Riprap consists of loose rocks placed along embankments to prevent erosion. Native rock retaining walls are another form of slope stabilization, with walls up to five feet in height, constructed from native rock to reinforce a steep slope.

Biotechnical Stabilization— Biotechnical stabilization uses live brush imbedded in the soils of a steep slope to prevent erosion. This method relies on the premise that the imbedded vegetation will eventually root and help stabilize the slope.

Straw Bale Barrier—Straw bales may be used as temporary berms, barriers, or diversions; capturing sediments, filtering runoff. When installed and maintained properly, these barriers remove approximately 67 percent of the sediment load.⁷⁵ These barriers are applicable across small swales, in ditches, and at the toe of bare slopes where there is a temporary large volume of sediment laden runoff.

Sediment Traps or Catch Basins— These temporary or permanent structures are useful for catching and storing sediment laden storm water runoff and are particularly useful during construction activities to contain runoff. The effectiveness of these BMPs is better in smaller drainage basin areas. Sediment traps are less than 50 percent effective in removing sediment from storm water runoff.⁷⁶

Vegetated Buffer Strips—The installation of vegetated buffer strips will reduce runoff and prevent erosion at a removal efficiency rate of 75 to 99 percent depending upon the ground cover.⁷⁷ In addition, vegetated buffer strips catch and settle sediment contained in the storm water runoff prior to reaching receiving waters.

Silt Fence/Filter Fence—A low fence made of filter fabric, wire and steel posts, should be used on small ephemeral drainage areas where storm water collects or leaves a mine site. Silt fences remove 97 percent of the sediment load and are easier to maintain and remove without creating lasting impacts to the environment.⁷⁸ Silt and filter fences need to be inspected periodically and may not be as effective as straw bales, since fabric may become clogged with fine particles preventing water flow.

Silt fences may have limited applicability for large areas. They are most effective for use in a small drainage areas. These fences may also be used in conjunction with nonstructural practices to maintain the integrity of soil prior to the establishment of vegetation.

Siltation Berms—Siltation berms are typically placed on the downslope side of a disturbed area to act as an impermeable barrier for the capture and retention of sediments in surface water runoff. Plastic sheeting is typically used to cover the berm. The berm and the plastic sheeting may require periodic maintenance and repair.

Brush Sediment Barriers—Brush barriers are temporary sediment barriers composed of tree limbs, weeds, vines, root mat, soil, rock and other cleared materials placed at the toe of a slope. A brush barrier is effective only for small drainage areas, usually less than 1/4 acre, where the slope is minimal.

Brush barriers do not function as permanent barriers since over time the barrier itself will degrade. This BMP is most effective when located at the toe of a slope of an area in which vegetation is being grown or during temporary operations. The brush barriers remove any excessive sediment generated by erosion prior to the establishment of vegetation.

(5) Vegetation Practices. Vegetation practices involve establishing a sustainable ground cover by permanent seeding, mulching, sodding, and other such practices. A vegetative cover reduces the potential for erosion of a site by: absorbing the kinetic energy of raindrops which would otherwise impact soil; intercepting water so it can infiltrate into the ground instead of running off and carrying contaminated discharges; and by slowing the velocity of runoff to promote onsite deposition of sediment. Vegetative controls are often the most important measures taken to prevent offsite sediment movement and can provide a six-fold reduction in the discharge of suspended sediment levels.⁷⁹ Permanent seeding has been found to be 99 percent effective in controlling erosion for disturbed land areas.⁸⁰ Many States require that topsoil be segregated from other overburden for use during reclamation. While stored, topsoil stockpiles should be vegetated. This temporary form of vegetation can

often be used for other piles of stored materials and for intermittent/seasonal operations.

Typically, the costs of vegetative controls are low relative to other discharge mitigation practices. Given the limited capacity to accept large volumes of runoff and potential erosion problems associated with large concentrated flows, vegetative controls should typically be used in combination with other management practices. These measures have been documented as particularly appropriate for mining sites.

Topsoiling, Seedbed Preparation— The addition of a layer of topsoil or plant growth material provides an improved soil medium for plant growth. Seedbed preparation may include the addition of topsoil ingredients to be mixed in with soils used for seedbed preparation. Ripping, dicing, and mixing soils promotes weed control and aerates the soil, encouraging seedling growth.

Broadcast Seeding and Drill Seeding—Seeding and vegetative planting are methods used to revegetate an area. Broadcast seeding spreads seeds uniformly, by hand or machine, to steep sloped or rocky areas, flat surfaces, and areas with limited access. Drill seeding is performed using a rangeland drill seeder and may not be used on rocky surfaces. Drill seeding is more suitably performed on flat, nonrocky surfaces, where the machine can insert seeds into the soil.

Willow Cutting Establishment— Willow cutting establishment describes a method of soil stabilization useful for stream banks and other areas located adjacent to water. Similar to biotechnical stabilization, willow cuttings are used to promote growth in an area needing stabilization. Willow cuttings are typically used to reinforce a streambank or other moist area. Willow cuttings require a great deal of moisture and must be planted in areas that remain moist for long periods in order to take hold and grow.

(6) Capping. In some cases, the elimination of a pollution source through capping contaminant sources may be the most cost effective control measure for discharges from inactive mineral mining and processing operations. Depending on the type of management practices chosen, the cost to eliminate the pollutant source may be very high. Once completed, however, maintenance costs will range from low to nonexistent.

Capping or sealing of waste materials is designed to prevent infiltration, as well as to limit contact between discharges and potential sources of

⁷⁵ "Sediment and Erosion Control: An Inventory of Current Practices—Draft," EPA, April 20, 1990, page IV–14.

⁷⁶ "Sediment and Erosion Control: An Inventory of Current Practices—Draft," EPA, April 20, 1990, page IV–26.

⁷⁷ "Sediment and Erosion Control: An Inventory of Current Practices—Draft," EPA, April 20, 1990, page IV–7.

⁷⁸ "Sediment and Erosion Control: An Inventory of Current Practices—Draft," EPA, April 20, 1990, page IV–15.

⁷⁹ "Performance of Current Sediment Control Measures at Maryland Construction Sites," January 1990, Metropolitan Washington Council of Governments, page X.

⁸⁰ "Sediment and Erosion Control: An Inventory of Current Practices—Draft," EPA, April 20, 1990, page IV–4.