(2) Erosion and Sediment Controls. Erosion and sediment controls limit movement and retain sediments from being transported offsite. Several structural collection devices have been developed to remove sediment from runoff before it leaves the site. Several methods of removing sediment from site runoff involve diversion mechanisms previously discussed, supplemented by a trapping or storage device. Structural practices typically involve filtering diffuse storm water flows through temporary structures such as straw bale dikes, silt fences, brush barriers or vegetated areas.

Structural practices are typically low in cost. However, structural practices require periodic removal of sediment to remain functional. As such, they may not be appropriate for permanent use at inactive mines. However, these practices may be effectively used as temporary measures during active operation and/or prior to the final implementation of permanent measures.

(a) Structural Practices.

(i) Sediment/Settling Ponds— Sediment ponds function as sediment traps by containing runoff for long periods of time, allowing suspended solids to settle. These structures can achieve a high removal rate of sediment for both process wastewater and storm water discharges.

Discharge ponds may also be designed to act as surge ponds which are designed to contain storm surges and then completely drain in about 24 to 40 hours, and remain dry during times of no rainfall. They can provide pollutant removal efficiencies that are similar to those of detention ponds.⁴⁵

(ii) Gabions, Riprap, and Native Rock Retaining Walls—These BMPs are all forms of slope stabilization. Gabions consist of rocks (riprap) contained by rectangular wire boxes or baskets for use as permanent erosion control structures. Riprap consists of loose rocks placed along embankments to prevent erosion.

(*iii*) 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.

(iv) 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.⁴⁶

(v) 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.⁴⁷

(vi) 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.⁴⁸

(vii) 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.⁴⁹

(viii) 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.

(ix) 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.

(b) Stabilization—Stabilization 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. Stabilization 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.⁵⁰ Permanent seeding has been found to be 99 percent effective in controlling erosion for disturbed land areas.⁵¹ 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 stabilization 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, stabilization controls should typically be used in combination with other management practices. These measures have been documented as particularly appropriate for mining sites.

(i) 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.

(*ii*) 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.

(iii) 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.

(iv) Plastic Matting, Plastic Netting, and Erosion Control Blankets—These BMPs are used to protect bare soils to control dust and erosion. Mats and blankets help to promote vegetative growth by maintaining moisture and heat within the soil.

⁴⁵ "Urban Targeting and BMP Selection," EPA, Region V, November 1990.

⁴⁶ "Sediment and Erosion Control: An Inventory of Current Practices—Draft," EPA, April 20, 1990, page IV–14.

⁴⁷ "Sediment and Erosion Control: An Inventory of Current Practices—Draft," EPA, April 20, 1990, page IV–26.

⁴⁸ "Sediment and Erosion Control: An Inventory of Current Practices—Draft," EPA, April 20, 1990, page IV–7.

⁴⁹ "Sediment and Erosion Control: An Inventory of Current Practices—Draft," EPA, April 20, 1990, page IV–15.

⁵⁰ "Performance of Current Sediment Control Measures at Maryland Construction Sites," January 1990, Metropolitan Washington Council of Governments, page X.

⁵¹ "Sediment and Erosion Control: An Inventory of Current Practices—Draft," EPA, April 20, 1990, page IV–4.