Industrial Stormwater

Fact Sheet Series

Sector J: Mineral Mining and Processing Facilities

U.S. EPA Office of Water
EPA-833-F-06-025
February 2021

What is the NPDES stormwater permitting program for industrial activity?

Activities, such as material handling and storage, equipment maintenance and cleaning, industrial processing or other operations that occur at industrial facilities are often exposed to stormwater. The runoff from these areas may discharge pollutants directly into nearby waterbodies or indirectly via storm sewer systems, thereby degrading water quality.

In 1990, the U.S. Environmental Protection Agency (EPA) developed permitting regulations under the National Pollutant Discharge Elimination System (NPDES) to control stormwater discharges associated with eleven categories of industrial activity. As a result, NPDES permitting authorities, which may be either EPA or a state environmental agency, issue stormwater permits to control runoff from these industrial facilities.

What types of industrial facilities are required to obtain permit coverage?

This fact sheet specifically discusses stormwater discharges that have been exposed to significant materials from active and inactive mineral mining and processing facilities as defined by Standard Industrial Classification (SIC) Major Group 14. Facilities and products in this group fall under the following categories, all of which require coverage under an industrial stormwater permit:

- Potash, Soda, and Borate Minerals (SIC Code 1474)
- Phosphate Rock (SIC Code 1475)
- Chemical and Fertilizer Mineral Mining (SIC Code 1479)
- Dimension Stone (SIC Code 1411)
- Crushed and Broken Limestone (SIC Code 1422)
- Crushed and Broken Granite (SIC Code 1423)
- Crushed and Broken Stone (SIC Code 1429)
- Construction Sand and Gravel (SIC Code 1442)
- Industrial Sand and Gravel (SIC Code 1446)
- Kaolin and Ball Clay (SIC Code 1455)
- Clay, Ceramic, and Refractory Minerals (SIC Code 1459)
- Miscellaneous Nonmetallic Minerals, Except Fuels (SIC Code 1499).

Contact your permitting authority for any additional requirements or limitations, as industrial stormwater permit coverage may or may not cover or be required for certain discharges from mineral mining and processing facilities.

What does an industrial stormwater permit require?

Common requirements for coverage under an industrial stormwater permit include development of a written stormwater pollution prevention plan (SWPPP), implementation of control measures, and submittal of a request for permit coverage, usually referred to as the Notice of Intent or NOI. The SWPPP is a written assessment of potential sources of pollutants in stormwater runoff and control measures that will be implemented at your facility to minimize the discharge of these pollutants in runoff from the site. These control measures include site-specific best management practices (BMPs), maintenance plans, inspections, employee training, and reporting. The procedures detailed in the SWPPP must be implemented by the facility and updated as necessary, with a copy of the SWPPP kept on-site. The industrial stormwater permit also requires collection of visual, analytical, and/or compliance monitoring data to determine the effectiveness of implemented BMPs. For more information on EPA's industrial stormwater permit and links to State stormwater permits, go to **www.epa.gov/npdes/stormwater** and click on "Industrial Activity."

What pollutants are associated with activities at my facility?

Pollutants conveyed in stormwater discharges from active and inactive mineral mining and processing facilities will vary. There are a number of factors that influence to what extent industrial activities and significant materials can affect water quality.

- Geographic location
- Hydrogeology
- Topography
- Mineralogy of the extracted resource and the surrounding rock
- How the mineral was extracted (e.g., quarrying/open face, dredging, solution, or underground mining operations)
- Type of ground cover (e.g., vegetation, crushed stone, or dirt)
- Outdoor activities (e.g., material storage, loading/unloading, vehicle maintenance)
- Size of the operation
- Type, duration, and intensity of precipitation events

The activities, pollutant sources, and pollutants detailed in Table 1 are commonly found at mineral mining and processing facilities.

