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GEOLOGICAL EVALUATION:

STERLING DRILLING AND PRODUCTION COMPANY
JARVIS NO. 1143
GRI COMPREHENSIVE STUDY WELL NO. 2
CALHOUN COUNTY, WEST VIRGINIA

TOPICAL REPORT

September 1987 - May 1989

K&A Energy Consultants, Inc.
for
Gas Research Institute
Contract No. 5087-213-1617

**GAS RESEARCH INSTITUTE
8600 WEST BRYN MAWR AVENUE
CHICAGO, ILLINOIS 60631**



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By

K&A ENERGY CONSULTANTS, INC.

6849 East 13th Street

Tulsa, Oklahoma 74112

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16. Abstract (Limit: 200 words) Devonian shale gas production, from wells in a research area surrounding the Sterling Drilling Production Company, Jarvis No. 1143, located in Calhoun County, West Virginia, is from intervals which are affected by thrust faults and/or associated shearing, and which are relatively silty, with respect to the productive organic-rich shale interval to the west. Detailed whole core description and Markov interpretation lead to the formulation of a depositional model of ongoing pelagic sedimentation of dark gray shales, periodically interrupted by turbidites consisting of thin siltstones and associated gray shales. A fracture model includes slickensides resulting from Alleghenian thrusting, and irregular mineralized fractures produced during an earlier tectonic event. The local structural geology includes imbricate thrust faults in the Upper Devonian rocks striking northeast and dipping southeast at 0 to 30 degrees, underlain by rocks possibly affected by reactivation of basement faults. The gas reservoir in the CSW #2 area suggests a combination of structure-induced fracturing, possibly of two distinct types, and relatively abundant and thickly bedded siltstones. Exploration along the regional detachment trend between the Burning Springs and Mann Mountain Anticlines for fault intersections with favorable lithological intervals should improve the chances for economic wells.			
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RESEARCH SUMMARY

Title Geological Evaluation:
Sterling Drilling and Production Company
Jarvis No. 1143
GRI Comprehensive Study Well No. 2
Calhoun County, West Virginia

Contractor K&A Energy Consultants, Inc.,
6849 East 13th Street, Tulsa, Oklahoma 74112

Principal Investigator T. Hamilton-Smith/P. H. Lowry

Report Topical Report

Period September 1987 - May 1989

Objectives To explain the geology and gas producing mechanisms of the Sterling Drilling and Production Company, Jarvis No. 1143 (CSW2) based on mapped geological structures in the Upper Devonian Shales, whole core description and interpretation, regional geology, and production characteristics of CSW2 and offsetting wells.

Technical Perspective Gas production from the Devonian Shales of west central West Virginia depends on a combination of unusual geological factors, which are somewhat different from those in the historical gas producing region to the west. A unique occurrence of gas and oil production forms a north-south elongate field including the Burning Springs area and extending southward toward the Mann Mountain area. Although there are relatively high capacity wells in this area, they are rare. Noneconomical wells are frequently drilled in the field and there is still no generally accepted model to aid in the siting of wells.

Results Thrust faulting, possibly influenced by basement structure, and sedimentologic factors appear to combine to create relatively high capacity gas reservoirs in the CSW2 research area. This area is located between the Burning Springs and Mann Mountain Anticlines along a regional thrust fault detachment front, where it intersects the southern boundary of the Rome Trough. Imbricate thrust faults beneath the Burning Springs and Mann Mountain Anticlines may be localized by a ramp caused by a deep normal fault. In contrast, thrust faults in the CSW2 area appear to be less strongly ramped, probably due to a much greater depth to the basement. Between the Rhinestreet Shale and the Chagrin Shale, several imbricate thrust faults with intervening shear zones have been interpreted. Individual thrust sheets strike approximately north 25 degrees east, are 6,000 to

12,000 feet long along strike, and dip to the east at 0 to 30 degrees. Shear zones between the thrust sheets represent areas of differential slip. Log standardizing and filtering techniques improved the detailed correlation within shale members, allowing the identification of thin repeat sections, indicative of low displacement thrust faults, which otherwise could not be easily identified from raw log data.

A local depositional mechanism of pelagic sedimentation interrupted by turbidite flows was interpreted from a Markov analysis of the thinly bedded sequence described in the whole core taken from CSW2. Of four types of fractures described in the core, slickensides and irregular mineralized fractures seem to have occurred in situ. The slickensides appear related to Alleghenian thrust faulting, and the irregular mineralized fractures related to earlier reactivation of basement faults. The main temperature log anomaly in CSW2 correlates with an interval in the core characterized by relatively numerous and thickly bedded siltstones, slickensides, and irregular mineralized fractures.

Temperature anomalies indicating initial gas entry in newly drilled wells offsetting CSW2 are often associated with thrust fault intersections. Production logging indicates that sustained gas production is from siltier intervals in the hanging wall of the thrust faults, suggesting that an interaction of fault-related fracturing with siltstone-rich intervals constitutes the reservoir. An elongate area of wells producing in excess of 20 mmcf/g in the first year coincides with the area of intersection of the thrust faults, shear zones, and siltier intervals. Exploration along the Burning Springs, Mann Mountain detachment front for the simultaneous occurrence of these specific geological features should improve the chances for economic wells.

Technical Approach

Detailed geologic mapping of well data obtained from the West Virginia Geological and Economic Survey and local operators was performed in the CSW2 area in order to identify structural and/or stratigraphic relationships which might indicate geologic controls on gas production. In order to place the locally mapped features into the regional context, a review of the regional geology and geophysics was undertaken, with attention to the character of the basement and reactivation of basement faults in Paleozoic tectonic events. Detailed description and interpretation of whole core, in combination with the structural geology and production data, allowed the formulation of a reservoir model for gas production.

CONTENTS

INTRODUCTION	1
WELL HISTORY	
CSW2 (Sterling Drilling and Production Corporation, Jarvis No. 1143).	1
REGIONAL GEOLOGY AND GEOPHYSICS.	11
Structure	11
Stratigraphy	12
Organic Geochemistry	14
GEOLOGICAL MAPPING AND INTERPRETATION.	15
Summary Interpretation of Upper Devonian Structure.	15
Description of Structure by Stratigraphic Unit.	16
Well Log Correlation.	27
CORE DESCRIPTION AND ANALYSIS.	30
Core-Log Correlation.	30
Whole Core Description.	31
Summary Depositional Interpretation	31
Markov Analysis	32
Fractures	35
Core Analysis	36
GEOLOGICAL CONTROLS ON GAS PRODUCTION.	39
REFERENCES	44
APPENDIX A Fortran Program for Polynomial Filtering of Log Data	A-1
APPENDIX B Detailed Whole Core Description Data	B-1
APPENDIX C Dye Penetrant Procedure	C-1

FIGURES

1.	CSW Research Areas, Index Map, Ohio, Kentucky, and West Virginia . . .	2
2.	Extent of Devonian Shale Gas Production, Ohio, Kentucky, and West Virginia	3
3.	CSW2 Well Log	4
4.	CSW2 Research Area, Well Location Map of Devonian Shale Penetrations .	6
5.	Alleghenian Detachment Fronts and Autochthonous Appalachian Basin, Ohio, Kentucky, and West Virginia	7
6.	Regional Basement Structures, Ohio, Kentucky, and West Virginia . . .	8
7.	Relationship of Basement to Middle Devonian Structures	9
8.	Relationship of CSW2 Research Area to Regional Middle Devonian Structure	10
9.	CSW2 Research Area, Type Log of Devonian Shale	13
10.	Structure, Top Rhinestreet Shale, Calhoun and Roane Counties, West Virginia	17
11.	Structure, Top Angola Shale, Calhoun and Roane Counties, West Virginia	18
12.	Isochore, Angola Shale, Calhoun and Roane Counties, West Virginia . .	19
13.	Repeat Section in Angola Shale	20
14.	Structure, Top Java Formation, Calhoun and Roane Counties, West Virginia	21
15.	Isochore, Java Formation, Calhoun and Roane Counties, West Virginia .	22
16.	Structure, Top Lower Huron Member, Calhoun and Roane Counties, West Virginia	23
17.	Isochore, Lower Huron Member, Calhoun and Roane Counties, West Virginia	24
18.	Structural Cross Section of Faulted Lower Huron Interval	25
19.	Structure, Top Berea/Bedford, Calhoun and Roane Counties, West Virginia	26
20.	Isochore, Berea/Bedford-Chagrin, Calhoun and Roane Counties, West Virginia	28
21.	Gamma Ray Curve Correlation Using Raw and Filtered Data.	29
22.	Depositional Interpretation - CSW2 Lower Huron Shale	33
23.	Lower Huron Shale Sequence CSW2, Markov Process Model	34
24.	CSW2 Cored Interval Fracture Summary	37
25.	CSW2 Whole Core Analysis Depth Plot	in pocket
26.	CSW2 Sidewall Core Analysis Depth Plot	38
27.	Gas Entry vs. Cored Interval	40
28.	Relationship of Structure to Initial Gas Entry	41
29.	CSW2 Area Fence Diagram	in pocket
30.	Structure and First Year Cumulative Production Overlay, Calhoun and Roane Counties, West Virginia	43

INTRODUCTION

GRI has identified the Eastern Devonian Shales as containing significant gas reserves in close proximity to the Eastern gas market. Exploitation of the gas reserves is limited by the lack of (a) an exploration strategy, (b) an understanding of production mechanisms, and (c) effective completion and stimulation techniques. K&A Energy Consultants, Inc. has proposed to develop an area geological model, based on published research, which will be tested and refined by a series of Cooperative Study Wells, leading to an exploration strategy. The area for this geological analysis of Devonian shale gas consists of eastern Kentucky, western West Virginia, and adjacent counties of Ohio (Figure 1) and includes five Cooperative Study Wells (CSW). This report concerns the second of those wells, CSW2.

The CSW2 research area is located in west central West Virginia (Figure 1). It is near the eastern edge of the historical Devonian shale gas producing region (Figure 2) and on the western edge of an area of gas production from siltstones in an equivalent interval. The research area falls along the Burning Springs-Mann Mountain detachment front and on the south margin of the Rome Trough.

Data for various geological studies were obtained from the West Virginia Geological and Economic Survey, well operators, and from the CSW activities including drilling operations, whole and sidewall core descriptions and analyses, well logs, and well tests. The identification of geological controls on gas production was accomplished through correlation cross sections, structure and isochore mapping, isopotential maps, and through whole core studies. By interpreting the abundant data and placing this interpretation in the context of the regional geologic setting, a model for Devonian shale gas production in the CSW2 area was formulated.

WELL HISTORY

CSW2 (Sterling Drilling and Production Company, Jarvis No. 1143)

The Sterling Drilling and Production Company, Jarvis No. 1143 well (CSW2, API No. 47-013-04019) is located in Calhoun County, West Virginia, 0.93 miles south and 1.86 miles west of Latitude 38° 40' and Longitude 81° 07' 30" (Figure 1). The well was spudded on October 5, 1987, and reached a total depth of 4550 feet (driller's depth) on October 20, 1987. The well was drilled with conventional rotary methods using air or an air/water mist to circulate out cuttings. Continuous wellsite geochemistry was performed from 2100 feet (driller's depth) to total depth (Brown and Ruth, c. 1987). Various measurements were taken while drilling and open-hole stress tests performed. A whole core was taken from 3424 to 3574 feet (driller's depth) and 28 sidewall cores were taken from between 2393 and 4482 feet. These are shown schematically on Figure 3.

CSW2 penetrated the top of the Devonian shale sequence (Chagrin Shale) at 2348 feet (-1268 feet subsea) and it reached its total depth while in the Java Formation without penetrating the entire sequence of Upper Devonian shales. Tops and thicknesses for key stratigraphic intervals in the Upper Devonian and Mississippian are listed below. Depth references are based on

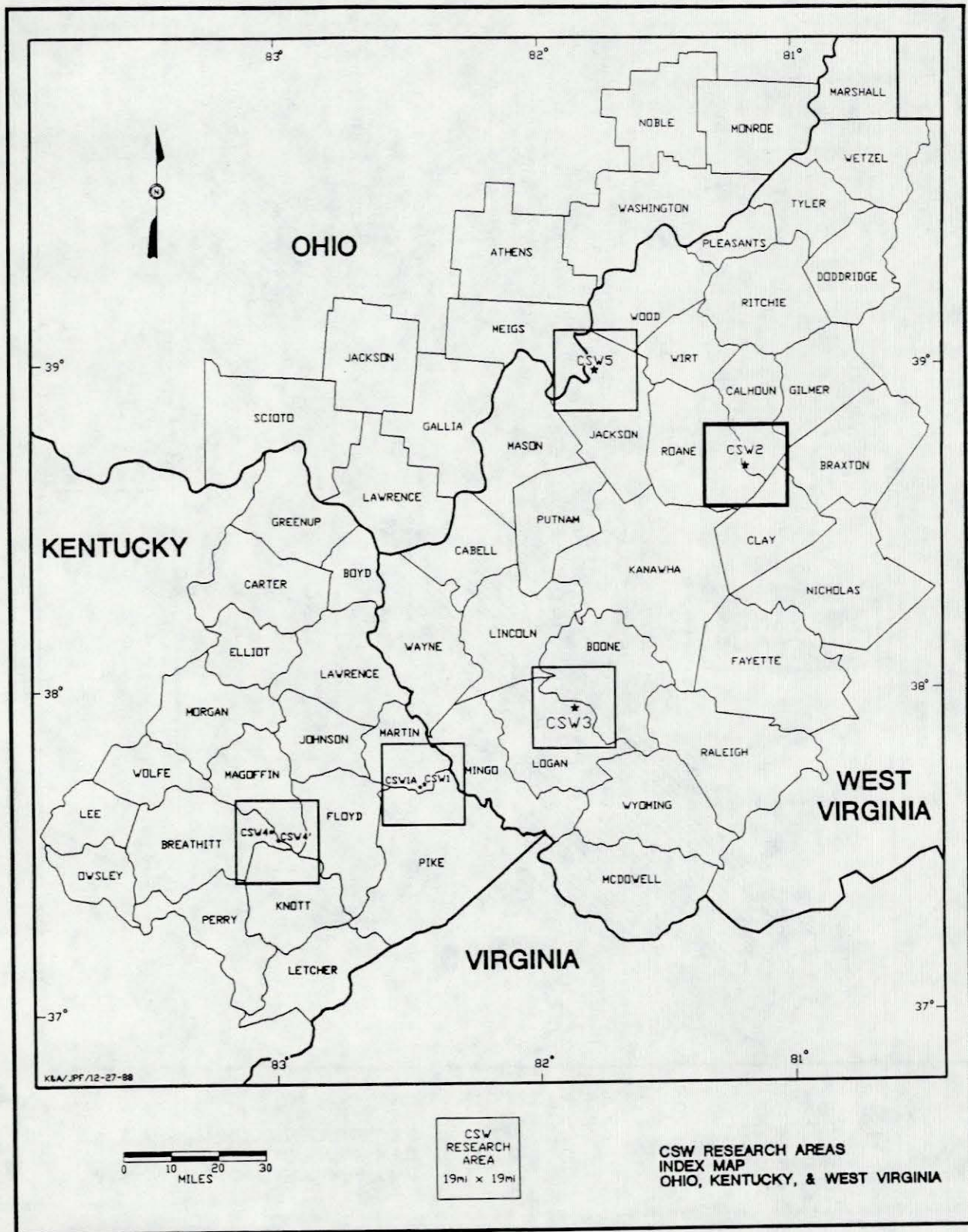


FIGURE 1

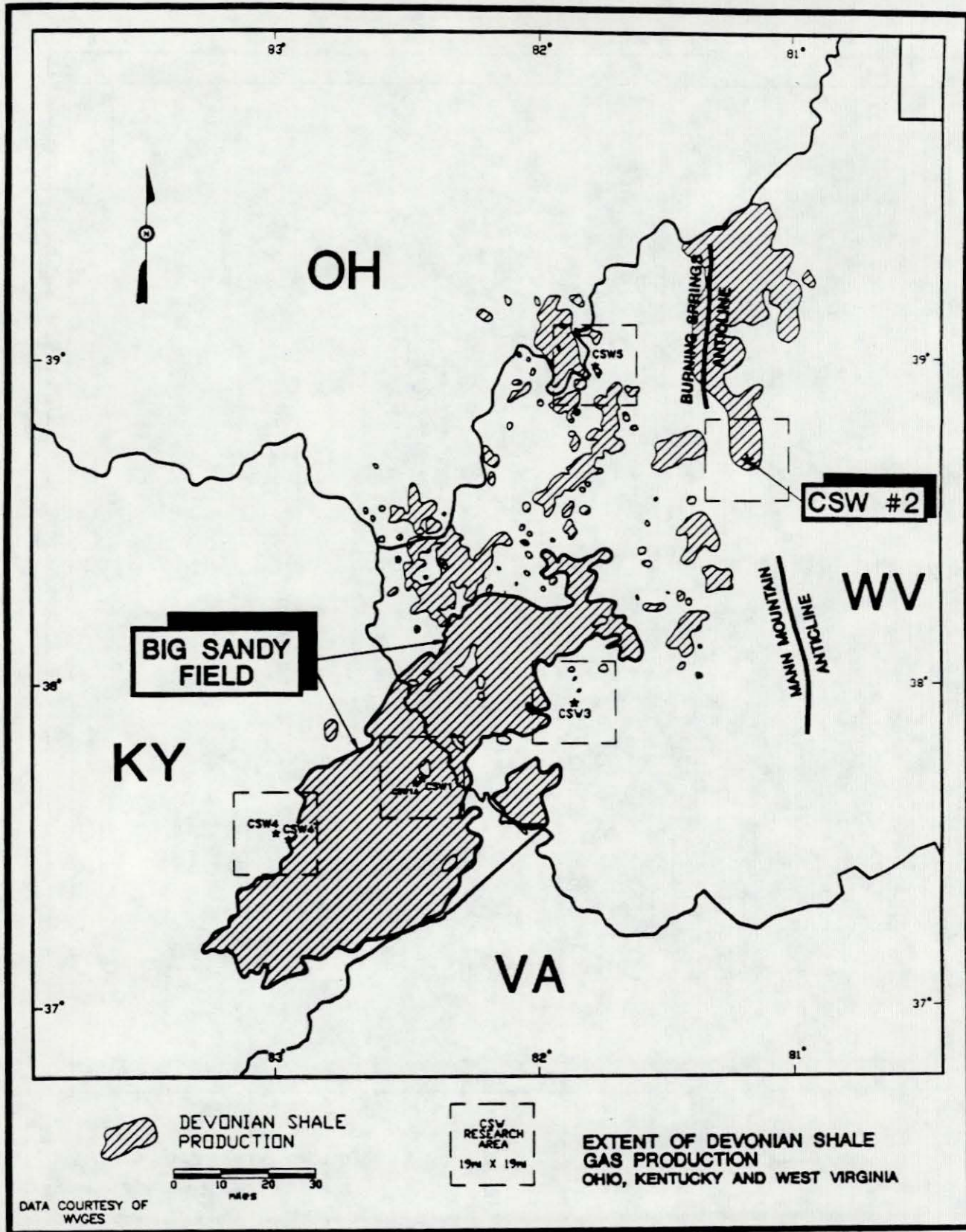


FIGURE 2

CSW2 WELL LOG

JARVIS #1143
CALHOUN CO., WV

STRATIGRAPHIC
INTERVAL

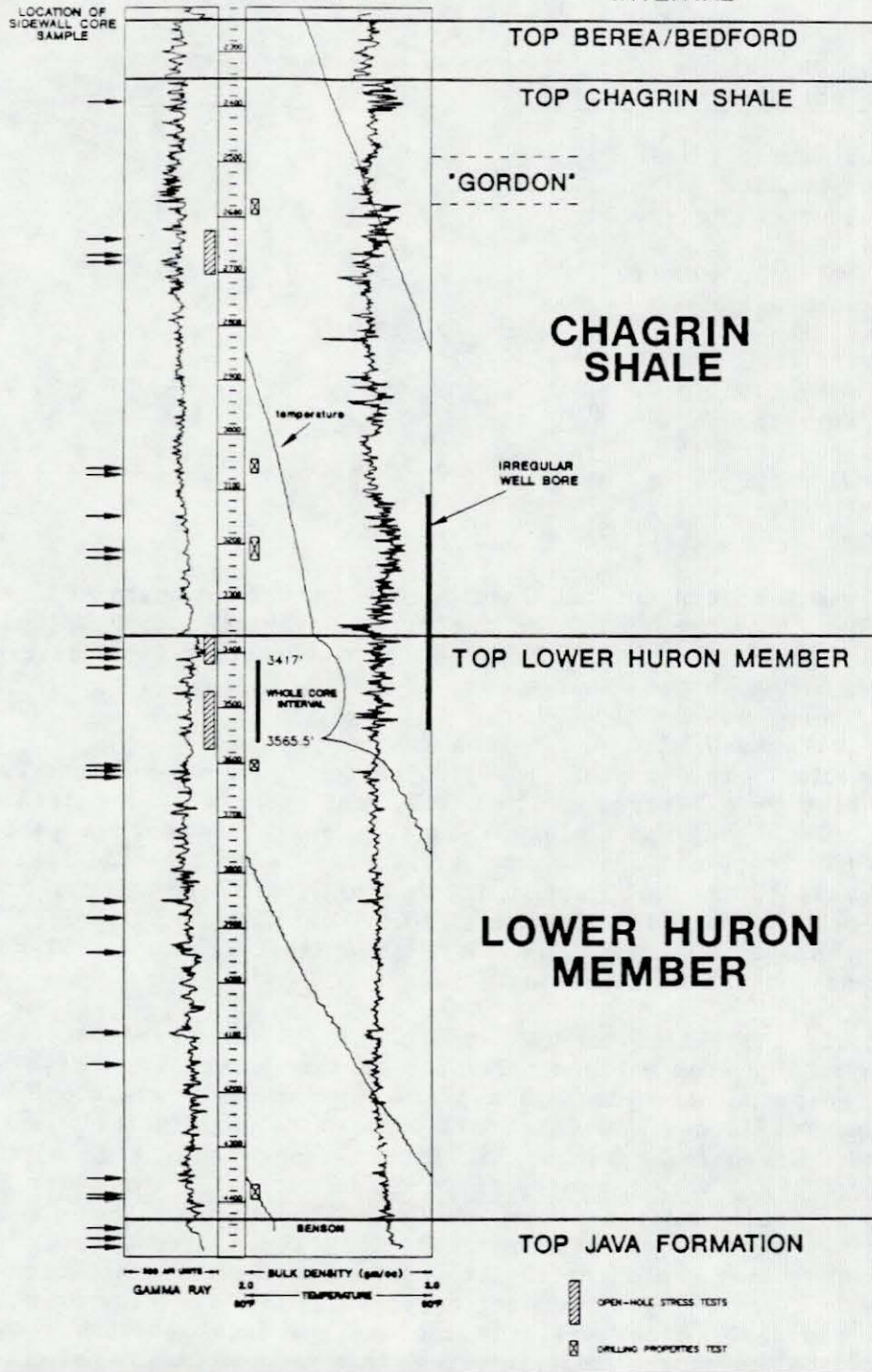


FIGURE 3

Run No. 2 of the Phasor Induction/Lithodensity Log unless otherwise indicated.

<u>Formation/Member</u>	<u>Depth (Feet)</u>	<u>Elevation (Feet)</u>	<u>Thickness (Feet)</u>
Top Sunbury Shale (Miss.)	2233	-1153	
Sunbury Shale			11
Top Berea/Bedford (Miss./Dev.)	2244	-1164	
Berea/Bedford			104
Top Chagrin Shale (Dev.)	2348	-1268	
Chagrin Shale			1021
Top Lower Huron (Dev.)	3369	-2289	
Lower Huron			1068
Top Java Formation (Dev.)	4437	-3357	
Java Formation			
First Reading (LD)	4520		
Total Depth (driller's)	4550		

Wellsite geochemistry and mud logging indicated four sustained gas shows and ten low permeability shows over the Upper Devonian interval (Guidry, 1987). Open-hole temperature logs indicated three shows, two correlating with mud log shows, and numerous minor shows.

The well was cased with 4 1/2-inch casing to a depth of 4421 feet, in the Java Formation. In December, 1987, 20 perforations in the interval from 4312 to 3954 feet were broken down, tested, and stimulated. Initial production was low and the well was plugged back. The well was then perforated from 3345 to 3680 feet, and a breakdown treatment was applied and tests performed. On May 4, 1988, the well was fractured with a 65 to 70 quality foam consisting of 913 barrels of water, 50,000 gallons of liquid CO₂ carrying 252,000 pounds 20:40 sand. Gas has not been sold from the CSW2 due to a high CO₂ content and periodic testing.

Wells within a 15-kilometer radius of CSW2 (Figure 4) produce predominately gas and some oil from various intervals in the Devonian and Mississippian age rocks. The principal hydrocarbon producing intervals are the Upper Devonian shales and siltstones, and the following units of Mississippian age: Salt sand, Maxton, Webster Springs, Big Lime, Keener sand, Big Injun, and Squaw (Sweeney, 1986). Within the Upper Devonian interval, the Lower Huron Member of the Ohio Shale and the lower portion of the Chagrin Shale appear to have the greatest tendency to produce gas. This is an area of relatively recent Devonian shale gas exploitation with most of the development occurring in the early 1980s. Initial gas production ranges from a few tens of mcf per day to 3.0 mmcf per day. A few wells in the area produce marketable quantities of oil from the Devonian shale ranging from a few hundred to thousands of barrels cumulative production.

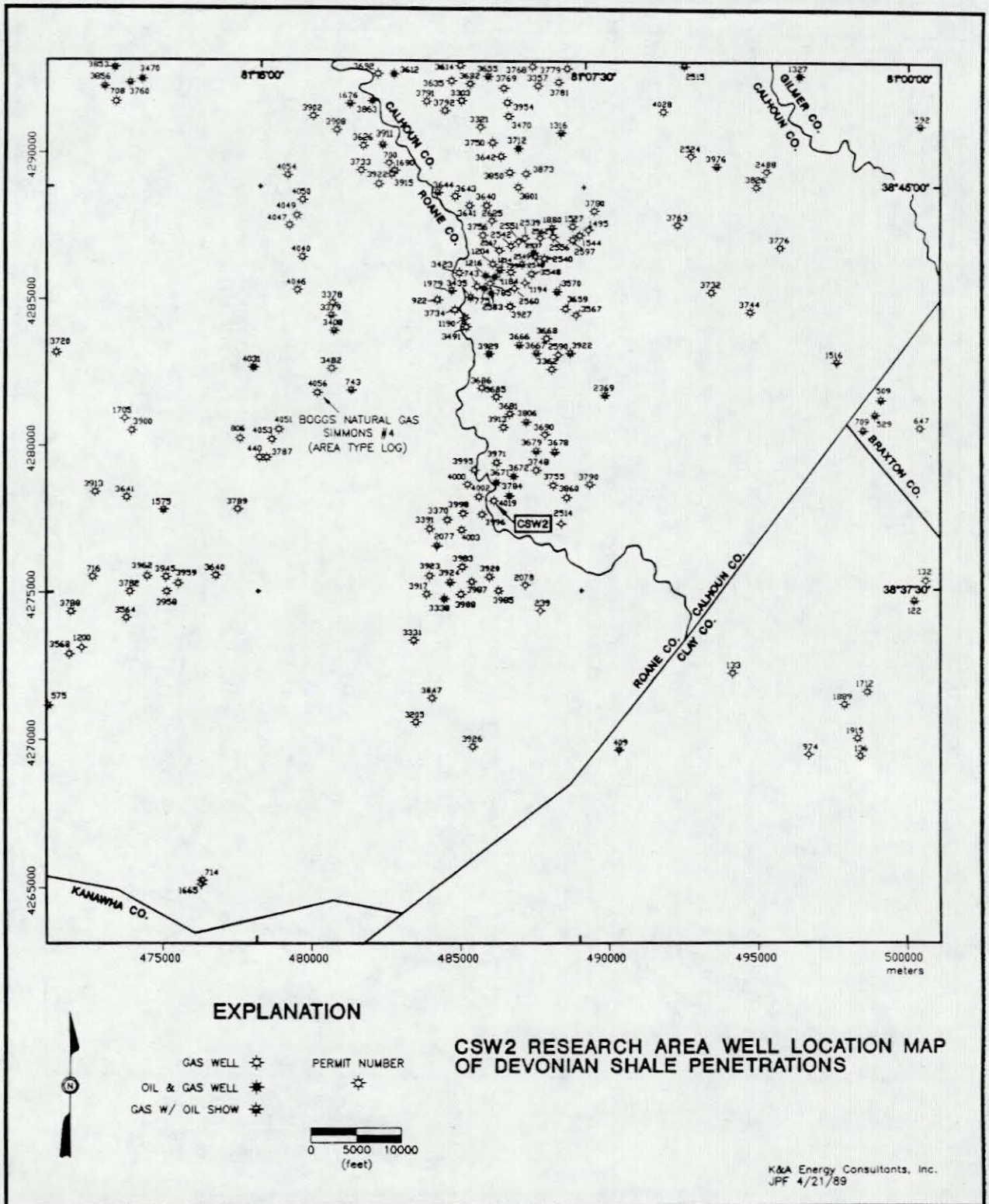


FIGURE 4

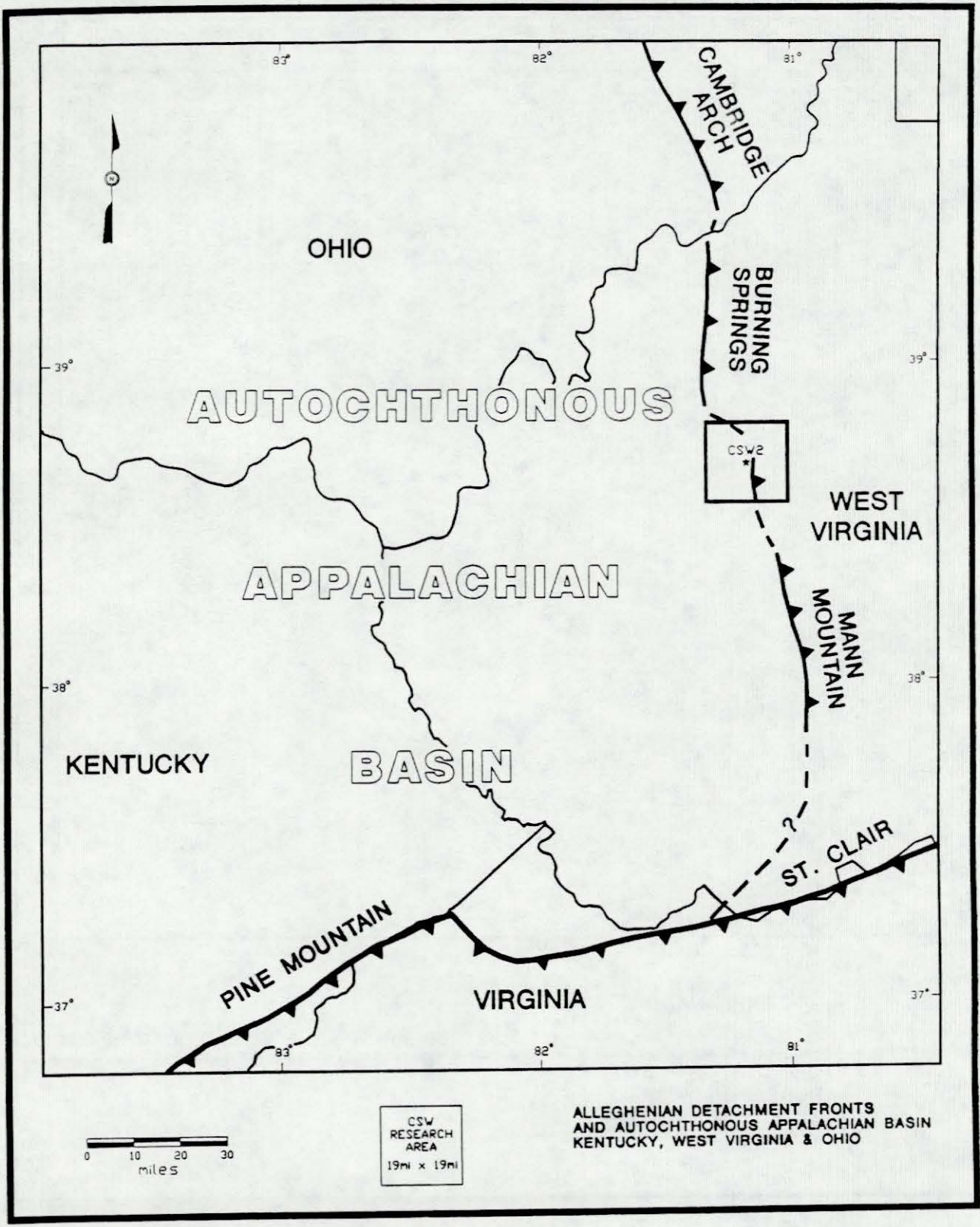


FIGURE 5

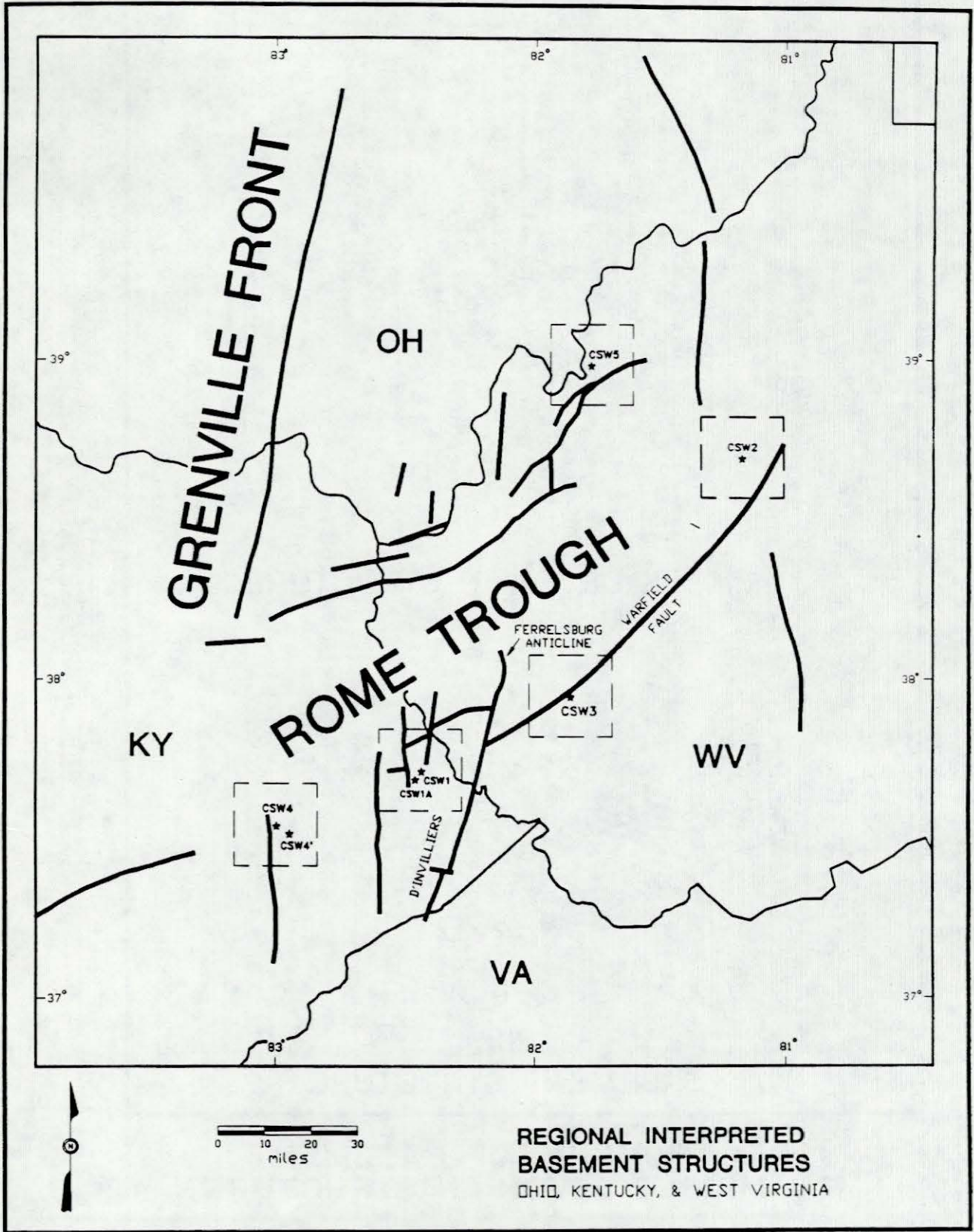


FIGURE 6

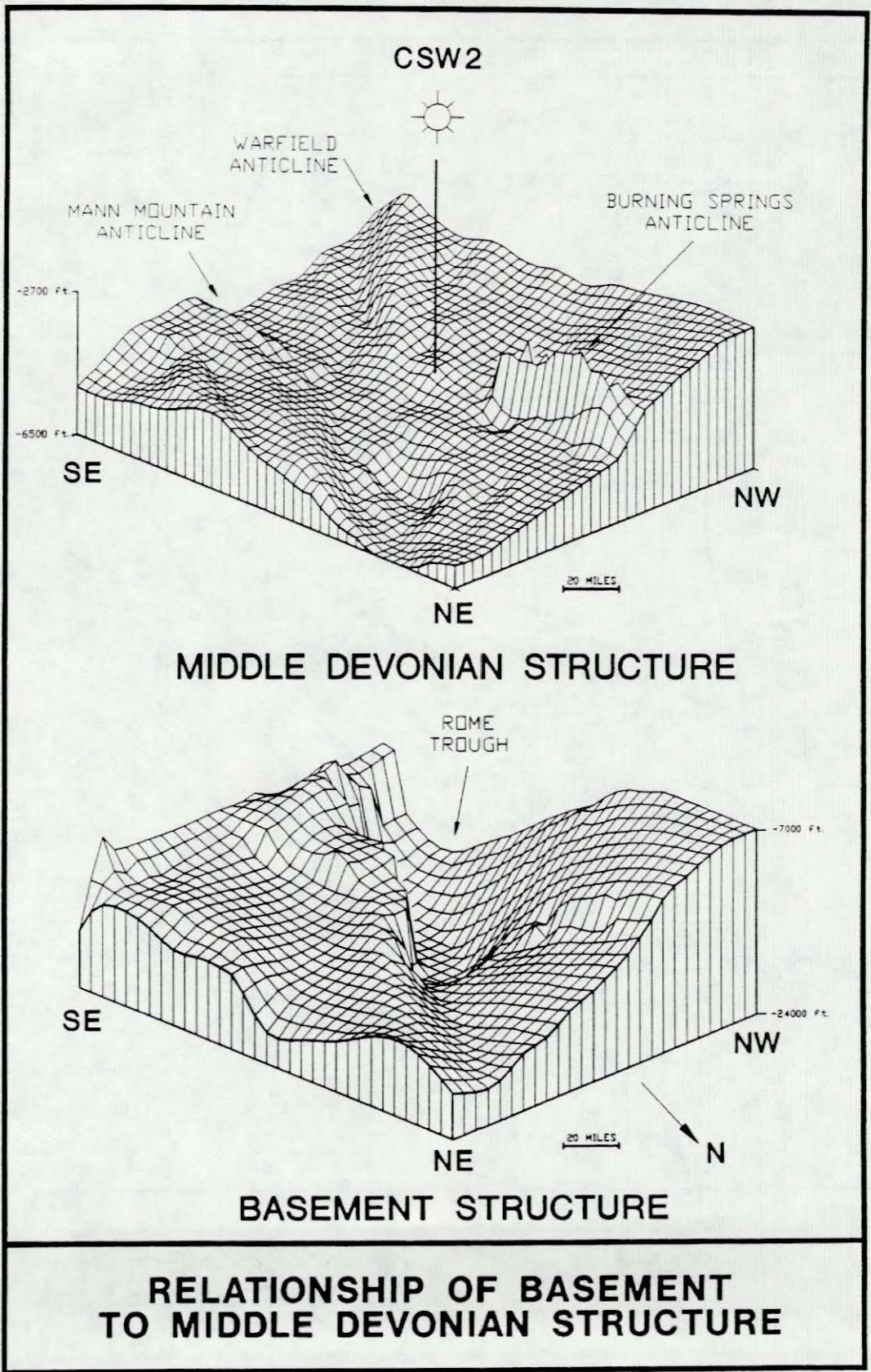


FIGURE 7

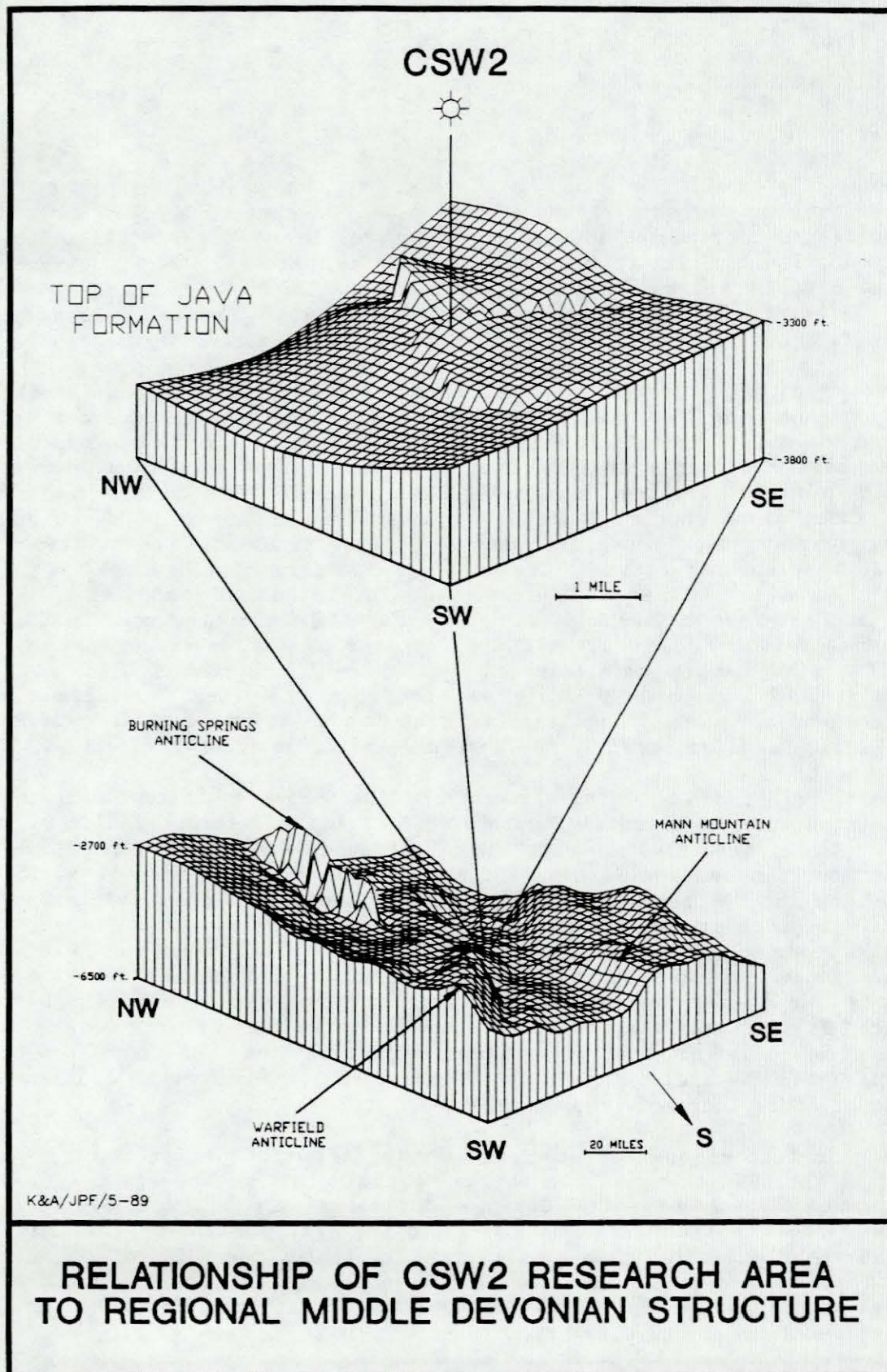


FIGURE 8

REGIONAL GEOLOGY AND GEOPHYSICS

Structure

The research area for the CSW2 is located at the eastern margin of the autochthonous Appalachian Basin (Figure 5). The autochthonous basin is characterized by structures and tectonics controlled by differential movement on basement faults (Figure 6). The boundaries between the autochthonous Appalachian Basin and allochthonous parts of the basin to the south and to the east consist of major detachment fronts made up of thrust fault systems produced in the Alleghenian orogeny of Permian age (Hamilton-Smith, 1988).

