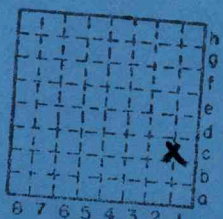
Freeman Coal Mining Corp. Orient # 4

Freeman United Coal Mining Company Orient # 4

HERRIN

FREEMAN UNITED COAL MNG. CO.
ORIENT # 4

Mine Index No. 688
County No. 1671
Coal Report No. S-99



WILLIAMSON COUNTY

Coal Slope 750' S, 650' W
of NE cor. NE¼ SE¼, Sect. 28

Company No.

Farm No.

Elev. of by Total depth Year drilled

For Method

K

R

FREEMAN UNITED, JOPPA ENERGY DISPUTE CLOSES ORIENT 4 MINE

Operations have been suspended indefinitely at Freeman United Coal Co.'s Orient No. 4 mine near Marion IL in the wake of a sharp cutback by the mine's primary customer, the Joppa Electric Energy plant. The coal company also reduced the work force at the Crown II mine near Virden IL, blaming a soft coal market for that work force reduction.

Freeman held a contract to supply Joppa with 700,000 tons of Orient No. 4 mine coal which should have run through Dec. 31, 1989. According to George Rice, president of Joppa, the contract with Freeman called for a maximum delivery of 700,000 tons annually through 1989. But the utility's major industrial customer cut back power purchases, prompting Joppa to make a corresponding cut in coal purchases.

Another official at Joppa said the utility had become unhappy with coal prices. "We cancelled the contract because of costs," he said. The utility and coal company entered into a negotiated settlement which ended the contract, Rice explained.

Joppa will go to the spot market sometime this summer, Rice indicated. "We've had some good offers," he said, although there has been no final decison on a new supplier or the amount to be purchased.

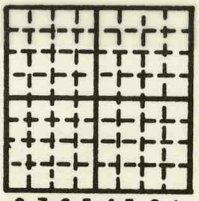
May 25, 1987 • COAL WEEK

Lo

Correlations by Date

Basis

County Co. no.



Sec.

T. N. S.

R. E. W.

Data sheet by Date

John C. Moore Corporation, Rochester, N.Y. 14604
MOORE'S MODERN METHODS
FORM 180 W

Preparation plant at old portal of Orient No. 4 Mine, looking north. Photo by John Nelson, March 24, 1981.

Mine originally operated by: (1) FREEMAN COAL MINING CORP.

Date
1952

Original name or number: 4
Illinois Coal Report 1952 p.

LATER OPERATORS

	Date	Operator	Name or No.
2	1965	Freeman Coal Mining Corp.	#4
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13	loc: 750' S., 650' W., NE/c NE SE		
14	-OLR June, 1957 from Mr. Aiken, Co. Engr.		

*Also owners #See ownership sheet

Railroad, Wagon, Strip, Idle, Abandoned

IDENTIFICATION

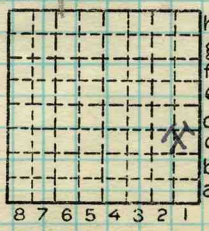
County No. 1641

Coal Report No. 5-99

Quad.

County Williamson

Coal No. 6



Sec. 28

T. 8 S.

R. 3 E.

Index No. C1

COAL MINE OPERATOR

(68020—1500—11-38) 2

(Sheets) COAL PRODUCTION (Sheet)

Period Mo.	Day	Year	Mo.	Day	Year	Tons			
					1952			147	697
					53			653	112
					1954			530	578
					1955			969	123
					1956		1	255	051
					1957		1	220	034
					1958		1	189	907
					1959		1	269	773
					1960		1	349	233
					1961		1	345	585
					1962		1	108	363
					1963		1	092	180
					1964		1	080	813
					1965		1	095	587
					1966		1	112	600
					1967		1	385	606
					1968			957	155
					1969		1	136	403
					1970		1	135	089
					1971		1	075	913
					1972		1	092	060
					1973		1	254	290
					1974			962	359

SUMMARIES

No.		to	No.			
1952 thru 1974				24	318	501

Railroad, Wagon, Strip, Idle, Abandoned

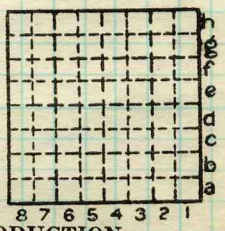
IDENTIFICATION

County No. 191 Coal No. ☐

Coal Report No. S-99

Quad.

County Williamson



Sec. 28

T. 8 S.

R. 3 E. W.

Index No. C1

COAL MINE—PRODUCTION

ILLINOIS GEOLOGICAL SURVEY, URBANA

(2732—2M—7-41)

MOORE'S MODERN METHODS

FREEMAN ORIENT NO. 4

(Sheets) COAL PRODUCTION (Sheet)

Period Mo. Day Year	Period Mo. Day Year	Tons
	1975	867 469
	1976	729 285
	1977	842 707
	1978	745 267
	1979	897 337
	1980	874 771
	1981	774 385
FREEMAN UNITED C.M.C.	1982	1 073 723
	1983	1 101 646
ORIENT NO. 4	1984	1 087 916
	1985	1 092 821
	1986	944 867
Last year of operation →	1987	352 038
	1988	idle
	1989	

SUMMARIES

No. to No.

Railroad, Wagon, Strip, Idle, Abandoned

IDENTIFICATION

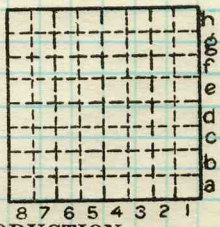
County No. Coal No.

Coal Report No. ☐

Quad.

County

Sec. 28



T. 8 N. S.

R. 3 E. W.

Index No.

COAL MINE—PRODUCTION

ILLINOIS GEOLOGICAL SURVEY, URBANA

(2732—2M—7-41)

ILLINOIS GEOLOGICAL SURVEY, URBANA

CONFIDENTIAL

Strata		Thickness	Top	Bottom
	9/17/59			
Channel Sample #1				
#6 Coal, Freeman #4 Mine				
Sample cut by a Jeffery Cutting Machine.				
Total thickness of coal = 75"				
Roof - Gray shale				
From Top				
Bright, clarian, vitrain 11" bands up to 1/8"	11"	0	11"	
Fusain	1/16"	11	11 1/16"	
Bright banded clarain	4"	11 1/16"	15 1/16"	
Fusain band	1/16"	15 1/16"	15 1/8"	
Clarain	12"	15 1/8"	27 1/8"	
Fusain	1/16"	27 1/8"	27 3/16"	
Clarain	4½"	27 3/16"	31 11/16"	
Fusain	1/16"	31 11/16"	31 3/4"	
Clarain	3½"	31 3/4"	35¼"	
Fusain	1/16"	35¼"	35 5/16"	
Last 2' of coal had vertical cleats with pyrite up to ¼" thick.				
Clarain	3½"	35 5/16"	38 13/16"	
Pyrite lense	1/8"	38 13/16"	38 15/16"	
Clarain	3½"	38 15/16"	42 7/16"	
Fusain	¼"	42 7/16"	42 5/8"	
Clarain	2 3/4"	42 5/8"	45 3/8"	
Duro-Clarain	¼"	45 3/8"	45 5/8"	
Clarain	3 3/4"	45 5/8"	49 3/8"	
Fusain	¼"	49 3/8"	49 5/8"	
Clarain	1½"	49 5/8"	51 1/8"	
Fusain	1/8"	51 1/8"	51¼"	

COMPANY Freeman Coal Corp.
FARM NO. 4
DATE DRILLED COUNTY NO.
AUTHORITY Harrison - Berger
ELEVATION
LOCATION 5th. W. off 30N. off Main West
COUNTY Williamson

28-8S-3E

Strata		Thickness	Top	Bottom
Dull clarain, possibly Duro-clarain.	4"	51 1/4"	55 1/4"	
Fusain	1/8"	55 1/4"	55	3/8"
Clarain	2"	55 3/8"	57	3/8"
Pyrite nodule	1 1/2"	57 3/8"	58	7/8"
Clarain	1 1/2"	58 1/8"	60	3/8"
Blue band	2 1/2"	60 3/8"	62	7/8"
Clarain	3"	62 7/8"	65	7/8"
Fusain	1/4"	65 7/8"	66	1/8"
Clarain to bottom	8 7/8"	66 1/8"	75"	
Floor-fine clay.				

ILLINOIS GEOLOGICAL SURVEY, URBANA

CONFIDENTIAL

9/17/59

Channel Sample #2
#6 Coal, Freeman #4 Mine
Sample cut with a pick
Total coal thickness 87½"

Strata		Thickness	Top	Bottom
Roof - Gray shale Bright banded clarain with a number of pyrite and calcite filled cleats, laterally the zone contains lenses of fusain and clay up to ½" occurring from 2 - 3 " intervals.	13"	0"	13"	
Pyrite band	1/16"	13"	13 1/16"	
Clarain	1½"	13 1/16"	14 9/16"	
Pyrite	1/16"	14 9/16"	14 5/8"	
Bright Clarain	6"	14 5/8"	20 5/8"	
Fusain	1/16"	20 5/8"	20 11/16"	
Clarain	½"	20 11/16"	21 3/16"	
Fusain	1/16"	21 3/16"	21¼"	
Clarain	6¼"	21¼"	27½"	
Gusain band, which laterally grades into a pyrite band.	1"	27½"	28½"	
Clarain	4 3/4"	28¼"	33¼"	
Fusain	1/8"	33¼"	33 3/8"	
Clarain	7"	33 3/8"	40 3/8"	
Fusain	¼"	40 3/8"	40 5/8"	
Clarain	1½"	40 5/8"	42 1/8"	
Fusain	1/16"	42 1/8"	42 3/16"	
Clarain	5½"	42 3/16"	47 11/16"	
Fusain	1/8"	47 11/16"	47 13/16"	

COMPANY Freeman Coal Corp.
FARM NO.
DATE DRILLED COUNTY NO.
AUTHORITY Harrison - Berger
ELEVATION
LOCATION Room 15 off 2nd. West off 30N. off Main
COUNTY West Williamson

28-8S-3E

Strata		Thickness	Top	Bottom
Clarain	2"	47 13/16"	49 13/16"	
Fusain	1/8"	49 13/16"	49 15/16"	
Clarain	3/4"	49 5/16"	50 1/16"	
Fusain	1/16"	50 7/8"	50 15/16"	
Bright clarain, at this level calcite filled cleats are present as well as pyrite filled cleats.	4"	50 15/16"	54 15/16"	
Dull coal, Duro-clarain?	3/8"	54 15/16"	55 5/16"	
Clarain	1½"	55 5/16"	56 13/16"	
Fusain	1/8"	59 7/16"	59 9/16"	
Dull Coal, Claro-Durain?	6"	59 9/16"	65 9/16"	
Clay band	1"	65 9/16"	66 9/16"	
Bright Clarain	6"	66 9/16"	72 9/16"	
Blue Band	1½"	72 9/16"	74 1/16"	
Clarain	2½"	74 1/16"	76 9/16"	
Pyrite Band	1/8"	76 9/16"	76 11/16"	
Clarain to bottom	7 5/16"	76 11/16"	84"	11/16
Bottom				
Every mineral band above ¼" was removed from the sample starting at 84½"(add following)				
Clarain	1"	84"	85"	
Fusain	1/8"	85"	85 1/8"	
Clarain	2¼"	85 1/8"	87 3/8"	
Pyrite band	1/8"	87 3/8"	87½"	

Floor - Fire Clay

ILLINOIS GEOLOGICAL SURVEY, URBANA

CONFIDENTIAL

9/17/59

Channel Sample #3
#6 Coal, Freeman #4 Mine
Sample cut with a pick
Roof Coal - 10-11"
Total thickness of coal 75 1/16" + Roof

Strata		Thickness	Top	Bottom
Clarain	1½"	0"	1½"	
Fusain	1/8"	1½"	1 5/8"	
Clarain	1¼"	1 5/8"	2 7/8"	
Fusain	1/8"	2 7/8"	3"	
Bright Clarain	4½"	3"	7½"	
Dull coal "Duro Clarain"	½"	7½"	8"	
Bright clarain, and a zone of clacite filled cleats.	5¼"	8"	13¼"	
Fusain mineralized with calcite	1"	13¼"	14¼"	
Bright clarain	12"	14¼"	26¼"	
Fusain, mineralized, laterally pyrite nodules in zone	1 3/4"	26¼"	28"	
Bright coal, probably impregnated by mineral matter.	1½"	28"	29½"	
Fusain, mineralized	½"	29½"	30"	
Bright clarain with a number of 1/16" fusain bands approximately 1½" apart.	5"	30"	35"	
Pyrite nodule zones coal taken from between nodules.	4"	35"	39"	
Bright Clarain	2½"	39"	41½"	
Fusain	1/8"	41½"	41 5/8"	

COMPANY Freeman Coal Corp.
FARM NO.
DATE DRILLED COUNTY NO.
AUTHORITY Harrison - Berger
ELEVATION
LOCATION Room 31, 5th. East off Main South
COUNTY Williamson

