# EXPLORATION DRILLING BEST MANAGEMENT PRACTICES

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MESSAGE FROM THE INDUSTRY

Mining Minnesota members are committed to following environmentally responsible drilling practices by reducing, minimizing or eliminating environmental impacts. We are proactively researching and implementing drilling practices to demonstrate this commitment.

Our members constantly develop and implement business practices that ensure we meet or exceed all federal and state environmental laws. Our membership expects their employees to comply with our environmental business practices and to constantly look for ways to improve those practices.

Mining Minnesota members are also committed to ethical and professional behavior among our employees, with our contractors, with each other, with landowners and within our communities. We expect each employee to be a positive representative of our industry at all times.

Mining Minnesota members

Members actively involved in exploration include:

**Beaver Bay Inc.**
Beaver Bay is a private company active in exploration in Northeastern Minnesota.

**Duluth Metals Limited**
Duluth Metals is a Canadian advanced-stage mineral exploration company acquiring, exploring and developing copper, nickel and platinum-group metal (PGM) deposits.

**Encampment Minerals Inc.**
Encampment Minerals is a private company active in exploration in Northeastern Minnesota.

**Idea Drilling**
Idea Drilling is an exploration and core drilling company operating in the Midwest.

**Kennecott Exploration Company**
Kennecott Exploration and its affiliate companies are members of the Rio Tinto group of companies. Rio Tinto is a leader in the international mining industry, helping to meet the growing global need for minerals and metals, including copper, gold, zinc, nickel, diamonds and energy minerals.

**North Central Mineral Ventures Inc.**
North Central Minerals is a private company active in exploration activities in Northeastern Minnesota.

**Lehmann Exploration Management Inc.**
Lehmann Exploration is a private company active in exploration activities in Northeastern Minnesota.

**PolyMet Mining Corp.**
A publicly traded mine development company, PolyMet Mining is focused exclusively on developing the NorthMet copper-nickel-precious metals project in Northeastern Minnesota's established Mesabi Iron Range mining district. PolyMet owns 100 percent of the NorthMet copper-nickel-precious metals ore body and the Erie Plant, a large processing facility about 6 miles from the deposit.

**Teck**
Teck is a diversified mining company with its U.S. headquarters in Spokane, WA. The company is a world leader in the production of zinc and metallurgical coal and is also a significant producer of copper, gold and specialty metals. Teck currently holds leases from the state and private interests on the Mesaba deposit.
EXPLORATION DRILLING PROCESS

Obtaining a sample of soils or bedrock for mineral exploration purposes is primarily accomplished by a process called core, sonic or reverse circular drilling. This process commonly requires the use of a truck, skid or tracked drill rig along with support equipment, such as water trucks. The most common type of drilling is bedrock diamond core drilling, but other methods, like sonic drilling, are also used, depending on sampling goals. The drilling process is a common practice in mineral exploration to obtain subsurface samples. The land use for drilling is a temporary activity that is highly regulated, and the land is reclaimed after drilling. All exploratory drilling is regulated under Minnesotan statutes 103 I.601, Exploration Boring Practices; and 103 I.605 Submission of Data from Exploration Borings.

Bedrock diamond core drilling process

1. A pipe called casing is installed from the surface through soils and sealed into bedrock.

2. Diamond core drilling uses a diamond bit, which rotates at the end of a drill rod (or pipe) inside the casing.

3. The opening at the end of the diamond bit allows a solid column of rock to move up into the drill pipe and be recovered at the surface.

4. Most drill rods are 10 feet long. After the first 10 feet are drilled, a new section of pipe is screwed into the top end so the combination of pipes can be drilled deeper into the ground.

5. The diamond bit is rotated with gentle pressure and lubricated with water and drilling water to prevent overheating.

6. The driller adjusts rotation speed, pressure and water circulation for different rock types and drilling conditions.

7. Inside the drill pipe is a core tube, which has a latching mechanism attached to a cable. At the end of each 10-foot run, the cable is lowered to winch the core tube containing the new rock core to the surface, where it can be recovered.

8. The drill core is stored in specially designed core boxes containing compartments to hold sections of the core.

9. The drill core is then logged and analyzed by a geologist.

Twin Metals Minnesota LLC
Twin Metals is a joint venture between Duluth Metals Limited and Antofagasta PLC that is pursuing the development of an underground mine in Northeastern Minnesota.