The CSW2 area is dominated by a structural intersection of the southern boundary of the Rome Trough with the major Alleghenian detachment front along the trend of the Mann Mountain Anticline and the Burning Springs Anticline. Both of these anticlines are cored by a stack of imbricate thrust faults, located by ramps controlled by normal faults at depth (Perry, 1978; Calvert, 1983). These deeper normal faults are marked by significant north to south trending aeromagnetic anomalies, and are probably due to reactivation of Grenville basement structures. The southern boundary of the Rome Trough is geophysically well defined at the basement level (Kulander and Dean, 1978) and trends northeast to southwest in the area slightly to the south of CSW2. The general relationship between the structures at the basement and at the Middle Devonian levels is indicated in Figure 7. Normal faults at the basement beneath the Mann Mountain and the Burning Springs Anticlines are suggested, and the Rome Trough structure at the basement level is expressed at the Middle Devonian level by the Warfield Anticline (Shumaker, 1987).

The general relationship of the structure of the CSW2 area to regional Middle Devonian structure is shown in Figure 8. The imbricate thrust faults of the CSW2 area are interpreted as part of a continuous detachment front linking the Mann Mountain and the Burning Springs Anticlines. The lack of vertical relief along the detachment front between the two anticlines is interpreted as due to the much greater depth to basement in this area, directly over the central portion of the Rome Trough. The ramping and consequent lateral concentration of imbricate thrust faults were not developed in the CSW2 area, presumably due to the lack of effective interaction with the deeply buried basement. It is likely that the detachment front in this area is less abrupt than is the case at both the Burning Springs and the Mann Mountain Anticlines, and may include a series of thrust faults both to the east and to the west of those currently mapped near CSW2.

A particular feature of the detachment front, of major significance to the geology of the CSW2 area, is the change of the decollement surface from the Salina level in the Burning Springs Anticline (Calvert, 1983) to the Marcellus level in the Mann Mountain Anticline (Perry, 1978). This may be accomplished by a lateral ramp at the southern facies boundary of the Salina salt, to the north of the CSW2 area. As the well data of the CSW2 area precluded mapping below the Rhinestreet Shale, this lateral ramp could not be effectively defined in this report.

Stratigraphy

Depth to the basement in the CSW2 research area is in excess of 20,000 feet, consisting of over 15,000 feet of Cambrian, Ordovician, and Silurian rocks, 3,000 feet of Devonian rocks, and 2,000 feet of Mississippian, Pennsylvanian, and Permian rocks (Kulander and Dean, 1978). The stratigraphy in the area of CSW2 has been described most recently by Sweeney (1986). A type log from a well in the area of CSW2 (Figure 9) was selected from the Boggs Natural Gas Simmons #4 well (see Figure 4). This log shows the stratigraphic section from the Sunbury Shale to the Onondaga Formation, which is the deepest level penetrated by wells targeting the Devonian shale.

The typical Onondaga Formation of Middle Devonian age is a hard, crystalline, marine limestone, with argillaceous, silty, or sandy sections. In the CSW2 area, the Onondaga Formation is in a transitional facies change eastwards into the Huntersville Chert, characterized by interbedded limestone and chert with the total proportion of chert between 50 and 90 percent. The Onondaga Formation is conformably overlain by the Marcellus Shale, also of Middle Devonian age. The Marcellus Shale is a calcareous, black, fissile shale containing thin beds and concretions of limestone, and is truncated erosionally by the Taghanic Unconformity, a major stratigraphic break in the region. Consideration of eustatic sea-level trends and the regional development of the unconformity suggests that it was not due to regression as suggested by Sweeney (1986), but is of major tectonic significance, representing the most significant local events of the Acadian Orogeny (Hamilton-Smith, et al., 1989).

Shales of the Genesee Group of Late Devonian age unconformably overlie the Marcellus Shale in the CSW2 area. In the section shown in Figure 9, the shales are correlative with the West River Formation of New York, but further to the east in Calhoun County, the underlying Genesee Formation is also represented (Sweeney, 1986). The Genesee Formation disappears westward by onlap on the Taghanic Unconformity surface. It consists of dark gray to black shales, whereas the West River Formation consists of gray shales, lighter in color than adjacent units.

Conformably overlying the Genesee Group is the Sonyea Group consisting, in ascending order, of the Middlesex Shale and the Cashaqua Shale. The Middlesex Shale is dark gray to black in color, and the Cashaqua Shale comprises a massive gray shale sequence. Conformably overlying the Sonyea Group in the CSW2 area is the West Falls Group consisting, in ascending order, of the Rhinestreet Shale and the Angola Shale. The Rhinestreet Shale is frequently the deepest unit in the CSW2 area penetrated by wells producing from the Devonian shale sequence. It consists of dark gray to black shales with frequent gas shows, but seldom has any significant gas production. Above the Rhinestreet Shale, the Angola Shale consists of gray to green-gray shales, and ranges in thickness from 250 to 430 feet, with the larger values due to repeat sections from thrust faulting. In the middle portion of the Angola Shale is a siltstone-rich interval known to drillers as the Lower Alexander. The West Falls Group is the western facies equivalent of the lowermost Chemung and Brallier Formations, suggesting that the siltstones of this sequence may represent distal turbidite deposits (Sweeney, 1986).

**CSW2 RESEARCH AREA
TYPE LOG OF DEVONIAN SHALE**

BOGGS NATURAL GAS CO.
SIMMONS #4
ROANE CO., WV

**STRATIGRAPHIC
INTERVAL**

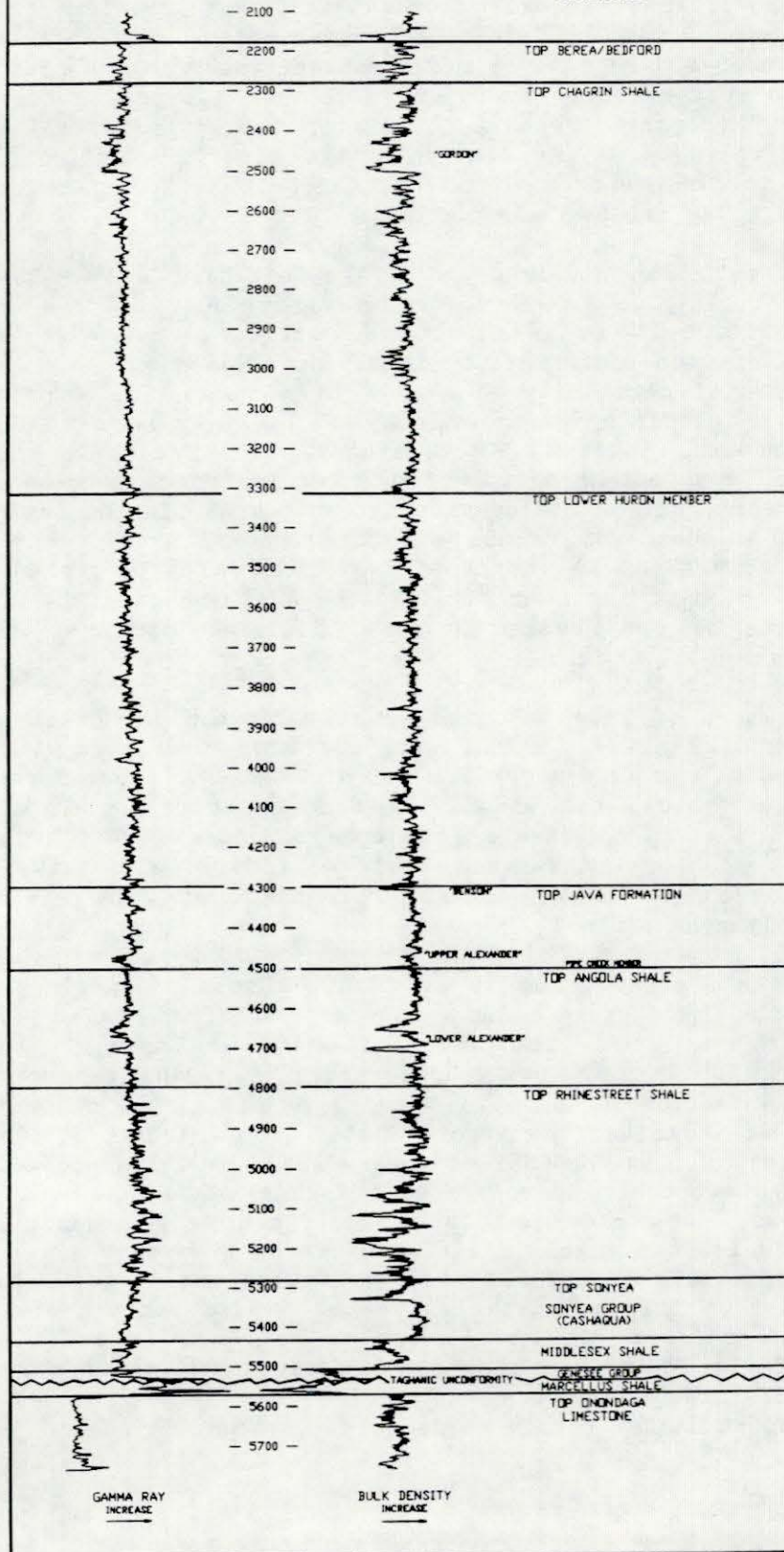


FIGURE 9

The Java Formation, conformably overlying the Angola Shale, is predominantly a gray shale of low organic content, ranging in thickness from 200 to 300 feet. The Pipe Creek Member, a dark gray shale of high organic content located at the base of the Java Formation, can be recognized on logs by a characteristic high gamma ray and low density log response. Within the Java Formation there are two major siltstone-rich intervals recognized by drillers, the Upper Alexander, located just above the Pipe Creek Member, and the Benson, located just below the top of the formation.

In Kentucky, south-central Ohio, and western West Virginia, the shale sequence above the Java Formation, and above the equivalents of the Java Formation, comprise the Ohio Shale Group, consisting in ascending order of the Huron Shale, the Three Lick Bed, and the Cleveland Shale (e.g., Frankie, et al., 1986). The Huron Shale Formation is in turn divided, in ascending order, into the Lower Huron, the Middle Huron, and the Upper Huron Members. In central and eastern West Virginia, and in east-central Ohio, the Upper Huron Member and the Cleveland Shale can no longer be identified, with the result that the Ohio Shale equivalent consists simply of the Lower Huron Shale overlain by a thick undifferentiated sequence called the Chagrin Shale.

In the CSW2 area, the Lower Huron Member ranges from 1,000 to 1,200 feet thick, with excess apparent thicknesses locally due to thrust faulting. The unit is composed of interbedded dark gray and gray shales with minor siltstones. The Chagrin Shale varies in thickness from 1,070 to 1,150 feet in the area, and consists mainly of gray shales, with minor siltstones. A siltstone-rich interval in the upper part of the Chagrin Shale is known as the Gordon to drillers.

Organic Geochemistry

The organic material in the Devonian shale section consists of four major biofacies (Zielinski and McIver, 1982). A herbaceous facies consisting primarily of spores, probably transported by wind, occurs throughout the region. The Tasmanites facies consists of more than 50 percent of cysts of green algae. A "marine" facies is characterized by a normal assemblage of marine microfossils. A "terrestrial" facies consists of greater than 50 percent of woody debris, cuticles, and oxidized and reworked woody material. Biofacies distributions in the shale section have a simple and consistent relationship to the paleogeographical environment (Hamilton-Smith, 1988). The terrestrial biofacies was derived from the Catskill Delta front to the east, whereas the Tasmanites biofacies developed from a persistent algal bloom in the partially restricted black shale basin between the Catskill Delta front and the Cincinnati Arch. In the CSW2 area, the predominant biofacies throughout the deposition of the Devonian shales was terrestrial, and the relative abundance of organic material was low, due to dilution with abundant inorganic terrigenous sediments.

The kerogen resulting from influx of terrestrial biofacies material is Type III in character, prone to the generation of gas in the thermally mature conditions reached in the CSW2 area (Curtis, 1988). Dilution of the kerogen with inorganic sediments has resulted in a relatively low total organic carbon content (generally less than one percent), an effect offset in part by the relatively thicker shale section available. Recent calculations of

gas-in-place (Curtis, 1988) show the following results for the Lower Huron Member in the CSW2 area:

<u>County</u>	<u>Gas-in-Place (BCF), Lower Huron</u>
Calhoun	221
Wirt	822
Roane	1,444

This contrasts with the study of production data reported by Sweeney (1986), which indicated that the potential for gas production in Calhoun County was substantially greater than that in Wirt and Roane Counties. The discrepancy suggests either an underestimation of gas-in-place, or the existence of significant gas migration in the Devonian shale section, or both.

GEOLOGICAL MAPPING AND INTERPRETATION

Summary Interpretation of Upper Devonian Structure

Structure and isochore maps of stratigraphic horizons in the Upper Devonian shale section have been used for geological interpretations. Isochore maps are representations of the apparent thicknesses of the stratigraphic units, measured in a vertical direction. Several imbricate thrust faults with intervening shear zones occur in the interval from the Rhinestreet Shale to the Chagrin Shale within the research area (Lowry, *et al.*, 1988). The interpreted thrust faults strike at approximately north 25 degrees east, oblique to the thrust faults in the Burning Springs and Mann Mountain areas. Individual thrust sheets range from 6,000 to 12,000 feet in length along strike, and dip to the east at 0 to 30 degrees. The thrust faults probably terminate along strike in tear zones which represent areas of differential or limited movement between thrusts. The style of thrusting is generally similar to the thrust faults in the Burning Springs Anticline (Filer, 1985), but ramping and consequent vertical structural relief is much less evident.

The gross character of the faults in the CSW2 area is based on available data and is defined to the extent that these data allow. It is likely that the thrust faults are splayed and there are faults which were not recognized. Strata near faults have probably been modified by brecciation and/or microfracturing, creating higher reservoir capacity and increased permeability.

The most definitive evidence of thrust faulting came from repeated section identified in individual wells, although isochore contour maps show the local thickening of faulted intervals in the CSW2 area. Thrust faulting is identified by anomalous thicknesses of the Angola Shale, Java Formation, Lower Huron Member, and Chagrin Shale. Structural contour maps reflect the structural complexity due to thrusting in the CSW2 area, but to a lesser degree than the isochore maps. The character of the thrust faults was defined by combining the information from the structure, isochore, trend surface residual maps, and the identification of fault intersections in wells.

Description of Structure by Stratigraphic Unit

The Rhinestreet Shale is not apparently faulted. The top of the unit has a distinct structure striking northeast and dipping northwest in Calhoun County and striking north to south and dipping to the east in Roane County (Figure 10). The Rhinestreet Shale may be thrust faulted, or its structure related to basement features, but explication of this will require a study of seismic data which was not obtained for this research.

The strike and dip of the top of the Angola Shale is similar to the Rhinestreet Shale (Figure 11) with the exception of the presence of a low angle thrust fault. A thickened section of the Angola Shale (Figure 12), with a confirmed repeat section in a well northeast of CSW2 (Figure 13), is evidence of one thrust sheet in that interval. The thrust fault appears to dip steeply to the east at the top of the Angola Shale, but may flatten out in the unit within the study area. This thrust fault probably continues upward into the overlying Java Formation (Figure 14) but has decreasing displacement upwards and possibly dies out in the Java Formation or in the bottom of the Lower Huron Member. The vertical displacement of the fault is approximately 130 feet at the top of the Angola Shale and approximately 50 feet at the top of the Java Formation. The direction of displacement is down to the west.

The gross structure at the top of the Java Formation is similar to the Angola. In addition to the fault described above, which penetrates the top of the Java Formation and is evident in local thickening (Figure 15), there is a structural high at CSW2 and a structural form that suggest a thrust fault which has not been intersected by a well. The interpreted fault appears to dip to the east and die out to the west in the Lower Huron Member. The displacement of this thrust fault is approximately 75 feet at the top of the formation.

At the top of the Lower Huron Member, 1,100 feet above the top of the Java Formation, three thrust sheets were interpreted which appear imbricate to the faults in the Java Formation and the Angola Shale (Figure 16). Anomalous thickening of the Lower Huron Member south to southwest and north to northeast of CSW2 is due to the thrust faults (Figure 17). The structural contours reflect the presence of the faults but to a lesser degree than do the isochore contours. Repeat sections were identified in a well positioned on the hanging wall of the faults (Figure 18).

Areas along the thrust front trend which do not have a thickened section of the Lower Huron Member or Java Formation, or structural expression of faulting, are interpreted to occur in shear zones representing differential slip between thrust sheets. The interpreted shear zones are similar to tear faults mapped in the thrust sheets of the Burning Springs Anticline (Filer, 1985). Oblique-slip faults are inferred to form the boundaries of the shear zones.

The thrust faults identified in the Lower Huron Member continue into the Chagrin Shale but direct evidence of the thrusts intersecting the top of the Chagrin Shale is lacking (Figure 19). The structure on the top of the Chagrin Shale appears to result from drape over the structure caused by faulting in the Lower Huron Member. There is a thickened section of the