28-8S-3E

Strata		Thickness	Top	Bottom
Clarain	4½"	41 5/8"	46	1/8"
Fusain	1/8"	46 1/8"	46¼"	
Clarain	1¼'	46¼"	47	½"
Fusain	1/16"	47½"	47	9/16"
Clarain	6"	47 9/16"	53	9/16"
Fusain	1/16	53 9/16"	53	5/8"
Clarain	1"	53 5/8"	54	5/8"
Fusain	1/16"	54 5/8"	54	11/16"
Dull Coal, "Duro Clarain"	3"	54 11/16"	57	11/16"
Fusain	1/8"	57 11/16"	57	13/16"
Clarain	2¼"	57 13/16"	60	1/16"
Pyrite nodular zone removed from sample	1¼"	60 1/16"	61	5/16"
Clarain	1½"	61 5/16"	62	13/16"
Blue band, removed from sample	1¼"	62 13/16"	64	1/16"
Bright clarain	10"	64 1/16"	74	1/16"
Pyrite nodular zone removed from some	1"	74 1/16"	75	1/16"
Floor - Fire clay				

Williamson County 28-8S-3E

COUNTY

ILLINOIS GEOLOGICAL SURVEY, URBANA

CONFIDENTIAL

Strata		Thickness	Top	Bottom
	9/17/59			
Channel Sample #1				
#6 Coal, Freeman #4 Mine				
Sample cut by a Jeffery Cutting Machine.				
Total thickness of coal = 75"				
Roof - Gray shale				
From Top				
Bright, clarian, vitrain 11" bands up to 1/8"	11"	0	11"	
Fusain	1/16"	11	11 1/16"	
Bright banded clarain	4"	11 1/16"	15 1/16"	
Fusain band	1/16"	15 1/16"	15 1/8"	
Clarain	12"	15 1/8"	27 1/8"	
Fusain	1/16"	27 1/8"	27 3/16"	
Clarain	4½"	27 3/16"	31 11/16"	
Fusain	1/16"	31 11/16"	31 3/4"	
Clarain	3½"	31 3/4"	35¼"	
Fusain	1/16"	35¼"	35 5/16"	
Last 2' of coal had vertical cleats with pyrite up to ¼" thick.				
Clarain	3½"	35 5/16"	38 13/16"	
Pyrite lense	1/8"	38 13/16"	38 15/16"	
Clarain	3½"	38 15/16"	42 7/16"	
Fusain	¼"	42 7/16"	42 5/8"	
Clarain	2 3/4"	42 5/8"	45 3/8"	
Duro-Clarain	¼"	45 3/8"	45 5/8"	
Clarain	3 3/4"	45 5/8"	49 3/8"	
Fusain	¼"	49 3/8"	49 5/8"	
Clarain	1½"	49 5/8"	51 1/8"	
Fusain	1/8"	51 1/8"	51¼"	

COMPANY Freeman Coal Corp.

FARM NO.

DATE DRILLED COUNTY NO.

AUTHORITY Harrison - Berger

ELEVATION

LOCATION 5th. W. off 30N. off Main West

COUNTY Williamson

28-8S-3E

Strata		Thickness	Top	Bottom
Dull clarain, possibly Duro-clarain.	4"	51¼"	55¼"	
Fusain	1/8"	55¼"	55 3/8"	
Clarain	2"	55 3/8"	57 3/8"	
Pyrite nodule	1½"	57 3/8"	58 7/8"	
Clarain	1½"	58 1/8"	60 3/8"	
Blue band	2½"	60 3/8"	62 7/8"	
Clarain	3"	62 7/8"	65 7/8"	
Fusain.	¼"	65 7/8"	66 1/8"	
Clarain to bottom	8 7/8"	66 1/8"	75"	

Floor-fine clay.

ILLINOIS GEOLOGICAL SURVEY, URBANA

CONFIDENTIAL

9/17/59

Channel Sample #2
#6 Coal, Freeman #4 Mine
Sample cut with a pick
Total coal thickness 87½"

Strata		Thickness	Top	Bottom
Roof - Gray shale				
Bright banded clarain with a number of pyrite and calcite filled cleats, laterally the zone contains lenses of fusain and clay up to ½" occurring from 2 - 3 " intervals.	13"	0"	13"	
Pyrite band	1/16"	13"	13 1/16"	
Clarain	1½"	13 1/16"	14 9/16"	
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Bright Clarain	6"	14 5/8"	20 5/8"	
Fusain	1/16"	20 5/8"	20 11/16"	
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Fusain	1/8"	47 11/16"	47 13/16"	

COMPANY Freeman Coal Corp.
FARM NO.
DATE DRILLED COUNTY NO.
AUTHORITY Harrison - Berger
ELEVATION
LOCATION Room 15 off 2nd. West off 30N. off Main
COUNTY West Williamson 28-8S-3E

Strata		Thickness	Top	Bottom
Clarain	2"	47 13/16"	49 13/16"	
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Bottom				
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Clarain	1"	84"	85"	
Fusain	1/8"	85"	85 1/8"	
Clarain	2¼"	85 1/8"	87 3/8"	
Pyrite band	1/8"	87 3/8"	87½"	

Floor - Fire Clay

Williamson County 28-8S-3E

COUNTY

ILLINOIS GEOLOGICAL SURVEY, URBANA

CONFIDENTIAL

9/17/59

Channel Sample #3
#6 Coal, Freeman #4 Mine
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Roof Coal - 10-11"
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Fusain	1/8"	41½"	41 5/8"	

COMPANY Freeman Coal Corp.
FARM NO.
DATE DRILLED COUNTY NO.
AUTHORITY Harrison - Berger
ELEVATION
LOCATION Room 31, 5th. East off Main South
COUNTY Williamson

28-8S-3E

ILLINOIS GEOLOGICAL SURVEY, URBANA

Strata		Thickness	Top	Bottom
Clarain	4½"	41 5/8"	46 1/8"	
Fusain	1/8"	46 1/8"	46¼"	
Clarain	1¼'	46¼"	47 ½"	
Fusain	1/16"	47½"	47 9/16"	
Clarain	6"	47 9/16"	53 9/16"	
Fusain	1/16	53 9/16"	53 5/8"	
Clarain	1"	53 5/8"	54 5/8"	
Fusain	1/16"	54 5/8"	54 11/16"	
Dull Coal, "Duro Clarain"	3"	54 11/16"	57 11/16"	
Fusain	1/8"	57 11/16"	57 13/16"	
Clarain	2¼"	57 13/16"	60 1/16"	
Pyrite nodular zone removed from sample	1¼"	60 1/16"	61 5/16"	
Clarain	1½"	61 5/16"	62 13/16"	
Blue band, removed from sample	1¼"	62 13/16"	64 1/16"	
Bright clarain	10"	64 1/16"	74 1/16"	
Pyrite nodular zone removed from some	1"	74 1/16"	75 1/16"	
Floor - Fire clay				

Williamson County 28-8S-3E

COUNTY

Orient #4 JAN 17, 1963

WILLIAMSON Co. SIMON + GLUSICOTER

FACE CHANNEL SAMPLE

600' W of fault (reverse - strike NW-SE, dipping about 45° NE)

in Main 3rd East Entry

74" of coal

Some left at top + bottom

1" Soney coal 3'8" from top

1" Blue band 5'2" from top

Calcite + kaolinite prominant on vertical fractures.

a 1" zone 3" below Blue Band with some sulfur staining

only Blue Band excluded from coal sample.

Strata	Thickness	Top	Bottom
Freeman # 4 Mine March 22, 1963 Harrison & Gluskoter			
Sample # 1 165' IN Room 17, 29th West, 18th South 600'W, 300'N of SE cor. Sec. 34, T. 8S., R. 3E., WILLIAMSON CO. gray shale, slickensided roof underclay bottom			
		From top down	
bone coal with vitrain bands up to ¼". Shale to about ¼" and about 1/16" pyrite band		0	2"
Clarain, normally bright banded			4 3/4"
Dull coal, "durain"			5¼"
Clarain, fine banded			1'2"
Fusain, mineralized			1'3"
Clarain, normally bright banded, vertical cleats filled with calcite			1'10"
Fusain			1'10¾"
Clarain			2'1½"
Fusain			2'1 3/4"
Clarain, normally bright banded with vertical cleats filled with calcite and pyrite			2'10¾"
Fusain, mineralized			2'11¼"

COUNTY

ILLINOIS GEOLOGICAL SURVEY, URBANA

Strata	Thickness	Top	Bottom
Clarain, Coarse banded			3'3"
Vitrain			3'4"
Clarain, coarse banded			3'4 3/4"
Clarain, narrow banded with 1/12" fusain at top			4'1½"
Fusain			4'2"
Clarain, narrow banded			5'9"
Blue band - gray shale			5'11"
Clarain, fine banded, bright			6'9¼"

Excluded from sample:

1. Blue Band
2. Pyrite nodule - encountered below surface at 2'6" to 2'11½"

COUNTY

Freeman Coal Mining Corp., Orient #4 - Bear between 8th & 9th S. off of 1st NW - 1100' E., 350' S., NW/c, Sec. 26, T. 8 S., R. 3 E. - HHD and MEH 3/1/68 - Sample #1

Total thickness of No. 6 Coal = 7'3"
Roof is gray shale, well laminated

Coal - normally bright banded, calcite, kaolinite, and pyrite on vertical fractures	0-10"
Coal - normally bright banded, with two thin fusain bands, mineralized in part with pyrite	10-12"
Coal - normally bright banded, as unit from 0-10"	12-19½"
Fusain - soft	19½-19 3/4"
Coal - pyrite most dominant on vertical fractures, some calcite	19 3/4-30½"
Fusain - soft	30½-30 3/4"
Coal - normally bright banded	30 3/4-38½"
Shale and bony coal	38½-38 3/4"
Coal - normally bright banded, few thin fusain bands, some pyrite	38 3/4-53"
Shale - brown, with thin coal lenses (a humic shale or bony coal)	53-53 3/4"
Coal - normally bright banded	53-60½"
Shale - brown, with fine coal partings (a humic shale or bony coal)	60½-61¼"
Coal - normally bright banded	61¼-65½"
Pyritic lense	65½-65 3/4"
Coal - normally bright banded	65 3/4-68¼"

Shale - gray with thin coal lenses (Blue Band) (excluded)	68¼-69 3/4"
Coal - normally bright banded	69 3/4-87"

Floor is claystone (Seatrock), medium light gray, carbonaceous rootlets, 4" seen

Excluded: 1½" shale at 68¼" (Blue Band)

Freeman Coal Mining Corp., Orient #4 - Room 4B, in second cross-cut of 3rd S. off of 1st SE - 3350' from SL, 1650' from WL, Sec. 26 - Sample #2

Total thickness of No. 6 Coal = 76" thick
Roof is black shale ("Black Slate")

Coal - normally bright banded, slight calcite and kaolinite on vertical fractures	0-21"
Fusain - slightly mineralized	21-21½"
Coal - normally bright banded, calcite on vertical fractures	21½-27"
Fusain - soft	27-27¼"
Coal - normally bright banded	27¼-29½"
Bony coal and shale	29½-30"
Coal - normally bright banded, several thin fusain lenses	30-37"
Fusain - soft	37-37½"
Coal - normally bright banded, calcite on vertical fractures	37½-43½"
Coal - normally bright banded with several bony bands up to ¼" thick	43½-56"
Vitrain band, kaolinite on cleat	56-57"
Coal - normally bright banded, kaolinite on vertical fractures	57-60½"
Shale - gray, thin coaly streaks, "Blue Band", excluded	60½-62"
Coal - normally bright banded, kaolinite on vertical fractures, several thin bony bands	62-76"

Claystone - gray "Seatrock"

A series of vertical fractures up to 1½" wide occurs in upper 3' of coal, noticed on face of entry - special sample taken

Freeman Coal Mining Corp., Orient #4 - in No. 15 room, approximately 144', 4th S. off of 1st SE - 1650' from SL, 1700' from WL, Sec. 26, T. 8 S., R. 3 E. - HHD and MEH 3/1/68 - Sample #3

Total thickness of No. 6 Coal = 6'2"
Roof is black slate

Coal - normally bright banded with some thin fusain lenses, kaolinite on cleats	0-29"
Fusain - shaly	29-29 3/8"
Coal - normally bright banded, kaolinite on cleat	29 3/8-35½"
Fusain - soft	35½-36"
Coal - normally bright banded, kaolinite on cleat	36-42½"
Shale - (humic), brown	42½-43"
Coal - normally bright banded, lower part has several thin bony bands	43-60"
Shale - gray (Blue Band) (excluded)	60-61"
Coal - normally bright banded, cleat with kaolinite	61-65"
Fusain with shale	65-65½"
Coal - normally bright banded, with fusain lenses	65½-66½"
Fusain - mineralized with pyrite, lenticular (excluded)	66½-67"
Coal - normally bright banded, with thin bony layers, some calcite on cleat	67-74"

Floor is claystone, gray, hard, silty, carbonaceous rootlets

FREEMAN COAL MINING CO. ORIENT NO. 4, NEAR PITTSBURG, WILLIAMSON COUNTY, ILLINOIS.

Heinz Damberger and others, 7/10/74, reconnaissance visit for Herrin (No. 6) Coal Roof Study.

Notes for this visit, if any were taken, have been lost. H.-F. Krausse was probably along on this visit, but any records he may have kept are lost. Damberger and Krausse since have left the Survey.

The following are two pictures of an oil seep noted in the roof of the travelway in the downfaulted block of the 6th North off the 2nd Southeast Mains, about 2300' inby. Here the entry is driven along the Danville (No. 7) Coal, with the Piasa Limestone forming the roof. The same oil seep was noted by Nelson and Ledvina on their visit 3/2/76. See their notes of that day* for maps and cross-section of the downfaulted block.

A third photo shows a normal fault with about 80 feet displacement forming the northeast side of the downfaulted block.

Three more photos from the Damberger visit are to be seen in the Roof Study Photo Book in the Confidential Room.