Table 1. Common Activities, Pollutant Sources, and Associated Pollutants at Mineral Mining and Processing Facilities

Activity	Pollutant Source	Pollutant
Site Preparation	Road construction	Dust, total suspended solids (TSS), total dissolved solids (TDS), turbidity
	Removal of overburden	
	Removal of waste rock to expose the mineral body	
Mineral Extraction	Blasting activities	Dust, TSS
Mineral Processing Activities	Rock sorting	Dust, TSS, TDS, turbidity, fines
	Rock crushing	Dust, TSS, TDS, turbidity, fines
	Rock washing	TSS, TDS, turbidity, pH
	Raw material storage	Dust, TSS, TDS, turbidity
	Waste rock storage	Dust, TSS, TDS, turbidity, pH
	Raw material loading	Dust, TSS, TDS, turbidity
	Processing materials unloading	Diesel/gas fuel, oil, lime
	Raw or waste material transportation	Dust, TSS, TDS, turbidity

Table 1. Common Activities, Pollutant Sources, and Associated Pollutants at Mineral Mining and Processing Facilities (continued)

Activity	Pollutant Source	Pollutant
Other Activities	Sedimentation pond upsets	TSS, TDS, turbidity, pH
	Sedimentation pond sludge removal and disposal	Dust, TSS, TDS, turbidity, pH
	Air emission control cleaning	Dust, TSS, TDS, turbidity
Equipment/Vehicle Maintenance	Fueling activities	Diesel/gas fuel, oil
	Parts cleaning	Solvents, oil, heavy metals, acid/alkaline wastes
	Waste disposal of oily rags, oil and gas filters, batteries, coolants, degreasers	Oil, heavy metals, solvents, acids
	Fluid replacement including hydraulic fluid, oil, transmission fluid, radiator fluids, and grease	Oil, arsenic, lead, cadmium, chromium, benzene, TCA, TCE, PAHs, solvents
Reclamation Activities	Site preparation for stabilization	Dust, TSS, TDS, turbidity
	Fertilizers	Nitrogen, phosphorus

Note: Activities may have additional pollutant sources that contain PFAS and can come into contact with stormwater discharges. Per- and polyfluoroalkyl substances (PFAS) are a group of man-made chemicals that include PFOA, PFOS, GenX, and many other chemicals.

What BMPs can be used to minimize contact between stormwater and potential pollutants at my facility?

A variety of BMP options may be applicable to eliminate or minimize the presence of pollutants in stormwater discharges from mineral mining and processing facilities. You will likely need to implement a combination or suite of BMPs to address stormwater runoff at your facility. Your first consideration should be for pollution prevention BMPs, which are designed to prevent or minimize pollutants from entering stormwater runoff and/or reduce the volume of stormwater requiring management. Prevention BMPs can include regular cleanup, collection and containment of debris in storage areas, and other housekeeping practices, spill control, and employee training. It may also be necessary to implement treatment BMPs, which are engineered structures, intended to treat stormwater runoff and/or mitigate the effects of increased stormwater runoff peak rate, volume, and velocity. Treatment BMPs are generally more expensive to install and maintain and include oil-water separators, wet ponds, and proprietary filter devices.

Discharges from mining operations are in some ways dissimilar to other types of industrial facilities. Mining facilities are often in remote locations and may operate only seasonally or intermittently, yet need year-round controls because significant materials remain exposed to precipitation when reclamation is not completed. These characteristics make resource intensive end-of-pipe management controls less desirable.

EPA believes that the most appropriate means of stormwater management at mineral mining and processing facilities are source reduction BMPs. Source reduction BMPs are methods by which discharges of contaminants are controlled with little or no required maintenance. Examples of source reduction controls include diversion dikes, vegetative covers, and berms. These practices are typically low in cost and relatively easy to implement. In some instances, more resource intensive treatment BMPs, including sedimentation ponds, may be necessary depending upon the type of discharge, types and concentrations of contaminants, and volume of flow.

BMPs must be selected and implemented to address the following:

Good Housekeeping Practices

Good housekeeping is a practical, cost-effective way to maintain a clean and orderly facility to prevent potential pollution sources from coming into contact with stormwater. It includes establishing protocols to reduce the possibility of mishandling materials or equipment and training employees in good housekeeping techniques. Common areas where good housekeeping practices should be followed include trash containers and adjacent areas, material storage areas, vehicle and equipment maintenance areas, and loading docks. Good housekeeping practices must include a schedule for regular pickup and disposal of garbage and waste materials and routine inspections of drums, tanks, and containers for leaks and structural conditions. Practices also include containing and covering garbage, waste materials, and debris. Involving employees in routine monitoring of housekeeping practices has proven to be an effective means of ensuring the continued implementation of these measures. Industrial facilities can conduct activities that use, store, manufacture, transfer, and/or dispose of PFAS containing materials. Successful good housekeeping practices to minimize PFAS exposure to stormwater could include inventorying the location, quantity, and method of storage; using properly designed storage and transfer techniques; providing secondary containment around chemical storage areas; and using proper techniques for cleaning or replacement of production systems or equipment.