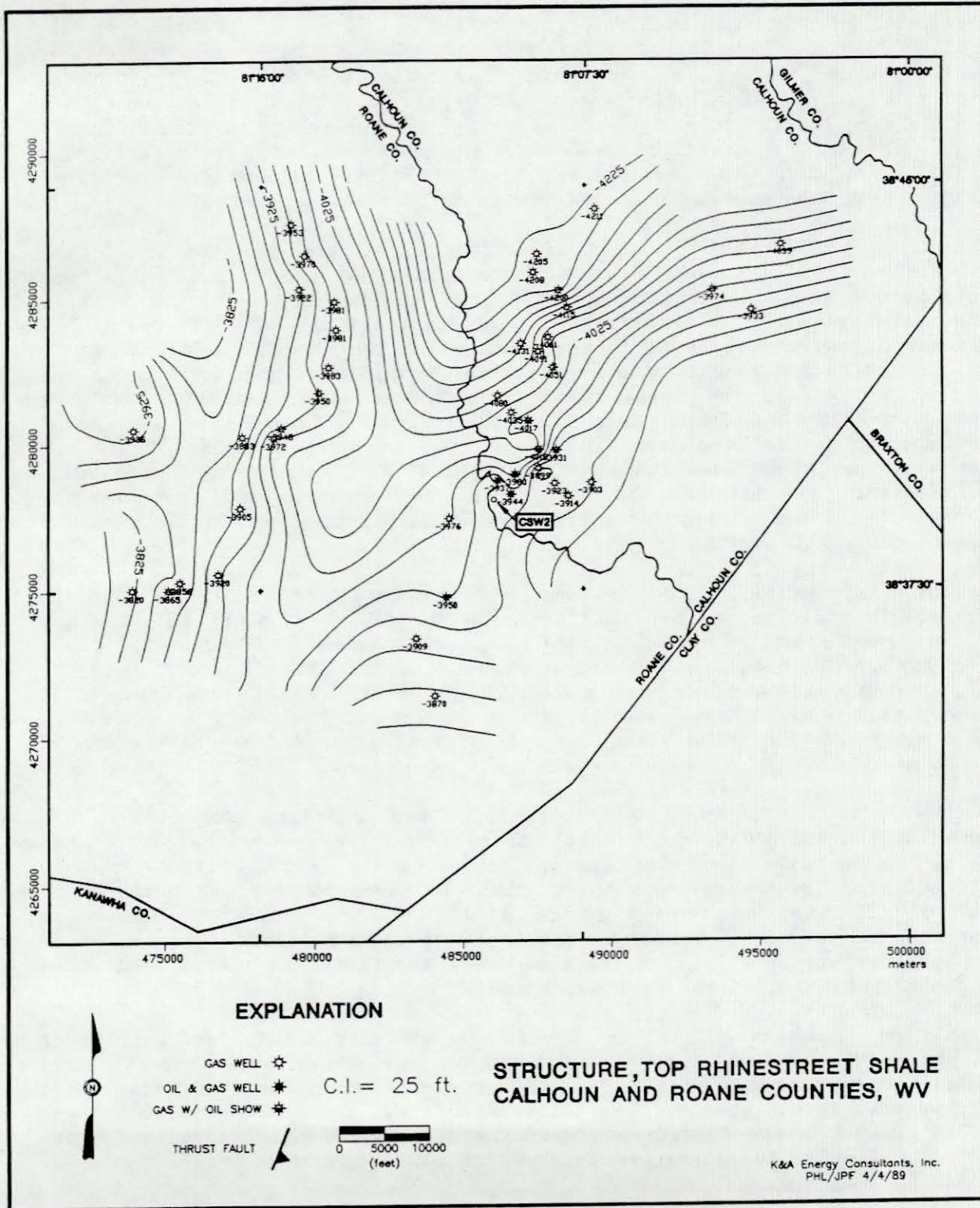


FIGURE 10

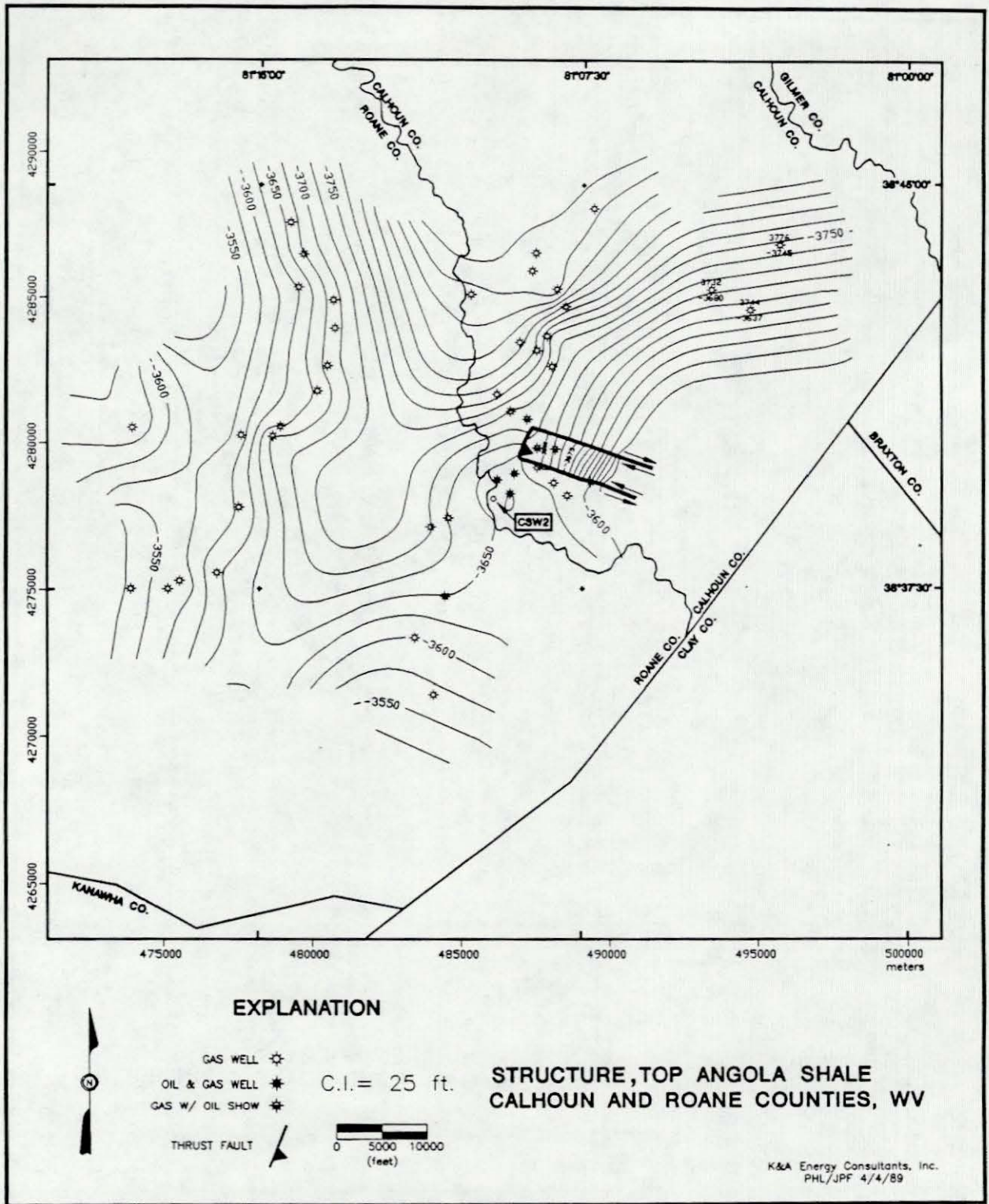


FIGURE 11

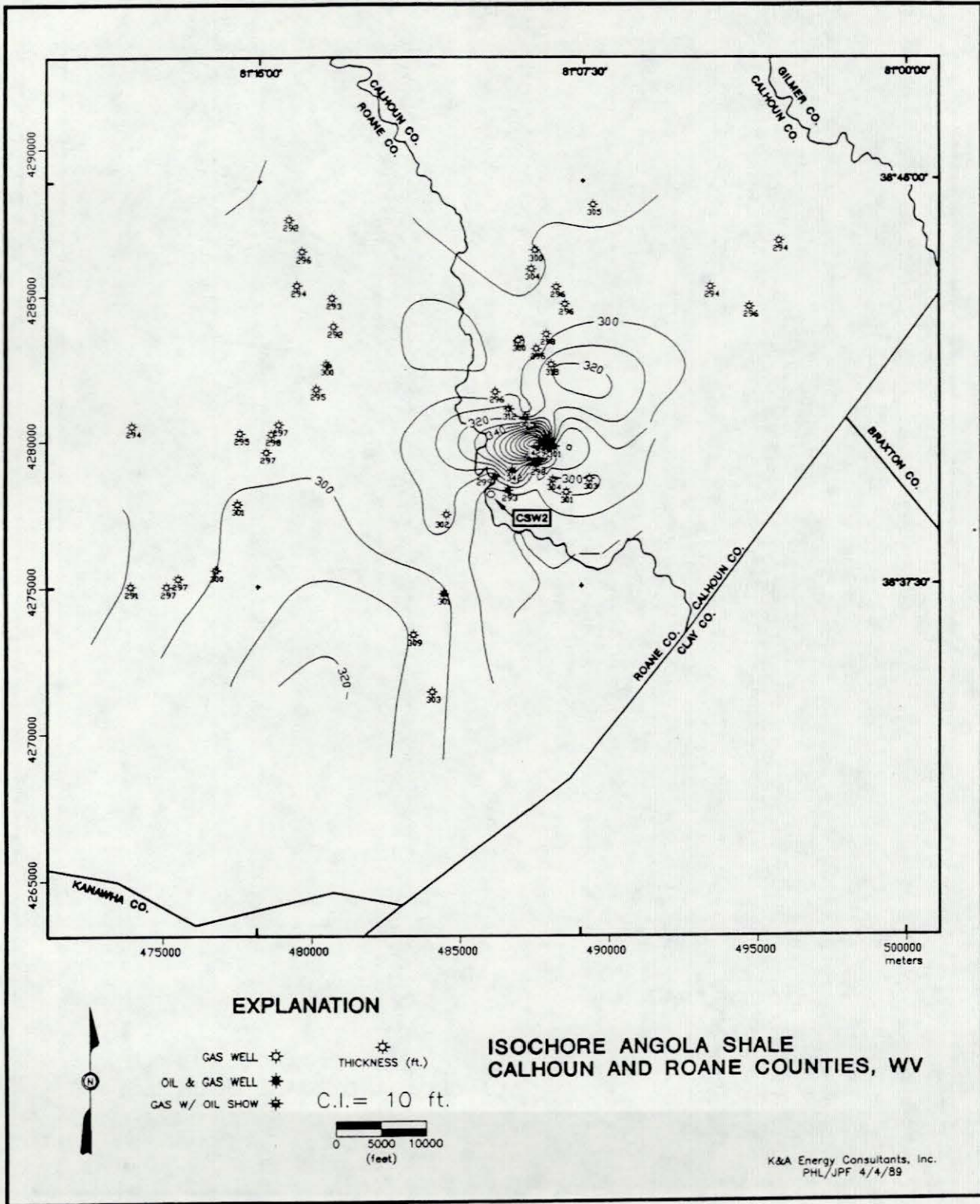


FIGURE 12

REPEAT SECTION IN ANGOLA SHALE CSW2 AREA

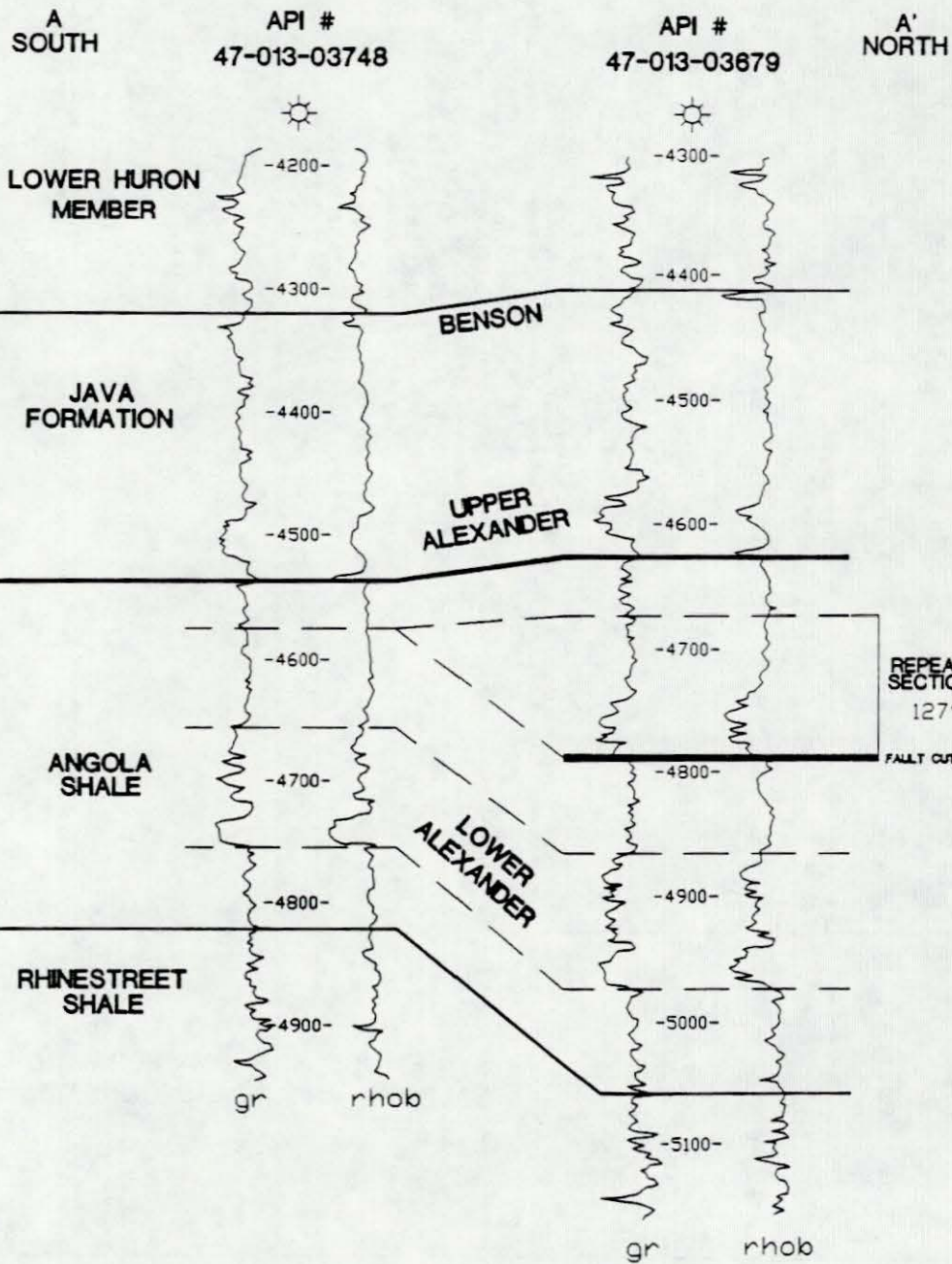


FIGURE 13

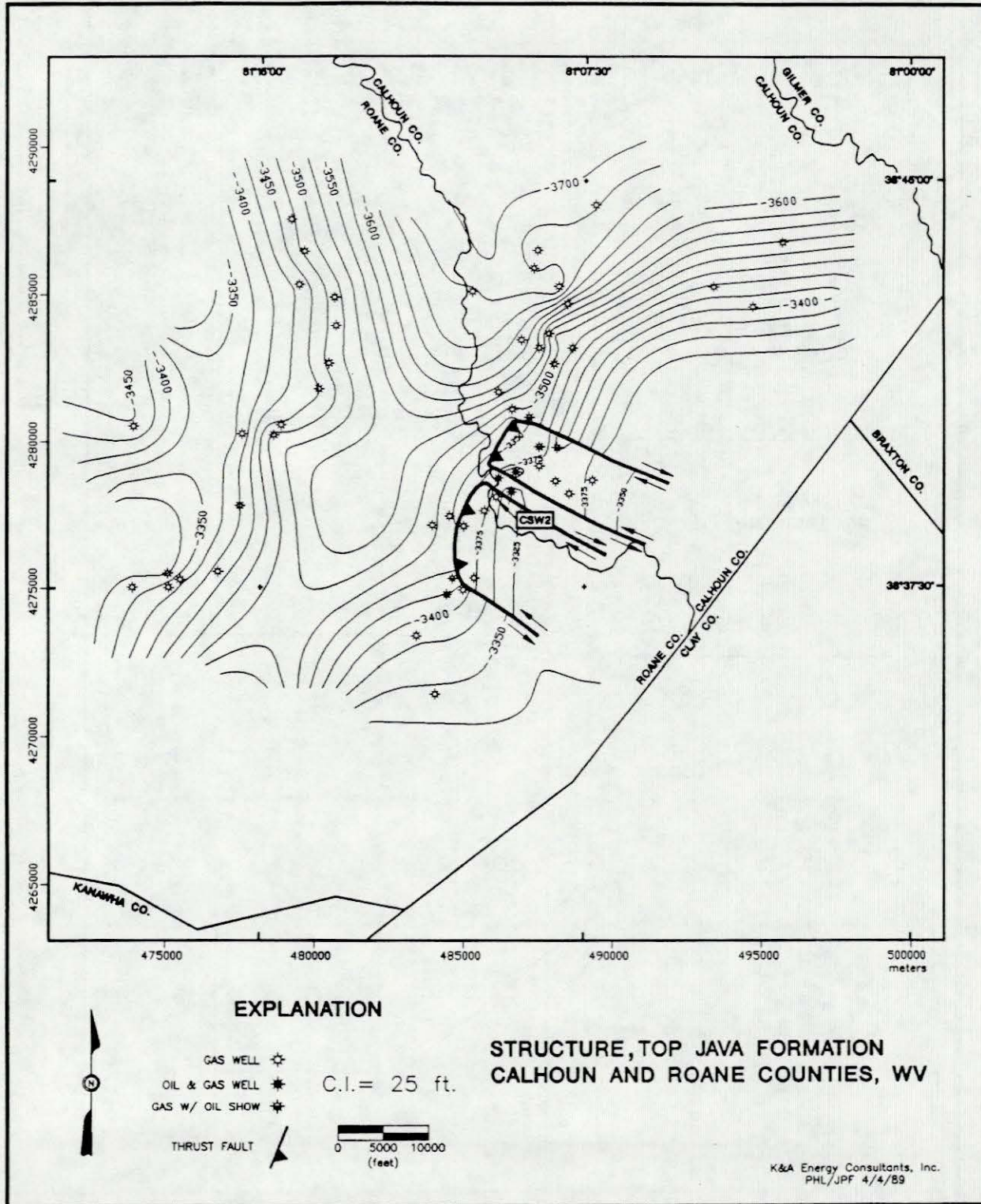


FIGURE 14

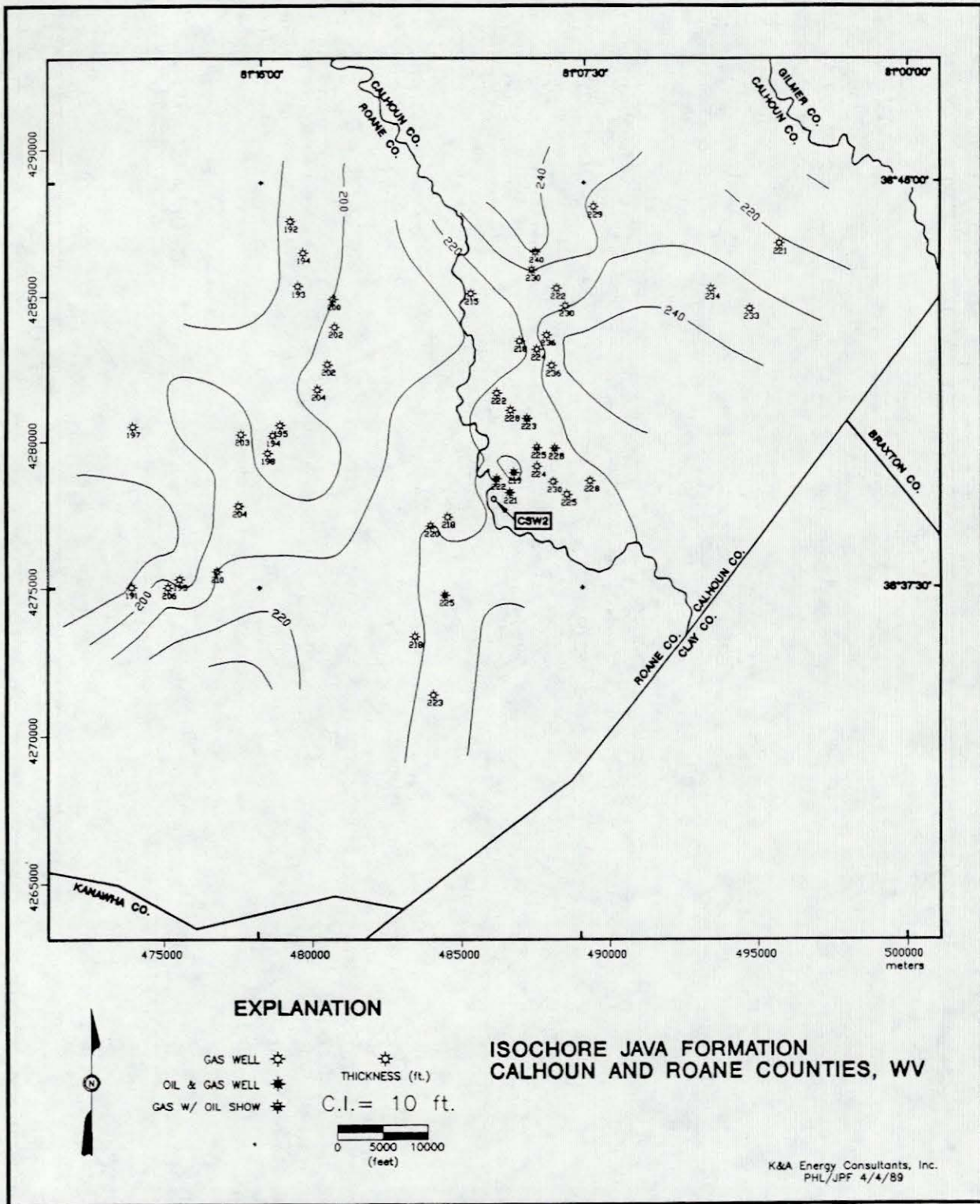


FIGURE 15

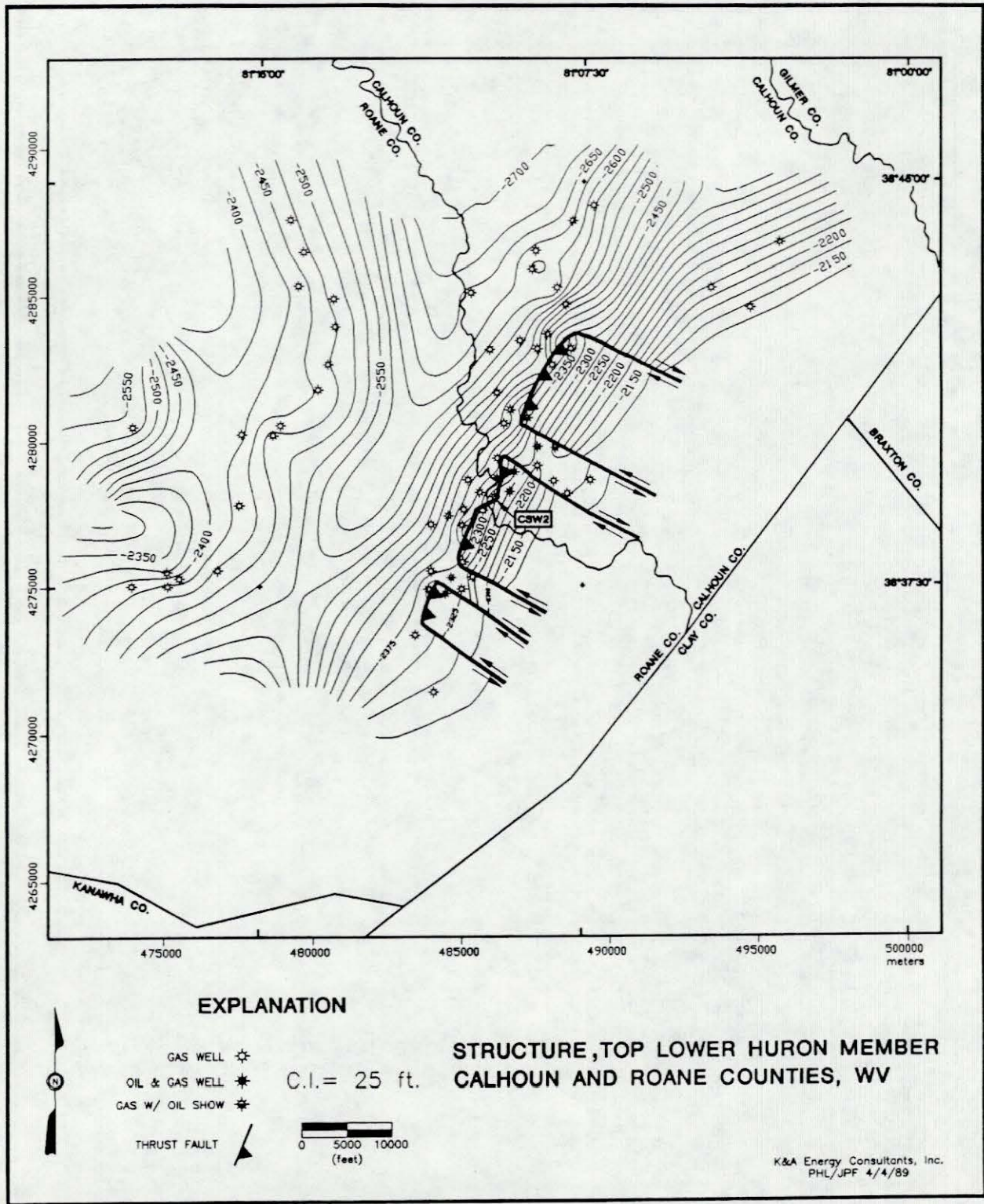


FIGURE 16

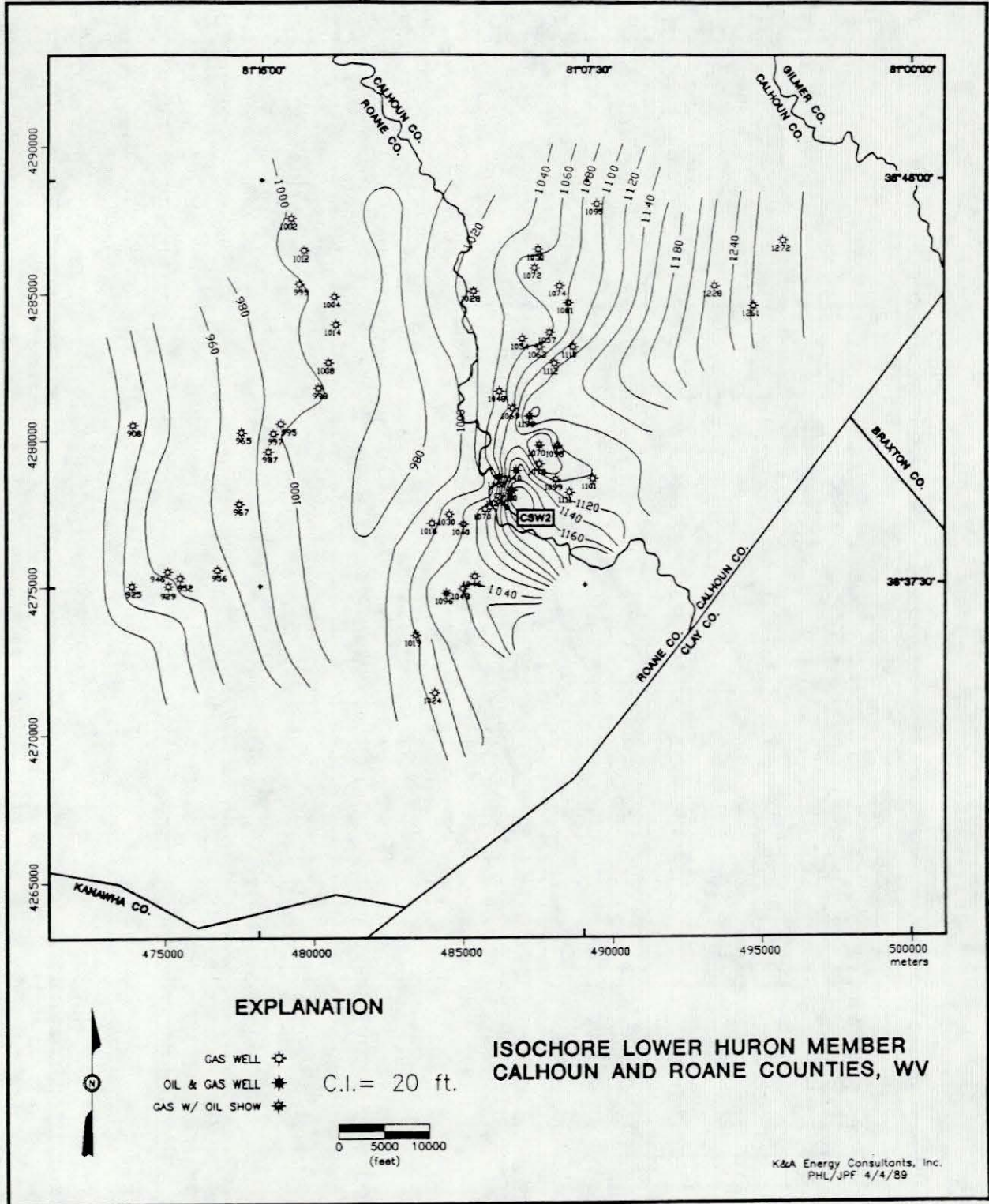


FIGURE 17

STRUCTURAL CROSS SECTION OF FAULTED LOWER HURON INTERVAL CSW2 AREA

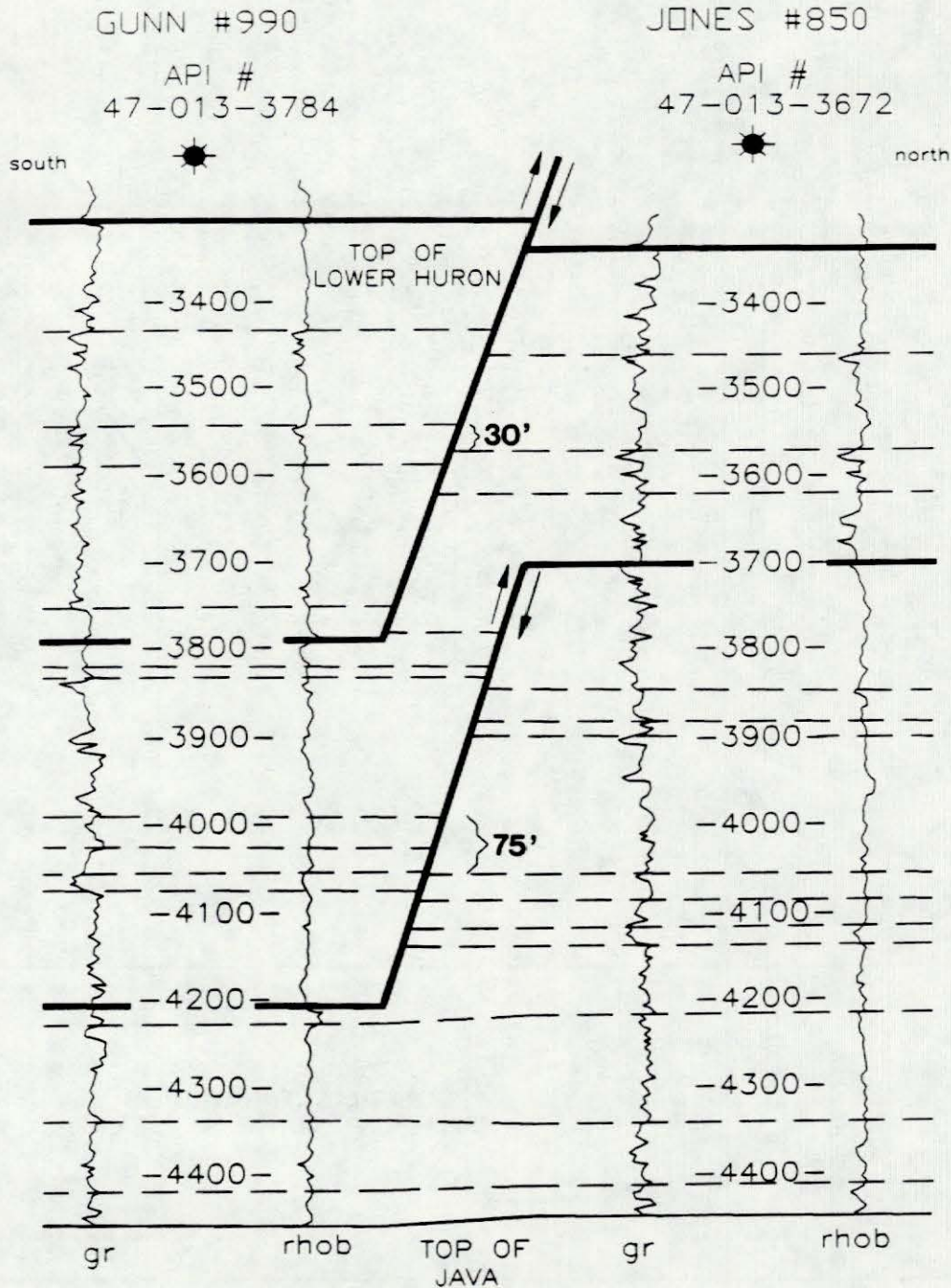


FIGURE 18

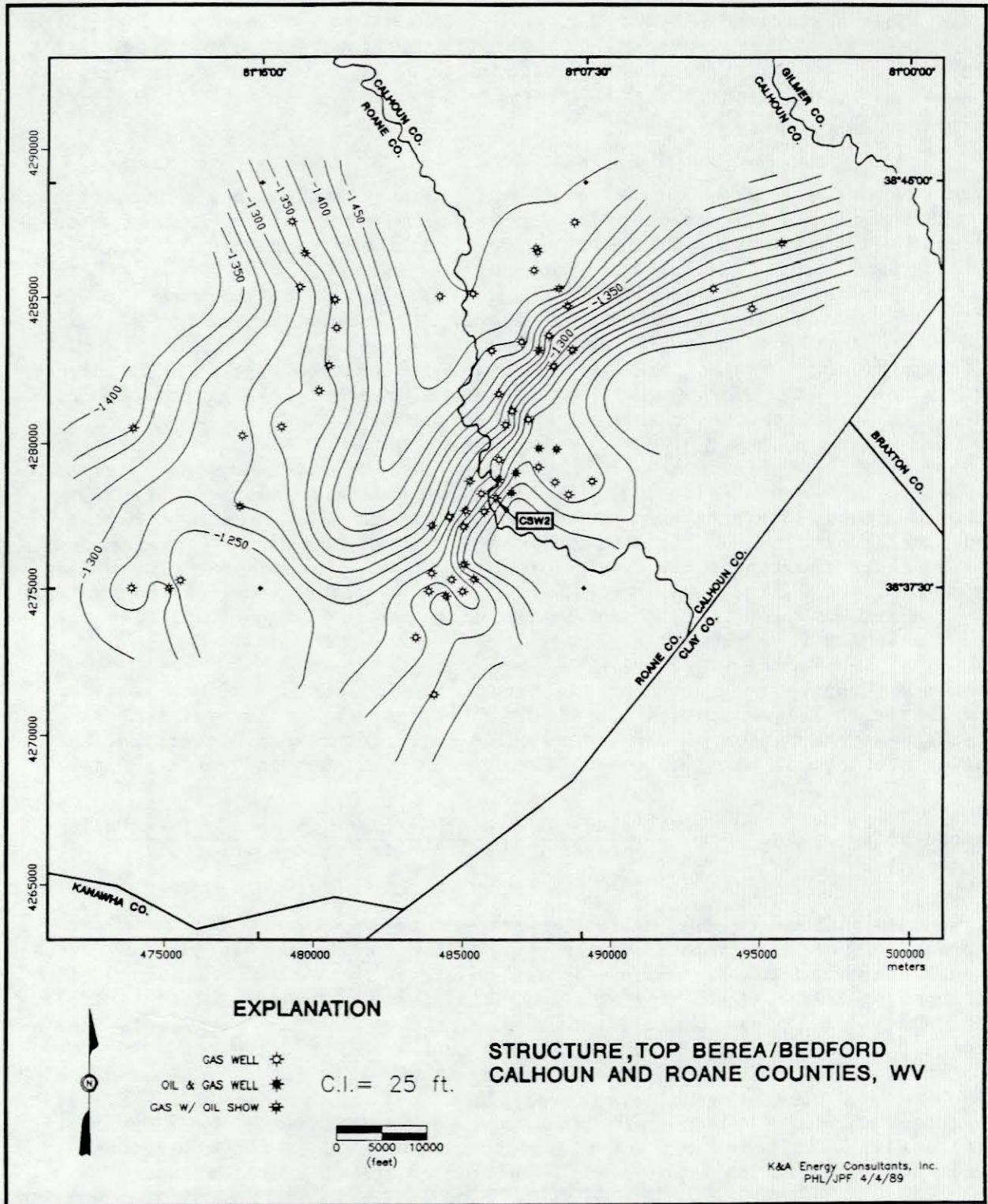


FIGURE 19

Chagrin Shale forming a band running south-southwest to north-northeast, just to the west of CSW2, suggestive of local thrust faulting within the unit (Figure 20). The thrust faults are presumed to be near horizontal or splayed such that the repeat sections are relatively thin.

Well Log Correlation

In the Devonian shale section, stratigraphic markers with strong contrasting log properties were identified and correlated for mapping purposes; but differences in log curve response frequency, amplitude, and curve shift make detailed correlations within shale members between wells difficult. Raw gamma ray log data from two wells offsetting CSW2, logged by the same service company six months apart, are shown in Figure 21, Panel A. Well No. 849 has a markedly different gamma ray log signature than No. 1119, presenting a difficulty in log correlation. The difference in log character is attributed to variation in log calibration, logging speed, or other logging phenomenon, rather than pure response to rock physical properties.

Standardizing and filtering of gamma ray and density log data eased correlation between logs (Figure 21, Panel B), leading to improved identification of fault intersections and repeat sections. For detailed correlations, an interval from 50 feet below the top of the Java Formation to 500 feet above the top of the Lower Huron Member was selected for nine wells in the CSW2 area. The gamma ray, density, compensation, and caliper data were obtained in a digital format by having a service company digitize the logs at one-half foot intervals.

The raw log data were converted to standard deviations using the equation below (Davis, 1973), which had the effect of correcting for lateral shift and dampening extreme ranges of deflection while retaining relative amplitude and allowing statistical calculations involving both gamma ray and density data.

$$\text{standardized value} = \frac{(\text{value at given depth} - \text{mean for entire interval})}{\text{standard deviation for entire interval}}$$

The desired outcome of the filtering process is to convert log data from different wells to a common sample rate while retaining the general log response character to the maximum degree possible. A method for doing this is to apply a filter consisting of a weighting function over a select minimal window size which gives the desired sample rate of the log responses. The selected filter is applied to the window and a value calculated for the midpoint of the window. The window is moved down the log data, one depth increment at a time, the filter is reapplied for each window position, and successive midpoint values calculated. A plot of these midpoint values constitutes the filtered log curve (Doveton, 1988). This filtering process is equivalent to fitting a polynomial function to the data in the window.

A comparison of logs from offsetting wells in the CSW2 area showed that the highest common frequency of gamma ray log response was about 10 feet and the filter window size was chosen on this basis. A third-order polynomial function of the form shown below was chosen (Doveton, 1986).

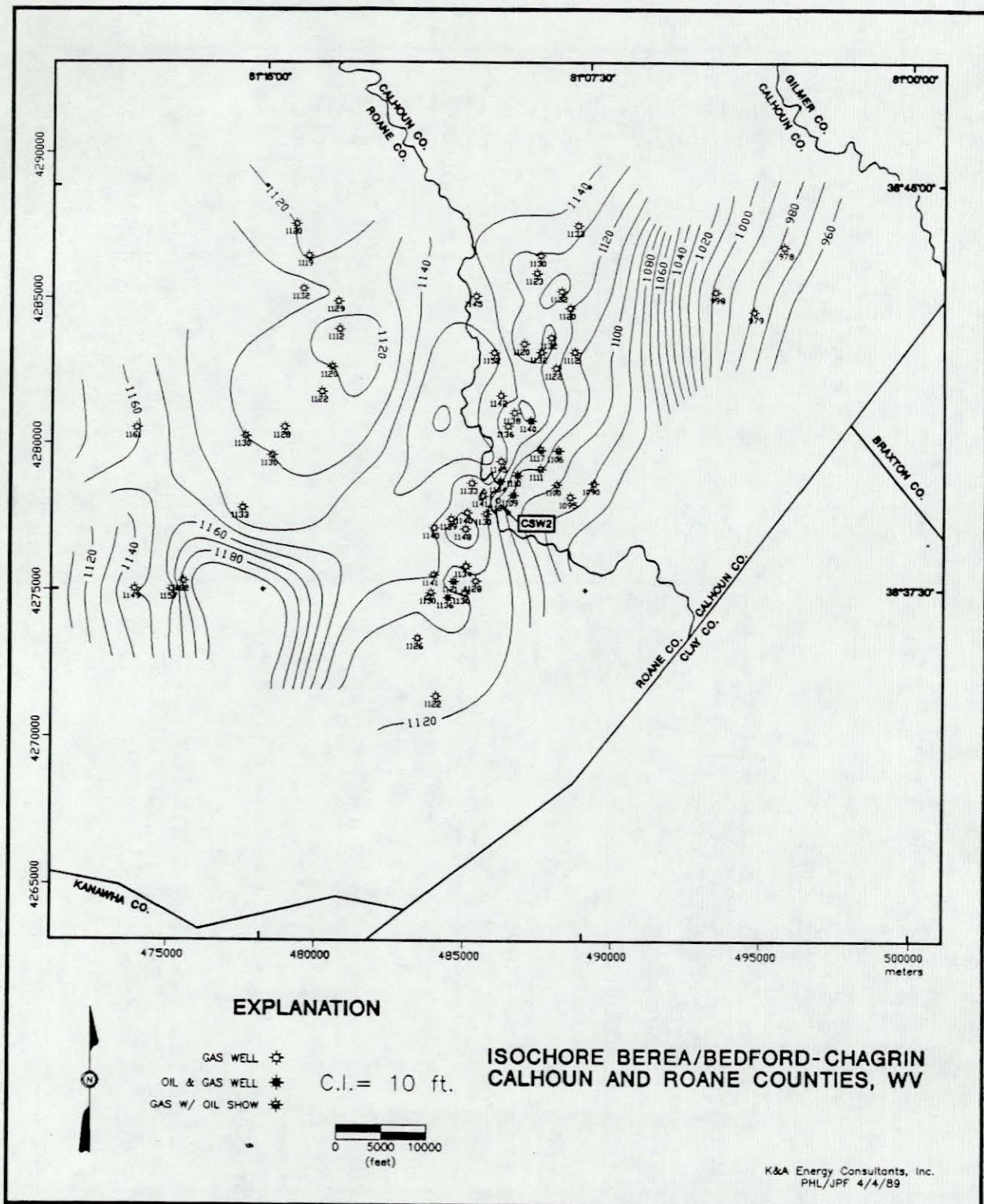


FIGURE 20

GAMMA RAY CURVE CORRELATION USING RAW AND FILTERED DATA

CORRELATION OF
A: RAW DATA

CORRELATION OF
B: FILTERED DATA

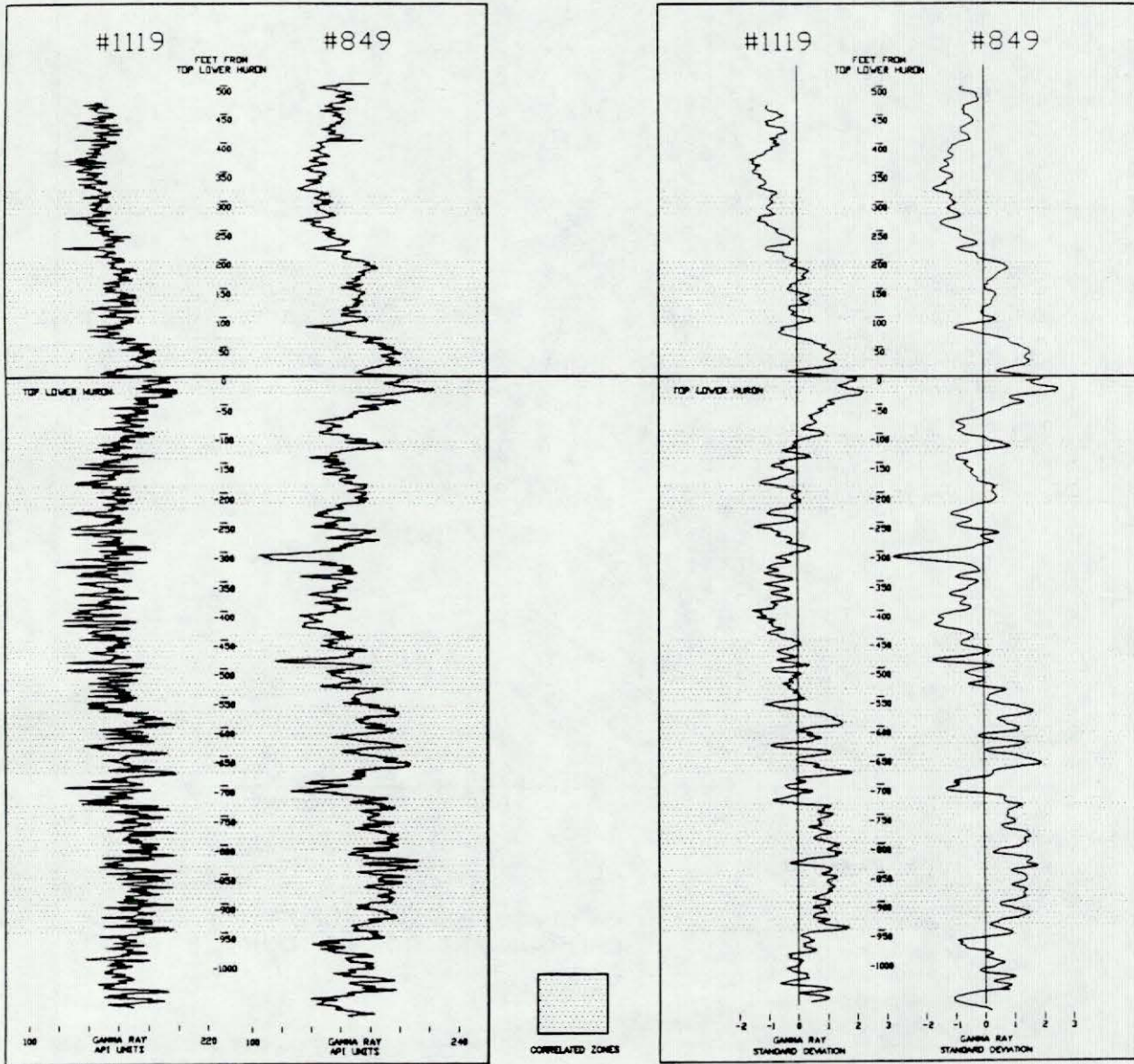


FIGURE 21

$$c = a_0 + a_1d + a_2d^2 + a_3d^3$$

The a_i values are the calculated coefficients and d is depth. The coefficients for the third-order polynomial function were calculated by the least-squares method of regression analysis. The process for each window position consists of calculating a unique coefficients, solving for the value of the polynomial for the midpoint of the window, and storing that value. This is repeated for each successive window position over the entire depth interval. The Fortran program used to perform the filtering, modified from Davis (1973) is included in Appendix A. The input data consists of depth and raw or standardized log response. The output includes the depth increments, raw data, and an additional data column consisting of filtered values at each depth increment.

The filtered log data for Well Nos. 849 and 1119 as shown in Figure 21, Panel B, leads to improved correlation of the pattern of these log curves. Such correlations improved the definition of the fault traces and repeat sections and qualitative correlation of intervals containing relatively greater amounts of siltstone. Correlations between the nine wells analyzed assisted in the confirmation of faults inferred from structure and isochore mapping.

CORE DESCRIPTION AND ANALYSIS

The acquisition, description, and analysis of core is critical to the definition of the reservoir character of the Devonian shale. A total of 148 feet of whole core and 28 sidewall cores were taken from CSW2. The whole core was described in detail, on the scale of the depositional events that produced the sequence. Analyses of the core materials included: routine core analysis, mechanical property testing, proppant embedment and fracture conductivity tests, gas permeability and resistivity testing, formation damage tests, petrography, scanning electron microscopy, X-ray diffraction, and induced fracture orientation.

Core-Log Correlation

The core in the CSW2 well was taken by Eastman Christensen in four segments. The first core segment (Core #1 of the wellsite coring log) was taken from 3424 to 3484 feet (driller's depth). The second core segment (Core #2) was taken from 3484 to 3544 feet (driller's depth). The third core segment (Core #3) was taken from 3544 to 3555 feet (driller's depth). There was 100 percent recovery in the first three cores. The fourth core segment (Core #4) was taken from 3555 to 3574 feet (driller's depth). No specific recovery was indicated on the Eastman Christensen coring log, although 100 percent recovery was claimed on the daily drilling report and confirmed by the K&A geologist on-site. On later description by K&A Energy Consultants, the base of the core was logged at 3572.25 feet (core depth), suggesting loss of portions of the core through post-coring handling. It is assumed that the base of Core #4 was lost.

The downhole depth reference was taken as the gamma ray log trace from Run No. 2 of the Phasor Induction/Lithodensity log run on October 23, 1987. There had been apparently some difficulty in obtaining a consistent wireline depth registration in the hole from run to run. Gamma log correlation of the various logging runs indicated complete inconsistency in depth record. The specific run used claimed to be accurate in the "Comments" section of the log header. Detailed comparison of the core gamma log run by Core Laboratories with the downhole reference curve gave the following result, applicable to all four segments of the CSW2 core with an uncertainty of plus or minus one foot:

$$\text{CORE DEPTH} - 7 = \text{LOG DEPTH (FEET)}$$

The record of the rock sequence provided by the core provides an important constraint on core-log correlation. The CSW2 core is continuous over the interval from 3424 to 3555 feet (core depth), and is assumed continuous to 3572.25. Consequently, the depth shift applied to the CSW2 core depth, to establish the best correlation with log depth must be single-valued and uniform over the cored interval. The introduction of variable depth shifts over the cored interval would either introduce core "overlaps", where two different feet of core supposedly are equivalent to the same foot of formation measured by logs, or would imply a gap in the core sequence, which is not supported by the coring record.

Whole Core Description

The whole core was taken from 3424 to 3572 feet (core depth), beginning approximately 50 feet below the top of the Lower Huron Member (see Figure 4). This interval was chosen because of the high frequency of gas shows as observed in offset wells, and variable character useful in calibration of logs. The description was based on a 1/3 slab of the entire core, using visual examination, assisted with a binocular microscope. A specific examination of the core for fractures was assisted by a subsequent treatment of the slabbed surface with dye penetrant, documented by before-and-after photography on a foot-by-foot basis. The data from the core description is compiled in Appendix B and the dye penetrant procedure is summarized in Appendix C. The core was very thinly bedded, consisting of about 4,000 distinct beds of the various lithotypes, ranging in thickness between 0.01 and 0.8 feet.

Summary Depositional Interpretation

Description at the scale of the individual beds, regardless of their dimensions, is essential for a quantitative sedimentological analysis and the definition of rock types with genetic significance. Four lithotypes were identified in the CSW2 core, including two siltstones and two shales. The two siltstone types have a variety of sedimentary structures, including graded bedding and load casts, generally indicative of turbidite sedimentation, and corresponding to the "C" and "D" turbidite bed types of Bouma (1962). Markov analysis (discussed in detail below) of the vertical sequence of lithotypes showed a strong association of the two siltstone types and the green-gray shale into fining-upwards sequences, suggesting the depositional

interpretation of the green-gray shale as the uppermost Bouma "E" part of a distal turbidite (Bouma, 1962). The second shale lithotype is dark gray in color and is not strongly associated with the turbidite siltstones, suggesting deposition by a different mechanism, presumably pelagic. The result is a simple depositional interpretation of the Lower Huron section in central West Virginia (Figure 22). Pelagic sedimentation of dark gray to black shale was periodically interrupted by distal turbidite deposition of thin siltstones and green-gray shale (Hamilton-Smith, et al., 1989).

Markov Analysis

Markov analysis (Davis, 1973) characterizes sedimentary successions by the tendency of one lithotype to succeed another in vertical sequence. The initial step in the analysis is the formation of the transition count matrix, which summarizes the record of all upwards transitions from one lithotype to another. For CSW2, the transition count matrix is as follows:

	<u>Black Shale</u>	<u>Gray Shale</u>	<u>Shaly Silts</u>	<u>Siltstone</u>
Black Shale	0	361	453	202
Gray Shale	852	0	174	89
Shaly Silts	131	638	0	29
Siltstone	27	176	145	0

Transitions between a particular lithotype and itself were not permitted in the model for the CSW2 core, resulting in zero values along the diagonal of the matrix. The next step in the analysis is the conversion of the transition count matrix into a transition probability matrix, accomplished by dividing each entry in the transition count matrix by the sum of the entries for its particular row. The transition probability matrix for the CSW2 core is as follows:

	<u>Black Shale</u>	<u>Gray Shale</u>	<u>Shaly Silts</u>	<u>Siltstone</u>
Black Shale	0.0	0.36	0.45	0.20
Gray Shale	0.76	0.0	0.16	0.08
Shaly Silts	0.16	0.80	0.0	0.04
Siltstone	0.08	0.51	0.42	0.0

The sum of the probabilities in each row totals 1.00, indicating that for any lithotype (in a particular row), there must be an upwards transition into one of the lithotypes indicated in the columns. For example, the probability of transition of siltstone upwards into shaly siltstone is 0.42.

The Markov process model resulting from this analysis is summarized in Figure 23, with the probabilities for the various transitions indicated. One significant feature of this figure is the large contrast in probabilities of transitions between the siltstone and the shaly siltstone, between the siltstone and the gray shale, and between the shaly siltstone and the gray shale, all consistently indicating a strong tendency to form a fining-upwards

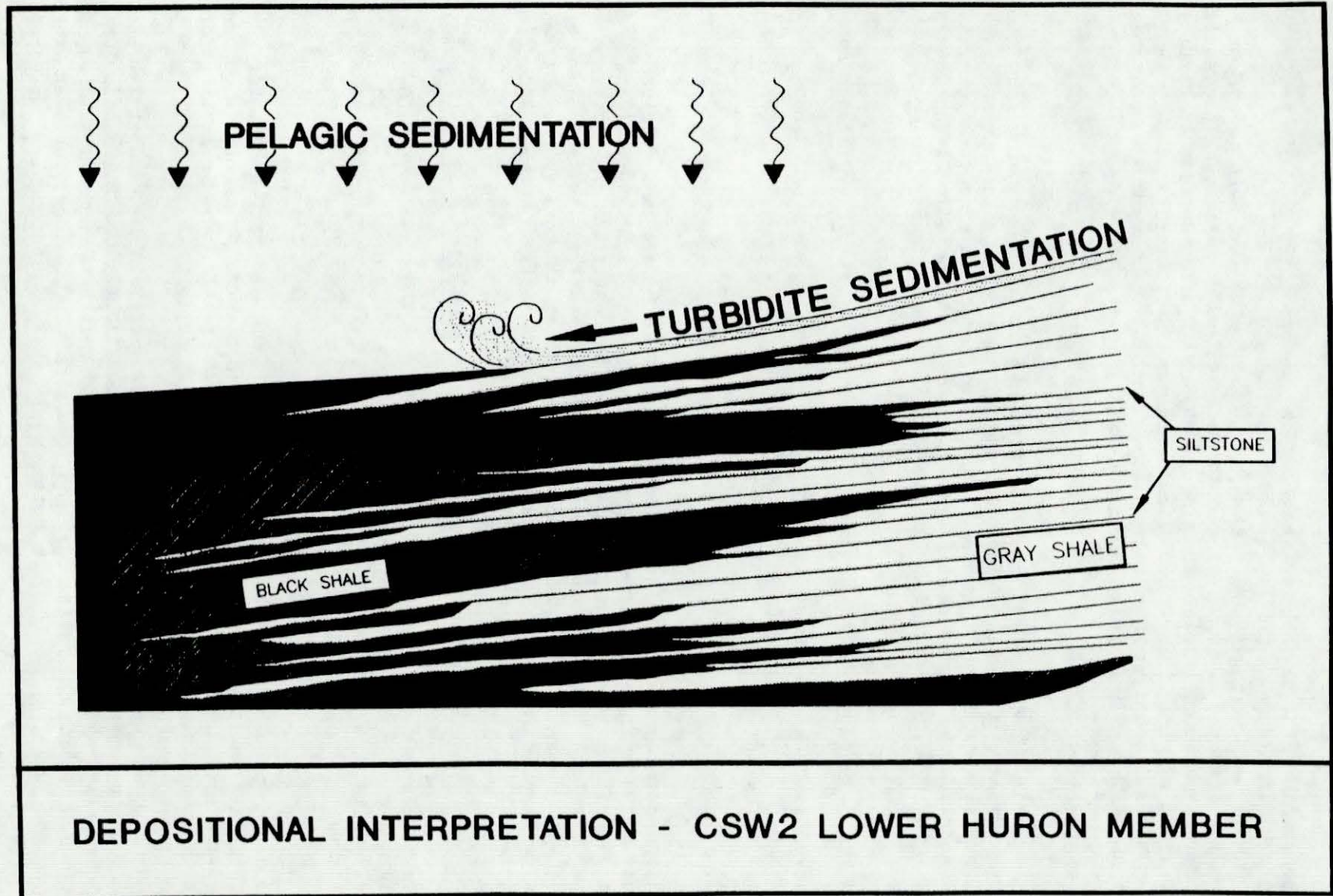


FIGURE 22

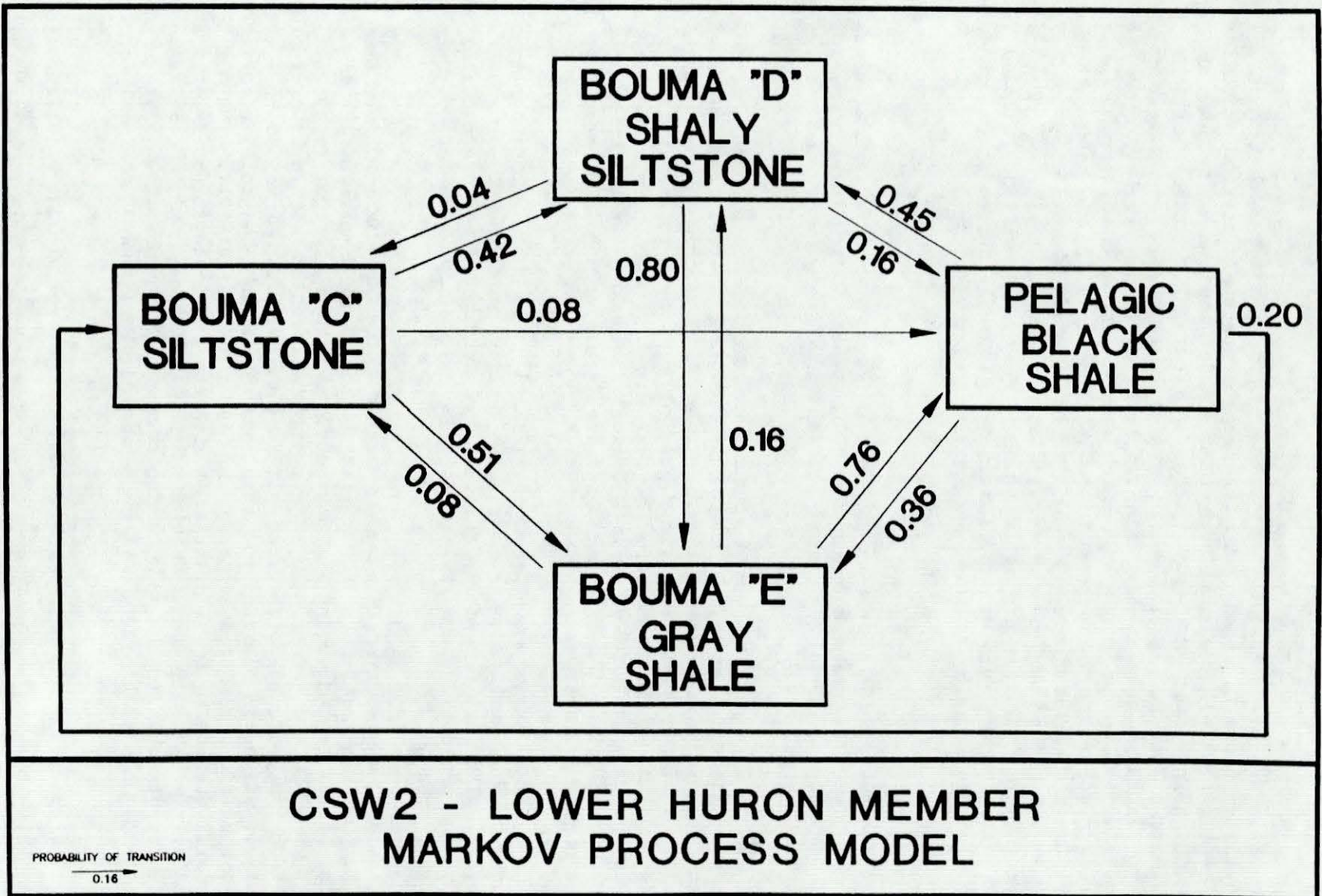


FIGURE 23

sequence. This association, which does not include the dark gray to black shale, is interpreted as the product of turbidite sedimentation. Similarly, examination of the transition probabilities between the siltstones and the shales suggests that the gray shale is genetically associated with the siltstones rather than with the dark gray or black shale. The siltstones are five to six times more likely to be followed by a gray shale rather than a black shale. If the gray shale were pelagic like the black shale, and resulted simply from variations in redox conditions in the basin, then the transition probability from gray shale to black shale should be approximately equal to that for the inverse transition from black shale to gray shale. However, there is a high probability that a gray shale will be followed by a black shale (waning turbidite buried in pelagic mud), but no strong tendency for a black shale to be followed by any particular lithotype.