* These notes are in separate book on Cottage Grove Fault System.

Print #4 7/10/78 7

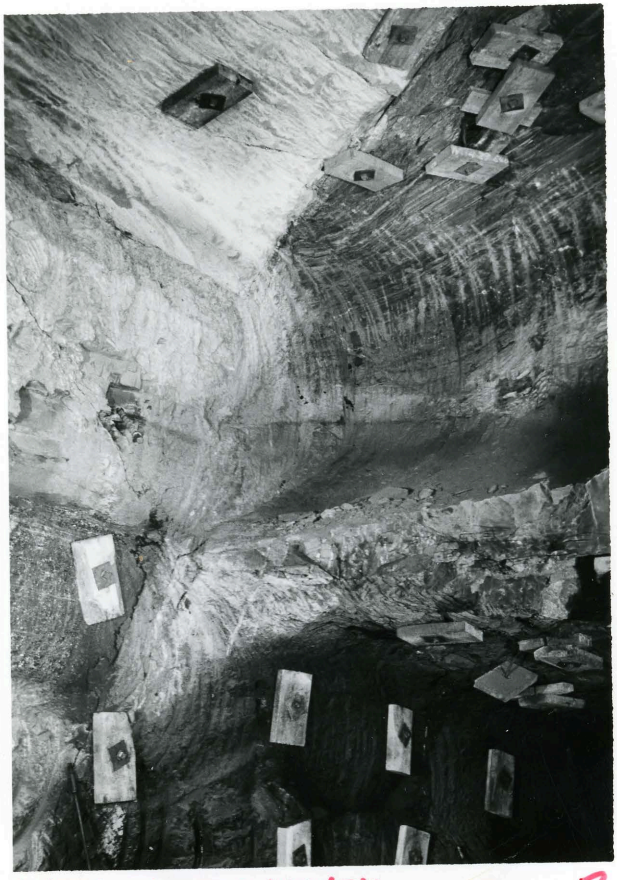
Oil seep in Piasa Limestone roof, travelway of 6th North off 2nd SE Mains, about 2300' inby.

Print #4 7/10/74 6

Same as previous photo.

T

P



B

7

Orient #4 7/10/74 B

Normal fault with about 80 feet displacement. Left side down. (P) Piasa Limestone (7) No. 7 Coal (B) Brereton Limestone on footwall.

Located about 2500' into 6th North travelway off 2nd SE Mains.

mn-45.018.tif

FREEMAN COAL CO. ORIENT # 4 MINE- MARION, ILL.

Notes by Heinz Damberger, 7/10/74. Reconnaissance visit for Herrin (No. 6) Coal Roof Study

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NW-SW-SE Sect. 24 8S-3E (2nd) SE entry (Mains) off Main NE entries just past intersection.

Main joints in roof shale 40-45 degrees, in gray shale, about 10-15' spacing, much less regular than in black shale above (not visible in this location) where it is rather closely spaced (few inches to 1 ft.)

2 gray shale samples taken.

FREEMAN UNITED COAL MINING CO. ORIENT NO. 4

STUDY OF COTTAGE GROVE FAULT SYSTEM

In 1976 a study was begun of faulting in Orient No. 4. Notes, sketches, and photos from this study are filed in a separate book and field maps are stored in Folder 10-3-4.

FORM 180 W

FREEMAN UNITED COAL MINING COMPANY ORIENT NO. 4 MINE
Williamson County

Notes by John Nelson on visit with Steve Danner and Chen-Lin Chou, accompanied by Pat Peterson from the company. December 3-4, 1980.

Purpose of visit was to examine faults and related features in the 1st Southwest Mains and adjoining panels. This area has been mined since my last visit to the mine.

We are told that mining has been completed in the panels off the 6th North, and that the area will be sealed within two or three months. The seals probably will be placed just north of the main fault zone.

Large normal fault at face of Southeast Mains, southeast of No. 3 Portal, was visited briefly. Small amounts of water and gas are still issuing from the fault zone in places. No new exposures since my previous visit are available here. The strike-slip fault, which strikes north-northwestward away from the normal fault, now is essentially inaccessible due to fallen rock and "gob".

As noted on earlier visits, northeast-trending vertical fractures are pervasive in the roof shales near No. 3 Portal.

Letters refer to locations on field map , stored in File 10-3-4.

(A). 1st Southwest Mains, 3rd entry from left facing inby, near 3rd Panel East.

Series of small high-angle faults and fractures, striking approximately NW-SE. Some have a few inches of offset. The direction of offset is not consistent and the faults have some appearance of strike-slip movement, but we did not examine them in enough detail to prove this. One of the faults shows a narrow zone of pulverized black shale apparently upthrust into the base of the Brereton Limestone. Dark oil stains are

locally present. The roof consists of about 8 feet of Energy Shale, then 3-4 feet of Anna Shale, then the Brereton Limestone (only base visible).

Another northwest-trending fracture zone was observed about three breaks (200 feet) to the southwes this also showed petroleum stains.

The coal in the Southwest Mains is very uniform in thickness, 5.5 to 6 feet, and shows no sedimentary disturbances or soft-sediment deformation to speak of. The coal is very nearly level. The roof is Energy Shale up to at least 10 feet thick, and showing only gradual variations in thickness. The Energy Shale is dark gray, poorly laminated, and slakes badly, producing difficult roof conditions. In some places it is missing and the Anna Shale, 3 to 5 feet thick, lies directly on the coal. Main fractures in roof trend NE-SW, parallel with entries, and are very intense and closely-spaced.

At the overcast of the 4th East Panel, in the 3rd entry from the left facing inby, one of the fracture zones is several feet wide and fractures in the Anna Shale are lined with calcite up to half an inch wide. The fractures, however, show no appreciable dip-slip. A second system of vertical fractures at right angles (135) to the first is a bit less conspicuous, though locally spaced less than an inch apart like the 045 fractures. The 135 fractures have no calcite.

These fractures indicate a horizontal stress field with maximum extension northwest-to-southeast (producing 045 fractures) and maximum compression at right angles to that.

(B). Southeast mains adjacent to 5th Panel East, and southwestward:

Three high-angle normal faults trending 045, parallel with the extensional fractures noted above. Two of the faults, in the 4th Entry from the left, are close together and along each the coal is downthrown several inches to the southeast. The third fault is

about 50 feet to the east and shows roughly a foot of offset, again with the southeast side dropped down. In addition a number of other fractures with very small but appreciable offsets (less than an inch) are visible The 045 fractures are very intense in both the Anna and Energy Shales. In spite of the fractures the coal rib is solid and the Anna Shale is competent, although the Energy Shale has behaved as a "draw shale".

At the overcasts of the 5th Panel East the 045 fractures are dominant (no calcite) but the 135 fractures are quite widely-spaced and subdued. The two smaller normal faults appear to have died out but the largest fault continues and has about half a foot of throw. The coal is beginning to show a very slight dip toward the south.

At the overcasts of the 6th East Panel no normal faults were observed, but the 045 fractures are ubiquitous and locally are lined with calcite where they penetrate the Anna Shale.

(C). Large faults in the "stubs" of the 6th East Panel The left-hand entry has butted against a face of solid limestone, probably the Brereton Limestone, with a little black shale (Anna) at the base. The surface dips steeply toward the northwest and shows faint, nearly vertical slickensides (?). Judging by the thickness of the shales in the vicinity, I believe this is a normal fault with 6 to 7 feet of throw.

Several other high-angle normal faults are present and show offsets ranging from a few inches to 2-3 feet. All the faults strike roughly 045, parallel with the fractures and faults noted above. The roof is pervasively fractured and slight amounts of water are dripping. Some of the small faults do not have clear-cut planes, but rather the coal is offset on a series of tiny steplike fractures. The smaller faults do not appear to be very continuous or consisitent in the amount and direction of offset (though most have the northwest side downthrown).

(D). "Stubs" of the 7th Panel East off the Southwest Mains.

In left-hand entry a broad zone of normal faults has been crossed. These are the same faults as seen at Stop C, and I am quite sure they also link with the normal faults at the face of the Southeast Mains, southeast of No. 3 Portal. The main zone is 10 to 15 feet wide and consists of numerous, mostly high-angle normal faults with an aggregate displacement of 10 to 12 feet down to the northwest. Roof falls make detailed examination of the faults unsafe.

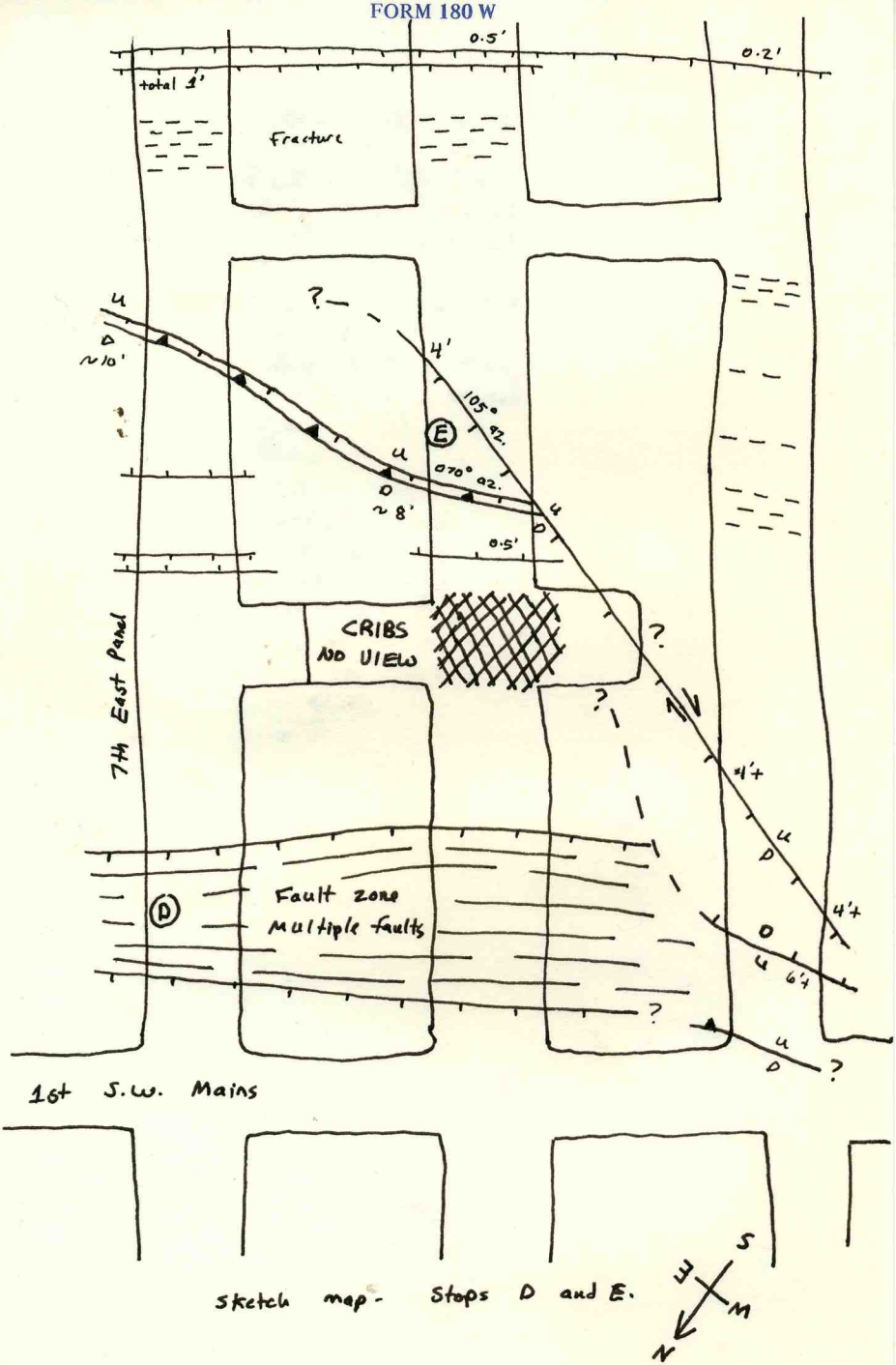
In the middle of the three entries the fault zone is wider, about 25 feet, and includes literally dozens of individual normal faults with throws ranging from fractions of an inch to several feet. The overall displacement again is about 10 feet down to the northwest. Faults dip 45 to vertical; most dip about 75 , and although most dip to northwest a few dip southeast and have that side downthrown, to form small horsts and grabems. In places the coal is "smeared" rather than cleanly sheared. This is the same phenomenon as noted at Stop C.

(E). Also in Stubs of 7th Panel East:

Complex series of faults trending east-west to northeast (070 to 105). See sketch map and drawings (over).