Vermillion Gold
Vermillion Gold is a private company active in gold exploration in Northeastern Minnesota.
Sonic (vibratory) drilling

Sonic drilling generally follows the same process as bedrock diamond core drilling. However, instead of using a diamond bit rotating on the end of a drill rod, the sonic drill head sends high-frequency resonant vibrations down the drill rods to the drill bit. This method is most commonly used to obtain soil samples, but it can also be used for bedrock sampling. The operator controls the frequencies of the vibrations to suit the specific conditions of the soil/rock geology. The frequency is generally between 100 and 200 hertz (cycles per second).

The vibrations transmitted to the drill bit fluidize the soil particles at the bit face, allowing for penetration through most geological formations. The fluidized soil zone extends about 5 millimeters from the rod. The sonic drill head contains two or more synchronized eccentric weights that are driven by high-speed hydraulic motors (6-12,000 rpm).

Reverse circular drilling

In reverse circular drilling, the drill cuttings are returned to surface inside the rods. The drilling mechanism is a pneumatic reciprocating piston, known as a ‘hammer,’ driving a tungsten-steel drill bit. Reverse circulation drilling ideally produces dry rock chips, as large air compressors dry the rock out ahead of the advancing drill bit. Reverse circulation is achieved by blowing air down the rods. The differential pressure creates air lift of the water and cuttings up the ‘inner tube,’ which is inside each rod. It reaches the ‘divertor’ at the top of the hole, then moves through a sample hose, which is attached to the top of the ‘cyclone.’ The drill cuttings travel around the inside of the cyclone until they fall through an opening at the bottom and are collected in a sample bag.
BEST ENVIRONMENTAL PRACTICES

Mining Minnesota business practices ensure all members meet or exceed federal and state environmental laws.

Minnesota Department of Health drill rig registration
All Mining Minnesota members’ drill rigs will maintain current registration with the Minnesota Department of Health (MDH). The registration card for each drill rig will be posted on the wall of the drill rig or kept in the cab of truck-mounted drills. Registration stickers will be posted conspicuously on the outside of all drills.

Layout and housekeeping
Drill sites shall be laid out in a manner that supports Mining Minnesota’s goal of reducing, minimizing or eliminating environmental impacts as well as achieving zero injuries on the job. Each drill site layout shall follow the guidelines set forth in an environmental plan. Housekeeping and site organization will comply with the following terms:

• All equipment, tools and supplies will be kept where they belong.
• All walking and working surfaces will be kept clean and free of debris. Snow will be cleared and sand and/or salt will be used on icy surfaces.

Wetlands/winter drilling
The following practices apply to winter drilling activities in wetlands:

• No fill is placed in the wetland, unless permitted to do so.
• Felling trees or depositing woody material into nonforested wetlands will be avoided.
• Only approved and safely functioning heating devices will be used. All state and federal fire laws and regulations will be observed to prevent and suppress fires.
• Fuel storage in wetlands is discouraged. However, if necessary for safe and efficient operation, fuel will be stored under direct supervision in containers no larger than 55 gallons with appropriate containment and spill prevention.
• When local conditions allow, we will use recirculation tanks with drill cuttings captured and transported off the wetlands for deposition.

Typical winter drill site with ground in frozen condition
Land use

Exploration drilling is a highly regulated activity. Regulations are aimed at protecting natural resources, especially ground water. Mining Minnesota members are supportive of these regulations and interested in practices that reduce, eliminate or minimize impacts from our drilling operations. Drilling represents a temporary use of the land, and sites are restored after drilling is complete.

In addition to state, federal and local regulations, landowners where drilling takes place have requests and requirements based on the goals they have for their land.

Examples of land use for drilling operations include:

- Most landowners, both private and public, require that an operations plan be submitted and approved prior to commencing drilling. Operation plans filed with the state are publicly available.
- Drilling will not be conducted inside developed recreation sites, including campgrounds, parking areas and trailheads, unless permitted to do so.
- Known occurrences of sensitive species or habitat will be avoided.
- Road building to access drill sites is minimized to the extent possible, and existing trails are used, if available. Road development is dependent on the type of drill platform used.
- Drill sites are generally about ¼ acre in size.
- The duration of drilling generally depends on the depth of the hole. For example, a 1000-foot-deep hole will take four to five days to complete, while a 3000-foot-deep hole may take two to three weeks to complete.
- Drill roads and drill sites are intended to be temporary uses of the land with clearing of trees and vegetation minimized, erosion controls used, and disturbed areas restored after drilling is complete.
- For some landowners, drill roads are not intended for public access to the land. For these landowners, measures to control access are used during drilling, and roads are decommissioned and blocked after drilling is complete.