Fractures

A fracture analysis was made on the core using both the geological description and dye penetrant photography. Four types of fractures were found; petal fractures, bedding plane partings, slickensides, and irregular mineralized fractures.

Petal fractures apparently begin at the core margin, and propagate downwards at an initial angle between 30 and 45 degrees from the vertical. This angle decreases rapidly with propagation, so that the fractures come to parallel the axis of the core, with a high degree of curvature in the initial, near-margin section of the fracture. The fracture typically terminates abruptly downsection in the core at a lithological boundary. Petal fractures are oriented parallel to the core axis, and are interpreted to have been a result of the coring process.

Bedding plane partings are fractures parallel to bedding, and are pervasive throughout the core, most commonly in thinly interbedded and laminated intervals. They are not mineralized and are attributed to core handling and the coring process. These fractures were frequently enhanced by the dye penetrant process.

Slickensides are subparallel to bedding, but cut depositional surfaces in detail, and most commonly occur near lithological boundaries. They are smooth, planar to undulating surfaces covered with a glaze of recrystallized clay minerals, and marked by a pronounced lineation within the fracture surface. Forty-two occurrences of slickensides were noted in the CSW2 core, with associations in distinct clusters, with over half the total occurrences in two specific zones from eight to ten feet thick (Figure 24). The slickensides are interpreted to be associated with the imbricate thrust fault system mapped in the Devonian shale section in the CSW2 area, part of the regional detachment produced in the Alleghenian orogeny of Permian age. Slickensides are not distinguishable from bedding plane partings when viewed only on the slabbed surface of the core.

Irregular mineralized fractures are vertical to horizontal in orientation, and locally form networks. They are fully to partially filled with a variety of minerals, predominantly calcite, but also including dolomite, gypsum, pyrite, and clay. They occur in all lithologies, but mainly in siltstones. Eighteen occurrences were noted in the CSW2 core, with over half of the

occurrences in one specific zone ten feet thick (Figure 24). There was no apparent association of this fracture type with the slickensides. The irregular mineralized fractures are interpreted to represent an independent and older fracture system, possibly resulting from the reactivation of basement faults prior to Alleghenian thrust faulting.

The distribution of fractures in the core is compared to the fractures and hydrocarbon shows interpreted from the three pertinent runs of the Open Hole Borehole Television (OHBT) in Figure 24. A one-foot precision of depth registration is assumed for the following discussion. Eighty-six percent of the individual feet with slickensides in the core were identified as fractures or as shows by the OHBT, 80 percent in the initial OHBT run. One hundred percent of the individual feet with mineralized fractures in the core were identified by the OHBT, 86 percent in the initial run. However, the inverse correlation from the OHBT to the core was not as good. Only 51 to 58 percent of the fractures and shows identified by the OHBT corresponded to fractures in the core, depending on the individual run. Run No. 5 of the OHBT followed coring, but preceded open-hole stress testing, and had the best correlation to core fractures. Run No. 6 followed stress testing, but before drilling to total depth, and shows a number of fractures produced by breakdown of the formation during stress testing. Run No. 7 followed drilling to total depth, and had the worst correlation to core fractures.

Core Analysis

Petrological and petrophysical analysis of the whole core from CSW2 is summarized in Figure 25. Petrological analysis of the sidewall cores from CSW2 is summarized in Figure 26. The petrological data was taken from work done by David K. Davies and Associates, Inc. (Davies and Vessel, 1988), and includes mineralogical analyses obtained from both point counts of thin sections and from X-ray diffraction. Core porosity, grain density, fluid saturations, and pore aperture data were obtained by Core Laboratories (Davis, 1988).

All the petrological data is reported in percentage of bulk rock composition. Point count data is relatively precise and quantitative within the constraint of the optically visible grain population of the particular thin section. However, the finer grained fraction of the rock is not effectively sampled by point count analysis. In contrast, X-ray diffraction data samples the entire size range of the rock, but with the disadvantage of relatively imprecise semiquantitative analytical results. In this situation, the point count data can be used as an effective constraint on the precision of the X-ray diffraction data. For example, in the sample from core depth 3551.3 feet, the point count results suggest that the calcite abundance should be increased by about 42 percent over that suggested by the X-ray diffraction data, and that pyrite, which was not detected in the X-ray diffraction analysis, is present in the rock at an abundance of about 2 percent. In addition, some ambiguities exist between the two data sets due to the different criteria used in mineral identification in the two techniques. In particular, it is likely that much of the material identified as illite in X-ray diffraction data corresponds to the muscovite mica identified in thin section. A similar ambiguity exists between ankerite as identified by X-ray diffraction, and dolomite as identified in thin section.

CSW2 CORED INTERVAL FRACTURE SUMMARY

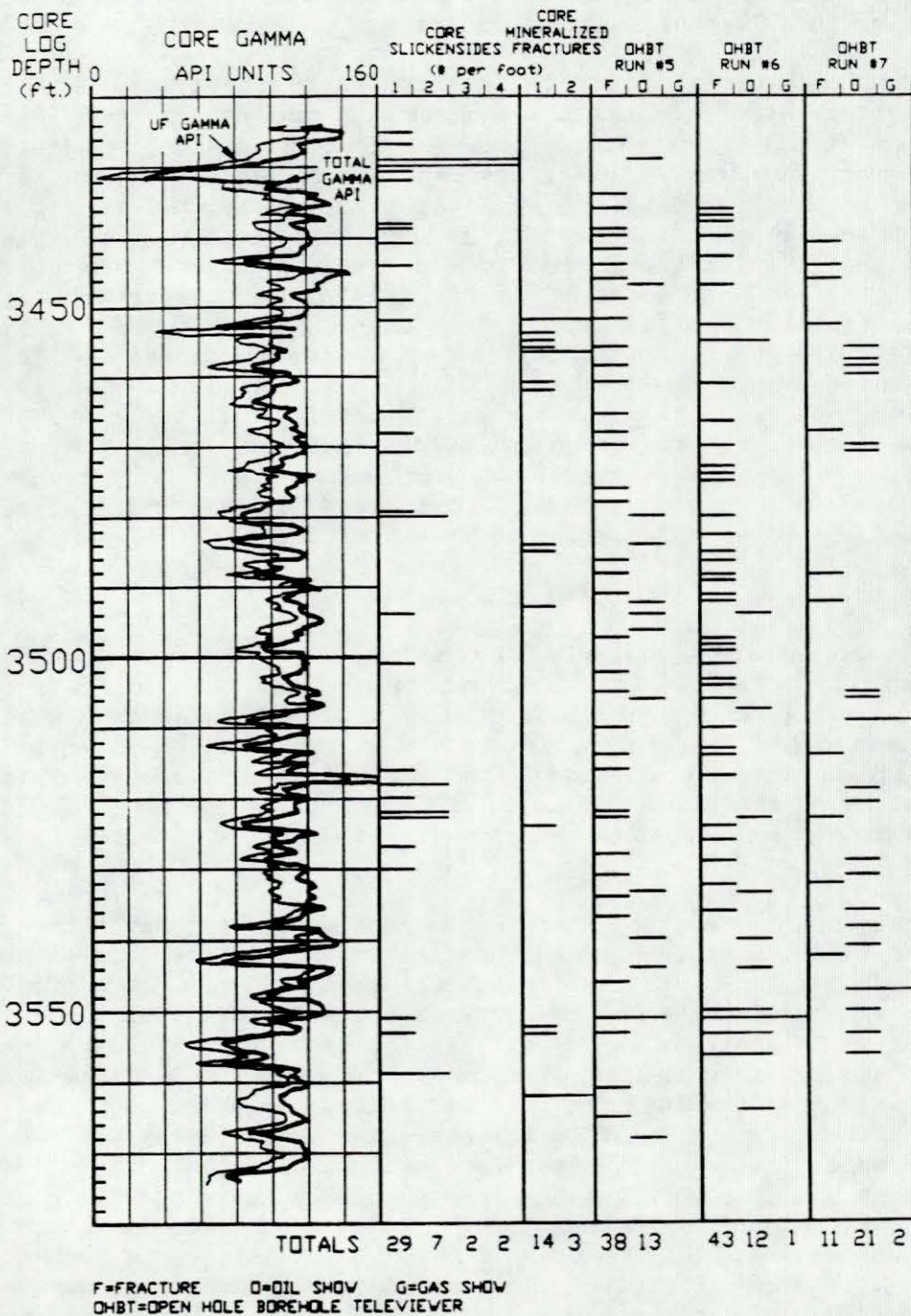


FIGURE 24

CSW2 Sidewall Core Analysis Depth Plot

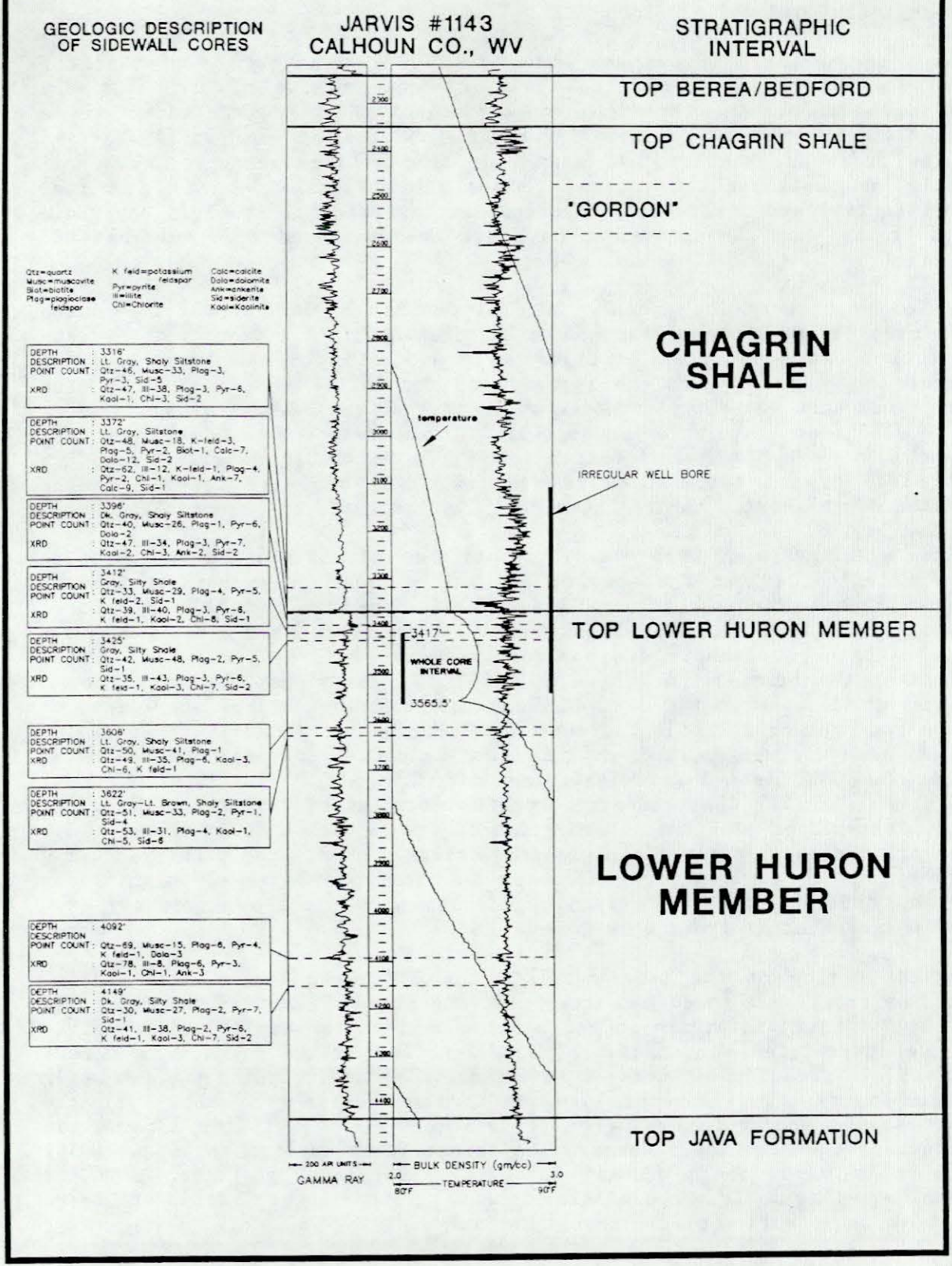


FIGURE 26

GEOLOGICAL CONTROLS ON GAS PRODUCTION

Wellsite geochemistry (Brown and Ruth, c. 1987) indicates the presence of "fair to good concentrations of free oil" at intervals throughout the Devonian shale section. Free gas concentrations measured from cuttings are apparently very low, but the striking contrast with large amounts of free gas measured from core samples, suggests that the cuttings measurements significantly underestimate the volume of free gas available in the formation. The substantial and consistent concentrations of free oil found in the shale also suggests that gas generation may have been measured from cuttings and cores.

The main temperature log anomaly in CSW2 occurs in the lower part of the cored interval (see Figure 4). A detailed display of this anomaly in comparison to core data is shown in Figure 27. According to the interpretation procedure suggested by ResTech (Truman and Campbell, 1986, p. 24-25), the anomaly indicates gas entry into the wellbore from an interval extending from 3534 to 3560 feet (reference log depth). This corresponds to a minor mud log show at 3551 feet (Brown and Ruth, c. 1987). It should be noted that the depth scale of the temperature log is four feet off with respect to the reference depth scale: the adjusted depth is indicated on Figure 27.

Detailed examination of both the distribution of lithotypes and fractures in the core indicates that the zone of gas entry is uniquely characterized by the simultaneous intersection of relatively numerous and thickly bedded siltstones (up to 0.8 foot), slickensides, and irregular mineralized fractures. All three elements are apparently required for effective reservoir development (Hamilton-Smith, *et al.*, 1989). The zone was also marked by a significant decrease in the rate of penetration during coring, sufficient to cause a trip out of the hole to examine the coring bit (see Figure 25). The zone was also uniquely marked by coincident fractures and oil shows on early runs of the OHBT (see Figure 24). Gas entry into the well bore of newly drilled wells in the CSW2 research area, as detected by temperature logging, is often associated with the intersection of a well with a fault (Figure 28). It appears that this early flush gas production is associated with fracturing caused by the thrust faults. Gas entry in such zones suggests significant migration from the site of original generation, a process previously suggested on geochemical grounds by Curtis (1988).

Flowmeter logging of the same wells in the CSW2 area that showed initial production from fault zones has shown that sustained production is associated with the "siltier" intervals in the hanging wall of the fault. Silty intervals are interpreted as relatively nonradioactive on the gamma ray log and relatively low density. Figure 29 is a fence diagram including the two wells shown in Figure 28. Flowmeter logs run in the eastern two wells indicated that sustained production was from perforations in the siltier interval in the upper part of the Lower Huron. The thrust fault cutting these two wells occurs at or below the producing interval. Sustained production from the western two wells is from the siltier interval in the lower Chagrin Shale and just above the position of the thrust fault.

Reference Log:
 Phasor Induction/Lithodensity/Natural Gamma Ray
 Run #2 October 23, 1987
 Jarvis #1143, Calhoun Co., WV

GAS ENTRY vs. CORED INTERVAL

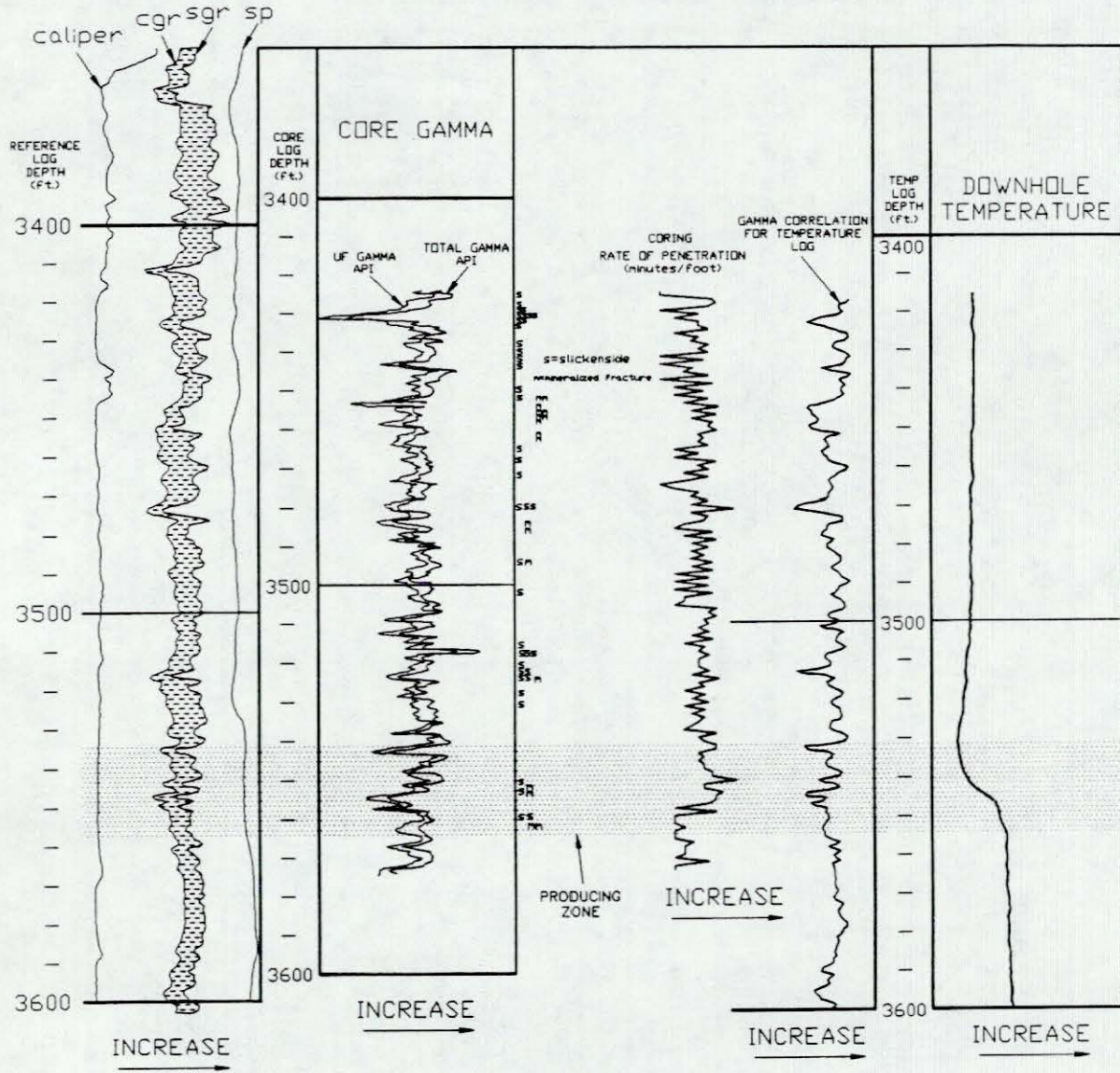


FIGURE 27

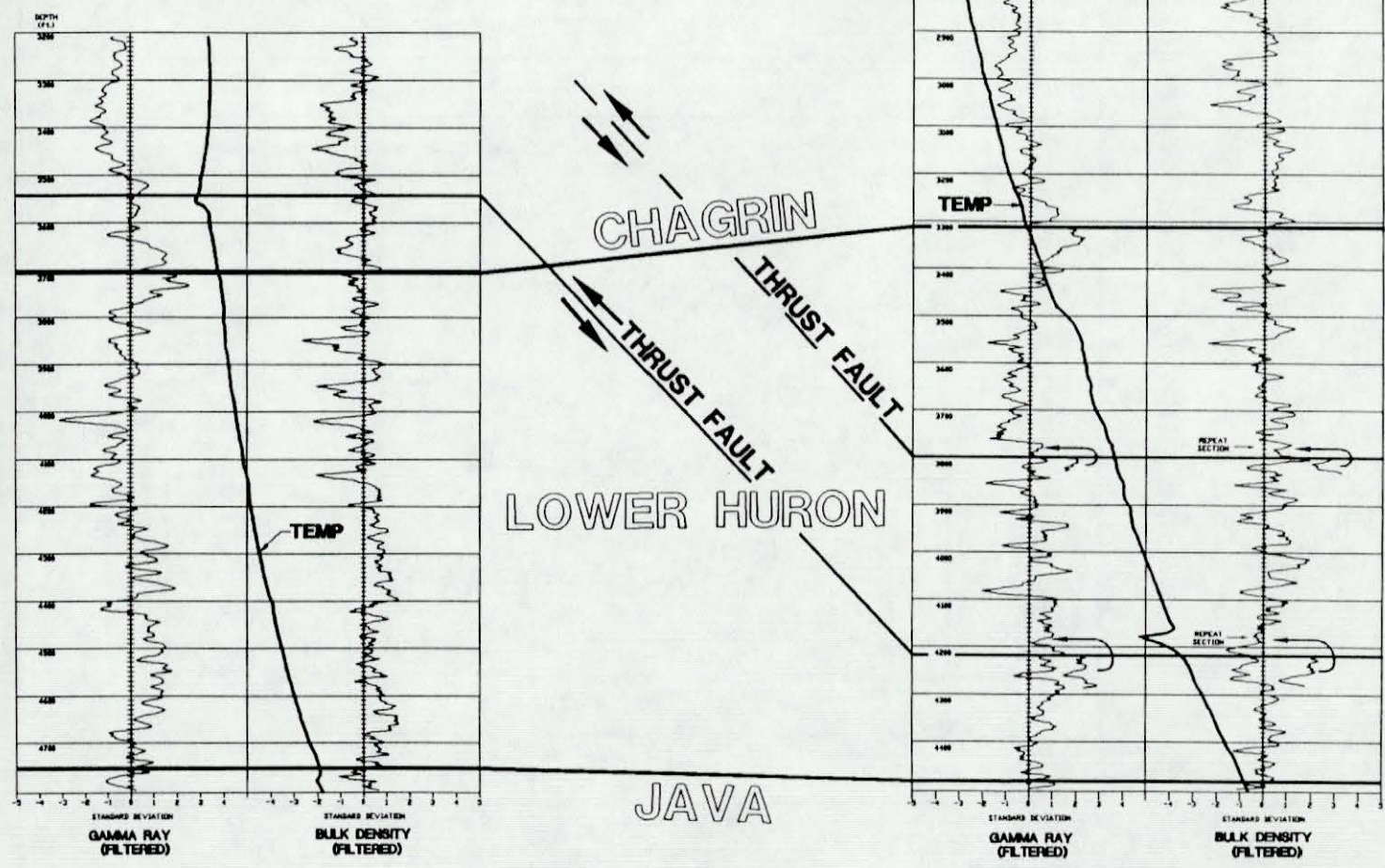
RELATIONSHIP OF STRUCTURE TO INITIAL GAS ENTRY CSW2 RESEARCH AREA

W

GUNN #990

E

JARVIS #849



41

FIGURE 28

CSW2 is located in the middle of the area of Figure 29, and has sustained production from the top of the siltier interval in the Lower Huron. The production from CSW2 is much less than the other wells in the fence diagram, possibly indicating a predominance of unfavorable lithologies in hanging wall proximal to the thrust fault. Although the thrust fault in the Lower Huron in the wells to the east can be correlated to the wells on the west, a fault cut in CSW2 was not positively identified.

The contours in Figure 30 are of the first year cumulative production from wells in the CSW2 research area. Wells producing in excess of 20 mmcf in the first year define a prominent band running south-southwest to north-northeast. This band coincides with a zone of stippling which reflects the composite area affected by thrust fronts, identified at the various horizons in the Devonian shale. Similarly, the zone of hatching shows the area affected by the interpreted tear faults, in the thrust sheets, at the various levels. These structurally affected areas, which also include the zone of intersection of faults and siltier intervals, closely coincide with the band of highest capacity wells. Wells very close to or cut by faults tend to have the highest cumulative recovery and some wells cut by faults produce oil. The highest capacity wells are near the intersections of thrust faults and tear faults, especially those tear faults mapped at the top of the Java Formation.

The gas reservoirs in the CSW2 area appear to require a combination of structure-induced fracturing, possibly of two types, and relatively abundant and thickly bedded siltstones. The CSW2 research area lies along an extensive north to south trending detachment front including the Burning Springs and Mann Mountain Anticlines and along the western edge of extensive siltstone-rich horizons deposited as turbidites of the Catskill delta complex. Exploration along this trend, for fault intersections with favorable lithologic intervals, should reduce the risk of noneconomic wells.

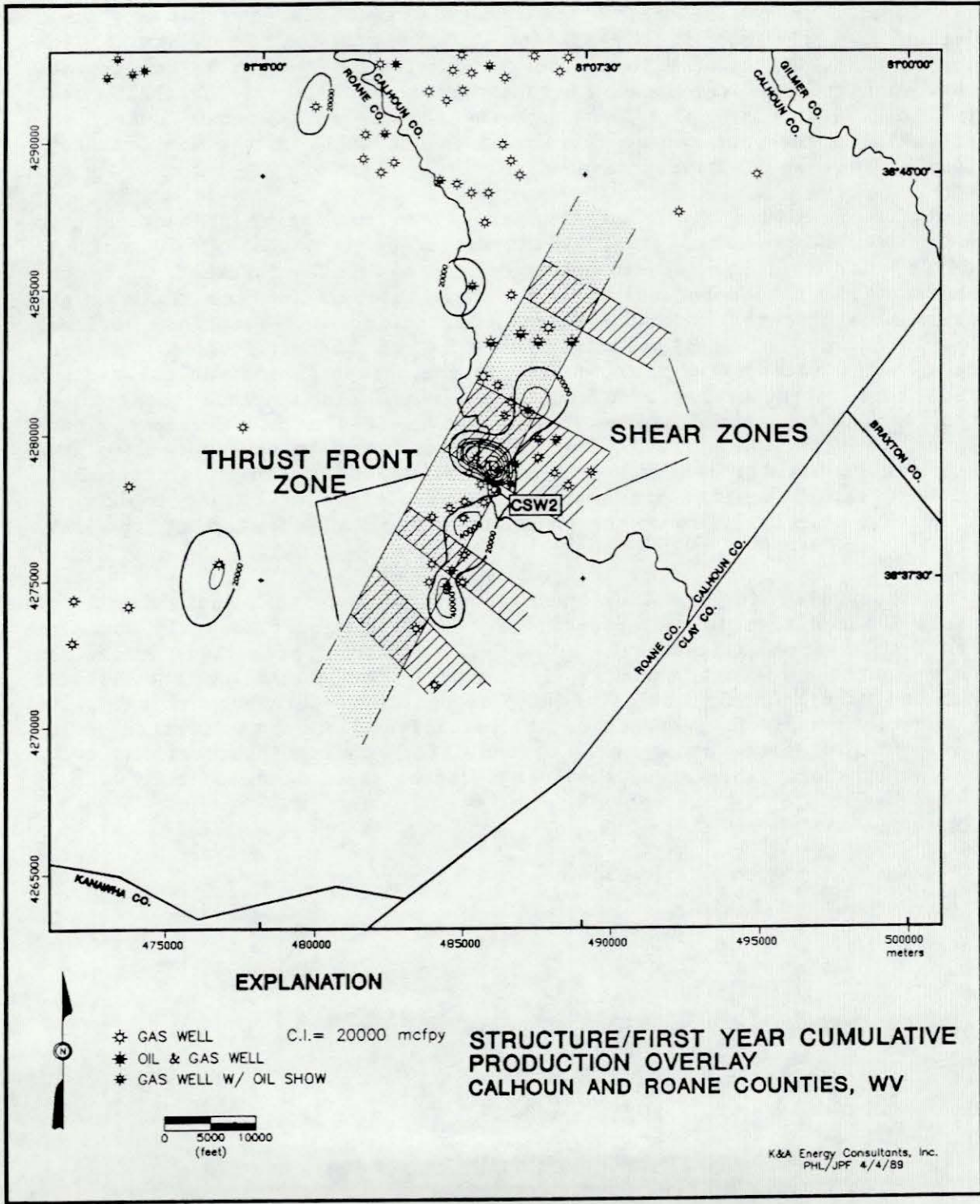


FIGURE 30

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APPENDIX A

Fortran Program for
Polynomial Filtering of Log Data

APPENDIX A

Fortran Program for
Polynomial Filtering of Log Data

This program was taken from Davis (1973), originally called Program 5-5 routine POLYD. It was modified to process the data within a user specified window rather than as a whole. The portions of the program, as published by Davis, that generated error figures were eliminated because they do not apply to successive calculations at window positions.

```

C
C   ROUTINE POLYFLT
C
C   ROUTINE TO FIT CURVILINEAR POLYNOMIAL
C   REGRESSION OF ORDER IORD TO SPECIFIED WINDOW OF DATA
C   CONVERTED FROM ROUTINE POLYD (DAVIS, 1973)
C   BY P. LOWRY, K&A ENERGY CONSULTANTS, INC., FEBRUARY, 1989
C
C   ARRAY A CONTAINS X (DEPTH) AND Y (LOG) DATA
C   ARRAY B CONTAINS THE TERMS OF THE COEFFICIENT MATRIX
C   ARRAY C ORIGINALLY CONTAINS THE VECTOR OF THE RIGHT HAND SIDE
C   OF THE NORMAL EQUATIONS. AFTER SOLVING
C   OF THE NORMAL EQUATIONS, ARRAY C CONTAINS THE COEFFICIENTS
C   OF THE REGRESSION EQUATION.
C   ARRAY D CONTAINS THE DEPTHS, INPUT LOG DATA,
C   AND THE REGRESSION FILTER WINDOW VALUES
C
C   MAXIMUM NUMBER OF OBSERVATION IS 4000
C   MAXIMUM ORDER OF EQUATION IS 19. REDUCE THE ORDER OF THE
C   POLYNOMIAL WITH INCREASED WINDOW SIZE. CONVERSELY, REDUCE
C   THE WINDOW SIZE WITH INCREASED ORDER OF POLYNOMIAL,
C   OTHERWISE THE PROGRAM WILL CRASH.
C   =====
C
C   IMPLICIT DOUBLE PRECISION (B,C)
C   DIMENSION A(4000,3),B(20,20),C(20),XP(20)
C   CHARACTER*20 INFILE,OFILE
C
C   PROMPT FOR FILE NAMES AND OPEN INPUT AND OUTPUT CHANNELS
C
C   WRITE(*,300)
300  FORMAT(/,' *****',/,
A   ' POLYNOMIAL FILTERING ROUTINE',/,
B   ' *****',/)
C   WRITE(*,301)
301  FORMAT(/,1X,'ENTER INPUT DATA FILE NAME: ',)$
C   READ(*,303) INFILE
C   WRITE(*,302)
302  FORMAT(/,1X,'ENTER TABULAR DATA OUTPUT FILE: ',)$
C   READ(*,303) OFILE
303  FORMAT(A20)
C
C   OPEN(30,FILE=INFILE,STATUS='OLD')
C   OPEN(31,FILE=OFILE,STATUS='UNKNOWN')
C
C   PROMPT FOR ORDER OF EQUATION AND FILTER SIZE

```

```

C
  WRITE(*,10)
10  FORMAT(/,1X,'ENTER ORDER OF EQUATION?...',$)
    READ(*,1000) IORD
    IORD1=IORD+1
    WRITE(*,20)
20  FORMAT(/,1X,'ENTER WINDOW SIZE IN FEET (ODD NUMBER)?...',$)
    READ(*,1000) IWNDO

C
C  READ MATRIX ONE ROW AT A TIME
C
  N=1
  9  READ (30,1002,ERR=999) A(N,1),A(N,2)
    N=N+1
    GOTO 9
999 N=N-1
C  (8X) IN FORMAT STATEMENT PROVIDED TO READ ACROSS DEPTH OF BOTTOM
C  OF INTERVAL OUTPUT BY LOG ANALYSIS PROGRAM
1002 FORMAT (1X,F6.1,8X,F10.5)
    CLOSE (30)
C  WRITE STATEMENT TO VERIFY INPUT DATA (ON/OFF BY COMMENT)
C  WRITE(*,500) ((A(I,J),J=1,3),I=1,N)
C 500 FORMAT(1X,2F10.5)
C
C... CALCULATE SUMS FOR LEAST SQUARES SOLUTION
C
C  INITIATE STARTING AND ENDING POINTS TO ACCOMODATE WINDOW
C
  IHLF=INT(IWNDO/2)
  NO=1.+IHLF
  N1=N-IHLF
  WRITE(*,501) IHLF,N,NO,N1
1001 FORMAT(1X,4I5)
C
C... ENTER MAIN LOOP
C
  WRITE(*,503)
1003 FORMAT(/,1X,'ENTERING MAIN LOOP')
C  OUTER WINDOWING LOOP
  DO 108 I9=NO,N1
  WRITE(*,504) I9
1004 FORMAT(1X,I5)
C... ZERO OUT DATA ARRAYS
  DO 100 I0=1,IORD1
  C(I0)=0.0
  XP(I0)=0.0
  DO 101 J0=1,IORD1
  B(I0,J0)=0.0
1001 CONTINUE
100 CONTINUE
C  INTRA WINDOW LOOP FOR SUMMATIONS
  DINDEXT=1.0
  DO 102 I=I9-IHLF,I9+IHLF
  XP(I)=1.0
  DO 103 J=2,IORD1
  XP(J)=XP(J-1)*DINDEX
1003 CONTINUE

```



```

DO 104 J=1,IORD1
DO 105 K=1,IORD1
B(J,K)=B(J,K)+XP(J)*XP(K)
105 CONTINUE
C(J)=C(J)+XP(J)*A(I,2)
104 CONTINUE
DINDEX=DINDEX+1.0
102 CONTINUE
C
C... SOLVE SLE
C
ZERO=1.0E-06
N2=IORD1
DO 200 I=1,N2
DIV=B(I,I)
IF (ABS(DIV)-ZERO) 99,99,1
1 DO 201 J=1,N2
B(I,J)=B(I,J)/DIV
201 CONTINUE
C(I)=C(I)/DIV
DO 202 J=1,N2
IF (I-J) 2,202,2
2 RATIO=B(J,I)
DO 203 K=1,N2
B(J,K)=B(J,K)-RATIO*B(I,K)
203 CONTINUE
C(J)=C(J)-RATIO*C(I)
202 CONTINUE
200 CONTINUE
GOTO 204
99 WRITE(*,512) I,DIV
512 FORMAT(1X,I5,E20.10)
CALL EXIT
C
C... CALCULATE ESTIMATED VALUE FOR DEPTH
C
204 XXP=1.0
YYP=0.0
DO 106 I=1,IORD1
YYP=YYP+XXP*C(I)
XXP=XXP*FLOAT(IHLF+1)
106 CONTINUE
A(I9,3)=YYP
108 CONTINUE
C
C... WRITE OUTPUT ARRAY
C
4 WRITE(*,505)
505 FORMAT(/,1X,'ENTERING OUTPUT FILE WRITING ROUTINE')
WRITE(31,1001) ((A(I,J)),J=1,3),I=NO,N1)
CLOSE (31)
C
1000 FORMAT (I3)
1001 FORMAT (1X,F6.1,1X,F10.5,1X,F10.5)
END

```

APPENDIX B

Detailed Core Description Summary

APPENDIX B

Explanation for Terms Used
In Detailed Core Description Summary

FT: Footage at top of whole foot intervals

THICK: Thickness in decimal feet of individual beds

TY: Letter designation of bed types

- b - dark gray shale
- c - gray shale
- d - shaly siltstone
- e - siltstone

MINOR: Minor bed associated with TY bed which is too thin to measure

PHYSICAL & BIOGENIC STRUCTURES

MA: Massive

PL: Planar laminated

WV: Wavy bedding

XB: Cross bedding

CN: Convolute laminations

LC: Load casts

FL: Flame structures

RC: Rip-up clasts

BIO: Biogenic structures - burrows and/or bioturbated

ACCESSORY MINERALS

OR: Organic material

PYRITE

DIS: Disseminated

CON: Concretions

LAM: Laminated

REP: Replacement

CAL: Calcite

FRACTURES

OP: Open

SEA: Sealed

OBL: Oblique

VER: Vertical

OTH: Other

BASAL CONTACT

MIS: Missing

GRD: Gradational

SHP: Sharp

IRR: Irregular

ERO: Erosional

UND: Undulatory

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *-----FRACTURES-----* *-----BASAL CONTACT-----*

FT	THICK	TY	MI	PYRITE-----																									
				NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
3424	0.070	b	C			1																							
	0.010	c				1																							
	0.110	b	C			1																							
	0.060	c				1																							
	0.020	b				1																							
	0.030	c				1																							
	0.020	b				1																							
	0.030	c				1																							
	0.015	b				1																							
	0.020	d				1																							
	0.020	b				1																							
	0.010	c				1																							
	0.030	b				1																							
	0.060	c				1																							
	0.040	b				1																							
	0.020	c				1																							
	0.020	b				1																							
	0.050	c				1																							
	0.280	b	C			1																							
	0.080	c				1																							
	0.030	b				1																							
	0.040	c	D			1																							
3425	0.090	c	D			1																							
	0.060	b	C			1																							
	0.020	c				1																							
	0.010	d				1																							
	0.020	b				1																							
	0.030	c				1																							
	0.010	d				1																							
	0.020	b				1																							
	0.040	c				1																							
	0.010	d				1																							
	0.050	b				1																							
	0.070	c				1																							
	0.080	b	C			1																							
	0.030	c	D			1																							
	0.040	b	D			1																							
	0.020	c				1																							
	0.340	b	C			1																							
	0.020	c				1																							
	0.040	b				1																							
3426	0.010	c				1																							
	0.020	c				1																							
	0.140	b	C			1																							
	0.080	c				1																							
	0.020	d				1																							
	0.030	b				1																							
	0.070	c				1																							
	0.030	b				1																							
	0.020	c				1																							
	0.003	d				1																							
	0.015	b				1																							

FT	THICK TY	*--PHYSICAL & BIOGENIC STRUCTURES--*																*--ACCESSORY MINERALS--*		*----FRACTURES-----*				*----BASAL CONTACT-----*					
		MI		PL	WV	XB	CN	LC	FL	RC	BIO	OR	PYRITE-----		DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
NOR	MA	DIS	CON																										
	0.012 c	D		1																									
	0.020 b			1																									
	0.040 c			1																									
	0.190 b			1																									
	0.030 c			1																									
	0.030 d			1																									
	0.060 c	D		1												1													
	0.010 b			1																									
	0.070 c					1																							
	0.010 d																												
	0.070 e		1									1	1							1									
3427	0.300 e			1								1	1						1							1			
	0.003 b																												
	0.030 c			1																									1
	0.030 b	C		1																									1
	0.110 c			1									1	1															
	0.050 b			1																									
	0.060 c			1																									
	0.170 b	C		1																									
	0.120 c			1																									
	0.020 b			1																									
	0.030 c			1																									
	0.003 d								1	1																			
	0.010 b																												
	0.010 c	B+D				1	1	1																					
3428	0.030 c	B+D				1	1	1																					
	0.130 c	B					1	1																					
	0.400 b	C						1																					
	0.100 d		1													1													
	0.110 c	B		1																									
	0.090 d		1					1																					
	0.130 c			1									1	1															
3429	0.050 c			1									1	1															
	0.030 b			1												1													
	0.080 c		1																										
	0.010 d																												
	0.180 c	B				1																							
	0.500 b	C				1																							
	0.060 c					1																							
	0.010 d																												
	0.020 c					1																							
	0.080 d					1																							
3430	0.150 e							1																					
	0.110 c	D				1																							
	0.030 b					1																							
	0.130 d	CB																											
	0.020 b					1																							
	0.060 c					1																							
	0.030 b					1																							
	0.190 e							1																					
	0.050 b																												
	0.030 c					1																							

