

INTEGRATING GEOMORPHIC RECLAMATION WITH UNDISTURBED AND PREVIOUSLY RECLAIMED AREAS USING A MULTI-PROGRAM COMPUTERIZED DESIGN APPROACH AT MCKINLEY MINE¹

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Abstract: McKinley Mine is a surface coal mine located in western New Mexico. Coal production began in 1962 and ceased in 2009, leaving extensive lengths of final pit and highwalls (11,850 LF), areas of ungraded spoil (793 acres), areas where reclamation had been performed using conventional reconstruction methods (211 acres), and large areas of undisturbed watersheds that contributed stormwater runoff to the disturbed area (891 acres). Under the Clean Water Act's Western Alkaline Coal Mining regulations (Subpart H), reclamation was required to comply with criteria based upon average annual sediment yield from pre-mining undisturbed conditions.

A combination of post-mining topography and hydrologic control structures were designed to reconstruct stable reclaimed watersheds. A multi-computer program design approach integrated MINCOM (mass balance); Natural Regrade (surface topography); SEDCAD and HEC-RAS (hydrologic modeling, sedimentology and structure designs); and RUSLE (slope stability evaluation). The multi-program approach enabled geomorphic topography to tie into watershed slopes and concentrated flow features at adjacent undisturbed and previously reclaimed areas. The use of various hydrologic control structures (unlined and armored channels, drop structures, loose rock check dams, small depressions and sediment control ponds, etc.) provided stable conveyance of concentrated stormwater flow onto, within and from the reclamation.

Draglines and other large mining equipment were used for the bulk materials handling, to rough-shape post-mining topography. Bulldozers, track excavators and haul trucks were used to shape the final surface and construct the hydrologic control structures. Construction of the hydrologic features integrated with the geomorphic topography required attention, but the resulting reclamation will provide more stable long term slopes and subsequent low-maintenance conveyance of stormwater runoff, with natural-looking, varied topography that is conducive to the establishment of permanent diverse vegetation communities.

Additional Key Words: Geomorphic Reconstruction, Stream Reconstruction, Mine Reclamation, GeoRiparian Restoration, Clean Water Act, Western Alkaline Mining Subcategory, dragline reclamation

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