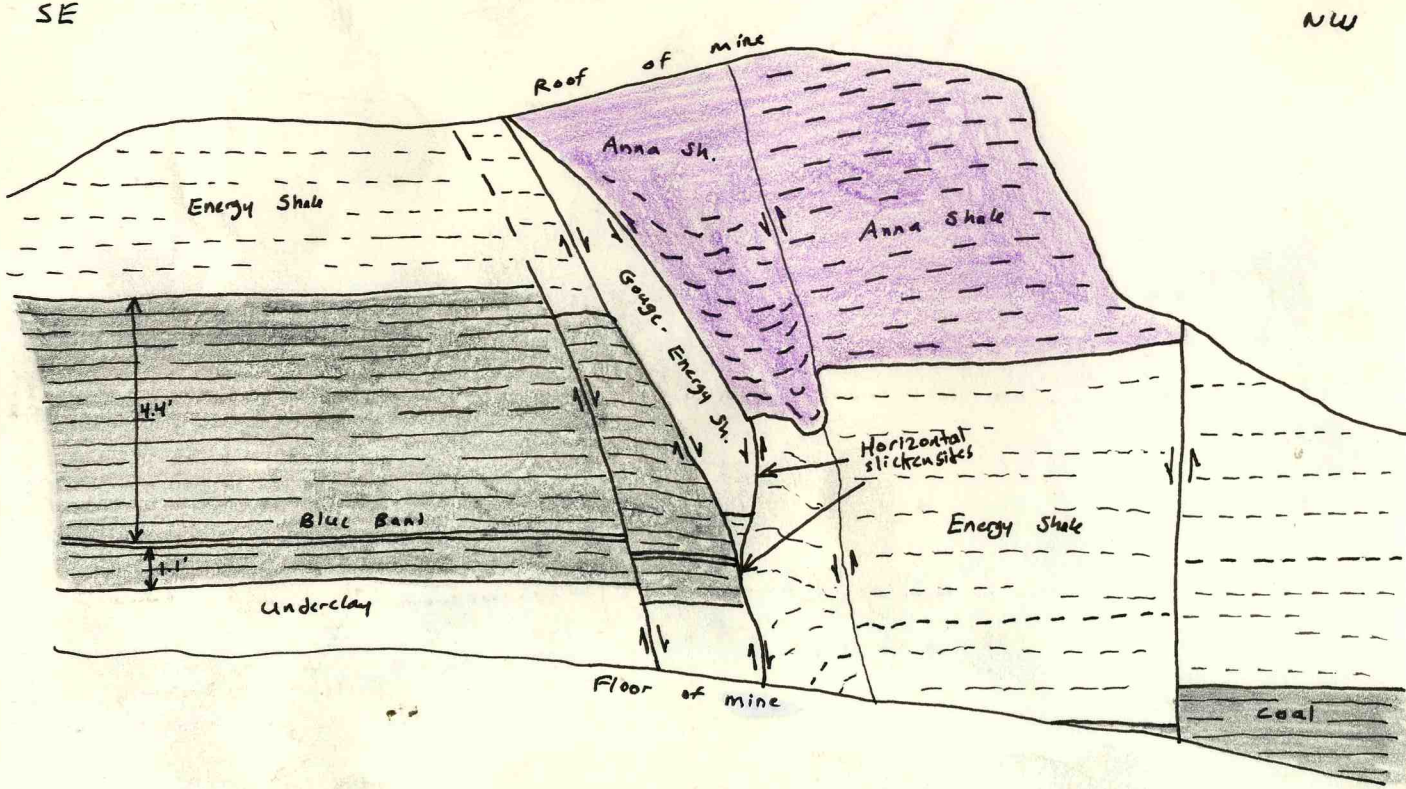
In the middle entry the faults are well-exposed; they are largely inaccessible in the left-hand entry, and are not very conspicuous in the right-hand entry.

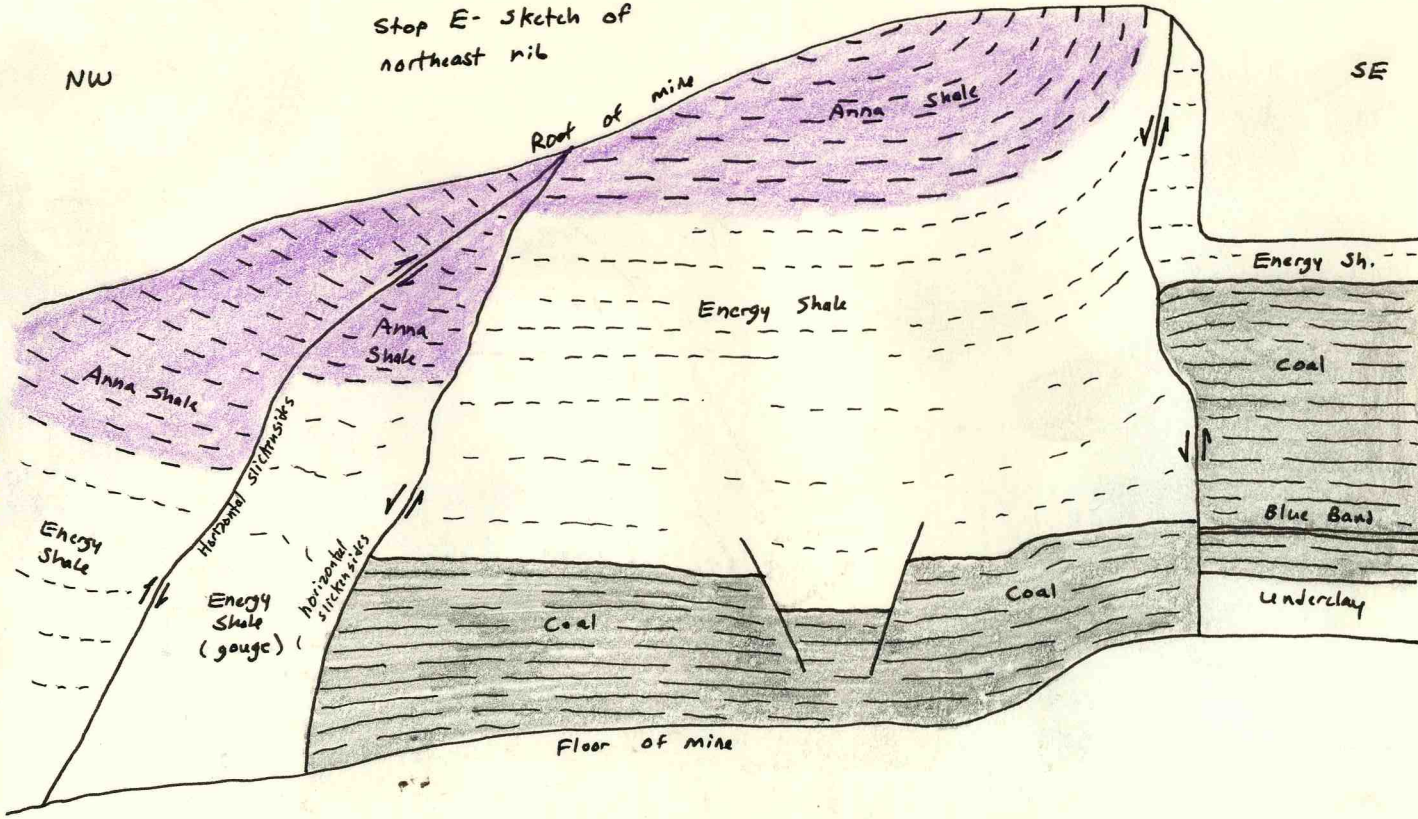
In the middle entry I believe there are three large faults (see sketch map). On the northwest are two parallel faults a foot or two apart and striking 070. Both dip steeply to the northwest, and have an overall throw of about 8 feet down to the northwest. Between the two faults a slice of Energy Shale appears to have been dropped lower than its level on either side of the faults; i.e. a narrow, inclined graben with a normal fault on the southeast and a high-angle reverse fault on the northwest.



Sketch map - Stops D and E.

STOP E- sketch of southwest rib.





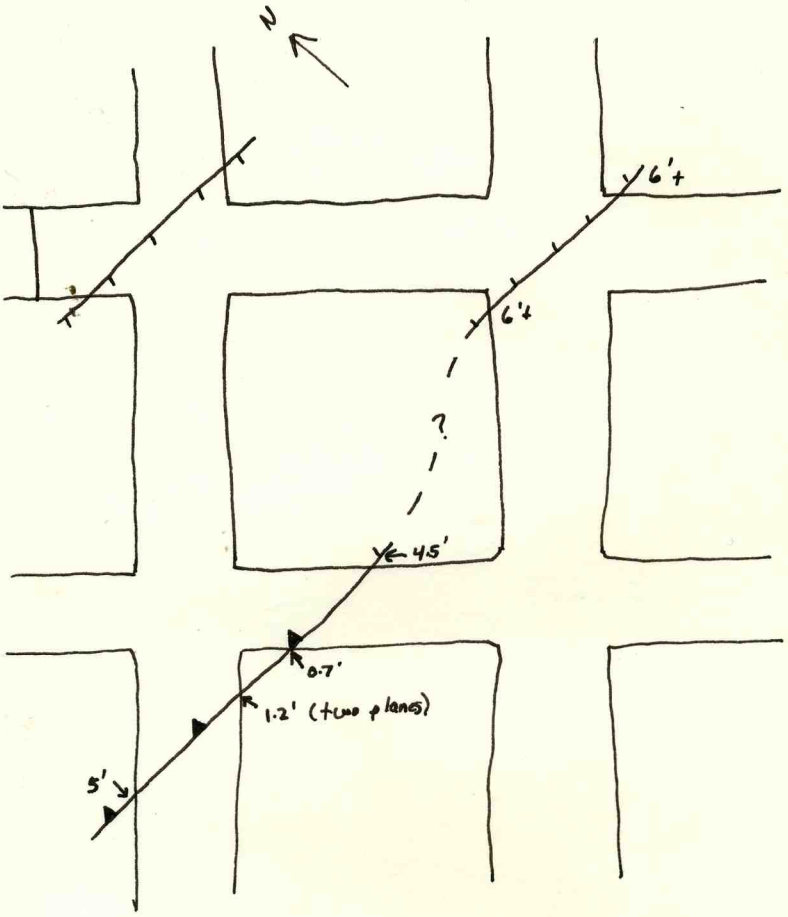
The surfaces of the faults show conspicuous horizontal or obliquely-dipping grooves and striations.

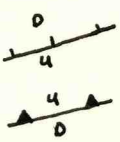
A third large fault trending 105 crosses the entry and appears to join the other two faults near the southwest rib. This fault is nearly vertical although its plane is S-shaped so that near the top of the coal on the northeast rib, it is a reverse fault. Higher up the Energy Shale and Anna Shale are very sharply folded, and the apparent drag indicates a right lateral movement along the fault.

This fault zone definitely has a component of strike-slip movement, which very likely is larger than the dip-slip component.

F). Continuation of fault zone from Stop E. Multiple faults are present, in a zone about 60 feet wide, and trending roughly east-west. The most interesting feature is one of the faults which changes from a normal fault to a reverse fault. As shown on the sketch map, the change is quite abrupt. On one side of the crosscut this north-dipping fault is a normal fault with 4.5 feet of offset. On the opposite side of the crosscut the same fault is reverse with the north side upthrown 0.7 feet. Farther west, diagonally across the entry, the reverse throw increases to roughly 5 feet. There is no doubt that the fault has truly "Scissored". Its trace is very well-marked in the roof.

Other structures of the fault zone are less easy to see because the thick gray shale has fallen and the entries "gobbed in" so that the coal is largely buried. Some faults have vertical offsets up to about 6 feet, but most are smaller. Within the fault zone two sets of obliquely-crossing fractures are seen. One set trends east-west and includes all the large offsets; these fractures are widely and irregularly spaced. Most dip about 45 and appear to be normal faults with possible strike-slip components. The other main set of fractures trend 045 and are spaced less than an inch apart, but show no discernable offsets.





Sketch map of Stop F
Showing fault "scissoring" from
normal to reverse

(G) Sketch shows profile in the 5th entry from the left, facing southeast rib.

The coal is strongly arched and is offset about 10 feet along a reverse fault, apparently the same fault which changed from normal to reverse, as noted above. This fault, which dips 50, is the only large fault visible. On the upthrown block is a sharp drag-fold or flexure 3 to 5 feet wide; the shale dips almost vertically against the fault plane. The layers on the southern, downthrown side dip gently toward the fault and do not show much drag, although heavy rock dust hides much of the view. The Brereton Limeston on the fault plane appears to display horizontal mullion.

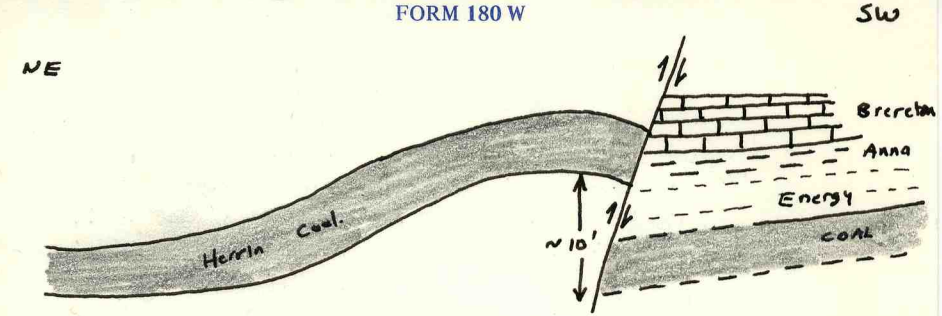
The structure appears to be similar in the belt and track entries, but very little is accessible as a result of heavy cribbing. The coal is strongly arched on both entries.

(H). Entry to right of travelway: the fold in the coal is less extreme and two reverse faults are present. The large fault from Stop G has decreased in throw to 1 foot, while another fault has appeared to the south. This second fault abruptly gains displacement toward the west.

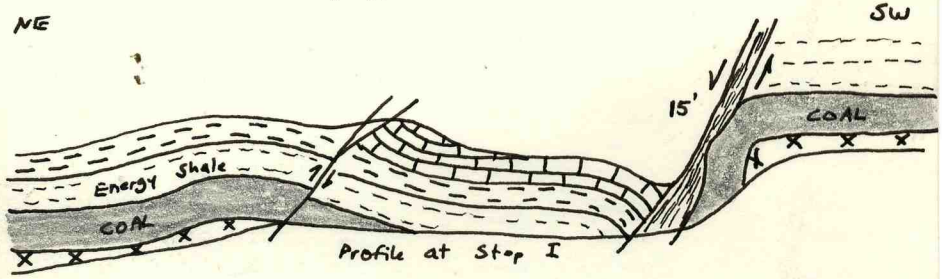
December 4, 1980.