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *---FRACTURES---* *---BASAL CONTACT---*

FT	THICK TY	MI											PYRITE				FRACTURES							BASAL CONTACT				
		NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND
	0.003 d				1																							1
	0.003 e				1																							1
	0.040 b				1							1	1														1	
	0.025 c				1							1		1										1				
	0.015 d				1												1							1				
	0.003 e				1																				1			
	0.010 b				1							1		1												1		
	0.003 c				1							1													1			
	0.050 b				1							1													1			
	0.010 c				1							1			1	1								1				
	0.010 d						1										1									1		
3431	0.190 d						1										1									1		
	0.250 e					1	1										1								1			
	0.020 b				1	1						1	1											1		1		
	0.010 c				1	1						1		1										1				
	0.090 e				1												1										1	
	0.020 b				1	1						1		1										1		1		
	0.030 c				1	1						1			1									1				
	0.030 b				1	1						1												1				
	0.010 c				1	1						1	1											1				
	0.110 d							1														1						
	0.003 e							1																				
	0.015 c				1	1						1	1											1				
	0.005 e				1	1			1				1											1			1	
	0.020 b				1	1						1	1											1		1		
	0.030 c				1	1						1		1										1				
	0.020 d				1	1			1															1				
	0.003 e				1	1																		1				
	0.020 b				1	1							1	1										1		1		
	0.030 c				1	1																		1				
	0.003 d				1	1																		1				
	0.030 e				1	1																		1				
3432	0.020 d				1	1																		1		1		
	0.010 b					1						1	1											1				
	0.010 c					1																		1				
	0.020 d					1																		1				
	0.015 b					1																		1				
	0.070 d					1			1	1			1		1									1		1		
	0.003 e					1																		1				
	0.070 b					1																		1				
	0.015 c					1																		1				
	0.025 d					1																		1				
	0.003 e					1																		1				
	0.040 b					1																		1				
	0.020 c					1																		1				
	0.010 b					1																		1				
	0.020 d					1																		1				
	0.070 e					1																		1				
	0.090 b					1																		1				
	0.030 c					1																		1				
	0.003 d					1																		1				
	0.003 e					1																		1				

B-4

FT	THICK TY	MI	*-PHYSICAL & BIOGENIC STRUCTURES--*											*-ACCESSORY MINERALS--*				*-----FRACTURES-----*				*-----BASAL CONTACT-----*					
			NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	PYRITE-----				SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND
													DIS	CON	LAM	REP	CAL	OP									
	0.015 b			1								1	1	1													1
	0.120 c			1								1			1							1					
	0.003 d			1																		1					
	0.070 e						1												1						1		
3433	0.280 e		1																1							1	
	0.010 b			1																					1		
	0.020 c			1								1	1												1		
	0.090 b	D		1								1	1								1				1		
	0.035 c			1								1	1												1		
	0.190 b	C		1								1			1									1			
	0.050 c			1								1		1										1			
	0.130 d		1	1								1	1											1			
3434	0.020 d		1	1								1	1											1			
	0.080 c			1								1	1		1										1		
	0.080 b	CD		1								1			1										1		1
	0.030 c			1								1	1										1				
	0.003 d			1																			1				
	0.020 d						1						1												1		
	0.050 c			1								1		1						1		1	1		1		
	0.003 d			1																					1		
	0.220 b	DC		1								1								1		1			1		
	0.030 c			1					1					1											1		
	0.020 b			1								1		1													1
	0.015 d			1								1	1											1			
	0.120 b			1								1												1			
	0.130 d		1	1								1	1											1			1
	0.210 b	CD		1								1												1			
3435	0.003 c			1																							
	0.003 d			1																							
	0.010 c												1														
	0.050 d						1					1			1										1		
	0.100 c	B		1						1		1	1		1									1			
	0.020 b			1									1												1		
	0.290 c	BD		1					1	1		1												1			
	0.130 b	C		1								1	1											1			
	0.050 c			1					1			1		1											1		1
	0.003 d			1																					1		
	0.040 b			1								1													1		
	0.003 c			1																					1		
	0.040 d						1						1												1		
	0.030 b			1								1													1		
	0.050 c			1					1	1		1		1											1		
	0.170 b	D		1								1													1		
	0.050 c	BD		1									1	1											1		
3436	0.020 c	BD		1									1	1											1		
	0.040 d	C		1										1											1		
	0.050 e			1																					1		
	0.045 e			1																					1		
	0.015 c			1										1												1	
	0.100 b			1								1													1		
	0.020 e			1																					1		
	0.040 c			1								1	1	1											1		

-PHYSICAL & BIOGENIC STRUCTURES--- *-ACCESSORY MINERALS---* *-----FRACTURES-----* *-----BASAL CONTACT-----*

FT	THICK TY	MI	*-----FRACTURES-----*													*-----BASAL CONTACT-----*													
			NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND
	0.070 b	C			1																		1						
	0.070 d			1	1																		1						
	0.070 b				1					1	1																	1	
	0.030 c				1					1	1																	1	
	0.003 d				1																							1	
	0.015 b				1																							1	
	0.040 c				1																							1	
	0.020 d				1																							1	
	0.030 b				1																							1	
	0.035 c				1																							1	
	0.020 d			1																								1	
	0.060 c				1					1	1																	1	
	0.020 b				1																							1	
3437	0.010 c				1																							1	
	0.030 d																											1	
	0.030 b				1																							1	
	0.020 c	D				1				1	1																	1	
	0.060 d				1																							1	
	0.030 b				1																							1	
	0.030 c				1																							1	
	0.020 b				1																							1	
	0.005 c				1																							1	
	0.060 d			1						1	1																	1	
	0.070 b	C			1					1	1																	1	
	0.070 d																											1	
	0.090 d			1																								1	
	0.060 b	CD			1																							1	
	0.045 d				1																							1	
	0.040 b				1																							1	
	0.035 c				1																							1	
	0.003 d				1																							1	
	0.050 b				1																							1	
	0.015 c				1																							1	
	0.060 d			1																								1	
	0.003 e			1																								1	
	0.070 c				1																							1	
	0.035 b	CD			1					1	1																	1	
3438	0.190 d																											1	
	0.035 b				1																							1	
	0.003 c				1																							1	
	0.110 d				1																							1	
	0.030 b				1																							1	
	0.020 c				1																							1	
	0.050 d			1																								1	
	0.035 b			1																								1	
	0.100 c	B			1																							1	
	0.125 b	C			1					1	1																	1	
	0.010 b				1																							1	
	0.003 c				1																							1	
	0.030 d			1																								1	
	0.015 b				1																							1	
	0.065 d	C			1		1																					1	

B-6

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *----FRACTURES-----* *----BASAL CONTACT-----*

FT	THICK TY	MI										PYRITE-----				-----											
		NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.090 b				1																						1
	0.003 c				1																					1	
	0.035 d		1		1							1		1								1					
	0.010 b				1																					1	
	0.035 c				1									1										1			
	0.050 d				1		1		1																	1	
	0.010 b				1																						
3439	0.015 b				1																					1	
	0.003 c				1																				1		
	0.150 d	B		1												1						1					
	0.090 b				1							1											1				1
	0.010 c				1							1		1									1				
	0.020 d			1																			1				
	0.130 d			1																			1				
	0.010 c				1			1	1	1															1		
	0.015 b				1							1	1	1									1				
	0.090 d			1													1						1				
	0.090 d				1								1													1	
	0.020 c				1							1	1	1											1		
	0.105 d				1							1											1				1
	0.030 c				1							1		1									1				
	0.040 b	C			1		1							1											1		
	0.020 c				1							1		1											1		
	0.060 b				1							1													1		
	0.040 c				1							1	1										1				
	0.040 d			1			1										1						1				
	0.020 c				1							1		1											1		
	0.003 d				1																				1		
	0.050 b				1							1	1										1				
	0.020 c				1							1	1												1		
3440	0.050 c				1							1	1												1		
	0.050 b				1							1	1		1									1			
	0.020 c				1							1	1			1									1		
	0.003 d				1							1	1												1		
	0.020 b				1							1	1		1									1			
	0.030 c				1		1					1	1					1							1		
	0.003 d				1							1	1												1		
	0.020 b				1							1	1		1									1			
	0.020 c				1		1					1	1											1			
	0.030 d				1		1					1	1					1							1		
	0.120 c	D			1							1	1											1			
	0.050 b				1		1					1	1											1			
	0.030 c				1							1	1												1		
	0.025 b				1							1	1												1		1
	0.020 c				1		1		1			1	1												1		
	0.020 b				1							1	1												1		
	0.035 c	B			1							1	1		1										1		
	0.070 b	C			1							1	1												1		
	0.030 d				1		1					1	1												1		
	0.040 b	C			1							1	1											1			
	0.015 c				1									1	1										1		
	0.050 d			1													1							1			

B-7

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *-----FRACTURES-----* *-----BASAL CONTACT-----*

FT	THICK TY	MI	*-----FRACTURES-----*													*-----BASAL CONTACT-----*												
			NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.120	b	C			1									1	1	1								1			
	0.060	c	B			1									1									1				
	0.035	d				1				1																1		
	0.020	b	C			1									1	1										1		
3441	0.090	b	C			1									1	1										1		
	0.003	c				1																				1		
	0.015	d			1																		1					
	0.090	b	C			1									1	1	1										1	
	0.030	c				1									1										1			
	0.065	d	BC			1				1	1				1	1							1				1	
	0.090	b	C			1									1	1	1										1	
	0.090	c				1									1												1	
	0.240	b	C			1									1	1	1	1							1			
	0.070	d				1				1	1				1												1	
	0.010	b				1				1															1			
	0.010	c				1				1					1													1
	0.040	d	C			1																		1				
3442	0.350	b	C			1																		1				
	0.040	c				1									1												1	
	0.003	d				1									1												1	
	0.090	b	C			1									1	1	1											1
	0.060	c				1									1									1				
	0.040	b				1									1		1									1		
	0.090	c	D			1									1		1							1				
	0.020	b				1									1	1								1				
3443	0.310	c	D			1				1					1	1	1											
	0.020	c	D			1									1	1	1										1	
	0.020	c				1									1									1				
	0.015	d			1					1	1															1		
	0.050	b				1									1										1			
	0.030	d	C			1				1																1		
	0.010	c				1																		1				
	0.110	b	C			1									1	1	1							1				
	0.260	e	CD			1				1					1		1									1		
	0.180	b	C			1									1										1			
	0.020	e				1				1																1		
	0.030	b				1									1		1							1				
	0.010	c				1									1		1									1		
	0.030	b				1									1	1								1				
3444	0.110	d	C			1										1									1			
	0.130	d	C			1										1										1		
	0.030	b				1									1		1								1			
	0.040	c				1									1	1	1									1		
	0.070	e			1										1	1										1		
	0.025	b			1										1	1										1		
	0.030	c			1										1											1		
	0.020	d				1				1					1	1										1		
	0.030	b				1									1	1	1								1			
	0.080	c			1											1	1									1		
	0.310	b	C			1									1	1		1	1								1	
3445	0.530	b	C			1									1	1												
	0.050	d				1									1	1									1			

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *----FRACTURES----* *----BASAL CONTACT----*
 PYRITE-----*

FT	THICK TY	MI	*-----*																										
			NOR	MA	PL	VW	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND
	0.240 b	C			1								1																1
	0.040 d				1								1	1	1												1		
	0.090 b	C			1								1																
3446	0.320 b	C			1								1															1	
	0.065 d							1					1	1					1									1	
	0.010 c				1								1															1	
	0.065 d	B						1					1					1	1								1		
	0.010 b				1								1													1			
	0.015 c				1								1	1					1							1			
	0.010 d				1								1														1		
	0.090 b	C			1								1	1														1	
	0.003 c				1								1															1	
	0.045 d				1								1															1	
	0.070 b	C			1								1	1	1						1							1	
	0.065 c				1								1	1													1		
	0.030 b				1								1	1														1	
	0.025 c				1								1														1		
	0.005 b				1										1											1			
	0.020 c				1																					1			
	0.110 d	C			1								1							1							1		
	0.050 b				1				1				1	1													1		1
	0.025 d				1								1	1	1												1		
	0.003 b				1								1														1		
3447	0.050 c				1							1	1							1								1	
	0.010 b				1								1	1														1	
	0.010 c				1								1														1		
	0.020 d				1								1														1		
	0.110 b				1								1	1							1							1	
	0.003 c				1								1														1		
	0.003 d				1								1														1		
	0.015 c				1								1														1		
	0.020 b				1								1	1	1												1		1
	0.003 c				1								1														1		
	0.025 d				1				1				1								1						1		
	0.020 b				1								1													1			
	0.015 c				1								1													1			
	0.015 b				1								1												1				
	0.035 c			1									1													1			
	0.003 d				1								1													1			
	0.070 b				1								1								1						1		
	0.100 c			1	1								1													1			
	0.003 d				1								1													1			
	0.020 b				1								1													1			
	0.010 c				1								1													1			
	0.015 d				1								1													1			
	0.120 b	C			1								1	1	1												1		
	0.050 c			1	1								1														1		
	0.005 d				1								1													1			
	0.085 b	C			1								1	1											1			1	
	0.050 c			1	1								1													1		1	
	0.003 d				1								1													1			
	0.050 b				1								1														1		

B-9

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *-FRACTURES--* *-BASAL CONTACT--*

FT	THICK TY	MI	*-PHYSICAL & BIOGENIC STRUCTURES--*										*-ACCESSORY MINERALS--*		*-FRACTURES--*				*-BASAL CONTACT--*									
			NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.050	c				1																						1
	0.010	d				1																						1
	0.020	b				1									1		1											1
	0.065	c			1	1									1		1											1
	0.003	d				1																						1
	0.035	b	CD			1									1		1											1
3448	0.015	b				1									1		1											1
	0.060	c	D		1	1									1		1											1
	0.003	d				1																						1
	0.090	b	C			1									1		1	1					1					1
	0.045	c	D			1									1		1	1					1					1
	0.020	b				1									1		1	1					1					1
	0.020	c				1									1		1	1					1					1
	0.030	d				1									1		1	1					1					1
	0.080	b	C			1									1		1	1					1					1
	0.020	c				1									1		1	1					1					1
	0.010	d				1									1		1	1					1					1
	0.090	b	C			1									1		1	1					1					1
	0.020	c				1									1		1	1					1					1
	0.015	b				1									1		1	1					1					1
	0.020	c				1									1		1	1					1					1
	0.180	b	CD			1									1		1	1					1					1
	0.010	d				1									1		1	1					1					1
	0.150	b	C			1									1		1	1					1					1
	0.060	d			1	1									1		1	1					1					1
3449	0.030	b				1									1		1	1					1					1
	0.015	c	D			1									1		1	1					1					1
	0.015	b				1									1		1	1					1					1
	0.020	c				1									1		1	1					1					1
	0.040	d			1	1									1		1	1					1					1
	0.010	b				1									1		1	1					1					1
	0.100	d			1	1									1		1	1					1					1
	0.030	b				1									1		1	1					1					1
	0.010	c				1									1		1	1					1					1
	0.220	b				1									1		1	1					1					1
	0.003	c				1									1		1	1					1					1
	0.003	d				1									1		1	1					1					1
	0.040	b				1									1		1	1					1					1
	0.015	c				1									1		1	1					1					1
	0.025	d				1									1		1	1					1					1
	0.035	c			1	1									1		1	1					1					1
	0.020	b				1									1		1	1					1					1
	0.003	c				1									1		1	1					1					1
	0.080	d	B			1									1		1	1					1					1
	0.100	b	C			1									1		1	1					1					1
	0.015	c				1									1		1	1					1					1
	0.045	d				1									1		1	1					1					1
3450	0.060	c	B			1									1		1	1					1					1
	0.070	b				1									1		1	1					1					1
	0.030	c	B			1									1		1	1					1					1
	0.040	d				1									1		1	1					1					1
	0.055	b				1									1		1	1					1					1

B-10

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *-----FRACTURES-----* *-----BASAL CONTACT-----*

FT	THICK TY	MI		*-PHYSICAL & BIOGENIC STRUCTURES--*										*-ACCESSORY MINERALS--*				*-----FRACTURES-----*				*-----BASAL CONTACT-----*						
		NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND
	0.050 c			1								1	1													1		
	0.020 b			1								1	1															1
	0.050 c			1								1	1										1					
	0.110 d			1														1								1		
	0.020 b			1								1		1											1			
	0.060 c		1					1	1				1													1		
	0.003 d			1																						1		
	0.010 b			1								1												1				
	0.425																											
3451	0.250																											
	0.060 b			1														1			1							1
	0.020 c			1									1					1			1				1			
	0.020 d			1									1					1			1				1			
	0.015 b			1								1						1		1	1					1		1
	0.003 c			1																						1		
	0.115 d		1	1					1									1								1		
	0.020 b			1																						1		
	0.050 c	D	1	1								1														1		1
	0.015 b			1								1	1		1											1		
	0.040 c			1								1	1	1												1		
	0.025 b			1								1		1												1		
	0.020 c	D		1								1	1												1			
	0.095 b			1								1														1		
	0.025 c		1									1														1		
	0.025 d	C			1							1						1								1		
	0.020 c			1																					1			
	0.005 d			1					1	1			1												1		1	
	0.005 b			1								1	1												1			1
	0.100 d	C		1								1	1			1	1								1			
3452	0.050 b			1								1	1	1		1								1				
	0.010 c			1								1	1	1												1		
	0.015 e			1								1	1		1	1	1			1					1			1
	0.070 d			1	1																					1		
	0.010 c			1										1		1									1			
	0.050 d			1				1		1	1														1		1	
	0.075 b			1								1	1	1		1		1	1	1					1			1
	0.020 c			1								1	1		1	1								1				
	0.020 d			1		1			1	1			1		1					1	1					1		
	0.020 b			1				1				1	1	1	1											1		1
	0.040 c		1	1								1	1					1		1						1		
	0.010 d		1						1	1								1	1							1		
	0.010 b			1					1			1	1					1			1					1		1
	0.130 d	CB							1									1	1						1		1	
	0.003 b			1																					1			
	0.065 c			1								1	1	1											1			
	0.030 d							1				1																
	0.080 d							1	1									1								1		
	0.005 b			1									1			1								1				
	0.020 c			1	1								1			1									1			
	0.035 d							1					1			1	1									1		
	0.040 b			1								1		1				1								1		
	0.060 d	C						1		1						1	1									1		

B-11

FT	THICK TY	*-PHYSICAL & BIOGENIC STRUCTURES--*											*-ACCESSORY MINERALS--*				*-----FRACTURES-----*				*-----BASAL CONTACT-----*							
		MI		PL	WV	XB	CN	LC	FL	RC	BIO	OR	PYRITE-----		DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR
	0.010 b			1				1						1														1
	0.015 c			1					1					1	1					1								1
	0.003 d			1																								1
	0.010 b			1										1														1
3453	0.030 c			1										1											1			
	0.010 d			1																1						1		
	0.015 b			1										1												1		
	0.020 d			1																						1		
	0.040 d			1										1											1			
	0.085 c	B		1									1											1				
	0.170 d			1	1																			1				
	0.003 c			1	1																			1				
	0.003 b			1	1																			1				
	0.370 d			1	1																			1				
	0.020 d	C		1									1													1		
	0.010 b			1										1	1												1	
	0.135 d			1																				1				
	0.010 c			1									1												1			
	0.010 d	C		1									1													1		
	0.025 d			1									1													1		
3454	0.015 c			1									1												1			
	0.020 d			1									1												1			
	0.015 c			1									1												1			
	0.020 d			1									1												1			
	0.005 b			1									1												1			
	0.005 c			1									1												1			
	0.135 d			1									1												1			
	0.005 c			1									1												1			
	0.020 d			1									1												1			
	0.010 b			1									1												1			
	0.005 c			1									1												1			
	0.030 d			1									1												1			
	0.005 b			1									1												1			
	0.030 c			1									1												1			
	0.025 d			1									1												1			
	0.005 c			1									1												1			
	0.100 d	C		1									1												1			
	0.010 b			1									1												1			
	0.095 c			1									1												1			
	0.010 b			1									1												1			
	0.020 c	D		1									1	1	1										1			
	0.010 b			1									1	1	1										1			
	0.050 c			1									1												1			
	0.035 d			1									1												1			
	0.020 c			1									1												1			
	0.010 d			1									1												1			
	0.020 c			1									1												1			
	0.015 d			1									1												1			
	0.015 b			1									1	1	1										1			
	0.020 c			1									1	1	1										1			
	0.005 b			1									1	1	1										1			
	0.055 d			1									1												1			

B-12

FT	THICK TY	*-PHYSICAL & BIOGENIC STRUCTURES--*											*-ACCESSORY MINERALS--*				*----FRACTURES-----*				*----BASAL CONTACT-----*							
		MI		PL	WV	XB	CN	LC	FL	RC	BIO	OR	PYRITE-----		DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR
	0.015 c			1									1														1	
	0.005 b			1									1	1	1												1	1
	0.025 c			1									1													1		
	0.003 b			1									1	1	1												1	
	0.035 c			1									1															
3455	0.050 c			1									1						1		1					1		
	0.005 d			1								1	1						1		1					1		
	0.060 c			1	1													1		1		1				1		
	0.320 d			1				1										1	1		1					1		
	0.010 b			1									1	1	1									1			1	
	0.030 c			1									1		1											1		
	0.100 d	C		1	1	1							1		1				1		1					1		
	0.030 b			1									1	1	1	1	1			1		1					1	
	0.010 c			1	1								1	1	1		1			1		1				1		
	0.030 d			1				1					1													1		1
	0.010 b			1									1												1			
	0.005 d			1									1													1		
	0.003 b			1									1													1		
	0.010 c			1									1		1											1		
	0.015 d			1		1	1						1					1								1		1
	0.005 b			1		1							1													1		
	0.010 d			1		1							1													1		
	0.010 b			1									1		1											1		
	0.045 d	C		1			1						1					1								1		
	0.010 b			1									1		1											1		
	0.015 c	D		1									1		1										1			
	0.010 b			1									1		1	1									1			
	0.050 c			1									1													1		1
	0.140 d			1		1	1						1					1	1						1			
	0.010 b			1									1													1		
	0.070 d			1			1						1		1				1						1			1
	0.020 c			1									1												1		1	
3456	0.085 d	C		1									1					1	1						1		1	
	0.010 b			1									1												1			
	0.050 c			1									1												1		1	
	0.010 d			1		1	1						1						1						1		1	
	0.020 c			1									1		1	1									1		1	
	0.085 d			1			1						1						1						1		1	
	0.010 b			1									1		1										1		1	
	0.080 c	D		1				1					1		1									1				1
	0.170 d	C		1									1		1									1				
	0.030 c			1									1												1			
	0.060 d			1									1												1		1	
	0.010 b			1				1					1		1			1							1		1	
	0.135 c	D		1									1		1										1		1	
	0.005 b			1									1		1										1		1	
	0.010 d			1			1	1	1				1		1				1						1		1	
	0.035 c			1									1							1	1				1		1	
	0.185 d			1			1						1		1				1		1				1		1	
3457	0.005 b			1									1		1				1						1		1	
	0.090 c	D		1				1				1	1	1	1				1					1		1		
	0.030 d			1									1						1		1				1		1	

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *----FRACTURES-----* *----BASAL CONTACT-----*

FT	THICK TY	MI	*-PHYSICAL & BIOGENIC STRUCTURES--*										*-ACCESSORY MINERALS--*			*----FRACTURES-----*				*----BASAL CONTACT-----*								
			NOR	MA	PL	WV	XB	CM	LC	FL	RC	BIO	OR	DIS	COM	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.005 b				1								1	1	1		1						1					
	0.130 c	D			1			1					1	1		1									1			
	0.035 d				1								1				1	1			1				1			
	0.003 b				1																						1	
	0.010 c				1								1	1		1									1			
	0.060 d						1						1					1		1		1			1			
	0.005 b				1								1	1	1									1				
	0.020 c	D			1								1											1				
	0.010 b				1								1		1											1		
	0.003 c				1																				1			
	0.020 d				1								1					1						1				
	0.005 b				1		1						1											1				1
	0.005 d				1		1											1						1				1
	0.020 c				1								1											1				
	0.030 d				1								1											1				
	0.070 c			1	1								1											1				
	0.200 d					1							1	1	1			1		1	1			1				
	0.050 b				1								1	1	1									1			1	
	0.003 c				1																			1				
	0.050 d	C			1	1		1					1					1					1					
	0.040 c	B			1								1		1									1				
	0.010 b				1								1		1											1		
	0.015 c				1								1											1				
	0.060 e					1												1						1				
3458	0.003 b				1													1								1		
	0.015 c				1								1												1			
	0.125 d	E				1							1					1						1				
	0.250 e	D		1			1						1					1						1				
	0.035 c				1								1											1				
	0.015 b				1								1	1	1									1			1	
	0.015 c				1				1				1	1										1				
	0.003 d				1								1											1				
	0.010 b				1								1	1												1		
	0.010 c				1								1	1	1											1		
	0.235 e					1							1				1							1				
	0.080 c	DE			1								1		1			1					1					
	0.025 e					1												1						1				
	0.025 c	D			1			1					1											1				
	0.030 e					1												1						1				
3459	0.050 c	D			1			1	1				1											1			1	
	0.020 b				1								1	1	1									1		1		
	0.040 c				1								1	1	1									1				
	0.015 b				1								1	1	1									1			1	
	0.010 c				1			1	1				1	1										1				
	0.003 d				1																			1				
	0.050 b				1								1												1			
	0.020 c				1									1	1	1									1		1	
	0.020 b				1								1	1	1		1							1				
	0.010 c				1			1					1												1			
	0.003 d				1																				1			
	0.025 b				1								1												1			
	0.030 e				1		1											1							1			

B-14

FT	THICK TY	MI	*-PHYSICAL & BIOGENIC STRUCTURES--*											*-ACCESSORY MINERALS--*		*-----FRACTURES-----*				*-----BASAL CONTACT-----*								
			NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.035 b	CD			1										1	1	1								1			
	0.025 c				1										1												1	
	0.010 d				1										1												1	
	0.010 e			1															1					1				
	0.010 b				1										1	1	1											1
	0.015 c				1										1										1			
	0.035 d				1				1						1											1		
	0.003 e														1											1		
	0.070 b	CD			1	1								1	1	1	1							1				
	0.040 c	D			1			1						1	1	1								1		1		
	0.050 e			1		1													1					1				
3460	0.015 c				1										1											1		
	0.115 b				1										1	1										1		1
	0.025 c				1										1	1	1									1		
	0.005 b				1										1		1									1		
	0.015 c				1										1										1			
	0.035 d				1										1											1		
	0.005 b				1										1		1								1		1	
	0.030 c			1		1									1	1									1			
	0.020 b	D			1										1										1		1	
	0.110 c	B			1										1	1	1								1			
	0.010 b				1										1	1	1								1			
	0.010 c	D			1										1		1								1			
	0.220 e			1				1							1	1	1			1	1				1		1	
	0.195 b	D			1										1									1				
	0.030 c				1										1	1	1								1		1	
	0.030 b	D			1										1									1		1		
	0.010 c				1										1		1							1				
	0.030 e							1							1					1					1		1	
	0.010 b				1										1		1								1			1
	0.020 c	D			1			1							1	1								1				
	0.045 d				1			1							1	1									1			
3461	0.140 e			1				1							1					1	1				1		1	
	0.010 b				1										1										1			1
	0.015 c				1			1							1	1	1							1				
	0.040 d	E			1			1							1	1				1	1			1				
	0.070 e			1		1									1									1		1		
	0.040 b				1										1	1	1							1		1		
	0.025 c				1										1	1	1							1				
	0.190 e							1							1											1		
	0.040 b				1										1		1									1		
	0.010 c				1										1	1	1	1						1				
	0.035 d			1											1	1	1							1				
	0.075 e	D			1				1	1																1		
	0.005 b				1										1	1	1	1								1		1
	0.015 c				1												1	1								1		
	0.003 d				1																					1		
	0.020 b				1										1											1		1
	0.035 c	D			1				1						1	1	1	1	1						1			
	0.055 d				1										1			1								1		
	0.010 b				1										1											1		1
	0.010 c				1										1	1										1		

B-15

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *----FRACTURES-----* *----BASAL CONTACT-----*

FT	THICK TY	MI		*-PHYSICAL & BIOGENIC STRUCTURES--*										*-ACCESSORY MINERALS--*		*----FRACTURES-----*					*----BASAL CONTACT-----*							
		NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND
	0.070 e						1					1					1									1		
	0.015 b				1							1														1		
	0.020 c				1							1	1	1												1		1
	0.035 d		1				1					1	1													1		1
3462	0.030 e						1					1														1		1
	0.105 d				1				1			1														1		1
	0.015 b				1							1	1	1												1		1
	0.080 e	D					1	1				1			1								1				1	
	0.010 c				1		1																			1		1
	0.020 e								1																	1		1
	0.070 b	CD			1							1														1		1
	0.010 c				1							1	1													1		1
	0.040 d	C			1							1		1											1		1	
	0.015 b				1							1			1								1				1	
	0.040 c				1							1	1	1											1		1	
	0.045 d				1							1														1		1
	0.030 b	D			1							1			1										1		1	
	0.040 c				1							1	1	1											1		1	
	0.005 d				1							1													1		1	
	0.010 b	D			1							1			1										1		1	
	0.025 c	D			1							1	1	1											1		1	
	0.390 e						1	1			1	1			1	1	1	1	1	1	1	1	1				1	
	0.020 c	D			1							1														1		1
3463	0.015 c	D			1							1														1		1
	0.010 b				1							1		1												1		1
	0.070 c				1							1														1		1
	0.030 d		1														1								1		1	
	0.030 c		1														1								1		1	
	0.010 d						1																		1		1	
	0.005 b				1							1	1												1		1	
	0.020 c				1							1													1		1	
	0.020 d				1				1	1		1													1		1	
	0.020 b	D			1							1													1		1	
	0.080 c		1	1								1	1	1											1		1	
	0.030 d						1					1		1											1		1	
	0.010 c				1							1		1											1		1	
	0.005 d				1																				1		1	
	0.050 c				1							1													1		1	
	0.070 d						1																		1		1	
	0.015 b	D			1	1						1	1	1											1		1	
	0.015 c				1							1	1												1		1	
	0.010 b				1							1			1										1		1	
	0.040 c	D			1							1	1	1											1		1	
	0.035 d	C					1	1																	1		1	
	0.030 c	B	1	1								1			1								1				1	
	0.035 b	CD			1							1			1												1	
	0.010 c				1							1	1	1												1		1
	0.003 d				1																					1		1
	0.010 b	D			1							1			1											1		1
	0.030 c	B			1							1	1	1											1		1	
	0.030 d	C			1							1													1		1	
3564	0.040 d	C			1							1														1		1

FT	THICK TY	MI		*-PHYSICAL & BIOGENIC STRUCTURES--*										*-ACCESSORY MINERALS--*		*-----FRACTURES-----*				*-----BASAL CONTACT-----*							
		NOR	MA	PL	VW	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.003 b			1																							1
	0.030 c		1	1								1														1	
	0.010 d			1	1																				1		
	0.050 b			1	1							1														1	
	0.010 c			1								1													1		
	0.050 d			1				1				1											1				
	0.003 e			1																					1		
	0.010 b	D		1				1				1													1	1	
	0.030 d						1		1																1		
	0.010 b			1	1							1														1	
	0.010 c			1								1	1	1											1		
	0.003 d			1																					1		
	0.003 b			1																					1		
	0.003 c			1																					1		
	0.030 d			1				1				1	1												1		
	0.035 c			1								1	1	1											1		
	0.005 b			1								1	1	1	1										1		
	0.015 c			1	1							1	1	1									1				
	0.090 d							1										1							1		
	0.015 b			1								1	1												1		
	0.010 c			1								1	1	1	1										1		
	0.045 d			1								1	1	1	1										1		
	0.060 c	B		1								1	1	1	1										1		
	0.240 d							1				1	1	1	1				1						1		
	0.010 b			1								1	1	1	1	1									1		
	0.025 c			1								1	1	1	1	1									1		
	0.025 b	CD		1								1	1	1	1	1									1		
	0.050 e	C		1				1				1	1	1	1	1									1		
	0.030 d	B		1								1	1	1	1	1									1		
	0.003 b			1																					1		
	0.025 c			1								1	1	1											1		
	0.055 d			1				1				1	1	1									1				
3465	0.010 c			1								1											1				
	0.020 d			1				1		1		1											1				
	0.045 c	B		1								1	1	1	1										1		
	0.005 b			1								1	1												1		
	0.005 c			1								1	1												1		
	0.020 d			1				1		1	1	1													1		
	0.020 b			1								1	1	1	1										1		
	0.005 c			1								1														1	
	0.005 b			1								1	1	1	1											1	
	0.040 c		1	1								1													1		
	0.003 d			1								1													1		
	0.030 c			1								1													1		
	0.003 b			1								1											1				
	0.160 c	B		1				1	1			1	1	1	1										1		
	0.025 b	D		1								1	1	1	1											1	
	0.025 c		1									1													1		
	0.045 d							1				1													1		
	0.010 c			1								1													1		
	0.005 d			1				1				1													1		
	0.005 b			1																						1	

B-17

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *-----FRACTURES-----* *-----BASAL CONTACT-----*

FT	THICK TY	MI		PYRITE-----										-----														
		NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND
	0.005 c			1								1	1												1			
	0.005 b			1								1															1	
	0.005 c			1																					1			
	0.005 c			1			1		1								1								1			1
	0.010 d			1																					1			
	0.005 b			1							1	1	1	1		1										1		
	0.010 d		1								1														1			
	0.030 b											1	1	1	1									1				
	0.003 c			1																					1			
	0.035 d			1			1		1																1			
	0.005 c			1		1						1	1												1			
	0.035 d					1			1	1															1			
	0.005 b					1						1	1	1										1				
	0.005 c					1						1	1	1											1			
	0.110 d			1			1																	1				
	0.215 d		1						1		1	1												1				
3466	0.050 d		1						1		1	1												1				
	0.025 b			1								1	1	1	1								1		1			
	0.035 c			1								1	1	1										1				
	0.055 d			1								1												1				
	0.005 b			1								1	1	1										1			1	
	0.035 c			1								1		1										1				
	0.025 b			1								1	1	1	1								1		1			
	0.025 c			1								1											1		1			
	0.060 d			1																			1		1			
	0.010 b			1								1												1		1		
	0.015 c			1								1												1		1		
	0.080 d			1			1																1		1			
	0.003 b			1																				1		1		
	0.025 c			1								1	1	1	1									1		1		
	0.065 b			1							1	1	1	1										1		1		
	0.070 d						1				1		1	1	1									1		1		
	0.005 b			1																					1		1	
	0.015 c			1								1	1	1	1									1		1		
	0.085 d			1			1					1		1										1		1		
	0.030 b			1								1	1	1	1									1		1		
	0.010 c			1								1	1	1	1									1		1		
	0.045 d			1					1	1		1	1										1		1			1
	0.040 b	D		1								1	1	1	1								1		1			
	0.015 c			1								1	1	1	1									1		1		
	0.005 d			1					1	1														1		1		
	0.020 b	D		1								1												1		1		
	0.020 c	D		1								1												1		1		
	0.025 b	D		1								1												1		1		
	0.025 c	D		1		1					1	1	1	1										1		1		
	0.003 d			1								1												1		1		
3467	0.010 b			1								1	1	1										1		1		
	0.055 c			1		1						1		1										1		1		
	0.165 d	E		1		1			1			1		1									1		1			1
	0.010 b			1								1		1									1		1			
	0.005 c			1								1	1	1										1		1		
	0.030 d			1		1						1												1		1		

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *---FRACTURES---* *---BASAL CONTACT---*

FT	THICK TY	MI		PYRITE-----										FRACTURES-----							BASAL CONTACT-----						
		NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.003 b				1							1	1	1													1
	0.035 c	D			1							1		1	1											1	1
	0.200 d	C	1		1	1						1					1					1					
	0.003 b				1							1	1	1													1
	0.005 c				1						1	1	1	1													1
	0.005 d				1							1														1	
	0.005 c				1							1														1	
	0.008 d				1							1														1	
	0.003 c				1							1	1														1
	0.100 d						1					1					1					1					
	0.003 c				1							1											1				
	0.060 d	C			1							1										1					
	0.040 c				1							1	1													1	
	0.035 b	D			1							1	1	1	1											1	
	0.003 c				1							1	1	1													1
	0.030 d				1							1	1									1					
	0.003 b				1							1											1				
	0.010 c				1							1	1	1									1			1	
	0.055 b				1							1	1	1	1		1						1			1	
	0.010 c				1							1	1	1	1		1						1				
3468	0.140 d	C			1						1	1	1	1												1	
	0.090 b	D			1							1	1	1												1	
	0.015 d							1			1		1													1	
	0.010 c				1				1			1	1	1									1				
	0.035 d		1	1								1	1					1				1					
	0.020 e						1					1	1					1	1			1				1	
	0.005 b				1							1											1				1
	0.240 d				1									1									1				
	0.035 e		1	1														1							1		
	0.010 b	D			1							1														1	
	0.115 d	C			1			1				1	1	1				1	1			1				1	
	0.020 b	D			1							1	1													1	
	0.020 c				1							1	1	1												1	
	0.023 b	D			1							1	1													1	
	0.045 c	B			1							1	1	1											1		
	0.160 b	D			1							1														1	
3469	0.020 b	D			1							1														1	
	0.030 c	B			1							1	1	1												1	
	0.150 b	CD			1							1	1													1	
	0.010 c				1							1											1				
	0.030 b	D			1							1														1	
	0.015 c	D			1							1	1	1												1	
	0.030 b	D			1							1														1	
	0.010 c				1							1			1											1	
	0.060 b	CD			1							1	1	1									1				
	0.005 c				1							1	1	1			1									1	
	0.020 d	C			1		1																			1	
	0.010 c				1							1			1											1	
	0.040 b				1							1	1	1										1			1
	0.020 c				1							1	1	1									1				
	0.005 d				1					1																1	
	0.025 b	CD			1							1	1													1	

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *---FRACTURES---* *---BASAL CONTACT---*

FT	THICK TY	MI		*-PHYSICAL & BIOGENIC STRUCTURES--*										*-ACCESSORY MINERALS--*			*---FRACTURES---*				*---BASAL CONTACT---*							
		NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND
	0.010	c			1																							
	0.075	d	E	1			1						1	1	1		1											
	0.010	c			1																							
	0.010	d							1																			
	0.010	e							1	1	1	1																
	0.100	b	D						1				1	1														
	0.025	c																										
	0.035	d					1																					
	0.005	b																										
	0.025	c	B																									
	0.020	d							1	1																		
	0.010	b																										
	0.023	c																										
	0.003	d							1	1																		
	0.050	b	CD																									
	0.025	c																										
	0.003	d																										
	0.015	b	D																									
	0.025	c																										
3470	0.013	d																										
	0.020	b																										
	0.015	c																										
	0.010	d																										
	0.035	c	D																									
	0.003	d																										
	0.030	b																										
	0.025	c	D				1																					
	0.060	d					1																					
	0.070	c	D																									
	0.025	b																										
	0.020	c																										
	0.045	d					1	1																				
	0.080	d	C				1																					
	0.003	b																										
	0.020	d																										
	0.005	e							1																			
	0.030	c	D				1																					
	0.010	d							1																			
	0.020	b																										
	0.025	c																										
	0.065	d																										
	0.015	b																										
	0.030	c																										
	0.003	d																										
	0.035	b	D																									
	0.020	c	D																									
	0.015	b																										
	0.043	c																										
	0.010	d							1																			
	0.003	b	C																									
	0.003	c																										
	0.010	b																										

