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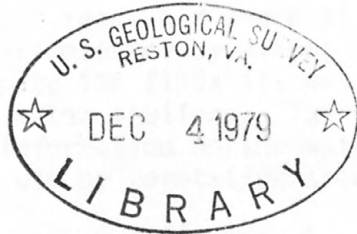
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ASSESSMENT OF POTENTIAL IMPACTS TO THE HYDROLOGIC SYSTEM
RELATED TO SURFACE MINING

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Assessment of potential impacts to the hydrologic system
related to surface mining

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With the increasing demand for energy minerals, such as coal and uranium, and other minerals, Indian lands have received the attention of leasing, exploration, and mining interests. If these mineral resources, together with all other land resources, are to be managed properly by tribal decisionmakers, they will need more information. The following steps should be considered: (1) assessment of the physical characteristics and natural resources of all areas having mining potential, (2) determination of the suitability for mining, and (3) estimation of reclamation potential if an area is disturbed.

There is often a lack of adequate hydrologic data needed for proper evaluation of the environmental impacts of land disturbance in semiarid and arid western United States. Therefore, any assessment should include the collection of water resources data.

In water-deficient areas of the West, most of the water resource is stored in the soil reservoir where it is used to support vegetation or returned to the atmosphere by evapotranspiration. Only a small part of the total precipitation finds its way to stream channels as runoff or to recharge ground-water aquifers. Therefore, soils and vegetation mapping should include information on the water-retention characteristics of the soils and water use by vegetation species.

Information on surface-water resources should include estimates of peak discharges during floods, estimates of annual flow volumes, and present water uses. The quality of surface water, including both chemical constituents and sediment discharge, are also important in evaluating water use.

Ground-water resources may be affected by surface mining. Shallow aquifers that are interbedded with near-surface mineral deposits may be disturbed and dewatered by mining. Also, the replacement of mine spoils in reclaiming mined areas may affect the chemical quality of ground water. Data should be collected in potential mine areas on the depth to ground water, quality of ground water, and hydraulic characteristics of aquifers.

Erosion is a serious problem in arid and semiarid regions because of the sparse vegetation cover and the common occurrence of high-intensity summer thunderstorms. Data should be collected on erosion rates on various rock and soil types and landforms. These erosion data should also be related to sediment yields in order to delineate areas that may not be suitable for mining because of serious erosion problems.

Some of the principal impacts on the hydrologic system that may result from mining are (1) topographic changes in elevation and slope lengths or steepness, (2) permeability and porosity of soils because of compaction or restructuring, (3) changes in vegetation species that may change water use, (4) changes in streamflow that may affect volume and quality, (5) erodibility of soils caused by disturbance associated with mining, and (6) changes in sediment yields from mined areas that may affect downstream areas.

Reclamation potential of mined areas should be estimated before potential mine sites are disturbed. This is difficult in many cases because of the lack of data and understanding of processes. However, some things that should be considered in evaluating the reclamation potential are (1) determination of postmining land use and its adaptability to the existing environment, (2) water requirements for proposed reclamation plan, (3) soils and vegetation characteristics and their limitations, and (4) recovery of hydrologic systems, both surface water and ground water.

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