(I). Profile of fault zone in 3rd entry from the right, 1st Southeast Mains.

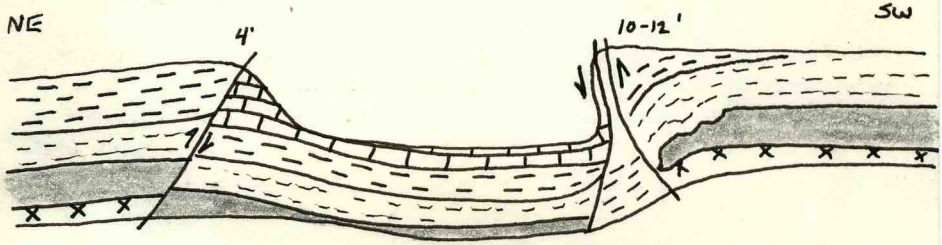
The northeast fault, a reverse fault with less than a foot of throw, probably is the same fault from Stop G. The main displacement is along the southwestern fault which appeared at Stop H. This fault has a very complex structure and its zone of gouge and broken rock is several feet wide. Overall the zone dips steeply northward and the strata north of the fault are downthrown roughly 15 feet.



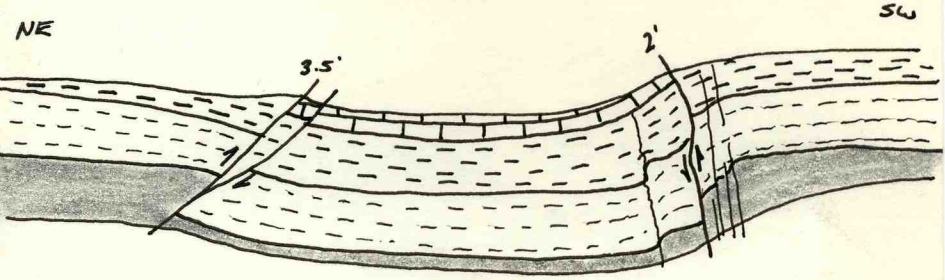
Profile at Stop G



Profile at Stop I



Profile at Stop J.



Profile of Stop K.

Profiles of the fault zone in the 1st S.W. Mains near 7th E. Panel. Width of all views about 100 ft.

On the southeast rib, as shown in the drawing, the coal on the upthrown side is bent very abruptly at the fault, and it is also squeezed and thinned along the fault. Bedding in coal at the fault is nearly vertical; the overlying Energy Shale is locally overturned, dipping 70-80 SW.

On surface on the southeast rib has mullion and slickensides plunging 25 to the west. This would seem to indicate left-lateral slip; but I cannot be sure that this is the main surface of movement.

The structure on the northwest rib is even more confusing than that on the southeast rib, and much of the critical portion is hidden by fallen debris.

The coal is overlain by about 4 feet of Energy Shale both north and south of the fault zone. Fracture trending 045 are prominent on both sides of the zone.

On the downthrown side of the fault the strata turn sharply downward in "false drag".

Note a thin layer of canneloid coal or bony shale in the transition zone from coal to Energy Shale.

(J). Profile of fault zone in the 2nd entry from the right.

The northeastern fault has re-increased its throw to 4 feet on the southeast rib and 5 feet on the northwest rib. This is a simple, clear-cut reverse fault dipping about 45 northward. South of this fault the rocks are folded into a broad, gentle trough.

The southern fault again has complex structure, but the main dislocation is nearly vertical and strikes 085. The brow of limestone on the downthrown side has distinct nearly horizontal mullion and striations, this time seeming to indicate right-lateral offset. (They plunge 10-15 to the east. But compare Stop I.)

A sharp drag-fold or flexure is shown on the upthrown side of the fault on the southeast rib, but on the northwest rib there is no flexure; the coal is cut quite cleanly. The fault zone is becoming narrower and less complicated westward. Strata on downthrown side show normal drag (contrast with Stop I).

About 50 feet south of the fault zone, the coal lies horizontal and the Energy Shale has two sets of vertical fractures trending 015 and 105 respectively.

(K). Sketch shows profile of fault zone in right-hand entry.

The northern fault appeass much as it does at Stop J, although it seems to split upward along the northwest rib. On the northwest rib the coal on the upthrown side has pronounced normal drag.

The southern fault is less compex and has less throw than before. The plane is nearly vertical but "S"- shaped. The strata show a broad, gentle flexure through the fault zone. Numerous minor faults are found subparallel with the largest fault. The throw seems to be increasing from 3-4 feet on the southeast rib to about 6 feet on the northwest rib.

Here, as elsewhere along this fault zone, there are no noticeable differences in the thickness of the Energy Shale or other stratigraphic units on opposite sides of the fault zone. Thus, large-scale strike-slip movements appear unlikely here.

(L). Series of small faults about 200 feet south of the main zone. Faults trend roughly parallel with main zone and dip 45 to vertical. The more northerly faults have small offsets in the coal and definite indicators, such as horizontal slickensides, of strike-slip movement. The more southerly faults mainly dip northward and appear to be simple dip-slip, normal faults with at most a few inches of offset.

(M). Intake entry of 8th West Panel intersects strike-slip faults nearly parallel with entry. Faults, which show very distinct subhorizontal slickensides, have caused a large roof fall and have forced the abandonment of the heading. At the top of the fall a large wedge of light gray shale , bounded by fault surfaces, is surrounded by darker gray Energy Shale. The Energy

Shale is at least 10 feet thick, and this has undoubtedly increased the instability of the top in this area. The lower shale is dark gray, with distinct fine parallel laminae and small lenses of siderite.

(N) Belt entry of 8th Panel West mined through large fault nearly parallel with entry. The view is very poor due to rock dust, but I can measure 2.5 feet of throw down to the north along one nearly vertical, S-shaped plane that has horizontal mullion and slickensides.

The continuous miner is mining into more faults at the face and appears to be cutting rock as we watch. The top is very badly broken by fractures.

In the 8th Panel West they are obviously mining into the same fault zone that was crossed in the 1st Southwest Mains and described above in Stops E through K. The limited exposures suggest that they now have mined about halfway through the zone, but since we know how discontinuous the individual faults are, we hestitate to predict whether more large faults lie ahead. Very unstable roof conditions, however, are a certainly (and already are being experienced). This was a very unwise decision to mine across a known fault zone, especially at so shallow an angle, nearly parallel with the headings. From talking with Pat I get the impression that management simply chose to ignore his warnings. I can also read that incorrect projections of the fault and/or fouled-up communications also played a role in this blunder. Unfortunately this style of mining seems to be the norm at Orient No. 4, and for that matter, at all of Freeman's mines.

The better course of action, which was rejected, would have been to drive rooms southward from the 7th Panel West until the faces contacted the fault zone. Then the 8th Panel West either should have been turned parallel with the fault (risky if the fault jumps "en echelon"), or started farther to the south,

so that the fault zone could have been probed in rooms rather than in main entries.

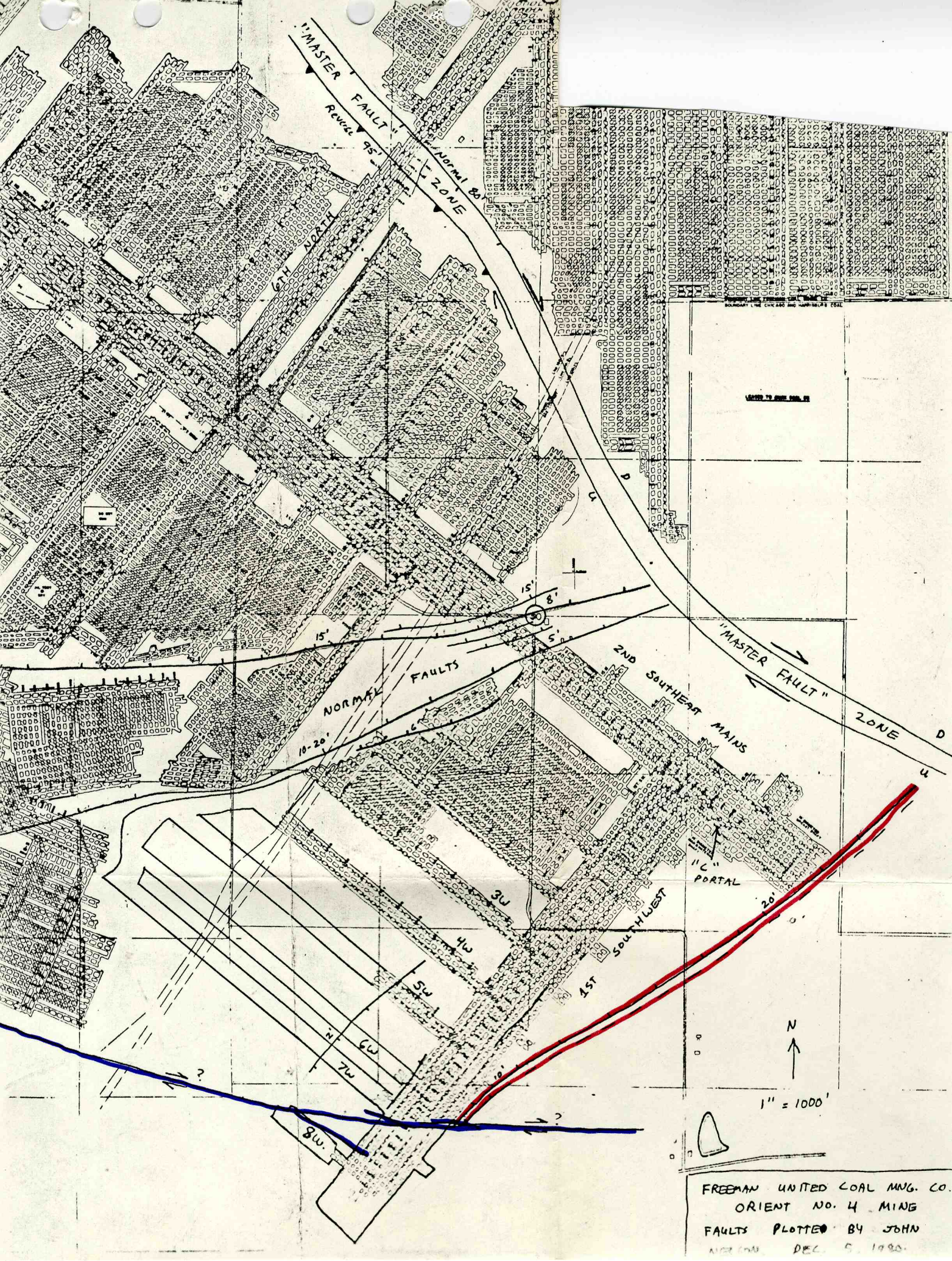
Structural Analysis

Map (over) shows the generalized pattern of faults in the active portion of Orient No. 4. The normal fault are outlined in red, and the strike-slip fault in blue.

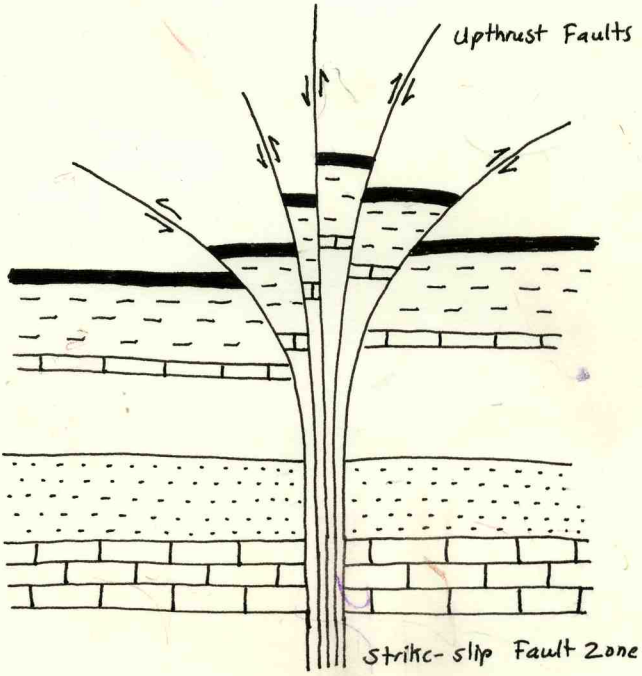
The blue fault probably connects with the zone of faults crossed in the Southeast Mains and Main East, just south of the No. 2 Portal. Here the zone took the form of a keystone-shaped horst with two reverse faults and a third reverse fault some distance to the south.