Drill site reparation and reclamation

Drill sites are to be abandoned in a manner that minimizes the long-term impact on the environment, health and safety, and visual aesthetics. Mining Minnesota members will reclaim drill sites with actions including, but not limited to, the following:

- Drill sites will be reclaimed to as near the original surface condition as possible.
- Solid waste, such as drilling fluid additive containers, rags, or refuse of any kind, is not to be disposed of on site. Suitable collection containers will be available at each drill site and disposed of at an approved facility off site.
- Surface disturbance from drilling will be minimized to the extent possible.
- If the landowner requests seeding for revegetation, only native or desired non-native species that are certified noxious weed-free seed will be planted.
- Topsoil will be salvaged and reused for drill site rehabilitation and access-road development and reclamation.
- When topsoil is unsuitable for reuse, at the request of the landowner, other methods or tools, such as sodding, hydro seeding, fertilization or erosion-resistant matting may be used to help rehabilitate disturbed areas.
- Staking, paint, flagging and staging areas will be minimized, removed and cleaned following project completion.
• New roads built for access will be temporary, unless otherwise permitted, and not intended for public motorized use. Temporary roads will be decommissioned and reclaimed after their use. As soon as access use is completed, temporary roads will be stabilized and effectively closed to motorized traffic.

• All temporary stream crossing structures will be removed and the stream riparian buffer restored.

• Road and trail fills will be removed from flood-prone and wetland areas to restore stream and wetland crossings to original contours.

• Removed fill will be used to re-contour the ‘cut’ section that it was removed from along the road (i.e., re-contour to pre-existing site conditions).

• Slash, brush, tree limbs, seedlings and saplings cut to clear temporary roadways will be pushed a minimum distance for safe and efficient use of access. This slash material shall be utilized in rehabilitating the temporary roads and drill pad sites once drilling operations are complete or during final reclamation.

• Temporary road entrances will be closed with methods that restrict access by motorized vehicles (e.g., gates and boulders are acceptable, but berms of soil material are not.

• Use culverts or temporary bridges, where possible, to minimize wetland impacts.

• Silt and sediment control measures will be used, where needed.

• If log mats are placed for crossing wetlands, they will be removed once they are no longer needed.

• Actions to develop frozen-ground conditions will be conducted at the earliest reasonable time during the year to extend the winter drilling season in wetlands and minimize/eliminate rutting.

• Ruts and holes that develop during road use will be repaired on a timely basis to mitigate the risk of soil erosion and protect water quality.

Temporarily abandoned drill site access trail with boulders to restrict access by motorized vehicles

Temporarily abandoned drill site after one growing season

Hole abandonment
Sealing of exploratory borings will be carried out according to Minnesota Statutes, chapter 103I and parts 4727.0050 to 4727.1250 under the direction of the state-licensed responsible explorer:

• Sealing of borings, whether temporary or permanent, will be undertaken within 30 days of drilling activity completion.
• Temporary sealing of exploratory borings will be conducted according to Minnesota Rule 4727.1100.

• A temporarily sealed exploratory boring will be maintained so that it is not a contamination source or channel for any aquifer.

• Until a boring is permanently sealed, all provisions for protection of the groundwater against contamination and pollution and for maintaining satisfactory sanitary conditions around the boring will be carried out. This includes extending the casing and cap at least 5 feet above the potential high water within the regional flood level and grouting boring according to Minnesota Rule 4727.0980.

• An exploratory boring will not be temporarily sealed for more than 10 years. The boring will be permanently sealed at the end of the 10th year, or sooner.

• Borings will be permanently sealed according to Minnesota Rule 4727.1250, including sealing with grout, removing obstruction and debris, grouting the annular space, and perforating or ripping the casing.

• An exploratory boring from which groundwater flows above the established ground surface will be permanently sealed with neat cement grout.

• Grouting for temporary abandonment will start on completion of drilling and testing an exploratory boring. Grout will be pumped into the annular space from the bottom up through the casing, drill rods or a tremie pipe. The annular space between an inner casing and an outer casing must be filled with neat cement grout.

