacts.

- The Agency's Department of Environmental Conservation (DEC) Drinking Water and Groundwater Protection Division will have records of any public water source that may be located within 2,000 feet of the proposed blasting.
- Town records or DEC Regional Offices (Water-Wastewater or Public Building permits).

Note: Other water resources in the area of the project, such as wetlands, vernal pools, surface waterbodies, should also be assessed in the field and shown on maps of appropriate scale. The Natural Resource Atlas may be used for initial planning, but field verification is required. Not all resources have been mapped, identified or accurately located and shown on the Atlas.

Step 2:

For the site, describe the geology and expected groundwater flow direction using existing geologic data, aerial photography/imagery, and site walkovers, if necessary.

Note: Based on the size of the project, this information may be used to determine if a subset of the groundwater sources identified do not have the potential to be affected by the proposed blasting, or if a subset of sources can provide the necessary monitoring to assess potential impacts from the blasting. Provide the rationale for how the subset was determined.

Step 3:

Send letters to all addresses within 2000 feet of the proposed blasting or the subset of sources identified in Step 2 to request:

- permission to monitor the groundwater sources for turbidity and nitrite/nitrate levels pre- and post-blasting to assess potential impact.

¹ Natural Resource Atlas, <http://anrmaps.vermont.gov/websites/anra5/>

- information on the groundwater source construction (well completion report, if available), depth, yield, etc.

If any groundwater source owner refuses to grant permission to monitor their source(s), no monitoring will be required. For projects involving multiple years of blasting: Requests for permission should be repeated annually. If a new groundwater source has been developed or a change in landowner has occurred within the monitoring area, request permission from the source owner to monitor the source(s).

Step 4:

Develop a Groundwater Monitoring Plan to evaluate Groundwater Quality.

Note: The chemicals proposed for monitoring in this section are based on the blaster using ANFO as the blasting agent. If other blasting agents are used, the list of analytes to be monitoring will need to be changed to reflect possible contaminants associated with the specific blasting agent.

Pre-Blast: develop a procedure for pre-blast groundwater quality monitoring to determine baseline conditions:

- Collect groundwater samples from each source being monitoring;
- Analyze samples for Nitrates, Nitrite and Turbidity;
- Within 1 month of each sampling, send the Agency a sampling report for each water supply source sampled, that includes the dates and turbidity and nitrite/nitrate baseline levels. Note whether any water quality results are at or above the Groundwater Enforcement Standard.

Post-Blast: conduct post-blast groundwater quality monitoring:

- For each blasting event until the end of the Quarry operation and closure, the Applicant shall complete a sampling series for each water supply source granted permission in the monitoring zone;
- Interview source owner/user to determine if there have been any noticeable changes in water quality since the blasting;
- Collect groundwater samples from each water supply source being monitoring – 30, 60 and 90 days after each blast event. Note: The Applicant may propose a modified sampling frequency if a large number of blast events are proposed per year;
- Analyze samples for Nitrates and Nitrite:

- If Nitrate, Nitrite or Turbidity are found in drinking water above groundwater enforcement standards, retest within one week of receiving laboratory results; and,
- Test for Volatile Organic Compounds (EPA Method 525 for Benzene, Toluene, Xylene, & Xylene), and Semi-Volatile Organic Compounds (EPA Method 8270 for poly-nuclear aromatic hydrocarbons).
- Report each sampling series:
 - Within 1 month of each sampling, send each water supply source owner a sampling report for each source they own, that includes the dates and turbidity and nitrite/nitrate levels, for all sampling events thus far conducted in the series.
 - Within 1 month of each sampling, send the Agency a sampling report for each water supply source sampled, that includes the dates and turbidity and nitrite/nitrate levels, for all sampling events thus far conducted in the series.

Note: At any time after the fourth blasting event and related sampling series is complete, the Applicant may seek written approval from the Agency to discontinue sampling.

The Groundwater Monitoring Plan shall include a list of proposed actions if post blast monitoring indicates an impact above baseline or Groundwater Enforcement Standards as specified in the **Groundwater Protection Rule and Strategy**.

If the Agency has evidence of groundwater pollution the Applicant shall be required to submit a corrective action plan to the Agency within 2 weeks for approval by the Agency. The Applicant shall comply with the Agency's investigations of concerns and, if necessary, implement corrective actions and revisions to the Groundwater Monitoring Plan.

QUARRY DEWATERING PLAN

A Watershed Management Division Multi Sector General Permit, if applicable, requires approval by the Secretary for a site-specific Dewatering Plan (Part 8.J) and/or NPDES permit. This may be necessary when it is likely or known, for a new quarry or based on current operation, that the project will encounter sufficient influx of groundwater and precipitation (overland flow, rain, snow, storm water, etc.) so that active measures are needed (this does not apply to wash water). Active measures are constructed drainage piping, sumps with pumps, or shallow or bedrock wells. The need to dewater an excavation on a relatively frequent or seasonal basis should be established during initial design for new quarries or proposed expansion of existing operations.

Sand and Gravel Extraction Activities

Sand and Gravel extraction operations are not likely to need a site-specific Dewatering Plan because the operation shall not excavate deeper than three feet above the seasonal high groundwater table. NOTE: If the groundwater table is encountered, cease operation in that area and contact the Water Resources Section of the Drinking Water and Groundwater Protection Division for advice.

In the event a sand and gravel pit reaches bedrock and plans to transition to become a rock quarry, an amendment to the Act 250 permit will be required. As part of that amendment, additional permits may be needed and practices for various criteria will need to be satisfied such as the **DEC Best Management Practices for Blasting to Avoid Environmental Contamination.**