Minimizing Exposure

Where feasible, minimizing exposure of potential pollutant sources to precipitation is an important control option. Minimizing exposure prevents pollutants, including debris, from coming into contact with precipitation and can reduce the need for BMPs to treat contaminated stormwater runoff. It can also prevent debris from being picked up by stormwater and carried into drains and surface waters. Examples of BMPs for exposure minimization include covering materials or activities with temporary structures (e.g., tarps) when wet weather is expected or moving materials or activities to existing or new permanent structures (e.g., buildings, silos, sheds). Even the simple practice of keeping a dumpster lid closed can be a very effective pollution prevention measure. Another example could include locating PFAS-containing materials and residues away from drainage pathways and surface waters.

Erosion and Sediment Control

BMPs must be selected and implemented to limit erosion on areas of your site that, due to topography, activities, soils, cover, materials, or other factors are likely to experience erosion. Erosion control BMPs such as seeding, mulching, and sodding prevent soil from becoming dislodged and should be considered first. Sediment control BMPs such as silt fences, sediment ponds, and stabilized entrances trap sediment after it has eroded. Sediment control BMPs should be used to back-up erosion control BMPs.

Management of Runoff

Your SWPPP must contain a narrative evaluation of the appropriateness of stormwater management practices that divert, infiltrate, reuse, or otherwise manage stormwater runoff so as to reduce the discharge of pollutants. Appropriate measures are highly site-specific, but may include, among others, vegetative swales, collection and reuse of stormwater, inlet controls, snow management, infiltration devices, and wet retention measures. For mine sites requiring additional sources of water for processing operations, rainfall events and stormwater run-on can be managed for use in dust suppression, processing, and washing activities. Incorporating treatment like granular activated carbon may be helpful to remove certain pollutants like PFAS.

A combination of preventive and treatment BMPs will yield the most effective stormwater management for minimizing the offsite discharge of pollutants via stormwater runoff. Though not specifically outlined in this fact sheet, BMPs must also address preventive maintenance records or logbooks, regular facility inspections, spill prevention and response, and employee training.

All BMPs require regular maintenance to function as intended. Some management measures have simple maintenance requirements, others are quite involved. You must regularly inspect all BMPs to ensure they are operating properly, including during runoff events. As soon as a problem is found, action to resolve it should be initiated immediately.

Implement BMPs, such as those listed below in Table 2 for the control of pollutants at mineral mining and processing facilities, to minimize and prevent the discharge of pollutants in stormwater. Identifying weaknesses in current facility practices will aid the permittee in determining appropriate BMPs that will achieve a reduction in pollutant loadings. BMPs listed in Table 2 are broadly applicable to mineral mining and processing facilities; however, this is not a complete list and you are recommended to consult with regulatory agencies or a stormwater engineer/consultant to identify appropriate BMPs for your facility.

Table 2. BMPs for Potential Pollutant Sources at Mineral Mining and Processing Facilities

Pollutant Source	BMPs
Site preparation: General	❑ Install temporary or permanent discharge diversions to prevent uncontaminated (or less contaminated) flows from contacting sources of pollutants. Examples of BMPs include: - Install dikes, curbs, and berms for discharge diversions. - Use check dams, rock outlet protection, level spreaders, stream alternation and drop structures for runoff dispersion. ❑ Install temporary or permanent diversions to direct contaminated flows to sediment ponds or other treatment facilities. Examples of BMPs include: - Install conveyance systems such as channels, gutters, culverts, rolling dips and road sloping, and/or roadway water deflectors. - Install gabions, riprap, native rock retaining walls, straw bale barriers, sediment traps/catch basins, and vegetated buffer strips for sediment control and collection.
Site preparation: Haul and access roads	❑ Construction of haul roads should be supplemented by BMPs that divert runoff from road surfaces, minimize erosion, and direct flow to appropriate channels for discharge to treatment areas. Examples of BMPs include: - Install dikes, curbs, and berms for discharge diversions. - Install conveyance systems such as channels, gutters, culverts, rolling dips and road sloping, and/or roadway water deflectors. - Use check dams, rock outlet protection, level spreaders, stream alternation and drop structures for runoff dispersion. - Install gabions, riprap, native rock retaining walls, straw bale barriers, sediment traps/catch basins, and vegetated buffer strips for sediment control and collection. - Keep as much vegetation as possible when building roads and seed as necessary. Stabilize soil via willow cutting establishment. ❑ Place as far as possible from natural drainage areas, lakes, ponds, wetlands, or floodplains ❑ Width and grade of roads should be minimal and should be designed to match the natural contours of the area. ❑ Frequently inspect all stabilization and structural erosion control measures and perform all necessary maintenance and repairs.

