Upper Pennsylvanian Coals and Associated Rocks — Depositional Environments, Sedimentation, Paleontology and Paleobotany, Upper Ohio River Valley[1]

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EXTENDED ABSTRACT

A number of geologically interesting localities in the upper Ohio River valley of eastern Ohio and western West Virginia have been selected as sites for geological discussion and collection at the coal geology field excursion of the North-Central Section of the Geological Society of America meeting at Akron, Ohio, 22-24 April 1988. The main focus is to be on coal-bearing strata of Upper Pennsylvanian (Allegheny, Conemaugh and Monongahela) age. Sixteen scheduled and three alternate sites have been chosen to represent: field examples of various types of stratigraphic problems; sedimentologic characteristics of diverse environments; controlling structural or physiographic anomalies of pre-coal-forming peat accumulation-surfaces; typical or unusual faunas and floras of terrestrial, brackish, or marine origin; and various economic coals demonstrating geologic problems related to their origin, constitution, and extraction.

Commercial coals of Allegheny age of both fluvial and deltaic origin, in three active strip mines to be visited, and in some exceptionally well-exposed road cuts, particularly along Ohio River bluffs, will be examined to analyze types of environments represented: regional trends; local anomalies such as channels, faults, splits, mineral enrichment, and so forth; sedimentary history; and stratigraphy and correlation. At several localities, Lower and Middle Kittanning coals are associated with thick fireclay or plastic underclay, and with generally thick deposits of evenly laminated, dark to black, bayfill sediments that appear to be marine in origin (or at least brackish), but occasionally may be of interlobate freshwater origin. The Lower and Upper Freeport coals to be visited often show some of the same characteristics. The region visited appears to have been one of marginally interdigitating marine and freshwater deposits with great irregularity of dimensions of prograding distributary delta lobes and intervening bays and estuarine channels.

Three sites will be visited to examine channels filled with brackish and marine clays, limestones, and coals. Some of these (Linton, 7-11, and East Liverpool) give clear indication of the extent of compaction of channel-filling sapropelic and humic peat accumulations.

Evaluation of sedimentologic features of several road-cut and river bluff exposures (mouth of Yellow Creek, south Wellsville, Toronto, and Chester) will allow for interpretation of very thick, stacked sandstones as contrasted with areas in which sandstones are minor compared with siltstones and mudstones that constitute the main sediments. Southward accreting point bars at To-

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ronto, south Yellow Creek, and south Wellsville indicate long maintenance of a major, northwest-oriented fluvial system that may have been controlled, in part, by regional faults. Diverse interpretations of the sedimentologic history of these sites are considered.

Conemaugh strata are to be examined at mines near West Point and East Liverpool, and at road cuts near Steubenville and south of Weirton, West Virginia. These strata are exceedingly variable locally above the Brush Creek limestone and marine shale sequences; below this they are less variable and contain more commercial coals. The initial red or variegated red-green shales and calcareous mudstones of the Conemaugh first appear in this sequence and become extensive above the Brush Creek horizon. These are especially well displayed in the new 120-m high road cut south of Weirton. The variability of the Cambridge and Ames limestone zones is demonstrated by comparison of exposures north of Steubenville and Weirton with those further west at Cross Creek and Skelley Station. Northwest of East Liverpool and in the vicinity of West Point, interdigitating coal and marine limestone in the Mahoning interval will be examined to demonstrate interlobate bays separating delta-plain coals.

The classic vertebrate locality near the mouth of Yellow Creek (Linton site) has produced more than 6,000 catalogued specimens of fish, tetrapods, and reptiles in the past 130 years, representing over 40 genera. These were collected from a cannel coal and canneloid shale below the main 2-3-m thick, high-quality, Upper Freeport humic coal in the bottom of a channel which is cut 10-15 m into the subjacent Kittanning fluvial sediments. There will be opportunity to collect some of these fossils from long-buried cannel blocks, in old mine spoil piles, and to hear R. Hook discuss the general setting of this abandoned meander channel and the accumulation of the sapropelic peat in the bottom of this channel as stream activity became further removed from the site. There will also be opportunity to examine closely the cut-outs and splays of the Middle Kittanning coal underlying the Freeport coals near Linton and to discuss the presence of rhizomes, roots, and stumps in overbank and crevasse splay deposits beneath the coal at continuous exposures along Yellow Creek.

Another locality with remarkable paleontologic material is the 7-11 pit northwest of East Liverpool. Fossils collected here include cockroaches, spiders, millipedes, shark teeth, and lungfish scales, and a variety of invertebrates such as brachiopods, corals, snails, and cephalopods. Associated with these are fronds and branches of one the earliest conifers present in eastern North America. This sequence of early Conemaugh strata also contains a broad channel, cut almost to the top of the Upper Freeport coal.

One other type of important coal seam fossil material, known as coal balls, will be examined in the Upper Freeport at south Yellow Creek, and at the Ames and Duquesne coals associated with Ames and Skelley limestones (mid-Conemaugh age), west of Steubenville. G. Rothwell will discuss the general character of the flora and the constituents of the coal-forming plant material. The permineralization of such masses of peat at an early stage in coal formation allows the most direct and accurate means of determining the relative contribution of coal-swamp plants to the coal accumulation.

Lower Monongahela strata will be studied at three sites. The variable types of sediments constituting the roof of the Pittsburgh coal are reviewed and the limitations of the different types of rocks (i.e., limestone, calcareous or bouldery limestone and shale, and sandstone) for mine roof support will be demonstrated. The variable character of the associated limestones, including the Pittsburgh, Redstone, Fishpot, and Benwood, will be examined. Regional trends in these lacustrine deposits, controlled by proximity to or distance from clastic input or ephemeral drying (oxidation) at the margins, are reviewed.