

# **ENVIRONMENTAL BEST MANAGEMENT PRACTICE**

## **BMP No. 209**

### **Road & Right of Way Construction, Land Clearing and Maintenance Outside of the Hydrologic Boundary**

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#### **DEFINITIONS:**

**Hydrologic boundary:** Simply stated, Freeport-McMoRan Morenci Inc (Morenci) is divided into two broad drainage areas separated by a zero discharge hydrologic boundary. The stormwater that falls within the boundary is either used in the operations or evaporates. Stormwater that falls outside the boundary is allowed to flow into “Waters of the United States”.

**Pollutants:** Any disturbed natural, stored manmade and/or other materials that have the potential to impact the quality of water flowing to “Waters of the United States”.

#### **WHY DOES MORENCI NEED A BMP TO MANAGE STORM WATER DISCHARGES OUTSIDE THE HYDROLOGIC BOUNDARY?**

Morenci is required to have a Stormwater Pollution Prevention Plan (SWPPP) that meets the requirements of the Clean Water Act (CWA) National Pollutant Discharge Elimination System (NPDES) Storm Water Multi-Sector General Permit. The SWPPP describes pollution prevention and control practices designed to minimize the contact of storm water with “pollutants” prior to its authorized discharge to Waters of the United States. The plan also describes the proper use of sediment and erosion control practices.

This document provides BMPs for Morenci to use when constructing or maintaining roads, drill sites, power lines, pipelines or other land disturbing activities outside of the hydrologic boundary. All land disturbing activities outside the hydrologic boundary require review and approval by the Environmental Services Department.

#### **ROAD PLANNING AND DESIGN:**

##### **Introduction**

Planning and location of secondary roads and other land disturbing activities, whether for short or long term use need to have proper location and planning prior to the start of construction. Poor planning and location can lead to problems such as improper placement and construction of road fills, poorly designed culverts/drainage channels, steep road grades, undercutting of slope support, and poor drainage control. All of which can lead to significantly increased sediment in stormwater.

##### **Information Gathering**

The more information known about the area, the better-equipped one will be when constructing an access road. When planning a project remember the following:

- Whether working in the Mine or the Process Division topographic maps and survey information is available from Resource Control and/or Plant Engineering.
- All land disturbing activities outside of the hydrologic boundary need pre-authorization by Environmental Services prior to construction.

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- Contact Mine Planning and Plant Engineering to see if current mine or project plans will interfere with your short term or long term use of the access road.
- For road construction determine maximum vehicle sizing and volume of traffic prior to design. This is extremely important where steep grades are present and dust control measures are necessary.
- For drill pads, power lines and other land disturbing activities, locate the improvement such that impacts are minimized.
- Notice to Morenci Blue Stake and/or State Blue Stake permitting is required prior to construction.

#### **Road Location**

Location is a critical part in the success of access roads and other improvements and will directly affect the engineering and environmental constraints of the road. Surface and subsurface conditions as well as location could have a significant impact on the cost, design, construction, and long term maintenance of the improvement.

When determining road locations geographical control points should be assessed. These control points will allow or disallow the road location and determine grades and maintenance issues.

- Rock Outcrops; cross above or below; going through out crops can be costly if that cannot be removed by ripping with a dozer.
- Ridge tops typically provide good road locations and tend to alleviate drainage issues.
- Saddles are good places to cross ridges.
- Natural occurring benches or mine benches provide areas for switchbacks and provide areas to route drainage.
- Natural occurring drainage channels should be avoided unless absolutely necessary to cross. Special environmental permitting under the CWA Section 404 may be required before actual work has begun. These are high maintenance areas and should be crossed perpendicular to the channel. Always leave a free zone of material between drainage channels when building parallel to the stream/wash or drainage area.
- Ensure that all property boundaries are accurately determined and qualified by resource management.

#### **Design**

After completing a sufficient walk through and locating rough design on a topographic map, contact either Resource Management or Plant Engineering Surveying for proper design. This design should include structural controls that divert runoff and have proper drainage outlets.