• For drilling on federally owned land within the Superior National Forest, boreholes within 500 feet of an existing well that is completed in bedrock will be permanently abandoned in accordance with MDH regulations within one week of removing the core. The hole can be temporarily abandoned in accordance with MDH regulations if it is cased to an elevation 50 feet below the deepest well that is located within 500 feet of the hole.

PETROLEUM PRODUCTS MANAGEMENT

On-site petroleum products storage
Petroleum products stored on site will be kept to the minimum quantity required for efficient production. All petroleum products will be stored in their original container or in a container that is clearly labeled as to the contents within secondary containment. Secondary containers will be able to contain 110 percent of product container volume. Secondary containers will be managed to prevent accumulation of precipitation. The EPA defines secondary containment as: That level of containment that is external to and separate from the primary containment.
On-site storage of used petroleum products

Used petroleum products will not be stored at the drill site. They will be placed in their original container and labeled ‘used oil’ or in other containers that are appropriately labeled ‘used oil’ and will be timely transported from the drill site to a designated storage area at the project laydown area. The designated storage area will be protected from precipitation and other weather-related elements and will be lined by a material that is impervious to used oil and other petroleum products to contain an accidental spill or leak.

Rig liners

Containment liners of rubber, plastic or other material that can effectively capture or contain any petroleum product release will be placed under all drill rigs. The liner will be maintained in good condition, free of tears or other conditions that could negatively impact its ability to act as a barrier. Supervisors will periodically inspect rig liners for condition and evidence of release. In case of a release onto a liner, crew members will immediately clean the release and properly dispose of the released product and any cleanup materials.

Transport and disposal of used petroleum products

Used petroleum products and other used items, such as filters, containers and products (petroleum and nonpetroleum) will be transported from the designated storage area and properly disposed of.
DRILLING FLUIDS AND ADDITIVES

Drilling fluids and additives will comply with the requirements of Minnesota Rule 4727.0935:

• Water used for drilling or sealing an exploratory boring will come from a potable water system, the boring itself, an exploratory boring of similar use and construction, or surface water.

• Surface water will be used only if the exploratory boring is located in a remote area where a potable water source is not available and the water has been disinfected by mixing sufficient chlorine so that after a minimum 30-minute contact time chlorine residual exists.

• Surface water used for drilling will contain a free chlorine residual at all times.

• Surface water will be conveyed in clean and sanitary tanks and water lined.

• Drilling additives will meet the requirements of NSF Standard 60-1988.

• Copies of material safety data sheets (MSDSs) for drill additives will be maintained in locations readily available to emergency responders or regulatory officials and employees.

CUTTINGS MANAGEMENT

Drill cuttings will be managed in an environmentally acceptable manner in accordance with regulations:

• Recirculation pits or in-ground sumps to contain drilling mud, cuttings, treatment chemicals and discharged water from the drilling process will be constructed as surface conditions allow. Drill cuttings recirculation tanks that capture cuttings for disposition off of wetlands are available for use at the request of landowners. Recirculation tanks will also be required where sumps cannot be constructed, such as in bedrock.

• Drill cutting and fluids are not to be released into waterways under any circumstances. Acceptable techniques include dug sumps, tanks and other settling or filtration devices designed specifically for cuttings management.

• Drill cuttings and additives will be allowed to sufficiently settle out of the drill water prior to backfilling the sump.

• At the conclusion of drilling, sumps will be backfilled with clean soil materials, leveled and graded.

SOLID WASTE MANAGEMENT

Solid waste on site will be collected in designated trash receptacles. Large solid waste volumes will not accumulate on site; it will be properly disposed of.

All used and unused oil, hydraulic fluid, solvents, fuel, antifreeze, etc. will be stored in sealed containers labeled to identify the contents. The sealed containers will be stored in secondary containment that is adequately covered to protect against the weather. Mining Minnesota members will regularly dispose of the used regulated substances and will maintain records regarding disposition of such substances.
Mining Minnesota members will have portable sanitary facilities for employees at drill sites and manage sanitary waste from portable sanitary facilities according to applicable regulations, unless other arrangements are available.

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**STORM WATER MANAGEMENT/SPILL PREVENTION**

Drilling operations that have the potential to disturb more than one acre require coverage under a National Pollutant Discharge Elimination System (NPDES) construction storm water permit. Activities disturbing less than one acre may also require a permit if the project is part of a larger common plan of development or the site used for support activities is greater than one acre.