FT	THICK TY	MI	*-PHYSICAL & BIOGENIC STRUCTURES--*										*-ACCESSORY MINERALS--*				*-----FRACTURES-----*				*-----BASAL CONTACT-----*							
			NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.013	c	D			1						1	1	1				1			1					1		
	0.020	b	D			1						1	1					1			1						1	
	0.010	c				1						1		1				1			1					1		
	0.045	d						1	1								1	1			1					1		
	0.010	b				1																				1		1
3471	0.030	d	E			1	1	1		1							1	1			1					1		
	0.070	d	E			1	1	1		1							1	1			1					1		
	0.010	b				1								1										1				
	0.025	c				1																				1		
	0.005	d				1			1	1	1															1		
	0.030	b	D			1						1	1	1										1				
	0.035	c				1						1	1													1		
	0.015	d				1																				1		
	0.035	b	D			1						1														1		
	0.040	b				1						1		1												1		
	0.020	c				1						1	1	1				1			1					1		
	0.040	b	D			1						1	1	1				1			1	1				1		1
	0.025	d				1						1		1				1			1	1				1		
	0.025	b	D			1						1	1	1												1		1
	0.070	c				1						1												1				
	0.060	d				1						1						1						1				
	0.003	c				1						1												1				
	0.040	b				1						1						1			1	1			1			
	0.030	d	E			1						1						1			1	1			1			
	0.035	b	D			1						1	1	1				1			1	1			1			
	0.065	d				1						1		1	1			1			1	1			1			
	0.005	b				1						1	1	1				1			1	1			1			
	0.003	c				1						1	1	1				1			1	1			1			
	0.025	b				1						1	1	1				1			1	1			1			1
	0.080	d				1						1		1	1			1			1	1			1			1
	0.025	b	C			1						1	1	1											1			
	0.050	d				1						1													1			
	0.020	b				1						1	1	1											1			
	0.030	d				1						1		1	1										1			
	0.050	b	C			1						1	1	1										1				
	0.085	d				1						1													1			
3472	0.010	d				1						1													1			
	0.005	b				1						1		1											1			
	0.020	c				1						1		1											1			
	0.015	b				1						1	1	1										1				
	0.005	c				1						1						1			1			1				
	0.025	d				1						1		1				1			1			1				
	0.005	b				1						1	1	1										1				
	0.040	c				1						1												1				
	0.003	d				1						1												1				
	0.003	b				1						1		1										1				
	0.025	c				1						1		1				1			1			1				
	0.010	d				1						1		1				1			1			1				
	0.005	b	C			1						1						1			1	1		1				
	0.010	d				1						1						1			1	1		1				
	0.060	e				1						1						1			1	1		1				
	0.035	b	D			1						1		1										1				1

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *-----FRACTURES-----* *-----BASAL CONTACT-----*

FT	THICK TY	MI	PYRITE-----													-----BASAL CONTACT-----													
			NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND
	0.025 c				1								1	1	1													1	
	0.013 b				1								1												1				
	0.025 c				1								1	1	1										1				
	0.015 b				1								1	1										1					
	0.035 c	D											1	1	1											1			
	0.025 b				1	1							1													1			
	0.070 e			1			1		1									1								1			
	0.020 b				1								1													1		1	
	0.040 d				1								1	1	1											1			
	0.010 c				1								1	1	1								1				1		
	0.150 b	D			1	1						1	1	1	1											1			
	0.005 d			1					1	1						1											1		
	0.060 b	D			1							1	1												1		1		
	0.030 c				1								1											1				1	
	0.200 e					1	1								1				1					1					
3473	0.040 e					1	1								1				1					1					
	0.015 b	D			1								1	1												1			
	0.010 c				1								1	1												1			
	0.020 d				1								1	1										1			1		
	0.110 e				1								1	1												1			
	0.003 b				1								1													1			
	0.003 c				1								1												1				
	0.025 b	D			1								1											1					
	0.010 c				1								1												1				
	0.085 e			1									1						1						1				
	0.175 b	D			1								1						1						1			1	
	0.015 c				1								1	1	1									1					
	0.085 d				1				1				1	1	1									1		1			
	0.075 b	D			1							1	1											1		1			
	0.010 c				1							1													1		1		
	0.010 d				1	1													1						1		1		
	0.020 b				1								1		1									1		1		1	
	0.020 c				1								1	1	1									1		1		1	
	0.015 b				1							1	1	1										1		1		1	
	0.025 d	B		1	1								1		1									1		1		1	
	0.045 b				1								1	1	1									1		1		1	
	0.010 c				1								1											1		1		1	
	0.010 d				1								1											1		1		1	
	0.003 b				1								1		1									1		1		1	
	0.020 c				1								1											1		1		1	
	0.015 d					1	1							1						1			1		1		1	1	
	0.030 c				1								1		1									1		1		1	
3474	0.035 d	C			1	1			1				1	1	1									1		1		1	
	0.040 b				1								1			1								1		1		1	
	0.020 d				1				1				1	1	1		1							1		1		1	
	0.020 c				1								1	1										1		1		1	
	0.003 b				1								1											1		1		1	
	0.080 d					1	1						1							1	1		1		1		1	1	
	0.005 c				1	1							1											1		1		1	
	0.085 d				1	1	1						1							1				1		1		1	
	0.050 b				1								1		1									1		1		1	
	0.020 c				1								1											1		1		1	

-PHYSICAL & BIOGENIC STRUCTURES--- *-ACCESSORY MINERALS---* *-----FRACTURES-----* *-----BASAL CONTACT-----*

FT	THICK TY	MI		*-----FRACTURES-----*										*-----BASAL CONTACT-----*													
		NOR	MA	PL	VV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.005 d			1		1																					1
	0.020 c			1								1															1
	0.010 b			1								1												1			
	0.015 d	B		1				1				1													1		
	0.040 b			1								1															1
	0.015 c	D		1								1		1												1	
	0.020 b			1	1						1	1	1											1			
	0.015 c			1								1		1											1		
	0.015 b			1								1	1	1										1			
	0.025 c			1								1		1										1			
	0.020 d			1								1		1												1	
	0.020 b			1								1	1	1												1	
	0.005 c			1								1		1												1	
	0.025 d			1			1	1				1		1												1	
	0.020 c	D		1	1						1	1						1	1		1					1	
	0.045 d			1			1					1						1								1	
	0.010 b	D		1								1		1												1	
	0.020 c	D		1								1		1										1			
	0.020 d			1	1			1	1			1		1				1							1		
	0.020 b			1	1						1		1	1	1										1		1
	0.040 c	D		1								1		1												1	
	0.010 d			1			1		1			1		1	1				1	1	1				1		
	0.003 b			1								1		1	1				1	1	1				1		
	0.020 c	D		1								1		1	1				1	1	1				1		
	0.040 d			1			1		1			1		1	1				1	1	1				1		
	0.035 b			1							1		1	1	1										1		1
	0.065 d			1			1					1		1	1				1	1	1				1		
	0.003 b			1								1		1	1									1			
	0.015 c			1								1		1	1										1		
	0.010 d			1			1		1	1		1		1	1										1		
	0.020 b			1							1		1	1	1										1		
	0.010 d			1	1				1	1		1		1	1										1		
	0.055 b			1								1		1	1									1			
	0.080 c			1								1		1	1									1			
	0.065 d			1								1		1	1									1			
	0.060 b			1								1		1	1										1		
	0.010 c			1								1		1	1									1			
	0.003 d			1								1		1	1										1		
	0.010 b			1							1		1	1											1		
	0.015 c			1								1		1	1									1			
	0.003 d			1								1		1	1										1		
	0.020 b			1								1		1	1										1		
	0.023 c			1								1		1	1									1			
	0.003 d			1								1		1	1									1			
	0.020 b			1								1		1	1									1			
	0.010 c			1	1							1		1	1										1		
	0.010 d			1					1	1		1		1	1										1		
	0.005 b			1	1						1		1	1											1		
	0.010 d			1					1	1		1		1	1										1		
	0.010 b			1	1							1		1	1									1			
	0.015 c	D		1	1							1		1	1									1			
	0.060 d			1			1							1	1										1		

B-23

FT	THICK TY	*-PHYSICAL & BIOGENIC STRUCTURES--*											*-ACCESSORY MINERALS--*				*----FRACTURES-----*				*----BASAL CONTACT-----*							
		MI		PL	WV	XB	CN	LC	FL	RC	BIO	OR	PYRITE-----		DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR
	0.003 d			1									1														1	
	0.030 c			1									1													1		
	0.050 d			1									1													1		
3477	0.040 b	D		1									1	1	1											1		1
	0.010 c			1									1														1	
	0.003 b			1									1														1	
	0.045 c			1									1	1													1	1
	0.005 b			1									1	1													1	1
	0.040 d			1	1				1	1			1						1								1	
	0.030 b			1									1	1	1				1							1		
	0.025 c			1									1													1		
	0.040 e			1									1	1	1				1					1				
	0.025 b			1									1	1	1											1		1
	0.005 c			1									1	1	1				1							1		
	0.010 d			1	1							1														1		
	0.030 c			1									1														1	
	0.015 b			1									1	1	1												1	
	0.025 e			1									1														1	
	0.003 b			1									1														1	
	0.035 c			1									1													1		
	0.025 d			1									1													1		
	0.015 e			1									1						1								1	
	0.005 b			1									1	1	1												1	1
	0.045 c			1									1														1	
	0.005 b			1									1	1	1												1	
	0.005 c			1	1								1													1		
	0.005 d			1	1								1													1		
	0.020 e			1									1														1	
	0.010 b			1									1	1	1									1				
	0.005 c			1									1														1	
	0.020 b	D		1									1	1	1										1		1	
	0.010 c			1									1	1	1											1		
	0.005 d			1									1														1	
	0.005 e			1									1														1	
	0.005 b			1	1								1													1		1
	0.015 c			1									1	1	1											1		1
	0.010 b			1									1													1		1
	0.008 c			1									1	1	1											1		1
	0.010 e			1									1													1		1
	0.013 b	C		1	1								1	1	1											1		1
	0.003 d			1									1														1	
	0.015 e			1									1														1	
	0.003 c			1									1														1	
	0.015 b	D		1									1														1	
	0.005 d	E		1									1														1	1
	0.035 c			1									1	1	1											1		
	0.015 d			1									1														1	
	0.003 b			1									1	1	1					1							1	
	0.055 c	B		1									1	1	1					1							1	
	0.040 d			1									1													1		
	0.130 e			1	1								1														1	
3478	0.410 e			1	1								1														1	

B-25

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *-FRACTURES--* *-BASAL CONTACT--*

FT	THICK TY	MI																	PYRITE					BASAL CONTACT				
		NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND
	0.010 c				1								1													1		
	0.005 b				1								1	1	1											1	1	
	0.020 c				1								1	1	1											1		
	0.005 b				1								1	1	1											1	1	
	0.035 c				1		1						1													1		
	0.003 b				1		1						1	1	1											1		
	0.008 c				1		1						1													1		
	0.005 b				1		1						1	1	1											1	1	
	0.010 c				1		1						1												1			
	0.015 d				1		1						1												1			
	0.005 b				1		1						1	1	1										1			
	0.010 c				1		1						1												1			
	0.010 c				1		1						1	1	1		1								1			1
	0.010 c				1		1						1												1			
	0.010 c				1		1						1												1			
	0.030 e		E		1		1						1												1			1
	0.020 c		D/C		1		1						1												1			
	0.020 c		E		1		1						1												1			
	0.080 e				1		1						1												1			
	0.010 c				1		1						1												1			
	0.003 d				1		1						1												1			
	0.003 e				1		1						1												1			
	0.060 d		C		1		1						1												1			
	0.070 e						1						1												1			
	0.020 d				1		1						1												1			
	0.050 e				1		1						1												1			
	0.010 b		D		1		1						1		1										1			
	0.020 c				1		1						1	1	1										1			
	0.070 e		D		1		1						1												1			
	0.090 e		D		1		1						1												1			
	0.020 c		E		1		1						1		1										1			
	0.010 d				1		1						1												1			
	0.320 e			1			1		1				1												1			
	0.005 c				1		1						1												1			
	0.025 d				1		1						1												1			
	0.015 c				1		1						1												1			
	0.470 e						1						1	1											1			
	0.140 e						1						1	1											1			
	0.025 c				1		1						1												1			
	0.010 d				1		1			1	1	1	1												1			
	0.015 b				1		1						1	1	1										1			1
	0.040 c		E		1		1						1	1											1			
	0.020 e		D		1		1						1												1			
	0.010 c				1		1						1												1			
	0.010 d				1		1						1												1			
	0.100 e				1		1						1												1			
	0.005 d				1		1						1												1			
	0.045 e				1		1						1												1			
	0.035 c				1		1						1	1	1										1			
	0.005 b				1		1						1												1			
	0.008 c				1		1						1												1			
	0.003 d				1		1						1												1			
	0.045 b		D		1		1						1	1	1									1				
	0.050 c				1		1						1												1			
	0.005 d						1						1												1			
	0.018 e				1		1						1												1			

FT	THICK TY	*-PHYSICAL & BIOGENIC STRUCTURES--*											*-ACCESSORY MINERALS--*				*-----FRACTURES-----*				*-----BASAL CONTACT-----*			
		MI		PL	VV	XB	CN	LC	FL	RC	BIO	OR	PYRITE-----				SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR
		NOR	MA									DIS	CON	LAM	REP	CAL	OP							
	0.040 c			1								1										1		
	0.140 d		1	1								1			1							1		1
	0.145 e				1					1		1					1					1		
3481	0.020 c			1								1										1		
	0.025 d	E		1								1										1		
	0.040 b			1								1	1	1	1							1		1
	0.003 c			1								1	1									1		
	0.003 d			1								1										1		
	0.190 e		1		1	1											1					1		
	0.005 b	D		1								1	1									1		
	0.070 d			1								1	1									1		
	0.040 b	D		1								1	1									1		1
	0.055 d			1								1	1	1		1						1		
	0.080 b	D		1								1	1									1		1
	0.015 c			1								1	1									1		
	0.003 d			1				1	1			1										1		
	0.085 b	D		1								1										1		1
	0.020 c			1								1	1	1								1		
	0.005 d			1								1										1		
	0.215 b	D		1								1										1		1
	0.005 c			1								1	1	1		1						1		
3482	0.040 b	D		1								1	1	1								1		1
	0.030 c			1								1	1	1	1							1		
	0.090 b	C/D		1							1	1	1	1								1		1
	0.035 c			1								1	1	1								1		
	0.010 d			1	1			1	1			1										1		
	0.025 b	D		1								1	1									1		1
	0.010 c			1								1	1									1		
	0.008 d			1	1							1										1		
	0.070 b	C		1								1	1	1								1		1
	0.005 c			1								1	1	1								1		
	0.035 d			1	1			1	1			1	1	1								1		
	0.130 b	D		1								1			1							1		
	0.015 c			1								1	1									1		1
	0.003 b			1				1				1	1									1		
	0.020 c			1								1	1									1		1
	0.020 b	C/D		1								1	1	1								1		1
	0.040 c			1							1	1	1	1								1		
	0.015 b			1								1	1									1		
	0.055 c	D		1								1	1									1		1
	0.010 b	D		1	1							1	1	1								1		
	0.040 d	B		1	1	1						1					1					1		
	0.003 c			1	1							1										1		
	0.013 d			1	1	1						1						1				1		
	0.010 c			1	1					1		1						1				1		1
	0.020 b	D		1							1	1	1	1								1		
	0.010 b			1	1	1						1						1				1		
	0.015 c			1								1	1									1		
	0.030 b			1	1							1	1	1								1		1
	0.015 d			1								1	1									1		
	0.015 c			1	1							1	1									1		
	0.020 b			1								1	1	1	1							1		

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *-----FRACTURES-----* *-----BASAL CONTACT-----*

FT	THICK	TY	MI		*-PHYSICAL & BIOGENIC STRUCTURES--*										*-ACCESSORY MINERALS--*				*-----FRACTURES-----*				*-----BASAL CONTACT-----*					
			NOR	MA	PL	VV	XB	CN	LC	FL	RC	BIO	OR	DIS	COM	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.015	c	D			1						1	1		1													1
	0.023	b	D			1	1					1	1	1									1					
	0.020	c				1						1		1										1				
	0.030	d	C				1			1				1					1		1						1	
3483	0.010	c				1								1													1	
	0.003	b				1								1	1	1										1		
	0.010	c				1								1												1		
	0.015	d				1								1												1		
	0.005	b	d			1								1		1									1			
	0.090	c				1								1									1					
	0.080	d				1								1									1					
	0.030	b				1								1	1												1	
	0.015	c				1								1													1	
	0.015	e				1	1			1				1					1								1	
	0.015	d				1								1	1												1	
	0.015	b				1								1		1											1	
	0.015	d				1	1							1													1	
	0.015	b	c			1								1	1												1	
	0.005	c				1								1									1					
	0.070	b			1	1							1	1	1	1						1					1	
	0.110	d				1	1	1						1								1						
	0.010	d				1								1									1					
	0.005	c				1								1									1					
	0.003	d				1								1									1				1	
	0.005	c				1								1									1				1	
	0.003	d				1								1									1				1	
	0.025	b				1								1									1				1	
	0.015	c				1								1									1				1	
	0.003	d				1								1									1				1	
	0.005	c				1								1									1				1	
	0.005	d				1								1									1				1	
	0.020	c	D			1								1									1				1	
	0.050	d			1									1									1				1	
	0.120	d				1								1									1				1	
	0.010	b	D			1								1	1	1							1				1	
	0.015	c				1								1									1				1	
	0.005	d				1								1									1				1	
	0.005	c				1								1									1				1	
	0.020	d				1								1									1				1	
3484	0.090	d				1					1	1		1									1				1	
	0.040	b				1								1	1								1				1	
	0.080	c				1								1									1				1	
	0.015	d				1					1	1		1									1				1	
	0.050	d				1								1	1								1				1	
	0.005	b				1								1									1				1	
	0.025	d			1	1								1									1				1	
	0.060	b	D			1								1	1								1				1	
	0.025	c				1								1	1	1							1				1	
	0.015	b				1								1	1	1							1				1	
	0.020	c			1	1								1									1				1	
	0.015	d				1								1									1				1	
	0.015	c				1								1									1				1	

-PHYSICAL & BIOGENIC STRUCTURES--- *-ACCESSORY MINERALS---* *-----FRACTURES-----* *-----BASAL CONTACT-----*

FT	THICK TY	MI		*-PHYSICAL & BIOGENIC STRUCTURES---										*-ACCESSORY MINERALS---		*-----FRACTURES-----*					*-----BASAL CONTACT-----*							
		NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND
	0.003 b			1													1						1					
	0.020 c			1													1							1				
	0.085 d			1	1			1	1	1							1									1		
	0.010 c	B		1				1									1									1		
	0.015 d	C		1	1																					1		
	0.005 c			1	1																					1		1
	0.015 d			1	1																					1		
	0.003 b			1													1	1	1								1	
	0.015 c			1													1	1	1								1	
	0.003 b			1													1	1										1
	0.013 c			1													1							1				
	0.005 d			1							1															1		
	0.025 b	D		1													1								1			
	0.050 c	D		1								1	1	1										1				
	0.020 d			1					1	1							1								1			
	0.015 c			1													1								1			
	0.045 d			1					1	1							1								1			
	0.010 b			1												1	1	1	1						1		1	
	0.025 c			1												1	1								1			
	0.020 d			1					1																1			
	0.003 b			1													1									1		
	0.100 c			1													1							1				
	0.003 d			1													1								1			
	0.020 b	C/D		1	1											1	1	1								1		
	0.015 c			1																								
3485	0.015 c			1																								
	0.090 d			1	1											1	1											
	0.010 e			1	1				1																	1		
	0.015 c			1	1											1										1		
	0.010 d	C		1	1											1										1		
	0.010 b	C		1	1											1										1		
	0.003 d			1	1				1	1																1		
	0.010 b			1												1										1		
	0.020 c	D		1	1				1							1	1	1	1						1			
	0.080 d			1	1											1	1	1								1		
	0.003 b	D		1												1	1	1								1		
	0.050 d			1					1							1	1								1			
	0.150 e		1	1					1							1									1		1	
	0.005 c			1	1											1	1	1	1	1					1			
	0.010 d			1	1																					1		
	0.005 c			1	1											1										1		
	0.005 d			1	1																					1		
	0.020 c			1												1										1		
	0.090 d	E		1	1				1	1	1					1	1	1	1	1					1			
	0.015 b			1	1											1	1	1								1		
	0.005 d			1	1																					1		
	0.003 b			1	1																					1		
	0.100 d			1	1				1																	1		
	0.005 b			1																					1		1	
	0.025 c			1																						1		
	0.015 b			1																					1		1	
	0.010 c			1																						1		

B-29

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *----FRACTURES----* *----BASAL CONTACT----*

FT	THICK TY	MI	*--PHYSICAL & BIOGENIC STRUCTURES--*													*--ACCESSORY MINERALS--*		*----FRACTURES----*				*----BASAL CONTACT----*						
			NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.005 b				1												1	1	1						1		1	
	0.020 c				1												1	1	1							1		1
	0.003 b				1												1	1	1							1		1
	0.030 d				1												1	1	1							1		1
	0.003 b				1												1	1	1							1		1
	0.008 c				1				1										1	1	1					1		1
	0.035 d				1														1	1	1					1		1
	0.003 b				1																		1			1		1
	0.003 c				1																					1		1
	0.055 e				1				1									1										1
3486	0.140 e				1				1									1						1				1
	0.010 d	C			1																					1		1
	0.005 c				1																					1		1
	0.020 d	C			1				1																1		1	
	0.050 e				1				1									1						1		1		1
	0.015 c				1																					1		1
	0.055 d				1													1				1				1		1
	0.003 b				1																			1			1	1
	0.010 c				1																				1		1	1
	0.010 d	C			1													1								1		1
	0.003 b				1																					1		1
	0.015 c	D			1																					1		1
	0.013 b				1																					1		1
	0.035 c				1																					1		1
	0.003 d				1				1																	1		1
	0.003 b				1																					1		1
	0.005 c				1																					1		1
	0.070 d				1																					1		1
	0.015 b				1																					1		1
	0.013 c				1																					1		1
	0.110 d	C			1				1																	1		1
	0.033 d				1																					1		1
	0.010 b				1																					1		1
	0.010 c				1																					1		1
	0.028 d				1				1																	1		1
	0.003 c				1																					1		1
	0.030 b	C			1																					1		1
	0.020 c				1																					1		1
	0.003 d				1																					1		1
	0.010 b				1																					1		1
	0.020 c				1																					1		1
	0.020 d				1																					1		1
	0.020 c				1																					1		1
	0.035 d				1																					1		1
	0.040 c	D			1																					1		1
	0.030 d				1				1		1															1		1
	0.005 b				1																					1		1
	0.005 c				1																					1		1
	0.003 b				1																					1		1
	0.008 c				1																					1		1
3487	0.015 d				1				1																	1		1
	0.040 c	B			1																					1		1

B-30

-PHYSICAL & BIOGENIC STRUCTURES--- *-ACCESSORY MINERALS---* *----FRACTURES-----* *----BASAL CONTACT-----*

FT	THICK TY	MI	PYRITE-----*													*----BASAL CONTACT-----*													
			NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND
	0.010 d				1																							1	
	0.040 b	D			1							1																	1
	0.020 c				1							1	1	1												1			1
	0.095 d					1	1					1		1					1								1		1
	0.060 d				1							1																1	1
	0.060 b				1							1	1	1														1	1
	0.045 c				1							1	1	1	1											1			1
	0.030 d				1						1																	1	1
	0.005 b				1							1	1	1															1
	0.010 c				1							1	1	1														1	1
	0.065 b	D			1							1																1	1
	0.010 c				1	1						1		1														1	1
	0.100 e		1								1									1					1				1
	0.075 b				1							1																1	1
	0.050 c				1							1			1													1	1
	0.050 b	E			1	1					1	1	1			1									1			1	
	0.080 d				1							1				1										1			1
	0.050 e	B/C	1					1	1	1		1				1									1			1	
3488	0.020 c		1					1				1	1			1											1		1
	0.010 b				1	1						1	1															1	1
	0.020 c				1							1	1	1													1		1
	0.025 b	D			1							1																1	1
	0.020 c				1							1	1	1														1	1
	0.025 d				1	1						1	1	1														1	1
	0.003 b				1							1	1	1	1		1											1	1
	0.048 d				1							1	1	1	1													1	1
	0.020 b				1							1	1	1	1													1	1
	0.030 c			1								1	1	1					1								1		1
	0.010 d				1	1						1															1		1
	0.110 e	D			1	1	1																					1	1
	0.005 b	E			1	1																						1	1
	0.040 c				1																							1	1
	0.020 d	E			1																							1	1
	0.003 e				1																							1	1
	0.010 b				1								1	1	1													1	1
	0.015 c				1																							1	1
	0.003 b				1								1	1	1	1	1											1	1
	0.010 c				1									1	1													1	1
	0.010 d				1									1														1	1
	0.140 e						1	1				1	1						1					1				1	1
	0.015 b				1	1							1	1	1													1	1
	0.005 c	D			1	1							1	1														1	1
	0.010 d				1	1								1	1													1	1
	0.100 e	D			1	1					1	1																1	1
	0.005 b				1								1		1													1	1
	0.010 c	E			1	1							1	1	1													1	1
	0.020 d				1	1																						1	1
	0.090 e	D			1	1	1																					1	1
	0.010 c	E/B			1	1								1		1												1	1
	0.050 e				1																							1	1
	0.010 c				1									1														1	1
	0.020 d	E			1																							1	1

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *-----FRACTURES-----* *-----BASAL CONTACT-----*

FT	THICK TY	MI	*-PHYSICAL & BIOGENIC STRUCTURES--*											*-ACCESSORY MINERALS--*		*-----FRACTURES-----*					*-----BASAL CONTACT-----*							
			NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
3489	0.035 e					1																						1
	0.015 c				1																							1
	0.035 d				1																							1
	0.005 b				1																							1
	0.010 c	B			1																							1
	0.003 b				1																							1
	0.010 c				1																							1
	0.005 e				1																							1
	0.005 b				1																							1
	0.010 c	E/D			1																							1
	0.040 e	D			1																							1
	0.005 b				1																							1
	0.015 c				1																							1
	0.010 d				1																							1
	0.010 c				1																							1
	0.005 b				1																							1
	0.008 c				1																							1
	0.020 d				1																							1
	0.005 e				1																							1
	0.010 c				1																							1
	0.010 d				1																							1
	0.010 e				1																							1
	0.003 b				1																							1
	0.005 c	B			1																							1
	0.005 d				1																							1
	0.005 e				1																							1
	0.140 c				1																							1
	0.010 d	E			1																							1
	0.008 e				1																							1
	0.003 b				1																							1
	0.030 c				1																							1
	0.020 e				1																							1
	0.020 b				1																							1
	0.010 c				1																							1
	0.025 d	C			1																							1
	0.045 c				1																							1
	0.010 d				1																							1
	0.010 c				1																							1
	0.015 b	C			1																							1
	0.015 c				1																							1
	0.015 d				1																							1
	0.010 b				1																							1
	0.080 c				1																							1
	0.003 b				1																							1
	0.050 e				1																							1
	0.010 b	C			1																							1
	0.005 c	D			1																							1
	0.025 d	C			1																							1
3490	0.025 d	C			1																							1
	0.005 b				1																							1
	0.055 c				1																							1
	0.015 d				1																							1

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *----FRACTURES-----* *----BASAL CONTACT-----*

FT	THICK TY	MI	*-PHYSICAL & BIOGENIC STRUCTURES--*										*-ACCESSORY MINERALS--*		*----FRACTURES-----*				*----BASAL CONTACT-----*									
			NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.025	b	D			1										1	1	1										1
	0.015	c				1										1	1	1							1			
	0.005	d				1																						
	0.010	c				1										1												
	0.003	d				1																						
	0.008	c				1										1												
	0.003	d				1										1												
	0.010	b				1										1												
	0.010	c				1										1												
	0.003	d				1										1										1		
	0.015	c				1										1											1	
	0.030	d				1										1											1	
	0.040	c				1										1											1	
	0.010	d	D			1										1											1	
	0.003	b	C			1										1	1	1										1
	0.020	c				1										1												
	0.003	d				1										1												
	0.013	c				1										1												
	0.003	d				1										1												
	0.003	b				1										1	1											1
	0.010	d				1										1	1											
	0.003	b				1										1		1										
	0.030	c	D			1										1												
	0.010	d				1										1												
	0.010	c	D			1										1												
	0.015	d				1										1												
	0.005	c				1										1												
	0.020	d				1										1												
	0.025	e				1										1												
	0.025	c				1										1	1	1										
	0.005	d				1										1												
	0.010	b				1										1	1	1										
	0.045	d	C			1										1												
	0.005	b				1										1												
	0.050	c				1										1	1	1										
	0.005	b				1										1	1	1										
	0.010	c				1										1	1	1										
	0.003	d				1										1												
	0.010	b				1										1												
	0.025	c				1										1	1	1										
	0.150	e				1										1												
	0.025	c				1										1												
	0.005	d				1										1												
	0.020	c				1										1												
	0.008	d				1										1												
	0.005	b				1										1	1	1										
	0.055	c				1										1												
	0.005	d				1										1												
	0.010	b	C			1										1	1	1										
3491	0.035	c				1										1	1	1										
	0.005	b				1										1												
	0.020	c				1										1												

B-33

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *-----FRACTURES-----* *-----BASAL CONTACT-----*

FT	THICK TY	MI	*-----PHYSICAL & BIOGENIC STRUCTURES-----*										*-----ACCESSORY MINERALS-----*				*-----FRACTURES-----*				*-----BASAL CONTACT-----*							
			NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.015	d				1		1	1																			1
	0.010	c	D										1		1													1
	0.005	d							1	1																		1
	0.005	b				1	1						1	1	1													1
	0.040	c	D			1	1						1	1	1										1		1	
	0.010	d				1	1																				1	
	0.003	b				1							1	1	1												1	
	0.030	c				1							1	1	1												1	
	0.010	d				1			1	1																	1	
	0.010	b				1							1	1	1												1	
	0.015	c				1	1						1	1	1			1									1	
	0.060	e						1										1									1	
	0.003	b				1							1	1	1												1	
	0.015	c				1							1	1	1												1	
	0.020	e	D					1						1	1				1								1	
	0.020	c				1							1	1	1												1	
	0.020	b				1						1	1	1	1										1		1	
	0.003	c				1							1	1	1										1		1	
	0.013	d				1							1	1	1												1	
	0.003	b				1							1	1	1												1	
	0.020	c				1							1	1	1												1	
	0.040	d				1			1				1	1													1	
	0.030	e			1								1	1											1		1	
	0.005	b			1								1	1	1				1								1	
	0.055	c	D			1			1				1	1	1												1	
	0.005	b			1								1	1	1												1	
	0.085	c			1								1	1	1												1	
	0.010	b			1								1	1	1												1	
	0.035	c			1								1	1	1												1	
	0.120	d			1							1	1	1	1												1	
	0.050	c	B			1							1	1	1												1	
	0.050	d			1				1										1								1	
	0.035	c			1								1														1	
	0.003	d			1								1														1	
	0.020	b	D			1							1														1	
	0.020	c			1									1	1	1											1	
3492	0.030	c			1									1	1												1	
	0.008	d			1				1	1				1	1	1											1	
	0.055	c			1								1	1	1												1	
	0.105	d			1				1				1														1	
	0.015	b	C			1							1														1	
	0.025	d			1								1														1	
	0.008	b			1								1														1	
	0.025	c			1								1	1													1	
	0.050	d			1								1														1	
	0.020	e				1		1																			1	
	0.015	b			1								1														1	
	0.015	c			1								1	1	1												1	
	0.003	d	E			1							1														1	
	0.030	b	D			1							1	1	1												1	
	0.035	c	D			1							1	1	1												1	
	0.055	e				1			1	1				1													1	

B-34

FT	THICK TY	*-PHYSICAL & BIOGENIC STRUCTURES--*											*-ACCESSORY MINERALS--*		*----FRACTURES-----*				*----BASAL CONTACT-----*									
		MI		PL	WV	XB	CN	LC	FL	RC	BIO	OR	PYRITE-----		DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR
	0.003 b			1	1								1															1
	0.025 c			1	1								1	1	1										1			
	0.025 d			1	1								1											1				
	0.025 e				1														1							1		
	0.005 b			1	1								1		1					1							1	
	0.045 d	E			1							1			1											1		
	0.025 b			1									1		1											1		1
	0.030 c	D		1									1	1	1											1		1
	0.045 b	D		1									1	1	1											1		1
	0.020 c	D		1									1	1	1										1			1
	0.015 d			1									1		1											1		1
	0.010 b	D		1									1		1											1		1
	0.005 c			1									1	1											1			1
	0.045 d			1									1	1									1					1
	0.030 c			1									1		1										1			1
	0.015 d			1									1		1										1			1
	0.020 e		1					1							1					1						1		1
	0.020 b	C/D		1									1		1											1		1
3493	0.050 b	C/D		1									1		1											1		1
	0.030 d			1									1		1											1		1
	0.005 e			1					1						1											1		1
	0.230 b	C/D		1									1		1										1			1
	0.040 c			1									1	1	1										1			1
	0.010 e		1	1					1						1					1						1		1
	0.010 b	D		1									1		1					1	1		1			1		1
	0.010 c			1									1		1					1	1		1			1		1
	0.055 e			1									1		1					1	1		1			1		1
	0.010 b			1									1		1					1	1		1			1		1
	0.030 c	D		1									1	1	1									1		1		1
	0.020 e	D		1		1			1				1	1	1									1		1		1
	0.040 c	D		1									1	1	1									1		1		1
	0.003 d			1		1			1				1		1									1		1		1
	0.010 b			1		1							1		1									1		1		1
	0.003 c			1		1							1		1									1		1		1
	0.010 d			1		1							1		1									1		1		1
	0.015 e			1		1							1		1					1				1		1		1
	0.080 d			1									1	1	1									1		1		1
	0.010 e			1									1		1									1		1		1
	0.030 b			1									1	1	1									1		1		1
	0.030 d			1									1	1	1									1		1		1
	0.020 c	B		1									1	1	1								1		1		1	1
	0.010 d			1									1		1									1		1		1
	0.010 b			1									1		1									1		1		1
	0.020 c			1									1	1	1									1		1		1
	0.085 e	D	1						1						1				1	1	1		1		1		1	1
	0.030 c	D		1									1		1									1		1		1
	0.025 e			1					1						1									1		1		1
3494	0.060 b	D		1									1		1					1				1		1		1
	0.090 c	D		1		1							1	1	1	1								1		1		1
	0.003 e			1		1							1		1									1		1		1
	0.003 c			1									1		1									1		1		1
	0.010 d			1		1							1		1									1		1		1

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS---* *---FRACTURES---* *---BASAL CONTACT---*

FT	THICK	TY	MI		*---PHYSICAL & BIOGENIC STRUCTURES--*										*---ACCESSORY MINERALS---		*---FRACTURES---					*---BASAL CONTACT---						
			NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.005	c			1																							1
	0.035	e						1		1				1														1
	0.195	d			1								1	1	1												1	1
	0.045	b				1							1													1		1
	0.015	c				1							1	1	1											1		1
	0.020	d				1							1	1	1											1		1
	0.040	c				1							1													1		1
	0.020	b	D			1							1	1	1											1		1
	0.020	c				1	1						1	1	1			1								1		1
	0.125	e	C/D					1																		1		1
	0.005	b				1							1														1	1
	0.025	c				1							1	1	1									1				1
	0.003	d				1							1											1		1		1
	0.020	c				1							1											1		1		1
	0.095	e				1							1						1						1		1	1
	0.003	b				1							1											1		1		1
	0.020	c				1							1		1									1		1		1
	0.015	d				1		1					1											1		1		1
	0.075	e				1		1	1			1												1		1		1
	0.040	b	D			1							1											1		1		1
	0.025	c	B			1							1	1	1			1						1		1		1
	0.010	d				1							1											1		1		1
	0.020	b	D			1							1	1	1	1								1		1		1
3495	0.040	b	D			1							1	1	1	1								1		1		1
	0.020	c			1								1											1		1		1
	0.030	d				1							1											1		1		1
	0.003	b				1							1			1								1		1		1
	0.090	c				1							1											1		1		1
	0.010	b				1							1			1								1		1		1
	0.005	c				1							1											1		1		1
	0.005	d				1							1											1		1		1
	0.270	e	D			1			1	1			1										1		1		1	1
	0.040	c				1							1		1	1								1		1		1
	0.010	b	C			1							1		1									1		1		1
	0.010	c				1							1		1	1								1		1		1
	0.003	d				1							1											1		1		1
	0.015	b				1							1											1		1		1
	0.008	c	D			1							1											1		1		1
	0.010	b				1							1											1		1		1
	0.020	c				1							1		1	1								1		1		1
	0.050	d				1							1											1		1		1
	0.005	b				1							1											1		1		1
	0.035	e	D			1			1				1											1		1		1
	0.030	b				1							1											1		1		1
	0.030	c				1							1		1	1								1		1		1
	0.080	d				1			1				1											1		1		1
	0.075	b	D			1							1											1		1		1
	0.008	c	D			1							1		1	1								1		1		1
	0.040	b	D			1							1											1		1		1
3496	0.010	c				1							1		1	1								1		1		1
	0.070	d				1							1											1		1		1
	0.015	b				1							1			1								1		1		1

B-36

-PHYSICAL & BIOGENIC STRUCTURES--- *-ACCESSORY MINERALS---* *-----FRACTURES-----* *-----BASAL CONTACT-----*

FT	THICK TY	MI		*-----FRACTURES-----*										*-----BASAL CONTACT-----*													
		NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.015 c			1								1	1	1												1	
	0.050 d			1								1		1												1	
	0.005 b			1								1		1													1
	0.010 c			1								1	1	1									1				
	0.040 e						1							1												1	
	0.020 b	D		1								1		1											1		
	0.025 c			1								1	1										1				
	0.065 e		1	1										1											1		
	0.010 b			1								1		1											1		1
	0.090 d			1								1	1	1											1		
	0.013 b			1								1		1											1		1
	0.030 c			1								1	1	1											1		
	0.040 d			1			1		1																1		
	0.015 c			1								1													1		
	0.025 d			1					1			1													1		
	0.005 b			1								1	1												1		1
	0.020 d			1								1													1		
	0.020 b	D		1								1		1		1									1		1
	0.025 c			1								1	1	1			1								1		
	0.190 d						1		1									1			1				1		
	0.020 c			1								1													1		
	0.003 b			1								1											1				
	0.010 c																						1		1		
	0.010 d			1		1			1																1		1
	0.025 c			1																					1		1
	0.005 d						1																		1		1
	0.005 c			1																					1		1
	0.005 b	D		1								1	1												1		1
	0.026 c																								1		
	0.005 b			1								1	1	1											1		1
3497	0.025 c	D		1								1	1	1	1										1		
	0.003 b			1								1													1		
	0.010 c			1								1	1	1									1			1	
	0.010 e		1									1	1												1		
	0.055 c			1								1	1											1		1	
	0.015 d			1																				1		1	
	0.060 e					1			1			1	1	1				1			1				1		1
	0.030 b			1								1	1	1				1							1		1
	0.010 c			1								1	1	1											1		1
	0.005 d			1		1							1	1	1										1		1
	0.003 b			1								1				1									1		1
	0.010 c			1								1			1									1		1	
	0.010 d			1		1						1	1	1											1		1
	0.015 c			1								1	1	1											1		1
	0.010 d					1		1					1	1	1										1		1
	0.020 c			1		1						1													1		1
	0.003 d			1		1						1	1	1											1		1
	0.005 b			1								1	1	1											1		1
	0.005 c			1		1						1	1	1											1		1
	0.010 d					1																	1			1	
	0.005 c			1									1	1											1		1
	0.003 b			1								1	1	1											1		1

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *-----FRACTURES-----* *-----BASAL CONTACT-----*

FT	THICK TY	MI		*-----FRACTURES-----*										*-----BASAL CONTACT-----*														
		NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND
	0.030	c				1																						1
	0.015	d				1																						1
	0.015	c				1		1																				1
	0.015	d								1																		1
	0.003	b				1																						1
	0.100	c	D			1																						1
	0.010	d						1		1																		1
	0.010	c				1																						1
	0.003	b				1																						1
	0.055	c	D			1																						1
	0.003	b				1																						1
	0.020	c				1																						1
	0.003	b				1																						1
	0.005	c				1																						1
	0.065	e				1																						1
	0.035	c	D			1				1																		1
	0.020	d				1																						1
	0.010	c				1																						1
	0.040	b				1																						1
	0.090	c	D			1																						1
	0.013	b				1																						1
	0.050	c	D			1																						1
3498	0.030	c	D			1																						1
	0.003	b				1																						1
	0.180	c	D/B			1																						1
	0.060	d	E			1																						1
	0.010	c	D			1																						1
	0.010	d				1																						1
	0.185	c	D			1																						1
	0.020	d	C			1																						1
	0.080	c	B			1																						1
	0.015	d				1																						1
	0.190	c	B/D			1																						1
	0.010	d				1																						1
	0.080	c	D/D			1																						1
	0.005	e				1																						1
	0.005	d				1																						1
	0.035	c				1																						1
	0.005	d				1																						1
	0.015	b	C			1																						1
	0.015	c	D			1																						1
	0.010	d				1																						1
	0.015	c				1																						1
	0.010	b				1																						1
	0.040	c	D			1																						1
	0.005	b				1																						1
	0.030	c	D/B			1																						1
3499	0.010	c	D/B			1																						1
	0.010	d				1																						1
	0.005	b				1																						1
	0.010	c				1																						1
	0.015	d	C			1																						1