Table 2. BMPs for Potential Pollutant Sources at Mineral Mining and Processing Facilities (continued)

Pollutant Source	BMPs
Mineral extraction: Pits/quarries or underground mines	❑ Install dikes, curbs, and berms for discharge diversions. ❑ Install conveyance systems such as channels and gutters. ❑ Use serrated slopes, benched slopes, contouring, and stream alteration to direct uncontaminated discharges away from a pit or quarry. ❑ Install sediment settling ponds, straw bale barrier, and siltation berms. ❑ Keep as much vegetation as possible when excavating and seed as necessary to minimize exposed soils.
Mineral extraction and processing: Overburden, waste rock, and raw material piles	❑ Install dikes, curbs, and berms for discharge diversions. ❑ Install conveyance systems such as channels and gutters. ❑ Overburden, topsoil, waste rock, raw material, or intermediate and final product stockpiles should be located away from surface waters and other sources of water, as well as geologically unstable areas. ❑ Use serrated slopes, benched slopes, contouring, and stream alteration around piles for sediment control and collection. ❑ Install plastic matting, plastic netting, erosion control blankets, mulch straw, compaction, sediment/settling ponds, silt fences, and siltation berms for sediment control and collection. ❑ Stabilize and recontour (if necessary) piles. ❑ Vegetate as many piles as possible (involves topsoiling, seedbed preparation, and/or seeding).
Reclamation	❑ Install dikes, curbs, and berms for discharge diversions. ❑ Install conveyance systems such as channels and gutters. ❑ Use check dams, rock outlet protection, level spreaders, stream alternation, drop structures, serrated slopes, benched slopes, contouring, and stream alteration for runoff dispersion. ❑ Install gabions, riprap, native rock retaining walls, straw bale barriers, sediment traps/catch basins, biotechnical stabilization, silt fences, siltation berms, brush sediment barriers and vegetated buffer strips for sediment control and collection. ❑ Recontouring and vegetation should be performed to stabilize soils and prevent erosion in mined out portions or inactive areas of the site as active mining moves to new areas (includes topsoiling, seedbed preparation, seeding, willow cutting establishment). ❑ If a quarry is being converted into a reservoir or recreational area, disturbed areas above the quarry rim must still be reclaimed. ❑ Use overburden and topsoil stockpiles to fill in a pit or quarry (when practical).
Equipment/vehicle maintenance	❑ Perform all cleaning operations indoors or under covering when possible. Conduct the cleaning operations in an area with a concrete floor with no floor drainage other than to sanitary sewers or treatment facilities. ❑ If operations are uncovered, perform them on a concrete pad that is impervious and contained. Use berms, curbs, or similar means to ensure that stormwater runoff from other parts of the facility does not flow over the maintenance area. ❑ Collect the stormwater runoff from the cleaning area and provide treatment or recycling. Discharge vehicle wash or rinse water to the sanitary sewer (if available and allowed by sewer authority), wastewater treatment, a land application site, or recycle on-site. DO NOT discharge washwater to a storm drain or to surface water. ❑ Eliminate floor drains that are connected to the storm or sanitary sewer; if necessary, install a sump that is pumped regularly. Collected wastes should be properly treated or disposed of by a licensed waste hauler.

