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Module 7: Geology Information
[§77.403-404]

7.1 Stratigraphy.

a) Rock Unit: Period (e.g., Lower Ordovician) _____
Formation (e.g., Rookdale Run) _____

b) Attach Geologic Logs of test holes or equivalent information on attached data sheet (test holes should be drilled to the ultimate depth of mining unless waived by the Department based on acceptable equivalent information). Log description must include the surface elevation of each hole submitted, lowest elevation of proposed excavation, elevation of static groundwater (method and date of measurement), lithologic description, location and extent of voids and thickness of strata encountered. Drill holes, highwall sections, or equivalent information should be located to represent the thickness of mineral and overburden to be disturbed in areas of maximum thickness.

c) Provide stratigraphic correlation of the strata by geologic cross sections or fence diagrams to include lithology, stratigraphy, existing ground surface, proposed mining limits, proposed benching, final reclamation slopes, postmining water table, aquifers to be encountered or affected, directions of groundwater movement and underground mines and cave systems. [Horizontal scale shall not be smaller than the scale of Exhibit 6.2 (i.e. not less than 1 inch: 400 feet, or 1 inch: 200 feet), larger scales are acceptable (e.g. 1 inch: 100 feet)]

7.2 Structure.

a) Describe the local geologic structure and its relationship to the regional structure. Use diagrams and regional structural relief maps where applicable.

7.3 Indicate joint and fracture orientations on the Module 6.2 map (or Module 6.1 if locations not within limits of Module 6.2), using standard joint strike and dip symbols, where fracture/joint measurements were taken. Rose diagrams may be submitted if available.

Type of Joint Or Fracture*	Lithology	Number of Measurements	Depth Below Surface	Aperature (width)	Key to 6.2 (or 6.1)

*Type of Joint or Fracture refers to tectonic, stress relief, bedding plane, etc.

Source of information (site specific measurements, publication source, etc.) _____

NOTE: Operations in karst geology areas may be required to complete the *Karst Permitting Supplement* in addition to supplying this information.

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7.1(B) GEOLOGIC LOG DRILL HOLES/OVERBURDEN ANALYSIS DATA

Hole No.: _____
(Key locations to Modules 6.2 and 9)
Surface Elevation: _____
Bottom Elevations: _____
_____
_____
Groundwater Elevations and Date Measured
_____ _____
_____ _____
Surveyed by: _____
Method _____
Remarks: _____

Operation Name: _____
Method of Drilling: _____
Date Drilled: _____
Drilled By: _____
Logged By: _____
Township: _____
County: _____

Quadrangle: _____
Laboratory: _____
Latitude: ____° ____′ ____.″ Longitude: ____° ____′ ____.″

Depth	Thick-ness	Scale	Graphic Log	Lithologic Description and Water Conditions	Overburden Analysis Logs*					
					Color or Munsell Code	OBA Sample Number	Log Interval	% Total Sulfur	Fizz Rating	Neutralization Potential
		10								
		20								
		30								
		40								
		50								
		60								
		70								

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*When requested by the Department

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7.1(B) GEOLOGIC LOG DRILL HOLES/OVERBURDEN ANALYSIS DATA - CONTINUED

Hole No.: _____ Operation Name: _____

Remarks:

Depth	Thick-ness	Scale	Graphic Log	Lithologic Description and Water Conditions	Overburden Analysis Logs*					
					Color or Munsell Code	OBA Sample Number	Log Interval	% Total Sulfur	Fizz Rating	Neutralization Potential

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*When requested by the Department

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7.45 Mine Workings and Solid Waste Sites.

Submit the following data on all active, completed and abandoned underground and surface mines and coal refuse disposal sites which are in or within 1000 feet of the permit area: (Key location to Modules 6.2, 9 and 18.)

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Surface and Underground Mines

Operator	Permit No.	Map Key	Status	Mineral	Water Sample No.(s)

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Solid Waste Disposal Sites:

List the operator permit number, and type of any solid waste disposal sites in or within 1000 feet of the permit area.

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7.4 Overburden Analysis.

Note: Typically overburden analysis is not required for noncoal mining operations. However, there are geologic conditions that may make overburden analysis necessary due to the potential for surface and/or groundwater pollution. Examples are mines in coal field strata that may be acid-forming, and sites where rock has undergone sulfide mineralization. The necessity for overburden analysis should be determined prior to permit application submittal. This can be done by contacting the appropriate District Mining Office.

The interpretation of overburden analysis should be provided in this Module. However, the operational plans for material placement should be provided in Module 10.

a) Overburden Analysis Report

The overburden analysis report must include at a minimum:

1) geologic logs of overburden analysis test holes including Munsell color codes. This must include the information requested in Module 7.1b. Overburden holes must be logged by a geologist. Water condition information is the same as that requested in Module 7.1b. This information is to be presented on a completed Module 7.1(B) "Geologic Log Drill Holes/ Overburden Analysis Data."

2) an explanation of considerations employed in determining

aa) drill hole spacing and number of holes,
bb) sampling depth; and
cc) sampling intervals of overburden analysis test holes.

3) a series of stratigraphic cross-sections or fence diagrams including all overburden analysis test holes, plus other representative test holes. The vertical scale must be sufficient to show all potentially acidic and alkaline zones and any zones proposed for special handling; a scale of one (1) inch to twenty (20) feet or greater is recommended. The

stratigraphic correlations between overburden holes and other test holes must be shown. In addition, hydrogeologic information (such as water table, perched systems and so forth) should be portrayed.

4) overburden holes accurately located on Exhibit 6.2. Overburden holes must be surveyed such that surface elevations and hole locations are accurately determined and plotted.

5) results of the chemical analysis of all overburden strata and strata immediately below the lowest stratum being mined. Acid-base accounting data must be presented on Module 7.1(B) "Geologic Log Drill Holes/ Overburden Analysis Data." Actual laboratory analysis sheets may be submitted in addition to Module 7.1(B). Forms of sulfur (when submitted) should be submitted on a separate sheet.

6) techniques and methods of chemical analyses. References pertaining to technique or method should be cited as appropriate (e.g. Sobek, and others 1978, p. 47-50; ASTM Method D2492-84) and where a standard method is not used or has been modified, the method used should be described in detail.

7) an identification of any stratigraphic units possessing the potential for significant acid or alkaline production and an overall interpretation of the overburden analysis data. The criterion and rationale by which the overburden is being judged must be explained.

8) the name, address and telephone number of the individual(s) responsible for the collection and analysis of the data and interpretation of the data.

Note: The interpretation of overburden analysis should be provided in this Module. However, the operational plans for material placement should be provided in Module 10.

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