FT	THICK TY	*-PHYSICAL & BIOGENIC STRUCTURES--*											*-ACCESSORY MINERALS--*				*----FRACTURES-----*				*----BASAL CONTACT-----*								
		MI		NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.015 c				1								1																
	0.013 d				1	1				1							1									1			
	0.005 c	D			1							1	1	1	1												1		
	0.003 b				1								1																1
	0.010 c	D			1								1		1	1											1		
	0.010 d				1							1			1	1												1	
	0.050 c				1							1																	1
	0.008 d						1																					1	
	0.010 c	D			1							1	1													1			
	0.020 d	C			1	1																		1		1			
	0.110 c	D			1		1						1				1											1	
	0.030 d						1					1																1	
	0.010 c				1								1															1	
	0.008 d				1																							1	
	0.020 c				1	1		1	1				1	1	1											1			
	0.100 d	C					1	1				1		1	1			1								1			
	0.010 c				1								1															1	
	0.003 b				1								1															1	
	0.010 c				1								1															1	
	0.035 d				1	1		1				1															1		
	0.030 c				1																							1	
	0.010 d						1																					1	
	0.015 b	C			1								1	1	1												1		
	0.160 c	B			1								1	1	1											1			
	0.010 b				1								1	1	1												1		
	0.120 d						1						1															1	
	0.003 b				1								1															1	
	0.028 c				1								1															1	
	0.003 b				1								1	1	1													1	
	0.025 c				1								1															1	
3500	0.015 c				1								1															1	
	0.005 b				1								1	1	1													1	
	0.035 c	B			1								1	1	1													1	
	0.015 b				1								1	1	1													1	
	0.015 c				1								1															1	
	0.005 b				1								1	1	1													1	
	0.015 c				1								1															1	
	0.015 d						1																					1	
	0.020 c				1								1															1	
	0.010 d					1	1						1															1	
	0.010 c				1	1							1															1	
	0.025 d						1																					1	
	0.008 c				1	1																						1	
	0.005 d					1			1																			1	
	0.015 c				1	1							1															1	
	0.075 d	C					1																					1	
	0.030 c				1								1															1	
	0.020 d				1																							1	
	0.010 c				1								1	1	1													1	
	0.015 b				1								1	1	1													1	
	0.015 c				1								1															1	
	0.010 d						1																					1	

B-39

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *---FRACTURES---* *---BASAL CONTACT---*

FT	THICK TY	MI											PYRITE				FRACTURES				BASAL CONTACT						
		NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.005 b			1								1	1	1													1
	0.015 c	D		1								1				1										1	
	0.005 b			1								1	1	1		1										1	
	0.025 c			1								1	1														1
	0.003 d							1																		1	
	0.020 e					1		1				1						1								1	
	0.025 b			1								1		1												1	
	0.020 c			1								1														1	
	0.020 b			1								1		1												1	
	0.010 c			1	1																					1	
	0.020 d	C		1		1	1																1			1	
	0.020 b			1								1													1	1	
	0.010 c			1																						1	
	0.015 d	D/B		1		1						1														1	
	0.030 c			1																						1	
	0.015 d					1																				1	
	0.003 b			1								1	1	1												1	
	0.045 c			1								1	1	1												1	
	0.005 b			1								1	1	1												1	
	0.010 c			1								1	1	1												1	
	0.003 b			1								1	1	1									1			1	
	0.025 c	D		1								1	1	1									1			1	
	0.015 d			1								1														1	
	0.020 c			1								1												1		1	
	0.015 d			1								1												1		1	
	0.020 c			1								1												1		1	
	0.003 b			1								1	1	1									1			1	
3501	0.010 c			1								1	1	1									1			1	
	0.025 d					1																				1	
	0.005 b			1	1							1	1	1												1	
	0.020 c			1	1							1														1	
	0.015 d					1																				1	
	0.020 c	D		1								1														1	
	0.005 d			1				1	1																	1	
	0.005 b			1								1		1												1	
	0.040 c	D		1	1							1		1										1		1	
	0.030 d					1																				1	
	0.003 b			1								1														1	
	0.120 c	D		1		1						1											1			1	
	0.010 d			1		1						1														1	
	0.005 b			1								1		1												1	
	0.015 c	D		1			1					1		1												1	
	0.010 d					1							1	1										1		1	
	0.015 b	D										1		1	1											1	
	0.050 c	D		1								1	1	1												1	
	0.005 d					1																				1	
	0.015 b	D		1								1	1	1												1	
	0.030 c	D		1								1	1	1												1	
	0.030 b											1	1	1												1	
	0.010 c			1	1							1		1										1		1	
	0.030 d					1																				1	
	0.060 b	C		1	1							1	1	1												1	

B-40

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *----FRACTURES-----* *----BASAL CONTACT-----*

FT	THICK TY	PYRITE-----														-----												
		MI		PYRITE-----												-----												
		NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND
	0.015 c			1	1								1															1
	0.040 d				1					1							1	1		1	1							1
	0.110 d									1				1	1		1	1		1	1							1
	0.270 d					1							1						1	1								D
3502	0.160 d					1							1					1										1
	0.003 b			1									1												1			1
	0.010 c			1									1	1											1			1
	0.003 d			1				1					1												1			1
	0.050 b	D		1								1	1	1										1			1	
	0.095 d	C		1		1	1					1	1	1			1							1			1	
	0.065 b	C/D		1								1	1	1			1										1	
	0.055 c	D		1								1	1	1													1	
	0.005 b			1								1	1	1													1	
	0.015 c			1								1	1	1													1	
	0.025 b			1								1	1	1										1			1	
	0.015 c			1								1	1	1										1			1	
	0.003 d			1					1																		1	
	0.020 b	D/C		1								1	1	1													1	
	0.060 c	D		1			1					1	1	1											1		1	
	0.005 b			1								1	1	1													1	
	0.020 c	D		1								1	1	1													1	
	0.010 b			1								1	1	1													1	
	0.025 c			1								1	1	1													1	
	0.050 b			1								1	1	1													1	
	0.095 d	C		1	1							1	1	1													1	
	0.010 b	D		1								1	1	1													1	
	0.065 c			1								1	1	1													1	
	0.050 b	C/D		1								1	1	1													1	
	0.015 c			1								1	1	1					1		1						1	
	0.025 d			1		1						1	1	1					1		1						1	
3503	0.065 b	D		1								1	1	1													1	
	0.020 c			1								1	1	1													1	
	0.080 b	C/D		1								1	1	1										1			1	
	0.010 c			1								1	1	1										1			1	
	0.005 d			1		1						1	1	1													1	
	0.045 b	C		1								1	1	1													1	
	0.050 c	D		1								1	1	1													1	
	0.005 b			1								1	1	1													1	
	0.020 c			1								1	1	1					1		1						1	
	0.010 b			1	1							1	1	1					1		1						1	
	0.010 c			1	1							1	1	1					1		1			1			1	
	0.015 d			1	1			1				1	1	1					1		1						1	
	0.030 b			1								1	1	1													1	
	0.010 c			1								1	1	1													1	
	0.040 b	D		1								1	1	1													1	
	0.060 c	D		1								1	1	1													1	
	0.020 b			1								1	1	1													1	
	0.010 c			1								1	1	1													1	
	0.060 d			1		1						1	1	1					1		1		1				1	
	0.015 c			1								1	1	1													1	
	0.020 b	D		1								1	1	1													1	
	0.050 c			1								1	1	1													1	

B-41

-PHYSICAL & BIOGENIC STRUCTURES--- *-ACCESSORY MINERALS---* *-----FRACTURES-----* *-----BASAL CONTACT-----*

FT	THICK TY	MI		*-----FRACTURES-----*										*-----BASAL CONTACT-----*														
		NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND
	0.015 b			1								1											1					
	0.050 d			1			1					1									1		1					
3504	0.050 d			1								1								1		1						
	0.010 c			1																				1				
	0.030 d			1		1						1														1		
	0.045 c			1								1														1		
	0.045 b			1								1	1	1												1		
	0.005 c			1								1															1	
	0.010 d			1					1																	1		
	0.035 b			1								1	1	1	1									1			1	
	0.075 c			1								1		1											1		1	
	0.003 b			1								1											1					
	0.075 c			1								1														1		
	0.010 b			1								1	1	1												1		
	0.020 c			1								1															1	
	0.145 b	C/D		1							1	1	1													1		
	0.020 d			1		1						1														1		
	0.020 c			1								1											1				1	
	0.035 d	C		1								1														1		
	0.020 b	D		1		1						1		1											1	1	1	
	0.030 c			1								1	1											1			1	
	0.003 d			1					1	1																1		
	0.020 b			1								1														1		1
	0.035 c			1								1														1		
	0.015 b			1								1		1												1		1
	0.010 d			1				1	1	1		1														1		
	0.015 b			1		1						1														1		
	0.005 c			1		1						1														1		
	0.025 d			1								1														1		
3505	0.040 d			1								1														1		
	0.003 b			1								1														1		
	0.070 c			1								1														1		
	0.003 d			1					1															1			1	
	0.095 b	CD		1								1		1										1		1		1
	0.010 c			1								1		1		1								1			1	
	0.003 d			1					1																1		1	
	0.035 b	CD		1								1	1											1			1	
	0.015 c			1								1												1			1	
	0.010 d	C		1					1	1																1		
	0.025 b	D		1								1			1											1		
	0.015 c			1								1														1		
	0.013 d			1								1												1			1	
	0.055 b	D		1								1	1	1										1			1	
	0.010 c			1								1														1		
	0.003 d			1					1																	1		
	0.015 b			1								1												1			1	
	0.015 c			1								1												1			1	
	0.060 d			1		1	1					1								1		1			1		1	
	0.005 c			1								1														1		
	0.005 d			1		1						1														1		
	0.085 c	D		1					1			1														1		
	0.010 b			1								1	1	1												1		

B-42

-PHYSICAL & BIOGENIC STRUCTURES--- *-ACCESSORY MINERALS---* *-----FRACTURES-----* *-----BASAL CONTACT-----*

FT	THICK TY	MI	PYRITE-----																												
			NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND		
3508	0.370 e			1			1	1		1		1						1											1		
	0.150 e		1				1	1		1		1						1											1		
	0.300 b	E/D			1							1		1														1			
	0.020 c				1							1		1														1			
	0.005 d				1							1		1														1			
	0.020 e		1		1																			1							
	0.160 b	D			1							1		1														1			
	0.035 c				1							1		1												1					
	0.003 d				1							1		1														1			
	0.220 b	D/E			1							1		1											1						
0.100 e		1						1			1		1														1				
0.250 e		1						1			1		1														1				
3509	0.045 b	D			1						1		1															1			
	0.080 c				1						1		1	1										1							
	0.120 b	C/D			1						1		1															1			
	0.005 c					1					1		1	1														1			
	0.010 e					1					1		1	1														1			
	0.065 b	C/D		1		1					1		1											1							
	0.003 e		1			1																						1			
	0.050 b	C/D			1						1		1															1		1	
	0.015 c				1		1				1		1	1													1				
	0.005 d					1			1																			1			
	0.150 b	C/D			1						1		1													1			1		
	0.030 c	E			1						1		1	1	1												1		1		
	0.015 b				1						1		1	1													1		1		
	0.100 e		1						1			1	1															1			
	3510	0.120 e		1								1	1	1											1						
		0.010 b				1		1				1	1	1															1		
		0.015 c				1		1				1	1	1															1		
		0.035 d	E/C					1				1		1															1		
0.020 e							1				1		1															1			
0.050 c		E		1	1						1		1															1			
0.030 e											1		1															1			
0.045 c		B/E			1						1		1	1														1			
0.330 e								1	1		1		1														1				
0.003 b								1	1		1		1															1			
0.003 c								1	1		1		1															1			
0.003 d								1	1		1		1															1			
0.003 e								1	1		1		1															1			
0.055 c		B			1						1		1	1	1													1			
0.010 b					1						1		1	1														1			
0.020 c					1						1		1	1														1			
0.040 e		D			1			1			1		1	1														1			
0.090 b		D			1						1		1	1	1	1												1		1	
0.015 c				1						1		1	1	1													1				
0.010 b				1						1		1	1	1													1				
0.015 c				1						1		1	1	1	1												1				
3511	0.040 c				1					1		1	1	1	1													1			
	0.003 d				1																						1				
	0.003 e				1																						1				
	0.040 b				1						1																	1			
	0.015 c				1						1		1	1														1			

B-44

-PHYSICAL & BIOGENIC STRUCTURES--- *-ACCESSORY MINERALS---* *---FRACTURES---* *---BASAL CONTACT---*

FT	THICK TY	MI	PYRITE-----*										*---FRACTURES---						*---BASAL CONTACT---									
			NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.010	d			1																							1
	0.005	e			1																							1
	0.005	c			1									1											1			
	0.005	d			1				1																	1		
	0.015	b			1									1	1	1											1	
	0.095	d	C		1								1														1	
	0.095	b	D		1									1	1			1									1	
	0.025	c			1									1	1	1	1								1			
	0.070	d			1																					1		
	0.210	b	D/C		1									1		1			1						1	1		1
	0.025	c			1									1	1	1								1				
	0.015	d			1				1					1	1											1		
	0.010	b	D		1									1												1	1	
	0.020	c			1									1	1	1								1				
	0.003	d			1																			1				
	0.040	e			1				1															1				
	0.040	b	D		1									1	1										1	1		1
	0.020	d			1									1	1	1									1			
	0.010	b			1									1	1	1									1		1	
	0.020	c			1									1	1	1								1				
	0.060	e			1									1	1	1							1					
	0.005	b			1									1										1				
	0.005	c			1									1										1				
	0.020	e			1									1		1								1				
	0.015	b			1									1										1				
	0.065	c	E		1									1										1				
3512	0.030	c	E		1									1									1					
	0.060	d			1									1										1				
	0.010	b	D		1									1	1									1			1	
	0.060	d			1									1		1								1				
	0.060	b	E		1									1	1	1								1				
	0.003	d			1																			1				
	0.080	e			1									1										1				
	0.010	b			1									1										1				
	0.120	c			1									1	1	1								1				
	0.070	d			1				1					1										1				
	0.003	e			1																			1				
	0.005	b			1									1										1				1
	0.010	c			1									1	1	1								1				
	0.095	e	D											1									1					
	0.005	c			1									1										1				
	0.115	e			1									1										1				
	0.075	c			1									1										1				
	0.010	b			1									1										1				1
	0.050	c			1									1	1									1				
	0.060	b			1									1									1					
3513	0.010	c			1									1										1				
	0.015	b			1									1	1									1				
	0.055	c			1									1										1				
	0.010	b			1									1	1									1				1
	0.070	c			1									1	1									1				
	0.010	b			1									1	1									1				1

B-45

-PHYSICAL & BIOGENIC STRUCTURES--- *-ACCESSORY MINERALS---* *----FRACTURES-----* *----BASAL CONTACT-----*

FT	THICK	TY	MI										PYRITE-----					-----									
			NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR
	0.030	c			1							1	1	1													1
	0.010	b			1							1											1				
	0.030	c			1							1												1			
	0.105	d			1							1													1		
	0.003	b			1							1	1										1				1
	0.010	c			1							1											1				
	0.003	b			1							1													1		
	0.035	c			1							1												1			
	0.010	d			1							1														1	
	0.030	b			1							1	1	1												1	
	0.010	c			1							1														1	
	0.030	d	E		1			1		1	1															1	
	0.015	b			1							1														1	
	0.045	c	B		1							1												1			
	0.010	d			1							1													1		
	0.010	b			1							1			1										1		1
	0.015	c			1							1			1										1		
	0.003	d			1							1													1		
	0.040	b	C		1							1			1										1		
	0.050	c	B		1							1													1		
	0.035	d			1							1													1		
	0.010	c			1							1													1		
	0.010	b			1							1	1	1											1		
	0.015	c			1							1													1		
	0.005	b			1							1												1			
	0.030	c			1							1												1			1
	0.075	d			1							1												1			
	0.030	c			1							1												1			
	0.010	d			1							1												1			
	0.015	e			1							1												1			
	0.010	b			1							1	1	1										1			
	0.015	e	C/D		1			1		1	1													1			
	0.005	b			1			1				1												1			
	0.020	c			1							1												1			
3514	0.035	b	D		1							1	1	1										1			
	0.020	c			1							1	1	1										1			
	0.030	d			1							1												1			
	0.003	b			1							1	1											1			1
	0.015	d			1							1												1			
	0.065	b	E		1							1	1	1										1			1
	0.010	c			1							1												1			
	0.003	d			1							1											1				
	0.020	e			1	1						1											1				
	0.015	d			1	1						1											1				
	0.003	e			1	1						1												1			
	0.020	c			1	1						1	1										1				
	0.040	e			1	1						1	1										1				
	0.005	b			1	1						1	1											1			
	0.030	c			1	1						1	1											1			
	0.020	d	E		1	1						1	1											1			
	0.030	e			1	1						1	1											1			
	0.040	b			1	1						1	1											1			1

FT	THICK TY	*-PHYSICAL & BIOGENIC STRUCTURES--*											*-ACCESSORY MINERALS--*			*-----FRACTURES-----*				*-----BASAL CONTACT-----*			
		MI		PL	WV	XB	CN	LC	FL	RC	BIO	OR	PYRITE-----			SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR
NOR	MA	DIS	CON										LAM	REP	CAL								
	0.010 c			1								1	1							1			
	0.025 d			1								1							1				
	0.030 e			1											1				1				
	0.010 c			1								1	1										
	0.008 d			1								1	1									1	
	0.040 b	E		1								1	1									1	
	0.005 d				1						1		1							1			
	0.070 e			1				1														1	
	0.045 b	E		1								1	1	1								1	
	0.010 c			1	1							1	1	1	1							1	
	0.005 b	D		1							1	1	1	1								1	
	0.005 c			1	1							1										1	
	0.060 e					1		1														1	
	0.010 b			1	1							1										1	
	0.010 d	E			1																	1	
	0.150 b	E		1								1										1	
	0.045 d			1	1																	1	
3515	0.055 d		1					1														1	
	0.020 b			1								1								1			1
	0.050 c			1								1	1	1								1	
	0.130 b	D/C		1								1	1	1								1	
	0.025 c			1	1							1	1	1								1	
	0.003 d			1	1																	1	
	0.005 e			1	1																	1	
	0.003 b			1								1										1	
	0.055 c			1								1	1	1								1	
	0.015 b			1	1							1										1	
	0.170 e		1			1										1						1	
	0.110 b	E		1								1		1								1	
	0.020 c			1								1	1	1								1	
	0.003 d			1																		1	
	0.020 b			1	1							1		1								1	
	0.045 c	D/B		1	1							1	1	1								1	
	0.005 b			1								1										1	
	0.020 c	D		1							1	1	1	1								1	
	0.020 b			1								1										1	1
	0.015 c			1								1	1	1					1				
	0.015 d			1								1										1	1
	0.020 b			1								1										1	
	0.010 c			1								1	1	1						1			
	0.020 d			1								1	1	1								1	
	0.020 b			1								1	1	1								1	
	0.010 c			1								1	1	1								1	
	0.005 d			1																		1	
	0.003 b			1								1										1	
	0.005 c			1								1	1	1								1	
	0.020 d			1				1	1			1								1			1
3516	0.070 b	C		1								1	1	1								1	
	0.020 c			1								1	1	1								1	
	0.025 b			1								1	1	1								1	
	0.005 c			1								1	1	1								1	
	0.035 b			1								1	1	1								1	

B-47

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *-----FRACTURES-----* *-----BASAL CONTACT-----*

FT	THICK	TY	MI		PYRITE-----										-----													
			NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.015	c			1							1	1	1													1	
	0.040	e		1	1				1		1		1														1	
	0.015	b			1							1	1	1													1	
	0.010	c			1							1															1	
	0.010	b	D		1							1																1
	0.015	e									1		1														1	1
	0.010	c			1								1													1		
	0.095	e		1			1						1					1				1					1	
	0.035	c			1		1						1										1				1	
	0.220	e						1				1		1	1			1				1					1	
	0.010	c			1							1	1	1	1								1				1	
	0.060	b	CDE		1						1	1	1	1									1				1	
	0.010	c			1						1	1	1														1	
	0.003	d			1		1		1	1																	1	
	0.003	b			1		1				1	1	1													1	1	
	0.010	c			1		1																				1	
	0.035	b					1						1	1												1	1	
	0.005	c					1						1	1												1	1	
	0.010	d					1																				1	
3517	0.020	e					1																				1	
	0.005	c			1							1															1	
	0.020	d			1																						1	
	0.060	c			1							1	1	1												1	1	
	0.010	d			1				1	1																1	1	
	0.025	b	D		1						1	1	1	1												1	1	
	0.020	c			1							1	1	1													1	
	0.005	d					1		1	1																	1	
	0.015	b			1							1														1	1	
	0.020	c	D		1							1														1	1	
	0.003	b			1							1														1	1	
	0.025	c			1							1														1	1	
	0.010	d			1				1																	1	1	
	0.025	b			1							1											1				1	
	0.015	c			1							1	1	1									1				1	
	0.003	e							1																		1	
	0.005	b			1							1	1	1													1	
	0.005	c					1					1	1	1													1	
	0.025	e		1					1	1		1															1	
	0.010	b			1		1					1															1	
	0.005	d			1		1					1	1														1	
	0.020	e						1				1															1	
	0.003	c			1																						1	
	0.180	e		1				1																			1	
	0.010	c			1		1					1															1	
	0.010	d			1							1															1	
	0.130	e					1																1					
	0.003	c			1		1					1															1	
	0.003	e			1		1					1															1	
	0.003	d			1		1					1															1	
	0.003	b			1		1					1															1	
	0.025	c			1		1					1															1	
	0.005	e	D				1			1																	1	

B-48

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *----FRACTURES----* *----BASAL CONTACT----*

FT	THICK TY	MI	*-PHYSICAL & BIOGENIC STRUCTURES--*										*-ACCESSORY MINERALS--*				*----FRACTURES----*				*----BASAL CONTACT----*						
			NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR
	0.040	b	C		1								1	1	1												1
	0.030	c			1								1														1
3518	0.025	b			1								1		1									1			1
	0.015	c	D		1	1							1												1		1
	0.170	e					1							1									1				1
	0.050	c	E		1							1	1										1				1
	0.015	e			1	1							1										1				1
	0.003	b			1								1														1
	0.030	d			1	1							1														1
	0.130	e		1			1						1					1					1				1
	0.010	c			1	1							1														1
	0.005	e			1	1							1														1
	0.005	b			1	1							1		1									1			1
	0.008	c			1	1							1											1			1
	0.010	e						1					1											1			1
	0.003	c				1							1											1			1
	0.025	d			1	1							1											1			1
	0.075	e					1		1															1			1
	0.003	b				1										1								1			1
	0.010	c	D		1								1										1				1
	0.025	d	E		1								1											1			1
	0.085	e					1		1															1			1
	0.003	b			1								1	1	1									1			1
	0.010	c			1								1											1			1
	0.140	e	BC				1					1												1			1
	0.040	b				1						1	1											1			1
	0.025	c	D		1	1						1	1	1	1									1			1
	0.010	b	D		1	1						1	1	1	1									1			1
3519	0.110	c			1								1		1									1			1
	0.005	b			1								1		1									1			1
	0.005	c			1								1		1									1			1
	0.003	d			1								1		1									1			1
	0.003	b			1								1	1	1									1			1
	0.010	c			1								1	1	1									1			1
	0.050	d			1								1											1			1
	0.003	b			1								1	1										1			1
	0.100	c			1								1											1			1
	0.015	b			1								1											1			1
	0.020	c	DE		1	1							1	1										1			1
	0.020	e			1	1			1				1											1			1
	0.020	b	D		1	1							1											1			1
	0.050	d	E		1							1	1	1	1									1			1
	0.430	e					1		1			1	1	1	1									1			1
	0.055	b	CD		1	1							1		1									1			1
	0.010	c			1	1							1	1	1									1			1
	0.020	e			1	1	1		1				1											1			1
	0.010	b			1	1							1	1	1									1			1
	0.040	c	E		1								1											1			1
	0.020	d			1	1							1											1			1
	0.010	e			1	1							1											1			1
3520	0.025	c	D/E		1								1											1			1
	0.005	d			1																			1			1

-PHYSICAL & BIOGENIC STRUCTURES--- *-ACCESSORY MINERALS---* *---FRACTURES---* *---BASAL CONTACT---*

FT	THICK TY	*---PHYSICAL & BIOGENIC STRUCTURES---*											*---ACCESSORY MINERALS---*		*---FRACTURES---*					*---BASAL CONTACT---*								
		MI	NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.020 e				1																							1
	0.005 c				1								1															1
	0.020 b	E			1								1														1	
	0.010 c				1								1	1	1												1	
	0.003 b				1								1														1	
	0.020 d				1																			1				
	0.010 e				1	1			1																1		1	
	0.025 b				1								1	1													1	
	0.015 c				1								1		1			1									1	
	0.050 d				1	1							1	1												1	1	
	0.010 b	D			1								1	1		1										1	1	
	0.040 c	D/E			1	1							1														1	
	0.040 e				1																						1	
	0.030 c	B			1								1			1											1	
	0.015 e	D			1								1														1	
	0.010 c				1								1											1			1	
	0.065 e	D			1								1			1										1	1	
	0.040 b	C/D/E			1	1							1														1	
	0.035 d	E			1								1	1	1												1	
	0.003 e				1				1																		1	
	0.015 b				1								1			1											1	
	0.045 d	B			1								1	1	1					1	1						1	
	0.003 b				1								1														1	
	0.050 c				1								1											1			1	
	0.010 d	E			1								1											1			1	
	0.005 b				1								1	1													1	
	0.010 c				1								1											1			1	
	0.015 d				1								1														1	
	0.025 e				1				1																		1	
	0.005 b				1								1	1	1												1	
	0.030 c	D			1	1							1	1	1												1	
	0.020 e	D			1	1			1	1																	1	
	0.015 b	E			1	1							1	1	1												1	
	0.010 c				1	1							1	1	1	1											1	
	0.200 e				1								1														1	
3521	0.025 d				1				1				1	1													1	
	0.015 e				1				1																		1	
	0.010 c				1								1														1	
	0.080 e	D			1	1			1															1			1	
	0.050 b	E			1	1							1	1													1	
	0.065 d	C/E			1	1							1	1	1									1			1	
	0.780 e				1	1	1	1					1											1			1	
3522	0.065 b	D			1								1			1											1	
	0.020 c				1								1	1	1	1	1	1									1	
	0.175 e				1	1							1														1	
	0.003 c				1																			1			1	
	0.200 e				1	1																					1	
	0.055 b				1								1	1	1												1	
	0.048 d	B			1				1				1	1	1	1											1	
	0.020 b	C			1	1							1	1	1												1	
	0.013 c				1								1	1	1										1		1	
	0.003 d				1																						1	

B-50

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *----FRACTURES----* *----BASAL CONTACT----*

FT	THICK TY	MI		PYRITE-----										-----														
		NOR	MA	PL	VV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND
	0.035 b			1								1	1	1												1		
	0.030 c			1								1	1	1												1		
	0.005 d			1								1	1	1												1		
	0.015 c			1								1	1	1												1		
	0.070 d			1								1	1	1												1		
	0.105 b	C/E		1								1	1	1											1	1		
	0.005 c			1								1	1	1												1		
	0.015 e			1				1				1	1	1												1		
	0.050 b	D		1								1	1	1												1	1	
	0.010 c			1								1	1	1												1		
	0.020 e			1				1	1			1	1	1												1		
	0.005 b			1								1	1	1											1		1	
	0.018 c			1								1	1	1											1		1	
	0.003 e			1		1						1	1	1												1		
3523	0.045 d			1		1						1	1	1												1		
	0.070 b	E		1								1	1	1												1		
	0.050 d			1								1	1	1												1		
	0.033 b	C		1								1	1	1								1				1		
	0.075 e		1	1								1	1	1				1								1		
	0.130 b	E		1		1						1	1	1				1		1						1		
	0.010 c			1		1						1	1	1												1		
	0.010 e		1	1								1	1	1												1		
	0.070 b	E		1								1	1	1												1		
	0.010 c			1								1	1	1												1		
	0.015 e			1								1	1	1									1			1		
	0.040 b	E		1								1	1	1												1		
	0.005 c			1								1	1	1									1			1		
	0.090 e		1	1				1				1	1	1				1	1		1					1		
	0.030 b			1								1	1	1												1		
	0.010 c			1								1	1	1												1		
	0.005 e			1								1	1	1												1		
	0.085 b	E		1								1	1	1												1		
	0.010 c			1								1	1	1												1		
	0.003 e			1								1	1	1												1		
	0.050 b	E		1								1	1	1												1		
	0.010 c			1		1						1	1	1												1		1
	0.050 e		1	1								1	1	1					1							1	1	
3524	0.040 b	E		1								1	1	1												1	1	
	0.060 d	E		1								1	1	1												1		
	0.010 b			1		1						1	1	1												1		1
	0.015 c			1								1	1	1												1		
	0.210 e			1				1				1	1	1												1		
	0.025 b	E		1								1	1	1										1		1		
	0.010 c			1								1	1	1												1		
	0.030 b	E		1								1	1	1												1		1
	0.020 c			1								1	1	1										1				
	0.070 e	B		1		1	1		1			1	1	1												1		
	0.015 b			1								1	1	1												1		
	0.400 e		1				1					1	1	1					1	1	1	1	1	1		1		
	0.030 d			1				1	1			1	1	1												1		
3525	0.060 d			1				1	1			1	1	1												1		
	0.020 b			1								1	1	1												1		

B-51

FT	THICK TY	*-PHYSICAL & BIOGENIC STRUCTURES--*											*-ACCESSORY MINERALS--*			*-----FRACTURES-----*					*-----BASAL CONTACT-----*									
		MI		PL	WV	XB	CN	LC	FL	RC	BIO	OR	PYRITE-----			DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.015	c			1									1	1	1										1				
	0.115	d	B		1								1	1													1			
	0.025	b			1									1	1	1													1	
	0.010	d	E		1		1						1	1														1		
	0.003	e			1																						1			
	0.060	c			1									1												1				
	0.035	d			1									1												1				
	0.220	e			1		1														1						1			
	0.205	b			1									1	1											1				
	0.005	c			1									1	1											1				
	0.080	b			1									1	1	1										1				
	0.005	c			1									1	1											1				
	0.030	b	C		1		1							1	1	1											1			
	0.005	c			1		1							1	1	1											1			
	0.005	b			1		1							1	1	1											1			
	0.020	c			1		1							1													1			
	0.070	e	D				1							1													1			
	0.030	b			1									1															1	

FT	THICK TY	MI	*-PHYSICAL & BIOGENIC STRUCTURES--*										*-ACCESSORY MINERALS--*			*-----FRACTURES-----*				*-----BASAL CONTACT-----*							
			NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR
3526	0.010 c				1								1	1	1												1
	0.020 b	D			1	1							1	1											1		
	0.025 e	B			1	1							1												1		
	0.005 b				1	1							1													1	
	0.015 c					1							1	1	1		1							1			
	0.055 d					1							1	1										1			
	0.008 b				1								1		1										1		
	0.085 c				1								1		1										1		
	0.025 d	E			1	1						1													1		
	0.005 e				1	1			1																1		
	0.003 b				1	1							1	1	1											1	
	0.005 c				1	1							1	1	1									1			
	0.010 d				1	1			1				1												1		
	0.030 b	D			1								1	1											1		
	0.015 c				1								1	1	1										1		
	0.005 e				1	1							1												1		
	0.010 b				1								1	1											1		
	0.015 c	E			1								1	1	1										1		
	0.030 b				1								1	1												1	
	0.015 c				1								1	1	1										1		
	0.005 b	E/C			1	1			1				1	1											1		
	0.015 c				1	1							1	1		1									1		
	0.010 e				1	1							1										1				
	0.015 c				1	1							1												1		
	0.140 e			1					1									1							1		
	0.010 c				1								1												1		
	0.025 b				1								1	1											1		
	0.030 c				1								1	1	1									1			
	0.003 d				1								1												1		
	0.003 b				1								1												1		
	0.035 c	D			1	1							1												1		
	0.005 e				1				1																1		
	0.020 b	C			1								1	1	1		1								1		
	0.030 c				1								1												1		
	0.010 d				1	1																		1			
	0.025 e				1	1																			1		
	0.020 c				1								1											1			
	0.015 d				1				1	1			1											1		1	
	0.025 b	D			1								1												1		
	0.015 c				1								1	1	1	1	1								1		
	0.015 e				1								1												1		
3527	0.045 b	C			1								1	1	1										1		
	0.015 c				1																				1		
	0.010 d				1	1			1																1		
	0.015 c				1								1												1		
	0.015 d				1	1	1																		1		
	0.003 e				1								1												1		
	0.015 c				1								1												1		
	0.180 e				1								1		1	1	1						1			1	
	0.080 c				1								1												1		
	0.030 b	D			1								1		1										1		1
	0.015 c				1								1		1										1		

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *-----FRACTURES-----* *-----BASAL CONTACT-----*

FT	THICK TY	MI	PYRITE-----*													*-----BASAL CONTACT-----*													
			NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND
	0.015	b	C/E			1							1	1	1	1													1
	0.030	c			1									1													1		
	0.010	d			1																						1		
	0.070	e					1															1							
	0.035	c	D		1									1											1				
	0.010	d								1																	1		
	0.005	b			1									1	1	1										1		1	
	0.030	c	D											1													1		
	0.010	b			1									1	1	1											1		
	0.015	c			1									1											1				
	0.035	d			1									1	1	1											1		
	0.010	b			1									1	1												1		
	0.025	c			1									1		1											1		
	0.040	d	C		1		1							1	1	1											1		
	0.015	b			1									1	1	1											1		
	0.015	c			1									1													1		
	0.003	d			1																						1		
	0.010	b			1									1													1		
	0.030	c	B		1									1	1												1		
	0.010	d			1																						1		
	0.003	e			1					1																	1		
	0.015	b			1									1		1											1		1
	0.015	c			1									1	1	1											1		
	0.003	b			1									1													1		
	0.015	c			1									1													1		
	0.050	e			1					1																	1		
	0.010	b			1									1													1		
	0.055	c			1									1													1		
	0.020	b			1									1	1	1											1		
3528	0.010	c			1									1	1												1		1
	0.035	d	E		1																						1		
	0.003	b			1									1													1		
	0.008	c			1									1	1	1											1		
	0.045	e			1					1				1	1												1		
	0.040	b			1									1													1		
	0.020	c			1									1	1	1											1		
	0.005	d			1																					1			
	0.003	e			1																						1		
	0.013	b			1									1	1												1		
	0.015	c	B/E		1									1	1	1											1		
	0.005	b			1									1													1		
	0.010	c			1									1	1	1											1		
	0.090	e	D			1		1																			1		
	0.020	c	D			1								1													1		
	0.055	b			1									1													1		
	0.003	c			1									1	1	1											1		
	0.080	e			1																						1		
	0.020	b			1		1							1													1		
	0.050	e			1																						1		
	0.065	b	E		1									1													1		
	0.005	c			1		1							1		1											1		
	0.075	e	D/C		1		1																				1		

B-54

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *----FRACTURES----* *----BASAL CONTACT----*

FT	THICK TY	MI		*-PHYSICAL & BIOGENIC STRUCTURES--*										*-ACCESSORY MINERALS--*			*----FRACTURES----*					*----BASAL CONTACT----*						
		NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	COM	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND
	0.090 b			1								1															1	
	0.010 c			1								1	1	1													1	
	0.010 b			1								1	1	1													1	
	0.040 c			1								1	1	1														
	0.090 d			1								1												1				
	0.040 e		1	1																				1				
	0.015 b			1								1														1	1	
	0.025 d			1								1	1	1										1				
3529	0.085 d			1								1	1	1										1				
	0.030 e		1																							1		
	0.023 b			1								1														1		
	0.013 c			1								1	1	1												1		
	0.070 b			1								1														1		
	0.010 c			1								1	1	1												1		
	0.015 b			1		1						1														1	1	
	0.010 c	E		1		1						1														1	1	
	0.025 e			1		1		1				1														1		
	0.015 b	E		1		1						1														1		
	0.040 c	B/E		1		1						1	1	1									1					
	0.080 e		1						1									1								1		
	0.090 b			1								1														1	1	
	0.025 c			1		1						1	1	1												1		
	0.010 b			1		1						1	1													1	1	
	0.010 c			1		1						1	1													1		
	0.260 e		1				1											1					1					
	0.005 b			1		1						1														1		
	0.010 c			1		1							1	1												1		
	0.015 e			1		1							1													1		
	0.003 c			1		1							1													1		
	0.060 e		1			1							1													1		
	0.035 b			1								1														1		
	0.015 c			1								1	1	1	1	1										1		
	0.003 d			1																						1		
3530	0.010 b			1								1	1	1	1												1	
	0.025 c		1									1	1	1												1		
	0.030 e			1								1	1	1												1		
	0.095 d		1			1						1														1		
	0.005 b			1		1						1			1											1		
	0.175 e	B				1		1	1	1		1			1			1								1		
	0.010 b					1						1														1		
	0.005 c					1						1														1		
	0.180 e	C				1							1	1												1		
	0.005 b			1								1	1														1	
	0.010 c			1								1	1	1													1	
	0.035 e					1																				1		
	0.030 b			1								1	1													1		
	0.015 c			1									1	1												1		
	0.020 d			1																					1			
	0.003 e		1						1																	1		
	0.050 b	E		1								1														1		
	0.025 c			1								1	1	1											1			
	0.015 d			1									1													1		

B-55

FT	THICK TY	*PHYSICAL & BIOGENIC STRUCTURES--*											*ACCESSORY MINERALS--*			*-----FRACTURES-----*				*-----BASAL CONTACT-----*				
		MI		PL	WV	XB	CN	LC	FL	RC	BIO	OR	PYRITE-----			SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
		NOR	MA									DIS	CON	LAM	REP	CAL	OP							
	0.020 b			1								1	1	1										1
	0.015 c			1								1	1	1			1						1	
	0.003 d			1					1					1									1	
	0.010 b			1										1									1	
	0.040 c	D		1										1	1	1							1	
	0.020 b			1										1									1	
	0.070 c	D		1										1	1	1							1	
	0.003 b			1										1									1	
	0.010 c			1										1									1	
	0.005 d			1										1									1	
	0.035 b			1										1		1							1	
	0.005 c			1										1	1	1							1	
	0.025 e	D		1	1			1				1											1	
	0.003 b	E		1	1							1	1										1	
	0.010 c			1	1								1	1								1		
	0.010 d			1																	1		1	
3531	0.010 b			1									1	1	1								1	
	0.035 c			1									1	1								1		
	0.010 d			1									1	1									1	
	0.005 e			1																			1	
	0.008 d			1																			1	
	0.030 e			1	1																		1	
	0.005 c			1																			1	
	0.080 e	B		1	1	1							1										1	
	0.030 b			1	1								1										1	
	0.020 d			1	1								1	1	1								1	
	0.015 c			1	1								1										1	
	0.040 e			1		1																	1	
	0.005 b			1									1										1	
	0.015 c			1										1	1	1							1	
	0.010 d			1																			1	
	0.010 b			1									1										1	1
	0.010 c			1									1	1									1	
	0.003 e			1																			1	
	0.020 b	E		1									1										1	
	0.035 e		1	1	1			1															1	
	0.005 c			1	1																		1	
	0.080 b			1									1	1	1								1	
	0.010 c			1									1	1	1								1	
	0.050 e			1	1	1																	1	
	0.025 c			1									1	1	1								1	
	0.010 d			1																			1	
	0.003 c			1									1										1	
	0.060 b			1									1										1	1
	0.015 c			1									1	1	1								1	
	0.003 d			1																			1	
	0.003 b			1									1										1	
	0.010 c			1									1	1	1								1	
	0.010 d			1						1											1		1	
	0.020 b			1																			1	
	0.070 c			1	1								1	1	1								1	
	0.003 b			1									1										1	

