Identification and Characterization of Coal Containing High Rare Earth Element Concentrations – Northern and Central Appalachian Basins

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Abstract

Tetra Tech, Inc. has organized a team to conduct sampling to characterize Northern and Central Appalachian Basin coal and coal-related associated materials in search of high concentrations of Rare Earth Elements (REE). Coal and coal-related associated materials are defined as run-of-mine coal; roof rock; overburden clays; shale interlayer formations; mine seam underclays; coal preparation plant refuse; etc.; and other coal-like materials as mined.

Tetra Tech has partnered with West Virginia Geological and Economic Survey (WVGES) to screen and conduct sampling of coal measures expecting a high probability to contain high Rare Earth Elements (REE's) in West Virginia. The Pennsylvania Department of Environmental Protection's Bureau of Abandoned Mine Reclamation (PaBAMR) has also agreed to provide Tetra Tech with access to sample specific coal seams on their project sites in central Pennsylvania.

Background

The WVGES has a long history of investigating the State's coal resources. This study began in earnest in the second and third decades of the Twentieth Century, documented in a series of detailed "County Geologic Reports" discussing the economic geology of the State. The goal of their most recent program is to remap the coal resources of West Virginia on a 1;24000 scale, depicting, on a seam-by-seam basis, mined areas, remaining resources and coal quality.

In previous work completed by Tetra Tech there were two distinct diapirs identified in the Pennsylvania Coal basins in Clearfield County, PA. A diaper is a geologic intrusion in which a more mobile and ductilly deformable material is forced into brittle overlying rocks. There appeared to be an association with igneous materials from diapirs, etc. found in or adjacent to coal basins and elevated levels of REE's. Out project is intended to sample and analyze target areas to confirm the geologic and stratigraphic locations of REE in the coal basins of West Virginia and Pennsylvania.

Investigation Areas

Pennsylvania
Samples were collected In 9 counties and 12 seams in the Allegheny, Conemaugh, and Monogahela Geologic Units.

West Virginia
Samples were collected In 22 counties and 28 coal seams in the Pottsville, Allegheny, Conemaugh, and Monongahela Geologic Units.

Table 1 Pennsylvania

Strata	Average TREE in PPM	Max TREE in PPM
Roof	279	+1,200
Coal	133	+700
Parting	226	+300
Floor	328	+1,100
Other	774	+2,000

Table 2 West Virginia

Strata	Average TREE in PPM	Max TREE in PPM
Roof	271	+500
Coal	85	+250
Parting	296	+1,000
Floor	298	+500
Full Seam	176	+1300
Other	532	+1100

Figure 1 Example of Coal Seam Sample Cross Section
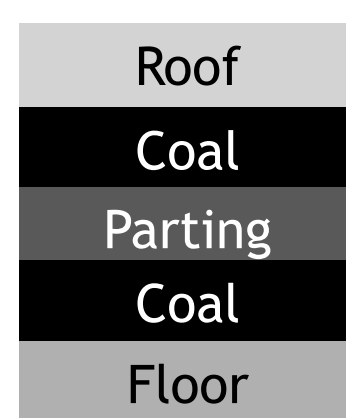

Roof
Coal
Parting
Coal
Floor

Figure 3 Clearfield County PA Faulting

Figure 2 Sample Locations

SAMPLE LOCATION MAP
REE APPALACHIA
DEPARTMENT OF ENERGY
PENNSYLVANIA AND WEST VIRGINIA

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Legend
Sample Location

Base map provided by ESRI's World Physical Map
Source: US National Park Service

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