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CHAPTER V

V. MAINTENANCE FOR WATER QUALITY CONTROL

5.1 Pond Maintenance

The useful life of a pond is partially a function of the maintenance of the pond and the embankment. The primary purposes of maintenance are to preserve the structural integrity of the dam to ensure that essential design features of the outlets are maintained, and to ensure adequate storage and capacity for the pond. Minor problems should be repaired before they become major problems. It is usually less costly to implement aregular maintenance program than it is to make repairs after an extended period of negligence.

Written instructions for maintenance and operation of the structure (and any required monitoring equipment) should be prepared as part of the design. These instructions should establish the frequency, and describe the nature of, inspections. Instructions should also be provided for routine maintenance of inlet and outlet structures. If a spillway is controlled by manually operated gates, specific instructions should be given regarding the operation of the gates.

A record of all inspections and any maintenance performed on the pond should be kept. The date, last major rainfall, sediment storage level, and any problems should be noted. If maintenance has been performed, the date and type of repair should be noted. These two records will aid the operator in determining if chronic problem areas exist in the pond design.

After an area has been stabilized and successfully revegetated, sedimentation ponds may be removed. The decision for removal or retention of a sedimentation pond is usually addressed in the mining and reclamation plan submittal. The options available to the operator will be discussed later in this chapter.

Repairs of embankments and emergency spillways are extremely important for the proper functioning of the sedimentation pond system. In humid regions, embankments are usually stabilized by mulching and then by establishing a good vegetation cover. Where conditions do not allow the establishment of a vegetative cover, riprap or mulching may be used. The use of either a vegetative cover or riprap is not specifically required by OSM. However, both of these measures will aid in stabilizing the embankment or spillway and will usually reduce the required maintenance. The design

engineer should check with the regulatory authority to determine regionally accepted methods to stabilize the embankment and spillway.

Studies investigating the performance of existing sediment ponds for the control of erosion from surface mining operations have shown that once the pond has been constructed and operated maintenance of sediment level, inlets and outlets is one of the main causes of poor pond performance (EPA 1980, EPA 1979).

5.1.1 Accessibility

Location of the pond is of prime importance. The pond should be accessible for construction, monitoring, and maintenance. Accessibility for maintenance should be considered during the planning of the pond. The design engineer should consider the type of equipment used for construction and maintenance and the room required for this equipment to function efficiently. In a well designed pond, the heavier sediment will deposit near the inlet of the pond. Therefore, access to the inlet end of the pond is essential. A well constructed and regularly maintained road is very helpful for providing proper maintenance, including sediment removal, riprap repair, or embankment repair. Adequate accessibility is vital if chemical flocculation is being used.

5.1.2 Monitoring/Maintaining Sediment Storage Volume

Most sedimentation ponds are designed with sufficient annual sediment storage volume for a number of years. However, designing for excess storage volume does not guarantee that this storage volume will not be exceeded by a large storm event.

In order to ensure adequate storage volume, the available sediment storage volume in a pond must be monitored. Pre-defining the clean-out level is helpful for monitoring. One of the simplest means of pre-defining the clean-out level is to install a staff gage in the pond and to determine the sediment accumulation level that requires clean out. Most design manuals (Virginia Soil and Water Conservation Commission, 1980) recommend clean out when the accumulated sediment reaches 60 percent of the design sediment storage volume. An acceptable schedule should be established by the design engineer, operator, and regulatory agency. It is the responsibility of the operator to ensure that the schedule is followed.

Clean out of sediment is usually handled by a small dragline, clamshell bucket, or a backhoe for wet ponds and by a front-end loader for dry ponds. If a front-end loader is used, the ponds should be sufficiently dried in order to support the weight of equipment. For large ponds which cannot be cleaned by draglines operating from the banks, cleaning is more difficult. In such cases dredging may be necessary. Dredging will often require the service of professionals experienced in this procedure.

Sediment removed from a pond is usually incorporated into the spoil material. If the removed sediment is found to contain acid- or toxic-forming materials, the sediment will have to be disposed of in a more controlled manner. Sediment removed from a pond may be used as a substitute for topsoil. Use of this material as a topsoil substitute may be very useful for underground coal mining activities where the amount of available topsoil is limited. If chemical flocculation is used to improve the efficiency of the pond, use of the accumulated sediment will probably not be suitable as a topsoil substitute because of the possible toxic effects of the chemicals. Chemical and physical analyses are needed before any material can be used as a substitute for topsoil.

5.1.3 Bank Stability and Maintenance

Depending on the pond surface area, location, and local climate, maintenance of side slopes is important. Wave action, excavation, and removal of vegetation will promote the erosion of side slopesand subsequent increase in solids concentration of the pond. Several methods and maintenance procedures are discussed.

5.1.3.1 Vegetation Stabilization

Maintenance of vegetative measures should occur on a regular basis, consistent with favorable plant growth, soil, and climatic conditions. This involves regular seasonal work for fertilizing, liming (if applicable), pruning, fire controls, reseeding, and weed and pest control. Open channel spillways are subject to rapid infestation of weeds and woody plants. These should be eradicated or cut back since they often reduce drainageway efficiency. Well-maintained vegetation will provide a comfortable margin of erosion control .

5.1.3.2 Riprap Stabilization

Large storms may displace the riprap and allow erosion of the underlying material. Displacement and damage to the riprap will usually occur where flow velocities are highest. Typically, discharge structures and spillway areas experience the most damage. If displacement of the riprap has occurred, the riprap filter blanket should be checked for damages. Repairs should be made as soon as practical. These areas should be checked for erosion or silting of the channel in order to assess the impact of the carrying capacity of the channel.

Riprap is commonly used to control the upstream embankment of the dam from damages due to wave action. If riprap is damaged, the size of the riprap may have to be increased. The riprap filter blanket should be checked for damages wherever the riprap is displaced.

5.1.3.3 Rill and Gully Control

Concentrated water flow will cause rills and gullies on the embankment slope. Vegetation and riprap will often stop their development; however, a certain amount of erosion is expected on any earth embankment. The size and density at which rills and gullies become uncontrollable is difficult to define and is dependent on the soils, climate, and land use of the local area. OSM requires rills or gullies deeper than nine inches in reclaimed areas to be filled, graded, or otherwise stabilized (i.e., straw mulch) (30 CFR 816.106). Use of this rule as a guideline for embankment stabilization is suggested and will preclude the formation of large gullies. State agencies may require a more stringent maintenance program.

5.1.4 Maintenance of Inlet and Oultet Structures

Maintenance of inlet and outlet structures is an extremely important requirement in achieving effective sediment control. All water-handling structures should be inspected after every major storm. Erosion damages require prompt repair to prevent further damage and to help prevent similar damage in the future.

Sediment buildup in the inlet section and behind check dams and filter barriers should be checked. Sediment and other debris removed from these

areas should be disposed of in a manner that will prevent sediment from being carried back into the waterways at the mine. Possible use of this material as a substitute soil medium should be considered. Straw bales and sandbag barriers should be replaced before they become clogged or overtopped.

When vegetation is used to stabilize the area or as a vegetative filter, top dressing with fertilizer is usually required. Fertilizer will help keep a dense stand and provide growth of desirable plants. Areas where failures have been experienced in the establishment of vegetative protection must be promptly treated. Timely maintenance will reduce costs in the long run. If the area continues to exhibit vegetation failure due to either high or prolonged water flow, more extensive stabilizing measures such as riprap may be needed.

Pipe culvert spillways should be examined for structural stability both at the inlet and at the discharge point. Trash racks should be cleaned of debris. If gates or valves are used, they should be tested to see that they work freely.