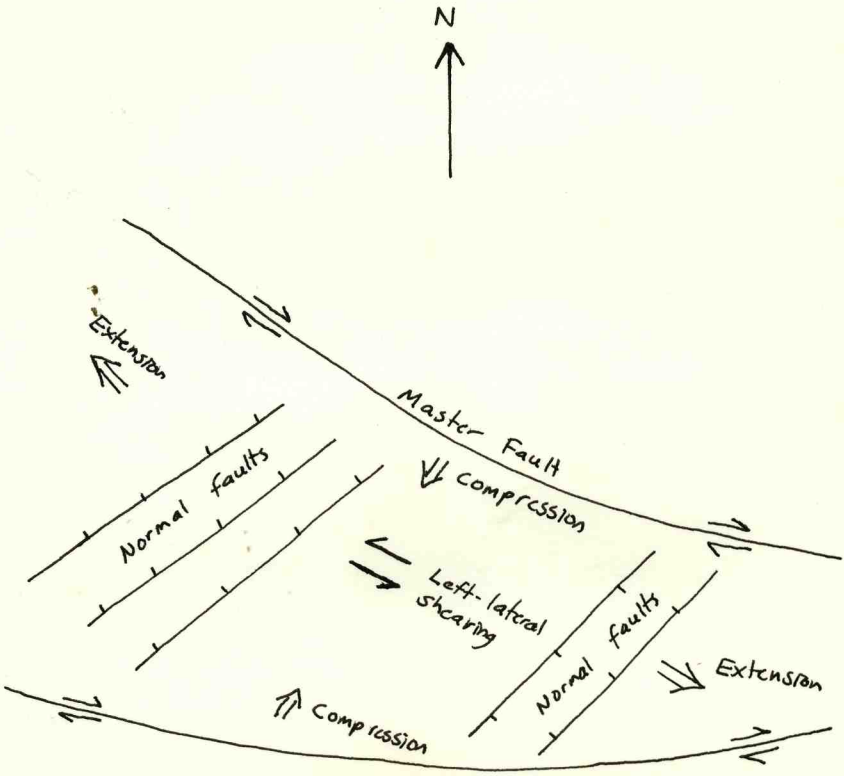
I call it a strike-slip fault, and show right-lateral movement on the map, but this is somewhat conjectural. It is obvious that strike-slip or oblique-slip movements are significant, but their direction and magnitude were not determined. As noted above, I do not believe the amount of strike-slip is very large; as large lateral offsets should have brought different roof lithologies into juxtaposition across the fault zone. Furthermore, the evidence that the large faults are discontinuous along strike does not allow for major lateral offset at the level of the Herrin Coal. Probably the horizontal slip is of the same order of magnitude as the vertical slip: a few feet to a few tens of feet.

The general structure of the zone, with sharp folds and dominantly high-angel reverse faults, signifies the type of deformation sometimes called "upthrusting". The sketch (over) shows how such upthrusting may occur. I surmise the existence of a large, vertical strike-slip fault at depth below the coal. Movements in the deep fault tended to squeeze blocks or slices of rocks upward. During this upward squeezing action faults tended to propagate upward, becoming more gently dipping with decreasing depth. Most of these faults are reverse faults with a component of strike-slip


"MASTER FAULT" ZONE
Reverse 95'
Normal 80'
6TH NORTH
"MASTER FAULT" ZONE
NORMAL FAULTS
10-20'
15'
8'
5'
2ND SOUTHEAST MAINS
"C" PORTAL
1ST SOUTHWEST
3W
4W
5W
6W
7W
8W.
20'
10'
N
1" = 1000'
FREEMAN UNITED COAL MNG. CO.
ORIENT NO. 4 MINE
FAULTS PLOTTED BY JOHN
DEC. 5, 1980.

UPTHRUST FAULT (CROSS-SECTION)




N
Extension
Master Fault
Compression
Normal faults
Left-lateral shearing
Normal faults
Extension
Compression

motion. Some slices in the buried fault zone may slip downward, producing "normal" faults in the surficial strata.

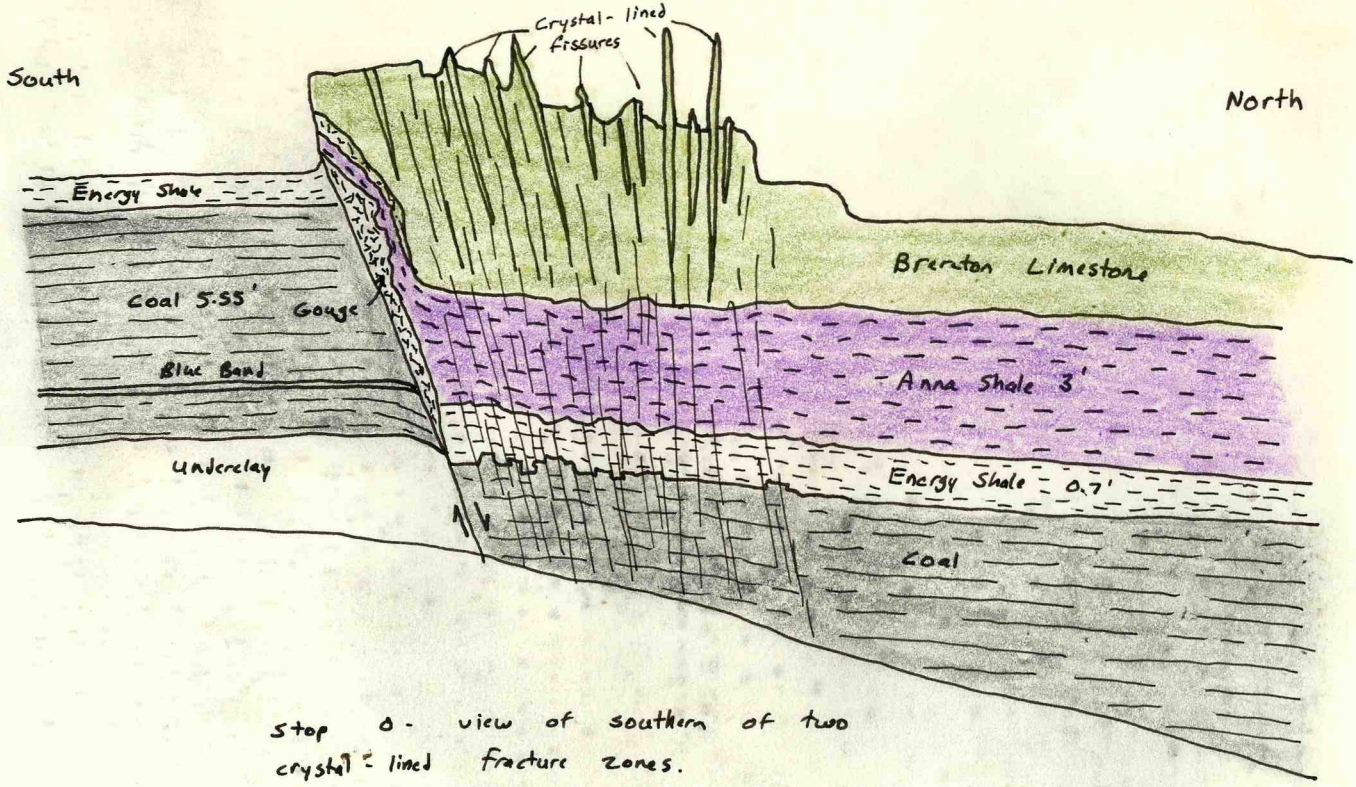
The position of the "blue" fault relative to the overall structure of the Cottage Grove Fault System suggests that it is the expression of a major branch of the "master fault". The master fault of the Cottage Grove System is a right-lateral fault and so I presume that the "blue" fault is right-lateral. The main branch of the master fault passes northeast of the No. 3 Portal, as shown in the map. Thus, the rocks between these two faults have been subjected to a left-lateral couple. The predicted result of such a couple is extensional faulting trending northeast-southwest, and this is indeed observed. The maximum compression is at right angles to the extension, and produces small reverse and strike-slip faults such as those seen at Stop A, and also jointlike fractures trending 135.

(O) Spectacular accumulation of crystalline calcite along fractures in Brereton Limestone, near the face of the 1st Panel West off the 1st southwest Mains. The locality is difficult of access and soon will become completely out -of-reach due to rising water along the bleeder entries.

The crystals are found along a series of normal faults and pull-apart fractures trending slightly north of east. These fractures and faults are part of the system of faults crossing the Southeast Mains, and traced through a large area of the mine.

Entries were driven through the "crystal" faults and a set of rooms was mined on the northern, down-thrown side of the faults. These rooms are rapidly filling with water. The faults were seen only in one entry. To reach the other entries we would have had to knock down stoppings.

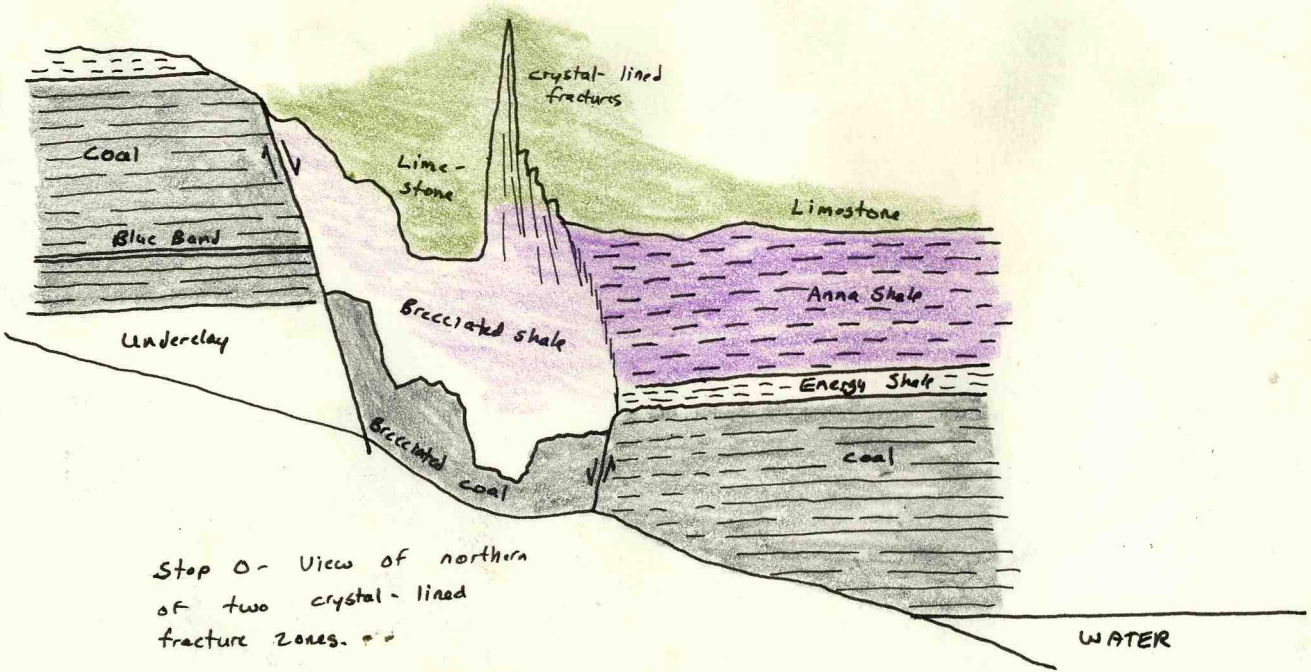
There are two faults with crystals. The southern one (see sketch) is a fairly simple high-angle normal



Stop 8 - view of southern of two crystal-lined fracture zones.

South

North



Stop 0- View of northern of two crystal-lined fracture zones.

fault with the north side downdropped about 6 feet. The rocks on the downthrown side, in a zone approximately 10 feet wide, are intensely fractured parallel with the faults. The fractured rock shows numerous tiny offsets and the coal, in particular, has a "smeared" appearance. The limestone behaved in more brittle fashion, with large extensional fractures being opened; it is these that contain the crystals. Some of the fractures in the limestone are several inches wide and extend several feet upward. The fractures dip steeply and most are parallel with the main fault, although some dip backwards toward it.

The northern fault zone is about 10 feet wide and its structure is harder to see, and more complex. The north side has been dropped about 8 feet relative to the south side, but in the middle of the fault zone the rock is highly broken and some of it has dropped below its level on either side of the zone. That is, I believe that the walls of the fault pulled away from each other enough to allow masses of rock to slide downward into fissures along the fault plane. The coal and shale are brecciated, with large angular blocks showing all orientations, and caught in a matrix of more finely pulverized material. The limestone again behaved more competently but broke into large blocks; the fractures again are lined with coarse crystals of white calcite.

Most likely some of the fractures in the limestone were actually opened due to extensional forces, allowing water to move along them, and this water dissolved the limestone along the cracks, then re-precipitated the crystals.

Freeman United Mining Co. Orient No.4 Mine
Williamson County
Notes by Steve Danner; accompanied by John Nelson and Chen-Lin Chou of the ISGS, and Pat Peterson from Freeman United. Dec 3-4, 1980.

Purpose of visit was to examine faults and associated features in the 1st Southwest Mains and adjoining panels.
Location letters refer to locations on the field map, stored in file 10-3-4.

(A) 1st Southwest Mains, 3rd entry from left facing inby, near 3rd Panel East.

Series of fractures and small high-angle faults trending NW-SE. Maximum vertical offset is approx 0.5'. The roof consists of 8' of gray Energy Shale, overlain by 3-4' of black Anna Shale, capped by Brereton Limestone. The base of limestone shows numerous fractures that have healed closed. The gray shale seems rather brittle in this area. Oil stains are present locally.

(B) Southwest mains adjacent to 5th Panel East.

High-angle fault (85°) striking N40E; southeast side of fault is downdropped approx. 1.1'. Roof consists of 2' of gray shale overlain by 3+' of black shale. Numerous small fractures paralleling fault, little offset if any.

(C) Stubs of 6th Panel East off Southwest Mains.