Table 2. BMPs for Potential Pollutant Sources at Mineral Mining and Processing Facilities (continued)

Pollutant Source	BMPs
Equipment/vehicle maintenance (continued)	❑ Use drip pans, drain boards, and drying racks to direct drips back into a fluid holding tank for reuse. ❑ Drain all parts of fluids prior to disposal. Oil filters can be crushed and recycled. ❑ Promptly transfer used fluids to the proper container; do not leave full drip pans or other open containers around the shop. Empty and clean drip pans and containers. ❑ Dispose of greasy rags, oil filters, air filters, batteries, spent coolant, and degreasers properly. ❑ Store batteries and other significant materials inside. ❑ Label and track the recycling of waste material (e.g., used oil, spent solvents, batteries). ❑ Maintain an organized inventory of materials. ❑ Eliminate or reduce the number and amount of hazardous materials and waste by substituting nonhazardous or less hazardous materials. ❑ Clean up leaks, drips, and other spills without using large amounts of water. Use absorbents for dry cleanup whenever possible. ❑ Prohibit the practice of hosing down an area where the practice would result in the discharge of pollutants to a stormwater system. ❑ Clean without using liquid cleaners whenever possible. ❑ Do all cleaning at a centralized station so the solvents stay in one area. ❑ If parts are dipped in liquid, remove them slowly to avoid spills. ❑ Do not pour liquid waste into floor drains, sinks, outdoor storm drain inlets, or other storm drains or sewer connections. ❑ Park vehicles and equipment indoors or under a roof whenever possible and maintain proper control of oil leaks/spills. ❑ Check vehicles closely for leaks and use pans to collect fluid when leaks occur. ❑ Inspect the maintenance area regularly for proper implementation of control measures. ❑ Train employees on proper waste control and disposal procedures.
Fueling activities	❑ Conduct fueling operations (including the transfer of fuel from tank trucks) on an impervious or contained pad or under a roof or canopy where possible. Covering should extend beyond spill containment pad to prevent rain from entering. ❑ When fueling in uncovered area, use a concrete pad (asphalt is not chemically resistant to the fuels being handled). ❑ Use drip pans where leaks or spills of fuel can occur and where making and breaking hose connections. ❑ Use fueling hoses with check valves to prevent hose drainage after filling. ❑ Use spill and overflow protection devices. ❑ Keep spill cleanup material readily available. Clean up spills and leaks immediately. ❑ Minimize/eliminate run-on into fueling areas with diversion dikes, berms, curbing, surface grading or other equivalent measures. ❑ Collect stormwater runoff and provide treatment or recycling. ❑ Use dry cleanup methods for fuel area rather than hosing down the fuel area. Follow procedures for sweeping up absorbents as soon as spilled substances have been absorbed.

Table 2. BMPs for Potential Pollutant Sources at Mineral Mining and Processing Facilities (continued)

Pollutant Source	BMPs
Fueling activities (continued)	❑ Perform inspection and preventive maintenance on fuel storage tanks to detect potential leaks before they occur. ❑ Inspect the fueling area to detect problems before they occur. ❑ Train personnel on proper fueling procedures. ❑ Provide curbing or posts around fuel pumps to prevent collisions from vehicles. ❑ Discourage "topping off" of fuel tanks.

What if activities and materials at my facility are not exposed to precipitation?

The industrial stormwater program requires permit coverage for a number of specified types of industrial activities. However, when a facility is able to prevent the exposure of ALL relevant activities and materials to precipitation, it may be eligible to claim no exposure and qualify for a waiver from permit coverage.

If you are regulated under the industrial permitting program, you must either obtain permit coverage or submit a no exposure certification form, if available. Check with your permitting authority for additional information as not every permitting authority program provides no exposure exemptions.

Where do I get more information?

For additional information on the industrial stormwater program see **www.epa.gov/npdes/stormwater/msgp**.

A list of names and telephone numbers for each EPA Region or state NPDES permitting authority can be found at **www.epa.gov/npdes/stormwatercontacts**.

References

Information contained in this Fact Sheet was compiled from EPA's past and current Multi-Sector General Permits and from the following sources:

- Idaho Department of Environmental Quality, Air Quality Division. "Air Quality in Idaho: Supplemental Fugitive Dust Control Information." **www.deq.idaho.gov/air/prog_issues/pollutants/dust_control_plan.pdf**
- Idaho Department of Lands in conjunction with Other State and Federal Agencies. Best Management Practices for Mining in Idaho. **www.idl.idaho.gov/Bureau/Minerals/bmp_manual1992/bmp_index.htm**
- Orange County, California, Watershed & Coastal Resources Division. "Stormwater program." **www.ocwatersheds.com/StormWater/documents_bmp_existing_development.asp#ind**
- Pierce County Public Works and Utilities. "Best Management Practices for Commercial and Industrial Activities." **www.co.pierce.wa.us/xml/services/home/environ/water/cip/swmmanual/stakeholders/SWMM%20V4-C4_1.pdf**

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