

UTILIZING GLOBAL POSITIONING SYSTEM TO EVALUATE RECLAMATION RESULTS AT A COAL MINE IN WYOMING ¹

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Abstract. Reclamation monitoring and evaluation require examining spatial areas within a coal mine over time to assess the results of reclamation. Global Positioning System (GPS) tools allow inspectors to gather the needed data and relate that data to mine and reclamation plans. A Trimble GeoXT is used by the Land Quality Division (LQD) to monitor the reclamation effort at the North Antelope Rochelle Mine (NARM) in Wyoming. The mine permit covers 27,187 acres, including a disturbed area of 11,105 acres. Coal production during the last annual report was 82,167,516 tons.

During monthly inspections, selected requirements for Area and Incremental Bond Releases are being monitored. According to Wyoming Department of Environmental Quality Coal Rules and Regulations, the Wyoming Coal Program has two types of bonds: an Area Bond and an Incremental Bond. The Area Bond is the cost required to achieve rough backfilling (the area is backfilled, graded, and ready for topsoiling). The Wyoming Coal Program allows some Area Bond release via the Annual Report (AR) or with information supplied through a regraded spoil program. The Incremental Bond involves the approval of the specific packages concerning the release of Phase 1 (topsoil applied), Phase 2 partial release (vegetation established) and Phase 3, full release. The GPS technique is used in the field to evaluate criteria for Area Bond and all phases of incremental release requirements. The criteria include:

- extent (acreage) of area bond release areas and slopes
- topsoil depth application
- wildlife features habitats
- restoration of creek channels
- erosional stability

The GPS dictionary was established for the bond release purposes. The data dictionary includes a list of fields with attribute choices for data entry. Similar fields and attributes are built for Geographical Information System (GIS) geodatabase established for NARM.

Upon returning to the office, the GPS field results are processed using the Trimble GPS Pathfinder Office program and Microsoft ActiveSync. Files are spatially corrected to improve the accuracy of the data and then the files are exported into ESRI shapefiles. A map using ArcMap is then produced and attached to the field inspection report.

The GPS field data are also processed as a part of the GIS geodatabase established for NARM. The basic framework for the GIS geodatabase was LQD Guideline No. 20 “Bond Release Procedures for Coal Mining Operations” (2003). This framework resulted in creating data layers (e.g. permit topography, area bond release application, post-mine streams, topsoil verification points, wildlife feature, tree restoration, slope line, erosion) and associated data types (point, line or polygon) and attributes (e.g. reclamation status, date of data collection). The GPS field data incorporated into the GIS geodatabase helps to track the bond release requirements for reclamation and bond release purposes.

Using the GPS technique in conjunction with GIS is improving the LQD inspector’s ability to assess reclamation adequacy and track features required for bond release.

Additional Key Words: bond release, ArcMap, GIS.

¹ Poster was presented at the 2005 National Meeting of the American Society of Mining and Reclamation, June 19-23, 2005. Published by ASMR, 3134 Montavesta Rd., Lexington, KY 40502.

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