Mining Minnesota members will take the following precautions to avoid regulated substances from entering storm water runoff:

- Each drill site will have a covered barrel labeled ‘Spill kit.’ Each spill kit will contain materials to assist in spill cleanup, including absorbent pads, booms for containing spills and heavy-duty protective gloves.
- Field employees and supervisors will inspect pumps, cylinders, hoses, valves, couplings and motors for damage or deterioration daily.
- Field employees and supervisors will regularly check the temperature of the hydraulic fluid during operation.
- Stored containers and drums with all petroleum products must be sheltered and/or enclosed on double containment systems.
- Avoid topping off fuel tanks, which may cause spills by overfilling.
- Do not wash or rinse fueling areas with water.
- Provide a spill-containment system and education on spill-response procedures.
- Perform regular preventive maintenance on tanks and fuel lines.
- Train employees about proper waste and tank management.
- Post signs or provide information on spill prevention and cleanup methods.
- One designated employee will maintain records, conduct inspections for compliance and oversee practices and training.
- Used batteries will not be stored at drill sites. Temporary used battery storage in the laydown area will consist of covered secondary containment.
SPILL MANAGEMENT

As noted earlier in the storm water management/spill prevention section, multiple steps and precautions are taken to prevent spills of regulated substances, such as petroleum products. These steps have proven effective in preventing spills. This section identifies the practices in place should a spill occur and the measures taken to clean up the spill.

Spill cleanup

Spills will be cleaned up according to guidelines set forth by Minnesota Pollution Control Agency (MPCA). All spills need to be cleaned up. Minn. Stat. Ch. 115.061 requires that the MPCA be notified of spills and discharges and that cleanup begins immediately:

115.061 Duty to Notify and Avoid Water Pollution:

(a) Except as provided in paragraph (b), it is the duty of every person to notify the agency immediately of the discharge, accidental or otherwise, of any substance or material under its control which, if not recovered, may cause pollution of waters of the state, and the responsible person shall recover as rapidly and as thoroughly as possible such substance or material and take immediately such other action as may be reasonably possible to minimize or abate pollution of waters of the state caused thereby.

(b) Notification is not required under paragraph (a) for a discharge of 5 gallons or less of petroleum, as defined in section 115C.02, subdivision 10. This paragraph does not affect the other requirements of paragraph (a).

If a spill occurs, follow these basic steps:

Materials that require cleanup include, but are not limited to, hydraulic oil, diesel fuel, gasoline, grease, solvents and antifreeze. Spills have the potential to cause severe environmental damage. All spills must be treated with great care and dealt with promptly to minimize the possibility of a spill becoming a major issue:

• Stop all work operations.
• Control any potential sources of ignition.
• Follow specific safety warnings and use appropriate personal protection equipment. Consult the Material Safety Data Sheet.
• Stop the source of the spill, if you can do so safely.
• Call 911 if fire or public safety hazards are created.
• Contain the spilled material. Dirt, sand or any semi-impermeable material may be used to create a containment structure to prevent the material from flowing.
• Report any spill that exceeds the reporting requirement threshold to the Minnesota Duty Officer at 651-649-5451 or 800-422-0798 any time, day or night.
• Do not flush the spilled material into waterways or wetlands.
• Block entry into waterways and wetlands and contain the spill with berms made of earth or other barriers.
• Remove spills with absorbent pads.

• Place absorbent pads and contaminated soil, vegetation, ice or snow in the spill kit drum for proper disposal. All used spill kit drums shall be properly labeled.

• Make every effort to avoid disturbing vegetation.

• Contain the spill from further spread.

A spill response plan will be posted in all drills or drill shacks. The project supervisor, supervisors and field employees of drilling contractors are responsible for understanding the spill response plan and ensuring the guidelines are strictly followed.

Spill kits will be available at all drill sites. The spill kit shall consist of the following:

• 55-gallon steel drum labeled ‘spill kit’ used for the sole purpose of collecting spilled product and cleanup materials.

• Absorbent pads.

• Booms for containing spills.

• Heavy-duty protective gloves.

INVASIVE SPECIES MANAGEMENT

The following precautions will be taken to prevent non-native invasive aquatic and terrestrial species (NNIS) from entering storm water runoff:

• To avoid cross-contamination of aquatic invasive species, there shall be no back flushing water from drill water tank into a surface water source. If it is necessary to empty the draft tank, it may be emptied in an upland area where no overland surface flow reaches water bodies or wetlands during back flushing.

• Water from one stream or lake will not be transferred into another.