Large, near-vertical fault striking N40E, almost perpendicular to entry. Coal, gray shale, and black shale butt up against the down-thrown wall of limestone. A few inches of Anna Shale are exposed at the base of the limestone. The fault dips approx 80° to the southeast, and appears to be a normal fault. Slickensides indicate that

movement was primarily vertical. Approx. 30' back in the entry the coal begins to rise until it is 2-3' higher at the fault. This rise is due to 4-6 parallel faults that cause the coal and shale to stair-step upwards towards the main fault. These small faults are nearly vertical and parallel the larger one; displacements appear to be mostly vertical with the offset ranging from 0.2' to 1.0'. Unlike the large fault, the northwest side of the small ones are downthrown. The roof contains a conspicuous series of fractures that parallel the large fault; there is a little water coming in, but not very much.

(D&E) See Nelson's notes.

(F) 1st Southwest Mains, 2nd entry east of haulageway, 2 pillars northeast of 8th Panel East.

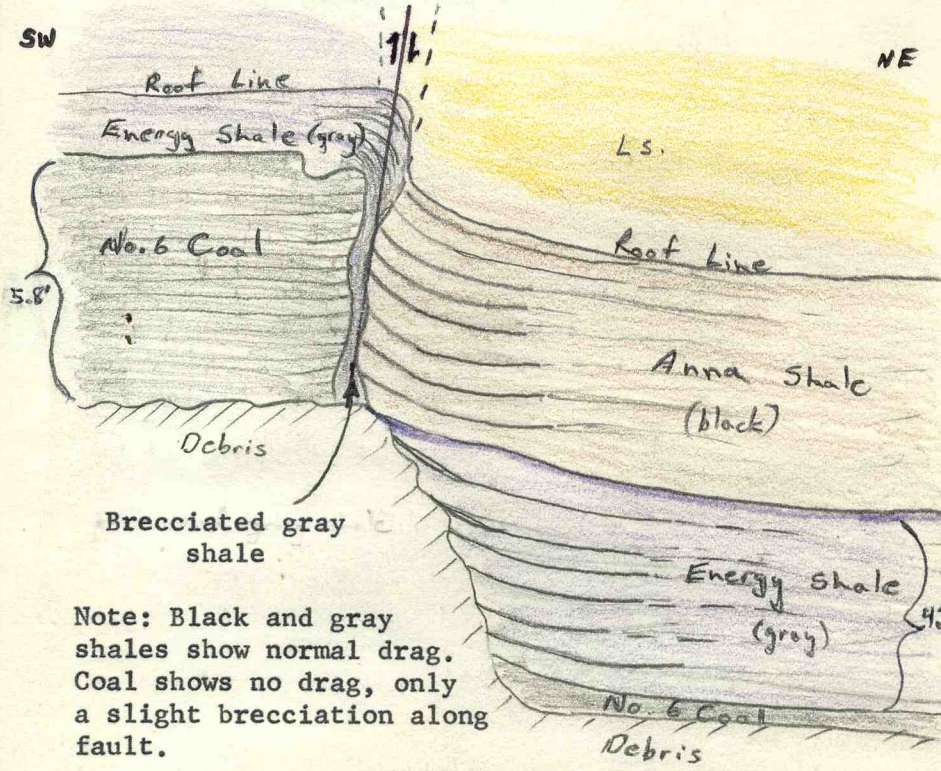
Continuation of fault zone from location E. Series of faults trending N80E; most distinct fault dips 45° to the south. This fault shows at least 8' of vertical offset with the southeast side downdropped. Both oblique and horizontal slickensides are in evidence. The coal is brecciated along the fault, but shows no signs of drag. The fault plane varies from a sharp contact surface to a 6 inch wide brecciated zone.

(G,H,&I) See Nelson's notes.

(J) 2nd entry out from 7th Panel West.

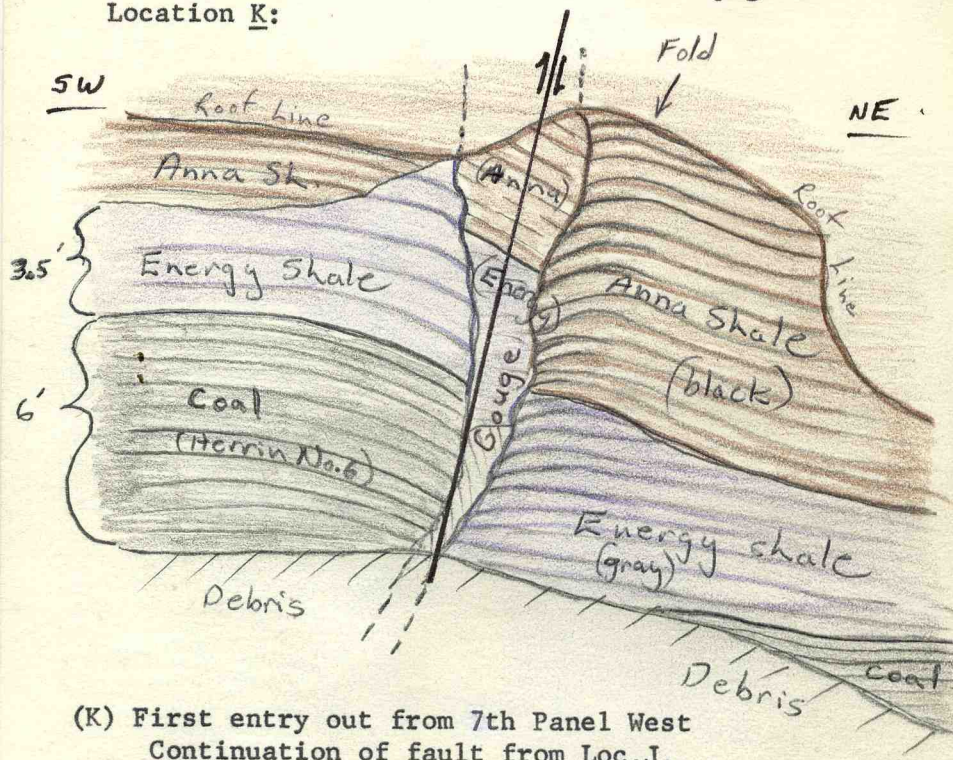
Two major faults trending N85W. The fault to the southwest shows the greatest displacement with almost 15' of vertical offset. Fault plane is nearly vertical. See sketch.

Location J: northwest rib of entry



Note: Black and gray shales show normal drag. Coal shows no drag, only a slight brecciation along fault.

Location K:



(K) First entry out from 7th Panel West
Continuation of fault from Loc.J.

Sketch of northwest rib of entry. Notice that on the NE side of the fault the bedding becomes more folded from bottom to top. The bedding near the base of the gray shale is rather flat near the fault. A gental anticlinal fold develops in the upper half of the gray shale and becomes more pronounced up through the black shale. Hence, what appears to be false drag is, in fact, the result of differential compression.

Horizontal slickensides are visible along the fault. In this entry, the fault strikes approx. N85W, which is the same as at Loc.J.

FREEMAN UNITED COAL MINING CO. ORIENT NO. 4 MINE
March 24, 1981
Notes by John Nelson on visit with Steve Danner, accompanied by Curt Lewman, assistant to the superintendent.

Purpose of visit was to collect three face-channel samples of coal. All samples were taken in panels off the Southwest Mains, southwest of the No. 3 Portal.

Channel Sample 1

8th Panel West off the Southwest Mains, 1535' inby the SW Mains and two crosscuts to the right off the panel entries. 980' from north line, 90' from west line, Section 31, T. 8S, R. 4E, Williamson County.

Roof- Shale (Energy), medium-dark gray, hard, poorly bedded, smooth, contains thin stringers of coal and small lenses of pyrite near base. Grades upward to grayish-black (Anna ?) Shale. Joints trend N. 45 E and are spaced about 0.5' apart on the average. About 2 feet of shale mined with coal. Contact of shale to coal is sharp and slightly uneven.

2.24' Coal, N.B.B., moderately hard, thinly banded overall, vitrain about 20%, thickest band about 0.02', average less than 0.01'; attrital coal 60-75%, thin to medium banding; fusain finely disseminated and in thin laminae; lustre of coal matte to resinous, moderate cleat development with much calcite, also numerous pyritic "goat beards" and occsional laminae of pyrite less than 0.01' thick. A few small nodules of pyrite also present.

0.04' Bone coal, discontinuous.

1.53' Coal, N.B.B., with more pyrite than above, as lenses and cleat facings. Several areas of concentrated vitrain in bands up to 0.03' thick. Otherwise thinly banded.

0.05' Bone coal, discontinuous.
0.50' Coal, N.B.B., similar to above; very thinly banded.
0.11' Shale (Blue Band), medium gray, moderately hard, slightly silty, appears continuous, irregular contact with coal. EXCLUDED from sample.
1.06' Coal, N.B.B., sim. to above, contains thin discontinuous laminae of shale near middle, also appears to contain bony interbeds. Less calcite than above, but pyrite still abundant.
Floor- Claystone, medium gray, moderately hard, slightly silty, slickensided, contains disseminated carbonaceous debris, small nodules of pyrite just below base of coal.

Total thickness of seam 5.53'

Coal at sampling locality is more or less level with no significant undulations or interruptions. Sample was collected north of the fault zone described on our visit of last year.

We went to the face of the 9th Panel West to observe the continuation of the same fault zone. The exposures were not very good but we could see that the structural pattern is similar to that seen in the 8th West and in the Southwest Mains. The major faults apparently had oblique-slip movement; the drag and the throw are inconsistent from one entry to the next and many of the slickensides are nearly horizontal. Local offsets of up to 6 feet are present. Parallel with the main fault are numerous medium to high-angle normal faults with small displacements. As usual, the faults create difficult mining conditions with unstable roof and a little seepage of water.

Channel Sample 2

Face of "B" Entry, 11th Panel West, 1005' inby the SW Mains. 2300' from north line, 425' from east line, Section 36, T. 8S- R. 3E.

Roof- Shale (Energy), medium to dark gry, moderately hard, smooth, poorly bedded, contains faint fine parallel laminations, thin stringers of coal and fine carbonaceous debris near base. Occasional shell fragments and whole shells of Dunbarella and other pelecypods. Contact to coal fairly even.

0.13' Coal, bright-banded at top grading to bone near base, discontinuous shaly partings near base.

0.98' Coal, N.B.B., hard, generally thinly banded, vitrain 15-20%, thickest band 0.015', average less than 0.01', attrital coal very thinly banded and comprises about 70% of unit, fusain finely disseminated and in small lenses, bench contains vertical mineralized fractures up to 0.03' wide, with calcite and possibly clay. Cleat poorly to moderately developed and contains calcite and kaolinite. Little pyrite noted.

0.06' Fusain, moderately soft, slightly mineralized, with pyrite, discontinuous.

0.56' Coal, N.B.B., with more fusain than above, in laminae and lenses. No visible pyrite. Calcite common on cleat.

0.03' Fusain, moderately soft, slightly mineralized.

0.42' Coal, sim. to above.

0.04' Fusain, discontinuous.

0.48' Coal, sim. to above, with a few bony patches.

0.04' Fusain, edge of a lens which has a max. thickness of 0.10'.

2.10' Coal, N.B.B., with numerous bony lenses and laminae up to 0.03' thick; small lenses and laminae of fusain though less than in units above. Cleat less prominent. Numerous shaly interlaminations in lower 1/3 of unit. Calcite prevalent, pyrite

rare. Contact uneven.

0.10' Shale (Blue Band), medium gray, moderately hard smooth, contains occasional stringers of coal, no mineralization eveident, appears continuous. EXCLUDED from sample.

1.45' Coal, sim. to above, generally thinly banded with numerous shaly partings, calcite abundant, little or no pyrite.

Floor- Claystone, medium gray with brownish cast, moderately hard, contains bands of bright coal near top, numerous carbonaceous inclusions, silty, slickensided. Platy fracture.

Total thickness of seam 6.39'

Coal is level, uniform, with no faults or other disturbance noted.

Channel Sample 3

Face of "C" Entry, 11th Panel East, approx. 1630' inby the SW Mains. 1430' from south line, 1850' from west line, Section 31, T. 8S- R. 4E.

Roof- Shale (Energy), medium-dark gray, moderately hard, poorly bedded, contains laminae of coal near base, becomes darker near base. Small pelecypods noted; small nodules of pyrite. Very thinly laminated.

1.08' Coal, N.B.B.,hard, lustre resinous, moderate cleat development, thnily banded overall. Vitrain about 15%, thickest band 0.02', average less than 0.01', attriatal coal 60-70%, thinly laminated, fusain in laminae and small lenses; calcite prevalent on cleat, occasional small pyritic lenses and very thin laminae of pyrite.

0.02' Fusain, soft, continuous.

1.05' Coal, sim. to above, with prevalent calcite, little or no pyrite, lustre duller than above,

appears slightly bony in places.

0.05' Bone coal, fairly continuous.

1.12' Coal, sim. to above, becomining bony near base.

0.06' Shale, medium gray with brownish cast, moderately soft, carbonaceous. EXCLUDED from sample.

0.56' Coal, sim. to above, slightly bony, less calcite cleat less prominent.

0.07' Shale, grayish-balck, very carbonaceous, moderately hard, silty, continuous. EXCLUDED from sample.

0.48' Coal, sim. to above.

0.10' Shale (Blue Band), light to medium gray, slightly silty, soft, contains occasional coaly stringers, uneven contacts with coal. EXCLUDED from sample.

0.98' Coal, sim. to above, with poorly developed cleat and increasing proportions of shale and fusain near base.

Floor- Claystone, medium gray, moderately hard, silty, slickensided, carbonaceous streaks and inclusions common, possibly rootlets; occasional stringers of bright coal near top.