#### **Diverting Runoff**

Runoff should be diverted away from roads and other disturbed areas by the use of berms, ditches, water bars, road sloping and other functionally equivalent diversions. Always divert water away from areas where high turbidity into mining solutions, rivers or streambeds may occur. One or all of the following procedures should be followed to divert runoff from roads or other disturbed areas:

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- **Diversion channels** such as V-ditches are bladed ditches running parallel to a road way in which runoff from roadway can travel. These require periodic maintenance and need to be installed in stable soil conditions. V-ditches can also be used in conjunction with drainage pits and water bars.
- **Berms** are designed to contain and direct storm water runoff and may be constructed along roads or may be installed in other areas where control of storm water runoff is necessary.
- **Water bars** are narrow structures that lie at a 30-degree angle down slope across a road that will force water off the road and into specific drainage areas. On highly active roadways, care should be taken to not damage traveling vehicles. Shallow water bars should be used with a maximum height of 8-12 inches in height and with a minimum width of 6-12 feet. The barrow material for the bar should be taken from upstream of the water bar leaving a shallow dip that will not hang up or damage the vehicles traveling across. The dip and bar should be designed for the lowest clearance vehicle traveling on the road.
- **Pipe Culverts** are open ended water channels that are installed under road ways to transport water from one side of the road to the other. These are successful if correct engineering controls are used prior to and during installation. If necessary, culverts should be used when all other alternatives will not work. Culverts pose high maintenance issues if not installed and sized properly. Culverts can be used in conjunction with diversion channels and drainage pits.

#### **Drainage and Drainage Outlets**

Removing fugitive out-falls and consolidating runoff into designed out-fall structures are required for quality engineering design. Drainage outlets need to be capable of managing expected volumes. Proper drainage will help to maintain the longevity of the improvement and keep erosion from destroying the surface areas. Improper drainage can lead to costly maintenance by washing away road fines and allowing sediment to be deposited in unwanted areas. These drainage areas need to be chosen carefully. Water should never run directly into open washes, active mining areas, or onto open dump faces where wash outs may occur. The use of the following common drainage structures will alleviate most common erosion problems and reduce maintenance cost.

- **Drainage pits** are excavated pits where road water or sediment is temporarily deposited during storm events. These pits are typically located adjacent to high water volume areas where water and sediment can be accumulated quickly and easily to forego road damage and high sediment carry-away. Water bars, ditches, sloping of road way and other road design methods used in erosion control are typically designed in conjunction with drainage pits. These pits need to be carefully located within stable, permeable soil. Pits located on fill areas need to be carefully reviewed for slope stability.
- **Reducing runoff velocities:** Energy dissipation devices such as hay bales, silt fences and rip-rap should be used to prevent any of the above from wearing away rapidly and to help develop healthy drainage. Minimizing grade will greatly reduce erosion and siltation problems as well.

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#### **Maintenance of Surface Disturbances**

Properly engineered roadways and other surface disturbances need to be maintained with the same intent as they were designed. The biggest issues for maintenance of disturbed areas are inconsistent maintenance blading techniques. Inexperienced operators tend to blade the crown off of the road, block existing drainage ways with win rows, and not follow the correct sloping of roadways etc. The following should be observed before blading any roadway:

- Follow proper Blue Stake procedures.
- Obtain information from area supervisors to understand the purpose and intent of the road.
- Be aware of what environmental concerns are in the area.
- Be aware of what the operational concerns are.
- Do a walk through to locate all drainage areas and record what did or did not work well during previous maintenance.
- If not sure, ask questions and/or contact engineering to avoid costly shutdowns and prevent costly maintenance issues.
- Finally use common sense.

#### **EMPLOYEE TRAINING**

All personnel shall receive training or at the least have access to this BMP when completing Road & Right of Way Construction, Land Clearing and Maintenance Outside of the Hydrologic Boundary.

Training will be provided by Supervisor and/or Department Environmental Representative.

#### **QUESTIONS OR NEED HELP? CONTACT:**

**Mine Planning Division Representatives**  
**Plant Engineering Division Representatives**  
**Resource Management Division Representatives**

**Enviro Representatives Phone Extensions:**

**Brian Chronowski (water) ..... 865-6257**

**Enviro Representatives Cell Phones:**

**Brian Chronowski (water) ..... 965-0235**

**Environmental Services Office:**

**865-6000**