• Avoid extracting organic and bottom material into water intakes when pumping from streams or ponds.

• Minimize driving equipment through or wading across water bodies, whenever possible.

• Avoid water sources known to have NNIS present.

• Prior to initial deployment to the project and before moving equipment from a drill site known to be infested with NNIS to a new drill site, all off-road equipment (bulldozers, excavators, drill rigs) shall be cleaned so it is free of soil, seeds, vegetative matter, NNIS and their propagation structures (spores, eggs, etc.).

• Sweep vehicle cabs, and deposit refuse in waste receptacles regularly.
NOISE MANAGEMENT

Noise reduction from drilling operations may be implemented due to local conditions, such as proximity to occupied dwellings, campgrounds, resorts, areas of high outdoor recreation use and the Boundary Waters Canoe Area Wilderness (BWCAW). Reductions can be accomplished with measures such as installing sound-abatement panels, adding baffling around the drill, adjusting the location of drilling activities, installing high-efficiency mufflers or other measures that may be identified during implementation.

State noise standards are contained in Minnesota Rule 7030:

<table>
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<th>Noise Area Classification</th>
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<th>Nighttime L50</th>
<th>Daytime L10</th>
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*Note: Noise Area Classification 1 is for homes, cabins, resorts, etc.

Definitions for L10 and L50:

- **L10** means the sound level, expressed in dB, which is exceeded 10 percent of the time for a 1-hour survey, as measured by test procedures approved by the commissioner.

- **L50** means the sound level, expressed in dB, which is exceeded 50 percent of the time for a 1-hour survey, as measured by test procedures approved by the commissioner.

In addition to the state standards for noise levels, any drilling on federal land within the Superior National Forest must also meet the additional requirement of:

- Reduce sound levels emitted by drilling reaching receptors to an L50 level of 30 dB and an L10 level of 35 dB at the boundary of the BWCAW.
LIGHT POLLUTION PREVENTION/REDUCTION

Employee safety is a top priority. Adequate lighting is required to maintain safety at the drill site. Mining Minnesota members will work to minimize the amount of light pollution our drilling activities create.

Members will control stray light as follows:
- Use lighting that is of adequate wattage but not excessively bright.
- Direct lighting away from areas used by the public, highways and roads, and homesteads, whenever possible.
- Minimize the use of high-beam lights on vehicles.
- Reduce light pollution generated at drill sites by pointing lighting sources for drill rigs downwards and/or shielding lighting as much as feasible while completing safe drilling operations.
WILDFIRE PREVENTION AND RESPONSE

The practices below, if appropriate and necessary, will be followed to prevent and respond to wildfires and other fires.

Wildfire response plans will be followed and will be commensurate with risk and in accordance with legislative requirements.

• The following equipment will be provided for by drilling contractor employees:
  o 5-pound ABC fire extinguisher will be maintained inside each shack or drill rig.
  o 10-pound ABC fire extinguisher will be mounted on the outside of each shack or drill rig.
  o 5-pound ABC fire extinguisher will be mounted on each pickup, water truck, and other support vehicles and equipment.
  o 10-pound ABC fire extinguisher will be located in a conspicuous location at the laydown area.
  o One 800-gallon water tank paired with a centrifugal pump and 50 feet of hose will be available during fire season in forested areas.
  o Management on a seasonal basis. The water tank shall be kept 75 percent full at all times, and field employees will test the system weekly.
  o Each drill rig will be outfitted with fire tools, including two spade shovels and one pickaxe.

• Cigarette butts will be disposed of in designated receptacles.

• All hot work, including welding, soldering, cutting and brazing of metal, will be done while there is an employee spotter available. The spotter will maintain visual surveillance for at least 30 minutes after all hot work is complete.

• Heaters will be maintained in good condition. Heaters in use will not be left unattended.

• Each piece of gasoline-powered equipment will be operated at all times with a spark-arresting muffler in good working condition and adapted to that equipment.

• A wildfire response plan will be posted in the shack of each drill rig.

If fire starts on site

• Use extinguishers and the water tank to extinguish it.
• Move combustible and flammable material out of the area.
• Do not try to fight a large fire.
• If you must evacuate, contact a foreman immediately. Notify other rigs.
• Evacuate to the designated rallying point for each project.
• Call 911 after you have made contact with a foreman.
If wildfire is rapidly approaching
- Do not try to fight a large wildfire.
- If you spot a fire, contact a foreman immediately. Notify other rigs.
- Evacuate the area immediately. Meet at the designated rallying point for each project.
- Call 911.