B-56

FT	THICK TY	*-PHYSICAL & BIOGENIC STRUCTURES--*											*-ACCESSORY MINERALS--*		*----FRACTURES-----*				*----BASAL CONTACT-----*									
		MI		PL	WV	XB	CN	LC	FL	RC	BIO	OR	PYRITE-----		DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR
	0.060 c			1									1	1	1												1	
	0.090 b	E		1									1	1													1	
	0.005 c			1																							1	
	0.035 e			1																							1	
3532	0.040 b			1									1														1	1
	0.020 c			1										1	1												1	
	0.030 e			1		1																	1				1	
	0.020 b			1									1											1			1	
	0.003 c			1									1														1	1
	0.050 e			1				1																			1	
	0.010 b			1		1							1														1	1
	0.003 c			1																							1	1
	0.040 d			1				1					1												1		1	
	0.060 e			1				1																	1		1	
	0.120 b	E											1													1	1	1
	0.065 c			1									1	1													1	1
	0.180 b	D		1									1														1	1
	0.010 c			1									1														1	1
	0.130 b			1									1														1	1
	0.090 c	B		1									1	1	1									1		1	1	
	0.080 e			1	1																				1		1	1
3533	0.165 e			1				1																1		1	1	1
	0.065 d			1									1	1	1											1	1	1
	0.085 b			1									1													1	1	1
	0.045 c			1									1	1	1											1	1	1
	0.030 b			1									1	1												1	1	1
	0.030 c			1									1	1												1	1	1
	0.060 e			1																				1		1	1	1
	0.130 b			1									1										1		1		1	1
	0.020 c			1									1	1											1		1	1
	0.025 d			1									1												1		1	1
	0.003 e			1						1															1		1	1
	0.170 b	C		1									1													1	1	1
	0.010 c			1									1	1	1											1	1	1
	0.070 e			1																					1		1	1
	0.010 b	E		1								1	1	1	1											1	1	1
	0.005 c	E		1								1	1													1	1	1
3534	0.050 d			1									1	1												1	1	1
	0.130 b			1									1	1												1	1	1
	0.010 c			1									1	1	1											1	1	1
	0.015 b			1									1	1	1											1	1	1
	0.030 c	B		1								1	1	1	1										1	1	1	1
	0.025 d			1						1			1	1											1		1	1
	0.130 b	C/D/E		1		1						1	1	1	1										1		1	1
	0.040 c			1									1	1	1											1	1	1
	0.010 b			1									1													1	1	1
	0.020 c			1									1													1	1	1
	0.025 e			1				1		1														1		1	1	1
	0.065 b	E		1								1	1	1												1	1	1
	0.045 d			1									1													1	1	1
	0.055 b			1									1	1												1	1	1
	0.020 c			1									1												1		1	1

B-57

-PHYSICAL & BIOGENIC STRUCTURES--- *-ACCESSORY MINERALS---* *----FRACTURES-----* *----BASAL CONTACT-----*

FT	THICK TY	MI	PYRITE-----																									
			NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND
	0.003 e			1					1																		1	
	0.125 b	D			1							1	1	1													1	
	0.090 d				1							1	1														1	
	0.025 b				1							1	1	1													1	1
	0.015 c	E			1																						1	
	0.050 e			1					1					1					1								1	
3535	0.180 e			1					1					1				1									1	
	0.010 b				1							1	1											1				
	0.020 c				1							1												1				
	0.010 d				1							1												1				
	0.020 b				1							1	1											1			1	
	0.010 c				1							1												1				
	0.015 d				1							1												1				
	0.015 b	D			1							1	1											1			1	
	0.015 c				1							1	1	1										1				
	0.008 d				1							1												1			1	
	0.045 b				1							1	1											1			1	
	0.065 c				1							1												1				
	0.015 d				1							1												1				
	0.300 b				1							1	1										1					
	0.140 e			1					1						1									1				
3536	0.160 e			1					1						1									1				
	0.120 b	C/D			1							1	1	1	1	1							1			1		
	0.015 c				1							1	1	1	1									1			1	
	0.055 b				1							1												1			1	
	0.020 c				1							1	1	1										1				
	0.030 d				1				1			1	1											1				
	0.030 e	D			1				1			1												1			1	
	0.035 b				1							1	1											1			1	
	0.005 c				1							1	1	1										1				
	0.080 e			1					1															1			1	
	0.010 d				1							1												1			1	
	0.005 c				1							1												1			1	
	0.060 b				1							1	1	1										1			1	
	0.010 c				1							1	1	1										1				
	0.008 e				1							1												1			1	
	0.040 b	D			1							1												1				
	0.010 c	E			1				1			1	1											1			1	
	0.015 e				1				1			1	1	1	1									1			1	
	0.025 b	C			1				1			1	1	1										1			1	
	0.040 c				1							1	1											1				
	0.003 d				1							1		1	1									1			1	
	0.003 c				1							1												1			1	
	0.010 d				1							1												1			1	
	0.020 e				1							1	1											1			1	
	0.003 c				1							1												1			1	
	0.035 b				1							1	1											1			1	
	0.008 c								1			1		1										1			1	
3537	0.015 e								1															1			1	
	0.070 d	E			1				1			1												1			1	
	0.005 c				1							1												1			1	
	0.015 e				1				1															1			1	

B-58

-PHYSICAL & BIOGENIC STRUCTURES--- *-ACCESSORY MINERALS---* *---FRACTURES---* *---BASAL CONTACT---*

FT	THICK TY	MI		PYRITE										FRACTURES						BASAL CONTACT								
		NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND
	0.015 c			1	1							1	1													1		
	0.260 e			1	1																		1					
	0.020 b			1								1	1										1					
	0.010 c	E		1				1				1	1	1												1		
	0.100 b	C/D		1								1															1	
	0.020 c			1								1	1	1												1		
	0.015 d			1				1				1	1													1		
	0.020 b			1								1														1		
	0.025 c			1								1	1		1											1		
	0.010 e			1	1							1														1		
	0.003 b			1								1														1		
	0.008 c			1	1							1														1		
	0.080 e	C		1	1			1			1												1				1	
	0.020 b	D		1							1																1	
	0.020 c			1								1	1	1												1		
	0.035 b			1								1	1													1		
	0.010 c			1								1	1	1												1		
	0.075 d			1								1												1			1	
	0.015 c			1								1	1	1												1		
	0.003 d			1								1	1	1												1		
3538	0.110 b			1								1	1													1		
	0.035 c	B		1	1							1	1	1												1		
	0.025 e	D		1				1				1	1	1												1		
	0.008 c			1								1												1			1	
	0.003 d			1								1														1		
	0.165 b	C		1								1		1												1		
	0.005 c			1								1														1		
	0.003 d			1								1														1		
	0.010 b			1								1	1	1												1		
	0.035 c	B/D		1								1														1		
	0.003 d			1								1														1		
	0.003 c			1								1														1		
	0.010 d			1																						1		
	0.035 e							1																		1		
	0.065 d			1								1														1		
	0.003 b			1								1	1													1		
	0.035 c			1								1														1		
	0.015 b			1								1	1													1		
	0.010 c			1								1		1												1		
	0.055 d			1								1												1			1	
	0.015 b			1								1	1													1		
	0.025 c	D		1								1														1		
	0.005 d			1								1														1		
	0.010 b			1								1														1		
	0.020 c	E		1				1			1													1		1		
	0.020 d			1								1														1		
	0.003 b			1								1														1		
	0.030 d			1								1														1		
	0.010 b			1								1														1		
	0.025 c	D		1								1	1													1		
	0.005 d			1								1														1		
	0.020 b			1								1	1	1												1		

-PHYSICAL & BIOGENIC STRUCTURES--- *-ACCESSORY MINERALS---* *----FRACTURES-----* *----BASAL CONTACT-----*

FT	THICK	TY	MI											PYRITE-----				*----BASAL CONTACT-----*										
			NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.015	c	D			1									1													1
	0.005	d			1	1				1	1																	1
	0.040	b		1		1									1	1	1											1
	0.030	c	D			1									1													1
	0.015	d				1				1																		1
3539	0.070	b				1									1	1	1								1			1
	0.020	c				1									1													1
	0.035	d	C			1	1																					1
	0.005	e			1					1																		1
	0.003	b				1				1					1										1			1
	0.010	c				1									1										1			1
	0.015	d				1									1										1			1
	0.130	b				1									1		1										1	1
	0.035	c				1									1										1			1
	0.015	d				1	1																					1
	0.020	c				1									1													1
	0.003	d				1									1													1
	0.200	b	C			1									1													1
	0.030	d				1				1																		1
	0.010	c				1									1													1
	0.050	b				1									1													1
	0.030	c				1									1									1				1
	0.005	e			1																							1
	0.025	c				1									1													1
	0.005	e				1				1					1													1
	0.010	c				1									1													1
	0.045	e	D			1	1								1													1
	0.005	c				1									1													1
	0.050	e				1				1																		1
	0.003	b				1																						1
	0.080	c	D/B			1									1	1	1											1
	0.010	d				1																						1
	0.020	c	E			1									1													1
3540	0.003	b				1									1													1
	0.020	c				1											1											1
	0.003	e				1									1													1
	0.080	c	B/D			1									1	1	1											1
	0.003	d				1																						1
	0.005	b				1									1													1
	0.010	c				1									1											1		1
	0.040	b				1									1	1												1
	0.010	c				1									1													1
	0.340	e			1																			1				1
	0.488																							1				1
3541	0.010	d	E				1								1													1
	0.010	c					1								1													1
	0.015	e			1																							1
	0.010	c	E			1	1								1	1												1
	0.540	e	D			1									1													1
	0.020	c	D				1																					1
	0.150	e	D																									1
	0.030	c	D				1								1	1	1											1

B-60

FT	THICK TY	*-PHYSICAL & BIOGENIC STRUCTURES--*													*-ACCESSORY MINERALS--*				*-----FRACTURES-----*				*-----BASAL CONTACT-----*			
		MI		PL	WV	XB	CN	LC	FL	RC	BIO	OR	PYRITE-----				SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND
		NOR	MA										DIS	CON	LAM	REP										
	0.025 b				1							1	1											1		
	0.010 c			1	1							1												1		
	0.005 b			1	1							1												1		
	0.050 c	E		1								1								1				1		
	0.075 e		1			1										1								1		
3542	0.200 e		1			1		1								1								1		
	0.035 b	E/C		1								1												1		
	0.010 c			1								1	1	1										1		
	0.020 e					1					1	1	1	1										1		
	0.070 b	E		1							1	1	1	1										1		
	0.010 c			1								1	1	1										1		
	0.125 e	D				1													1					1		
	0.003 b			1								1									1			1		
	0.003 c			1								1	1									1		1		
	0.040 d	E		1								1	1								1			1		
	0.010 b			1								1												1		
	0.010 c			1								1	1	1										1		
	0.003 d			1								1	1	1										1		
	0.020 e					1														1				1		
	0.040 b			1								1												1		
	0.055 d			1								1	1											1		
	0.180 b	D/E		1								1									1			1		
	0.050 d	E	1	1								1	1								1			1		
	0.050 e	D/B	1									1	1	1							1			1		
3543	0.030 e	D				1						1	1	1							1			1		
	0.130 e	D				1						1	1	1							1			1		
	0.040 b			1								1												1		
	0.055 d			1								1	1											1		
	0.005 b			1								1								1				1		
	0.040 d		1									1	1								1			1		
	0.010 c			1								1									1			1		
	0.018 d			1								1									1			1		
	0.003 b		1									1	1								1			1		
	0.060 d			1	1							1	1	1							1			1		
	0.050 b			1								1									1			1		
	0.010 c	E		1	1							1	1	1							1			1		
	0.025 e	D	1	1				1				1	1								1			1		
	0.025 b			1								1									1			1		
	0.045 e	C				1							1								1			1		
	0.080 c	E		1				1				1								1				1		
	0.070 e					1		1				1									1			1		
	0.020 d			1								1									1			1		
	0.010 e	E		1								1									1			1		
	0.040 d			1								1									1			1		
	0.005 b			1								1									1			1		
	0.015 c			1								1									1			1		
	0.090 e	D		1								1	1	1							1			1		
	0.015 c	D		1								1									1			1		
	0.025 b	D		1								1	1							1				1		
	0.010 c			1								1		1							1			1		
	0.010 b			1								1									1			1		
	0.025 c			1								1	1	1	1						1			1		

FT	THICK TY	**PHYSICAL & BIOGENIC STRUCTURES--*																**ACCESSORY MINERALS--*		*-----FRACTURES-----*				*-----BASAL CONTACT-----*						
		MI		PL	WV	XB	CN	LC	FL	RC	BIO	OR	PYRITE-----		DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND
		NOR	MA										DIS	CON																
	0.003 b			1									1															1		
	0.015 c			1									1														1			
	0.045 d			1									1														1			
3544	0.040 d			1									1														1			
	0.010 e	D		1									1														1			
	0.055 b	D		1									1		1												1	1		
	0.035 c			1									1		1												1			
	0.055 b	D		1									1		1												1			
	0.005 c			1									1														1			
	0.005 d			1									1											1			1			
	0.085 e	D	1					1					1										1				1			
	0.025 d		1	1									1														1			
	0.003 b		1										1														1			
	0.040 c			1									1														1			
	0.003 e			1			1						1														1			
	0.010 b			1		1							1														1			
	0.040 d	E	1									1		1	1												1			
	0.020 c			1		1							1														1			
	0.005 b			1									1														1			
	0.110 d	E/B		1								1		1	1	1											1			
	0.030 c			1								1		1	1	1											1			
	0.020 b	C		1		1		1		1		1		1													1			
	0.080 e	D		1		1		1	1	1		1		1													1			
	0.035 b			1		1						1															1		1	
	0.035 c			1									1											1						
	0.040 d			1									1														1			
	0.040 b	E		1									1		1												1		1	
	0.050 d	E		1									1														1		1	
3545	0.030 b			1									1														1		1	
	0.020 c			1									1		1	1									1				1	
	0.005 d			1									1		1	1											1		1	
	0.003 e			1									1														1		1	
	0.030 b	E		1									1														1		1	
	0.020 c			1									1		1	1											1		1	
	0.010 d			1		1							1		1												1		1	
	0.205 b	E		1		1						1		1	1	1											1		1	
	0.005 c			1									1		1	1											1		1	
	0.020 b			1		1							1														1		1	
	0.020 c			1									1		1											1			1	
	0.030 d			1									1		1										1				1	
	0.150 e	D	1	1									1														1		1	
	0.065 b	E/C		1									1														1		1	
	0.080 d		1										1														1		1	
	0.035 b	E		1									1														1		1	
	0.005 c			1									1		1	1											1		1	
	0.035 b			1									1														1		1	
	0.015 c			1									1		1	1											1		1	
	0.005 e			1		1							1														1		1	
	0.050 b			1									1		1	1											1		1	
	0.010 c			1									1		1												1		1	
	0.020 b			1									1		1	1											1		1	
	0.015 c			1									1		1	1											1		1	

-PHYSICAL & BIOGENIC STRUCTURES--- *-ACCESSORY MINERALS---* *----FRACTURES-----* *----BASAL CONTACT-----*

FT	THICK TY	MI		*-----FRACTURES-----*											*----BASAL CONTACT-----*													
		NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND
	0.005 b			1								1	1										1		1			
	0.005 c			1								1		1										1		1		
	0.090 d			1								1												1		1		
	0.025 b	E		1	1							1											1		1			
	0.005 c			1	1							1		1										1		1		
3546	0.030 e		1				1										1					1						
	0.220 e		1				1										1					1						
	0.080 b			1	1						1	1	1										1		1			
	0.080 c	D		1								1											1					
	0.010 d			1																				1		1		
	0.070 b	D		1	1						1	1											1		1			
	0.040 c			1							1	1												1		1		
	0.010 d			1					1		1													1		1		
	0.005 b			1	1			1			1													1		1		
	0.060 c			1								1												1				
	0.025 d			1								1												1		1		
	0.025 b			1								1												1		1		
	0.030 c	D/E		1								1												1		1		
	0.080 d		1	1							1	1												1		1		
	0.090 b	C/D/E		1		1		1			1	1												1		1		
	0.100 e	D	1				1	1																1		1		
	0.003 b			1								1												1		1		
	0.035 c			1								1											1			1		
	0.010 d			1					1	1														1		1		
	0.015 b			1								1												1		1		
	0.013 c			1								1												1		1		
3547	0.013 d			1								1												1		1		
	0.015 c	B		1				1				1											1					
	0.015 d			1	1			1				1														1		
	0.190 b	D/C		1	1						1	1														1		
	0.003 d			1					1															1		1		
	0.050 b			1	1						1	1												1		1		
	0.015 c			1								1												1		1		
	0.040 b			1								1			1									1		1		
	0.040 d			1								1												1		1		
	0.060 b			1								1			1								1		1		1	
	0.010 c			1								1												1		1		
	0.010 b			1								1												1		1		
	0.010 c			1								1												1		1		
	0.020 d	E	1					1	1			1	1											1		1		
	0.003 b			1	1							1	1		1	1	1							1		1		
	0.020 c	D		1	1						1	1		1	1	1								1		1		
	0.003 d			1	1							1												1		1		
	0.003 e			1	1							1												1		1		
	0.020 c	D	1								1	1		1										1		1		
	0.035 d			1				1																1		1		
	0.110 e		1	1														1						1		1		
	0.010 b			1	1							1	1											1		1		
	0.020 d			1								1							1			1		1		1		
	0.020 e		1	1								1												1		1		
	0.035 b			1								1	1											1		1		
	0.010 c			1								1												1		1		

-PHYSICAL & BIOGENIC STRUCTURES--- *-ACCESSORY MINERALS---* *---FRACTURES---* *---BASAL CONTACT---*

FT	THICK TY	MI	PYRITE-----																										
			NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND
	0.015 d	E			1	1			1				1		1														1
	0.053 c				1								1																1
	0.090 b	D			1								1													1		1	
3548	0.050 B				1								1	1											1			1	
	0.010 C				1								1	1	1										1				
	0.035 D				1																						1		
	0.010 B				1									1		1												1	
	0.015 C			1	1									1	1	1										1			
	0.010 D				1									1													1		
	0.020 E			1																			1						
	0.030 B				1									1	1									1				1	
	0.015 C				1					1				1	1	1									1				
	0.015 D				1					1				1												1		1	
	0.040 B				1									1		1												1	
	0.100 C	D			1									1	1	1											1		
	0.050 B	D			1									1													1		
	0.080 C	D		1	1								1	1	1	1				1	1						1		
	0.140 B	C			1									1	1	1											1		
	0.010 C			1	1									1										1					
	0.050 B				1									1														1	
	0.035 C				1										1	1									1				
	0.010 D			1						1																1		1	
	0.125 B				1									1											1			1	
	0.005 C				1					1				1											1		1	1	
	0.030 D				1										1	1									1				
	0.035 E			1						1													1				1		
	0.005 B				1					1				1										1					
	0.060 C			1	1									1	1	1									1				
3549	0.040 D	E								1				1	1	1									1				
	0.040 E									1				1	1	1										1		1	
	0.290 B	C			1									1	1	1									1				
	0.010 C			1										1	1	1									1				
	0.020 D													1	1	1										1			
	0.090 B	D			1									1	1	1										1		1	
	0.005 C				1									1												1			
	0.005 D				1									1	1											1			
	0.010 B				1									1	1											1		1	
	0.065 D	C/B			1									1	1	1	1	1						1	1				
	0.030 E			1											1										1				
	0.040 E				1										1										1			1	
	0.365 E													1											1				
	0.003 C				1																					1			
	0.010 E			1																						1	1	1	
3550	0.200 E			1						1																1	1	1	
	0.030 C			1										1												1			
	0.050 D			1										1												1			
	0.190 E													1	1											1			
	0.040 B				1									1	1										1			1	
	0.080 D				1									1	1										1				
	0.010 C				1									1	1										1				
	0.080 D	BE			1					1				1	1										1		1	1	
	0.020 B				1									1	1										1				

B-64

FT	THICK TY	*-PHYSICAL & BIOGENIC STRUCTURES--*											*-ACCESSORY MINERALS--*				*-----FRACTURES-----*				*-----BASAL CONTACT-----*							
		MI		PL	WV	XB	CN	LC	FL	RC	BIO	OR	PYRITE-----		DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR
	0.010 C			1									1												1		1	
	0.010 E			1	1			1																			1	1
	0.010 B			1							1	1	1												1		1	
	0.040 D			1	1						1	1		1											1			
	0.025 C			1	1								1														1	
	0.003 E			1									1														1	
	0.045 B	D		1								1	1	1											1			
	0.005 C			1								1																1
	0.050 D			1		1					1	1															1	1
	0.005 C					1						1															1	
	0.035 D			1							1	1							1			1					1	1
	0.020 E				1	1					1								1			1		1				
3551	0.020 C				1							1													1			
	0.005 D				1							1														1		
	0.015 B				1							1														1		
	0.040 C				1							1															1	
	0.050 E						1		1	1									1			1	1				1	1
	0.010 B				1							1								1					1			
	0.105 C	B			1	1						1			1											1		
	0.015 D			1															1				1				1	
	0.110 E			1					1	1									1								1	
	0.030 B	D			1							1												1				
	0.190 D	C			1	1						1			1										1			
	0.050 C	E		1	1							1							1			1				1		
	0.050 E						1												1			1					1	
	0.005 C				1							1															1	
	0.005 D				1							1															1	
	0.005 E				1							1															1	
3552	0.150 B	C			1							1		1														
	0.100 B	C			1							1		1											1			
	0.020 C			1	1							1															1	
	0.015 B				1							1		1											1			
	0.120 C	B			1				1			1		1	1									1				
	0.055 C			1	1							1															1	
	0.025 B				1							1													1			
	0.035 C			1	1							1													1			
	0.120 D	E		1	1							1							1		1						1	
	0.020 B				1							1													1			
	0.035 C			1	1							1															1	
	0.003 D				1							1															1	
	0.030 B				1							1		1											1			
	0.040 C	D			1							1														1		
	0.050 B				1							1															1	
	0.050 C	D		1	1							1												1				
	0.005 B				1							1			1											1		
	0.015 C	D			1							1															1	
	0.050 B	C			1							1		1	1										1			
	0.030 C			1	1							1													1			
	0.055 B	C			1							1			1												1	
3553	0.040 B	C			1							1			1										1			
	0.800 E			1						1									1	1	1	1	1		1			
	0.080 B	C			1							1		1	1										1			

B-66

FT	THICK	TY	MI	*-PHYSICAL & BIOGENIC STRUCTURES--*										*-ACCESSORY MINERALS--*		*-----FRACTURES-----*					*-----BASAL CONTACT-----*								
				NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
3554	0.020	B	C			1									1	1	1								1				
	0.020	C				1									1	1	1							1					
	0.130	B	C			1									1	1	1							1					
	0.050	C	B			1									1	1	1									1			
	0.140	B	C			1									1	1	1								1				
	0.050	C			1	1																				1			
	0.025	B				1									1	1									1				
	0.050	C	DE		1	1									1										1				
	0.010	D					1				1														1				
	0.015	E					1				1														1				
	0.045	D			1	1									1										1				
	0.045	E			1	1									1										1				
	0.010	B				1									1		1							1					
	0.035	C	D			1									1										1				
	0.035	B	C			1									1	1	1								1				
	0.055	C			1	1									1										1				
	0.050	E	D								1				1											1			
	0.050	C			1																					1			
	0.120	E	C								1	1												1					
	0.025	B	CE									1	1			1									1				
3555	0.060	C	B		1	1									1	1	1								1				
	0.070	B				1									1		1								1				
	0.035	C				1									1										1				
	0.045	B				1									1										1				
	0.250	E			1																			1					
	0.330	B	C			1	1								1	1	1										1		
	0.060	C	ED		1	1									1											1			
	0.005	E				1									1											1			
	0.040	B				1									1	1	1								1				
	0.015	C	D		1	1									1											1			
	0.003	D			1	1									1											1			
	0.020	B				1									1		1								1				
	0.015	C				1									1	1	1									1			
3556	0.265	E	C			1	1								1	1	1							1					
	0.045	C				1									1										1				
	0.420	D	EC												1	1											1		
	0.020	C				1									1											1			
	0.050	C	ED			1	1								1	1										1			
	0.020	E				1									1											1			
	0.030	C				1									1											1			
	0.020	E				1	1																			1			
3557	0.020	E				1	1																			1			
	0.280	C	DE			1	1								1	1										1			
	0.275	D	CE												1	1										1			
	0.150	E	D												1											1		1	
	0.060	C			1	1									1	1										1			
	0.050	D	E			1									1											1		1	
	0.020	C			1	1									1	1										1			
	0.035	D	E			1									1	1										1		1	
	0.080	C	DE			1	1								1	1										1			
	0.050	E																								1			
3558	0.080	E																									1		

FT	THICK TY	MI	**PHYSICAL & BIOGENIC STRUCTURES**											**ACCESSORY MINERALS**				**FRACTURES**				**BASAL CONTACT**							
			NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND
	0.003 D			1													1										1		
	0.170 C	DE			1						1	1					1									1		1	
	0.070 E				1												1												
	0.020 C			1							1	1	1										1				1	1	
	0.090 E							1		1							1								1		1		
	0.010 C				1	1						1											1						
	0.100 D	CE							1			1	1	1			1							1		1			
	0.070 C	D									1						1									1			
	0.100 D	E		1							1	1					1									1	1		
	0.040 C	D			1							1											1						
	0.090 D	E									1	1					1									1	1		
	0.085 C			1	1																								
	0.045 E	D									1						1	1		1			1						
3559	0.020 E	D									1						1	1		1			1						
	0.010 C				1							1													1				
	0.040 D								1	1	1																1	1	
	0.040 B	D									1	1		1		1								1		1			
	0.050 C	D										1	1	1	1										1		1		
	0.025 B											1													1		1		
	0.040 C											1	1	1		1										1			
	0.025 D	E									1						1									1			
	0.020 E			1													1									1	1		
	0.050 C				1							1						1			1					1			
	0.065 B	D										1		1												1	1		
	0.065 C								1	1			1	1												1			
	0.035 B											1														1			
	0.120 D	BC				1						1	1	1	1											1			
	0.010 C											1													1				
	0.035 D											1														1			
	0.025 E			1														1								1			
	0.010 B				1							1		1	1											1			
	0.050 D											1														1			
	0.020 C											1														1			
	0.025 D	E							1																	1			
	0.030 B											1			1											1		1	
	0.015 C	B										1				1							1				1		
	0.003 B											1				1								1					
	0.090 D	BE				1	1					1	1				1									1			
	0.030 C	D				1	1		1	1			1													1			
	0.015 B			1								1	1														1		
3560	0.455 D	EC			1	1			1			1	1	1			1	1		1						1			
	0.050 C				1	1						1	1													1			
	0.070 D	C				1						1	1	1												1			
	0.020 E			1																						1			
	0.140 D	C			1	1						1	1												1				
	0.050 E			1							1	1	1				1									1			
	0.135 C	B			1							1	1	1	1										1		1		
	0.035 E			1																						1			
	0.020 C	B				1							1													1			
3561	0.040 C	B				1							1													1			
	0.060 B																										1		
	0.060 C																												

B-67

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *-FRACTURES--* *-BASAL CONTACT--*
 PYRITE-----

FT	THICK TY	MI										PYRITE-----					FRACTURES--					BASAL CONTACT--					
		NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.060	D																									
	0.060	E																									
	0.080	E			1												1								1		
	0.010	C				1								1									1				
	0.140	E												1										1			
	0.010	B			1									1											1		
	0.075	E			1		1		1					1												1	
	0.035	C				1																		1			
	0.050	D	E		1									1												1	
	0.060	B				1																				1	
	0.045	C	D			1								1												1	
	0.010	E			1																					1	
	0.060	D	C			1								1											1		
	0.060	E			1									1													
	0.010	C				1																				1	
	0.020	E			1						1			1												1	
	0.020	C			1									1												1	
	0.120	E	CD			1								1											1		
3562	0.070	B	D			1								1											1		
	0.040	C	D			1								1												1	
	0.020	E					1																			1	
	0.010	D				1																				1	
	0.005	B				1																				1	
	0.035	C			1																					1	
	0.005	B				1																				1	
	0.005	D				1																				1	
	0.150	C	B			1																				1	
	0.010	B				1								1												1	
	0.010	C	D			1																				1	
	0.003	D				1																				1	
	0.020	B	D			1								1												1	
	0.025	C				1																				1	
	0.005	B				1																				1	
	0.050	C				1																				1	
	0.025	B	D			1								1												1	
	0.100	E			1									1												1	
	0.030	B	D			1																				1	
	0.030	C	D			1																				1	
	0.003	D			1																					1	
	0.010	E				1																				1	
	0.025	B	D			1																				1	
	0.015	C				1																				1	
	0.010	D				1																				1	
	0.015	C				1																				1	
	0.015	E	D				1																			1	
	0.020	C				1																				1	
3563	0.020	C				1																				1	
	0.010	D				1																				1	
	0.020	E			1																					1	
	0.015	B	D			1								1												1	
	0.005	C				1																				1	

B-68

FT	THICK	TY	*-PHYSICAL & BIOGENIC STRUCTURES--*											*-ACCESSORY MINERALS--*				*----FRACTURES-----*				*----BASAL CONTACT-----*						
			MI NOR	MA	PL	VV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.060	D			1							1	1					1		1						1		
	0.150	E	BC	1								1	1	1	1			1							1			
	0.120	E			1							1						1							1			
	0.030	C	D		1				1			1	1	1											1			
	0.030	B			1							1	1	1	1										1			
	0.060	C			1							1	1	1	1										1			
	0.110	B	D		1							1													1			
	0.015	C			1	1						1	1	1	1										1			1
	0.050	E					1		1				1	1				1							1			
	0.040	B			1							1	1												1		1	
	0.030	C	D		1							1													1			
	0.003	D			1							1													1			
	0.010	E			1													1					1					
	0.030	C	B		1																					1		
	0.020	E					1																		1			
	0.003	B			1							1	1	1											1			
	0.030	C	B		1							1	1	1											1			
	0.080	B	CD		1							1	1	1	1									1		1		
3564	0.090	B	CD		1							1	1											1		1		
	0.060	C			1	1						1													1			1
	0.020	E					1		1																1			
	0.035	B			1							1	1	1											1		1	
	0.020	C			1							1	1	1											1		1	
	0.030	E		1																			1					
	0.045	B			1							1													1		1	
	0.010	C			1				1	1		1	1	1				1							1		1	
	0.003	D			1							1	1	1	1										1			
	0.020	B			1							1	1	1	1										1			
	0.030	D			1			1	1			1	1	1				1							1			
	0.005	B			1							1	1												1			
	0.070	C			1							1													1			
	0.065	D	E		1	1													1						1			
	0.003	E			1	1																			1			
	0.040	B			1							1													1			
	0.050	D	E		1	1			1	1		1					1								1			
	0.003	E			1	1			1	1		1					1								1			
	0.040	B			1							1													1			1
	0.020	C			1							1												1				
	0.030	B			1							1													1			
	0.090	C	D		1							1													1			
	0.005	D			1							1													1			
	0.015	B			1							1	1	1											1		1	
	0.090	C			1							1													1			
	0.025	B	D		1							1	1	1											1			1
	0.055	C	D		1	1			1			1													1			
	0.005	D			1	1			1			1													1			
3565	0.020	C			1							1													1			
	0.025	D			1							1													1			
	0.020	B			1							1	1	1										1				
	0.035	C			1							1												1				
	0.020	D	E		1	1			1			1							1			1			1			
	0.015	C			1				1			1		1											1			

FT	THICK TY	MI	*-PHYSICAL & BIOGENIC STRUCTURES--*											*-ACCESSORY MINERALS--*			*-----FRACTURES-----*					*-----BASAL CONTACT-----*						
			NOR	MA	PL	VW	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.015	E	D			1			1																			1
	0.015	C				1		1										1										1
	0.035	E							1								1											1
	0.040	E	D			1										1												1
	0.010	B				1										1												1
	0.015	C				1										1												1
	0.005	D				1																				1		1
	0.015	E				1										1												1
	0.005	B				1										1												1
	0.035	C	B			1																						1
	0.010	D				1										1												1
	0.005	B				1										1												1
	0.120	C	B			1																						1
	0.010	E				1																						1
	0.025	B	D			1										1												1
	0.065	C	D			1																						1
	0.080	B	CD			1										1												1
	0.003	C				1										1												1
	0.035	D	CE			1										1												1
	0.003	E				1										1												1
	0.020	C	D			1										1												1
	0.010	B				1										1												1
	0.020	C	D			1										1												1
	0.040	B	CD			1										1												1
	0.005	C				1										1												1
	0.100	E				1																						1
3566	0.190	E				1																						1
	0.010	B				1										1												1
	0.005	D				1										1												1
	0.035	B				1										1												1
	0.020	C				1										1												1
	0.190	E	D			1										1												1
	0.015	B	D			1										1												1
	0.060	E	D			1										1												1
	0.095	B	D			1										1												1
	0.035	C	DE			1										1												1
	0.020	B				1										1												1
	0.040	C				1										1												1
	0.005	B				1										1												1
	0.055	C	D			1										1												1
	0.003	D				1										1												1
	0.030	B	D			1										1												1
	0.110	C	D			1										1												1
	0.010	D	E			1										1												1
	0.025	B	D			1										1												1
3567	0.140	B	D			1										1												1
	0.060	C				1										1												1
	0.010	D				1										1												1
	0.030	B				1										1												1
	0.030	C				1										1												1
	0.020	E				1										1												1
	0.040	C				1										1												1

B-70

-PHYSICAL & BIOGENIC STRUCTURES-- *-ACCESSORY MINERALS--* *-----FRACTURES-----* *-----BASAL CONTACT-----*

FT	THICK TY	MI	PYRITE-----*											-----*															
			NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO	UND
	0.080 E				1			1																					1
	0.015 C				1	1	1						1																1
	0.020 E			1						1																			1
	0.035 B	D			1	1						1	1							1		1						1	
	0.015 C	D			1	1									1													1	
	0.060 E							1															1					1	
	0.025 C				1								1															1	
	0.120 E			1				1		1																		1	
	0.190 B	D			1							1	1												1			1	
	0.050 C	D			1					1															1			1	
	0.003 D				1								1	1														1	
	0.040 B				1								1	1														1	
3568	0.025 E			1	1					1			1	1														1	
	0.025 B	C			1								1															1	
	0.080 E			1				1		1																		1	
	0.220 B	CD			1								1	1	1													1	
	0.010 C				1								1	1	1													1	
	0.030 D				1																							1	
	0.060 E				1					1																		1	
	0.090 B	CD			1								1	1	1	1												1	
	0.020 C			1	1									1	1	1												1	
	0.010 B				1									1	1	1												1	
	0.035 C				1									1	1	1												1	
	0.020 E			1																								1	
	0.010 B				1									1														1	
	0.050 C			1	1									1	1	1												1	
	0.050 E							1		1																		1	
	0.030 B				1									1	1	1												1	
	0.025 C				1									1	1	1												1	
	0.010 B				1									1	1	1												1	
	0.060 C				1									1	1	1												1	
	0.040 B				1									1	1	1												1	
	0.015 C	D			1					1				1	1	1	1											1	
	0.003 D				1									1	1	1	1											1	
3569	0.070 B	D			1									1	1	1	1											1	
	0.110 B	D			1									1	1	1	1											1	
	0.025 C				1									1	1	1	1											1	
	0.030 E							1																				1	
	0.050 D	B			1	1								1	1	1												1	
	0.130 E							1																				1	
	0.045 D			1	1									1	1	1												1	
	0.030 B				1									1	1	1												1	
	0.035 C				1									1	1	1												1	
	0.010 B				1									1	1	1												1	
	0.035 C				1									1	1	1												1	
	0.005 E			1	1																							1	
	0.060 C	D			1					1																		1	
	0.015 E			1																								1	
	0.075 B	CD			1									1	1	1												1	
	0.010 C	D			1					1	1			1	1	1												1	
	0.003 D				1					1	1			1	1	1												1	
	0.005 B	D			1									1	1	1												1	

B-71

-PHYSICAL & BIOGENIC STRUCTURES- *-ACCESSORY MINERALS-* *----FRACTURES-----* *-----BASAL CONTACT-----*

FT	THICK TY	MI	*-PHYSICAL & BIOGENIC STRUCTURES-*										*-ACCESSORY MINERALS-*			*----FRACTURES-----*					*-----BASAL CONTACT-----*							
			NOR	MA	PL	WV	XB	CN	LC	FL	RC	BIO	OR	DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.085	C			1							1														1		
	0.010	B			1							1	1	1										1		1		
	0.050	C			1							1		1											1		1	
	0.015	B			1							1	1	1										1		1		
	0.020	C	D		1				1	1		1		1											1		1	
	0.010	B			1							1	1	1											1		1	
	0.030	C	BD		1				1	1		1		1											1		1	
	0.010	B			1							1		1											1		1	
	0.060	C	D		1							1		1			1							1		1		
3570	0.080	E			1							1		1										1		1		
	0.100	D	E		1			1	1			1		1			1						1		1		1	
	0.010	B			1							1		1			1					1		1		1		
	0.030	E			1			1				1		1									1		1		1	
	0.100	B	CD		1	1						1	1	1									1		1		1	
	0.015	C			1							1		1										1		1		
	0.035	B	D		1							1		1										1		1		1
	0.015	C			1							1		1										1		1		
	0.420	E	C		1			1				1		1			1						1		1		1	
	0.003	B			1	1						1		1									1		1		1	
	0.015	C			1	1						1		1									1		1		1	
	0.015	B			1	1						1		1									1		1		1	
	0.010	C			1			1				1		1									1		1		1	
	0.040	E			1	1						1		1									1		1		1	
	0.040	B			1							1		1									1		1		1	
3571	0.030	C			1							1		1								1		1		1		
	0.025	B			1							1		1									1		1		1	
	0.020	C	D		1							1	1	1									1		1		1	
	0.015	B			1							1	1	1									1		1		1	
	0.060	C			1							1		1									1		1		1	
	0.080	B	D		1							1		1									1		1		1	
	0.050	C	D		1				1	1		1	1	1									1		1		1	
	0.003	D			1							1		1									1		1		1	
	0.080	B	D		1							1		1									1		1		1	
	0.020	C	D		1				1	1		1	1	1									1		1		1	
	0.040	B			1							1	1	1									1		1		1	
	0.010	C			1							1	1	1									1		1		1	
	0.025	D	C		1							1		1									1		1		1	
	0.010	B			1							1		1								1		1		1		
	0.015	C			1							1	1	1									1		1		1	
	0.020	D			1				1			1		1					1				1		1		1	
	0.030	B	D		1							1		1									1		1		1	
	0.020	C			1							1		1									1		1		1	
	0.135	D			1				1			1		1								1		1		1		
	0.030	C	D		1							1	1	1									1		1		1	
	0.005	D			1							1		1									1		1		1	
	0.020	B			1							1		1									1		1		1	
	0.015	C			1							1	1	1									1		1		1	
	0.015	D			1							1		1								1		1		1		
	0.015	C			1	1						1	1	1									1		1		1	
	0.040	B			1							1	1	1									1		1		1	
	0.020	D			1	1						1	1	1									1		1		1	
	0.060	B	D		1				1			1	1	1									1		1		1	

FT	THICK TY	*-PHYSICAL & BIOGENIC STRUCTURES--*										*-ACCESSORY MINERALS--*		*----FRACTURES-----*					*----BASAL CONTACT-----*										
		MI		PL	WV	XB	CN	LC	FL	RC	BIO	OR	PYRITE-----		DIS	CON	LAM	REP	CAL	OP	SEA	OBL	VER	OTH	MIS	GRD	SHP	IRR	ERO
	0.005 C											1	1	1											1				
	0.040 B	D										1												1					
3572	0.030 C											1															1		
	0.035 D			1														1									1		
	0.015 B											1		1														1	
	0.035 C	D										1												1					
	0.130 D			1		1						1												1					

APPENDIX C

Dye Penetrant Procedure

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Dye Penetrant Procedure

Dye penetrant treatment of the CSW2 core was done with a Spotcheck SK-3 kit, manufactured by MAGNAFLUX Corporation of Chicago, Illinois. The method was originally developed for the detection of porosity and cracks in manufactured articles composed of metals, alloys, certain plastics, and ceramics. An adaptation to the detection of fractures in shales in conjunction with isotherm studies had been made available to K&A Energy Consultants by Rick Parmely of Juniata College. Trial and error experimentation on core segments was used to develop an effective technique for fracture detection in the CSW2 core. The technique used was as follows:

1. The slabbed surface was cleaned by water washing and wiping dry. The SK-3 solvent was adsorbed so rapidly as to be ineffective. The surface was not ground smooth as experimentation showed that saw marks were easily distinguished from fractures during interpretation.
2. A one-foot section of the core was photographed, in a standard format with a specific depth marker, at a designated photographic station.
3. SK-3 dye penetrant was applied to the surface by brushing on a thin uniform coat, and was allowed to remain on the surface for one minute. The application of the SK-3 chemicals was done in a dedicated fume hood, with personnel protected by gloves and charcoal adsorbent respirators.
4. SK-3 dye penetrant remaining on the surface after one minute was removed by wiping the surface clean.
5. SK-3 developer was sprayed on the surface to form a uniform coat thick enough to have an even white coloration. The core segment was moved immediately to the photographic station.
6. Within a few seconds, the larger cracks showed up as vivid red traces in the white developer. Over the time period of a few seconds to a few minutes finer cracks showed up, as the traces of larger cracks were blurred by the continued mixing of dye and developer. The picture was taken at a compromise time after the final appearance of most of the finer cracks, and before excessive blurring out of the larger cracks.
7. Excess dried developer was brushed off the surface of the core segment.

8. The core segment was processed in an extractor unit where it was treated with chloroethene for a four- to eight-hour period, to remove the bulk of adsorbed dye penetrant and developer from the rock. Without this final step it was found that the core remained so contaminated with SK-3 dye penetrant and developer that it could neither be stored routinely nor be effectively used for further description, but had to be kept in a well ventilated area dedicated to the storage of volatile and toxic solvents.