Report all fires to a supervisor
- A rallying point for all fires will be designated for each drilling project.
- You must meet there unless a foreman directs otherwise.

TRAINING

The following training requirements ensure Mining Minnesota members comply with the best environmental practices.

Project supervisor and supervisor training
Project supervisors and supervisors will be trained on the best environmental practices by Mining Minnesota management. Each project supervisor and supervisor will receive a written copy of the best environmental practices and be expected to read and understand the contents.

Field employee training
Field employees newly assigned to the project will be trained on the best environmental practices prior to assignment. Field employees are expected to timely raise questions to their supervisor regarding any questions about the best environmental practices, especially if they are unclear about its intent or meaning. Project supervisors or supervisors will communicate revisions to the best environmental practices to field employees in a timely manner.

Visitors
Any visitors or groups will be required to receive training, including safety practices and requirements.
EXPLORATION BEST PRACTICES COMMITTEE

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Harold J. Noyes  
President  
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Senior Vice President, Exploration  
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Henry “Rick” Sandri, Ph.D  
President & COO  
Vermillion Gold Inc.

David Simpson  
GM, Exploration  
Rio Tinto Exploration

Marty Vadis  
VP Environmental Affairs  
Idea Drilling LLC

Andrew Ware  
Chief Geologist  
PolyMet Mining Corp
DRILLING REGULATIONS
AND REGULATOR CONTACT INFORMATION

The following is a partial list of laws, rules and permits that regulate exploration drilling in Minnesota:

- Minnesota Statute 103i
- MN Department of Health Rule 4727
- Minnesota Noise Pollution Control Rule 7030
- Minnesota Wetlands Conservation Act
- Corps of Engineers 404 Wetlands Permit
- Federal Hardrock Minerals Prospecting Permit Stipulations
- DNR Water Appropriation Permit
- Water Pollution Control Statute 115
- SWPPP Storm Water Pollution and Prevention Plan

Drilling operations

**Minnesota Department of Health – Central Office/Metro District**
http://www.health.state.mn.us
625 N. Roberts St.
P.O. Box 64975
St. Paul, MN 55164
Telephone: 651.201.5000 or 800.383.0823
TTY: 651.201.5797

**Minnesota Department of Natural Resources – Hibbing Office**
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**Minnesota Geological Survey**
http://www.mngs.umn.edu
2642 University Ave. West
St. Paul, MN 55114-1032
Telephone: 612.627.4780
Fax: 612.627.4778

**Natural Resources Research Institute**
University of Minnesota Duluth
http://www.nrri.umn.edu
5013 Miller Trunk Highway
Duluth, MN 55811
Telephone: 218.720.4278
Fax: 218.720.4329

**Minnesota Department of Natural Resources – Hibbing Office**
http://www.dnr.state.mn.us
1525 Third Ave. E.
Hibbing, MN 55746
Telephone: 218.231.8484
Fax: 218.262.7328
Drilling laws and regulations

Minnesota Department of Natural Resources – Central Office
http://www.dnr.state.mn.us
500 Lafayette Road
St. Paul, MN 55155
Telephone: 651.296.6157 or 888.646.6367
Email: info.dnr@state.mn.us
TTY: 651.201.5000 or 800.657.3929

Minnesota Pollution Control Agency
http://www.pca.state.mn.us
520 Lafayette Road
St. Paul, MN 55155
Telephone: 651.296.6300 or 800.657.3864

Minnesota Department of Health – Central Office/Metro District
http://www.health.state.mn.us
625 N. Roberts St.
P.O. Box 64975
St. Paul, MN 55164
Telephone: 651.201.5000 or 800.383.0823
TTY: 651.201.5797

US Army Engineer District, St. Paul
Army Corps of Engineers Centre
http://www.mvp.usace.army.mil
180 Fifth St. E.
St. Paul, MN 55101
Telephone: 651-290-5201

Minnesota State Senator or Representative
http://www.gis.leg.mn/OpenLayers/districts

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ABOUT MINING MINNESOTA
Mining Minnesota is a membership organization committed to sustainable and environmentally responsible critical and strategic metals mining development. Driven by a diverse coalition of organizations, companies and individuals, Mining Minnesota strives to bring growth and job creation to the state through the responsible development of Minnesota’s natural resources.