Total thickness of seam 5.57'

Coal in this section is horizontal with no undulations, no faults or other disturbances noted. Joints in roof trend N 45 E.

General notes: average refuse at cleaning plant runs 35%; but sometimes gets as high as 47% while the plant is designed to handle no more than 37%. Mining "draw shale" with the coal increases the percentage of reject. Coal is sold on the spot market and on short-term contracts with power companies.

Dumb move of the day - I left my box with all my pit clothes and gear on the bench in the wash house and had to borrow all equipment next day for my visit to Orient No. 3.

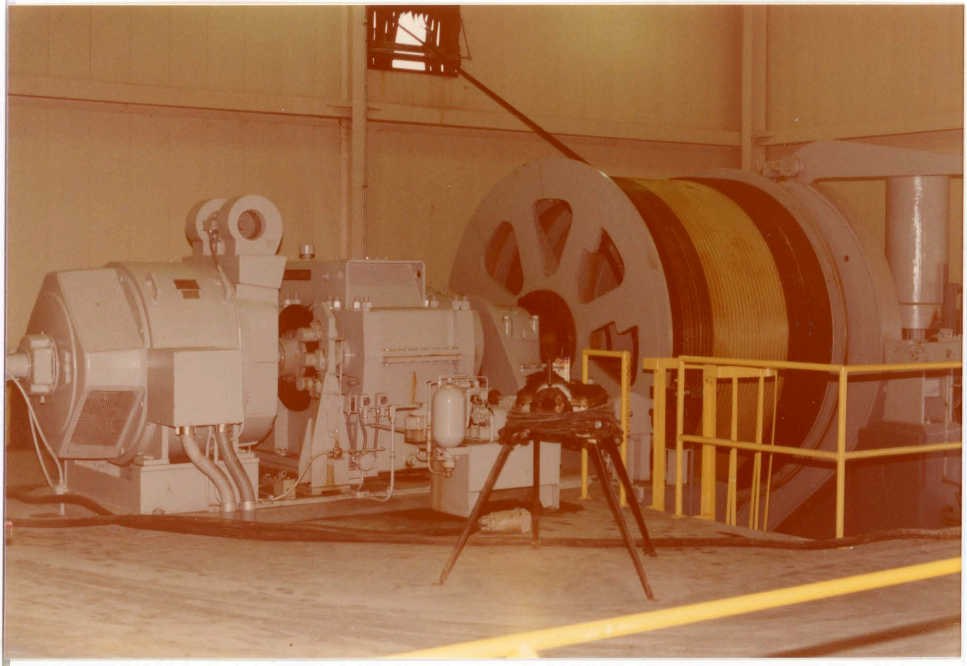
John C. Moore Corporation, Rochester, N.Y. 14604
MOORE'S MODERN METHODS
FORM 180 W

Curt Lewman (left) and Steve Danner with continuous mining machine. Photos by John Nelson, March 24, 1981.

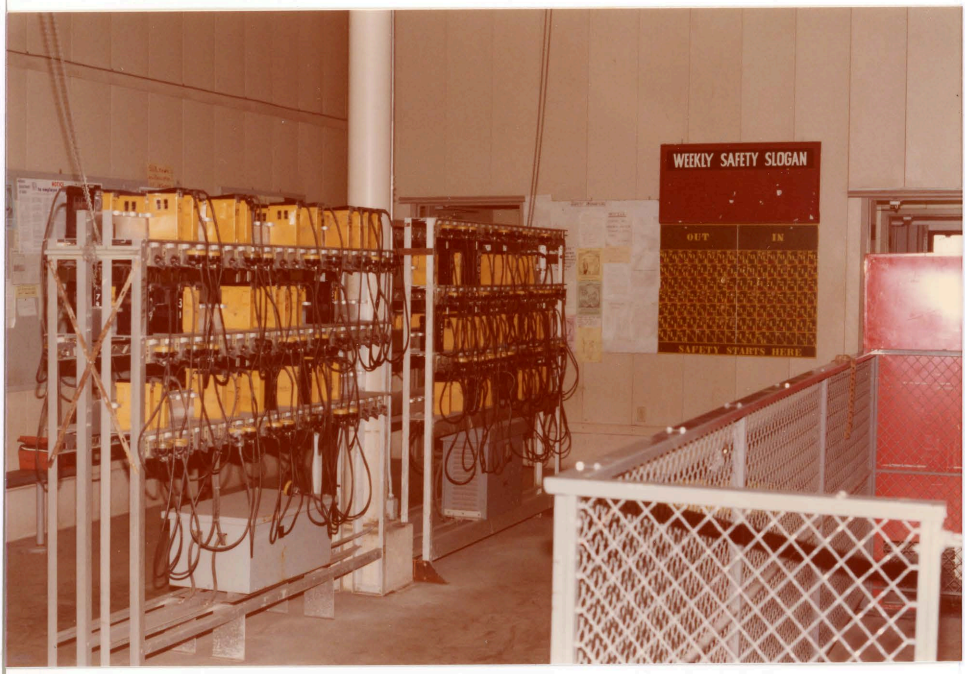
Operator's control position for continuous miner.

Headframe at No. 3 Portal, Orient No. 4.

John C. Moore Corporation, Rochester, N.Y. 14604
MOORE'S MODERN METHODS
FORM 180 W



Hoisting room, Portal No. 3



Lamp room, No. 3 Portal

Change room, No. 3 Portal

Continuous miner in action in the 8th Panel West.

Shuttle car in action.

FREEMAN UNITED COAL MINING CO. ORIENT NO. 4 MINE
February 8, 1983 Notes by John Nelson on visit with D.K. Lumm and Pat Peterson.

Purpose of visit was to examine faults recently encountered in panels east off the new Southwest Mains (southwest of No. 3 Portal). These faults are part of a zone that I have previously seen in the SW Mains and in panels west off the same.

Pat Peterson says that the company is having difficulty supporting the roof in north-south headings of the Southwest Mains beyond the point where the entries cross the strike-slip fault I saw previouly. Roof failures apparently are due to east-west compressional stresses in the rock. The stresses must be strongly concentrated, as failures are common even though the entries trend N 40 E. Failures, according to Pat, commonly begin in intersections and then "snake" around the corners of pillars, maintaining a north-south direction. Pat has seen horizontal offsets of as much as ½ inch in roof bolt holes. This is one reason why he believes modern stresses are to blame for the rock falls. Some of the falls are as high as 30 feet.

We know that similar problems have been encountered in numerous mines, mostly the deeper mines. The coal is only about 300 feet below the surface in the area where Freeman is encountering the stresses. This is the shallowest working in which I know of such problems. The stresses do not appear to be active north of the strike-slip fault. This suggests that either the stresses are residual stresses related to the Cottage Grove faulting or (more likely I believe) the stresses are modern, active stresses that in some places can relieve themselves by shifting the rocks along pre-existing faults, but elsewhere cannot be relieved until the coal is mined.

We did not visit the area having trouble with

IST E.

2ND E.

3RD. S.E.

4TH E.

5TH E.

6TH E.

IST. W.

2ND. W.

3RD. W.

4TH. W.

5TH. W.

INTAKE ENTRIES

RETURN ENTRIES

38'±

Freeman Orient 4
Williamson County
Feb. 8, 1983
John Nelson

Scale 1" = 200'

oblique slip?

many small faults not mapped

Normal fault over 5 feet

Normal fault under 5 feet

Fractures without displacement

Strike-slip fault

stresses - this must await a future visit.

1.) Here is a planar normal fault striking N 45 E, parallel with the mine entry, with the southeast side downthrown the thickness of the seam (5.4 feet) About 20 feet northwest is a second fault parallel with the large fault; the smaller fault has the NW side downthrown 0.8 feet. The roof, of hard black Anna Shale, is intensively fractured along both faults, the fractures being vertical, parallel with the faults, and in places spaced several to the inch. They weaken the roof, and water is seeping out of them in places. Pat says about 10% of the faults in this part of the mine have water associated. These faults show no appreciable drag but the strata have been displaced vertically by minute amounts om some of the parallel fractures.

The Herrin Coal, as noted, is 5.4 feet thick with a prominent shale parting (blue band) 1.1 ft. above the floor. No other significant partings. The roof is black fissile shale at least 5 feet thick. The floor is olive-gray pyritic, carbonaceous claystone with limestone nodules in the lower part (4 feet of the floor exposed along the large fault). The claystone is firm enough to be sheared rather than flow along the fractures and faults.

2.) In next crosscut to south (entries are on 72-foot centers) the large fault has split into many breaks of whichthe largest has no more than a foot of throw. The coal is folded downward to the southeast along a gentle monocline about 50 feet wide and 5 feet or so high. Near the NW side of the monocline some of the fractures have the NW side down thrown forming small horsts and grabens with SE-dipping faults. The faults in map view form a right-handed "en echelon"pattern. See map and sketch.

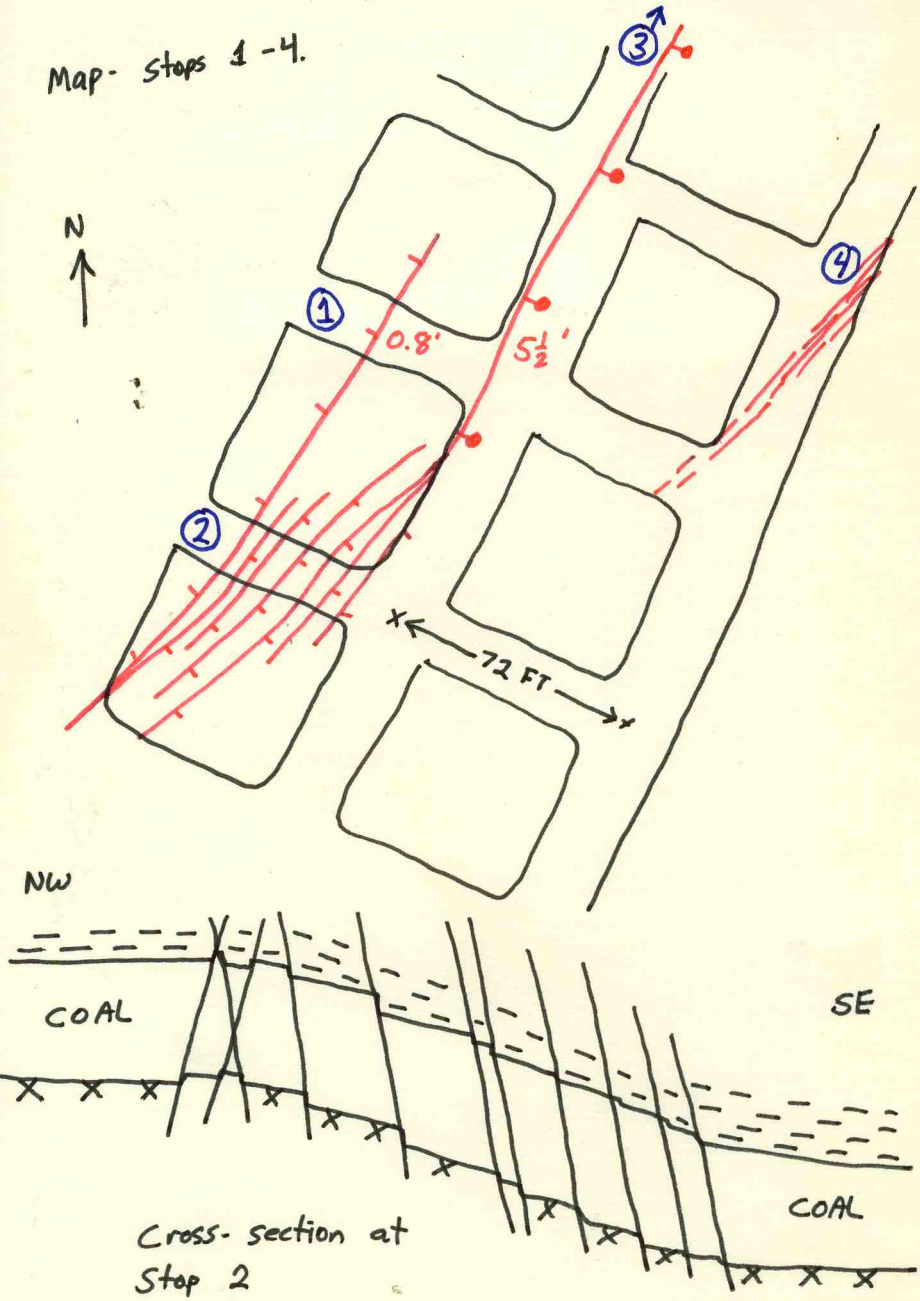
3.) Tracing the same fault toward the northeast we find that it again rapidly splits and dies out into a series of high-angle "en echelon" fractures. It maintains 5 to 6 feet of throw for about 100 feet north of Stop 1 before it begins to split. In this area is not such a pronounced monocline as at Stop 2 but there are many more fractures, most with exceedingly small displacements. They are offset to the right as at Stop 2.

As this fault dies out a second fault appears about 50 feet to the east, and it increases in displacement northeastward.

4.) Southwestern end of second fault referred to above. There is practically no displacement, just a zone of intensively fractured coal and roof shale. A few of the fractures in the Anna Shale are mineralized (calcite ?). Fractures strike N 40-45 E and most dip steeply NW. A few dip more gently, to 30 degrees, and show slickensides indicating dip-slip movement. Locally the fractures are so closely spaced that the coal and rocks appear pulverized. These fractures die out gradually toward the southwest, opposite Stop 1.

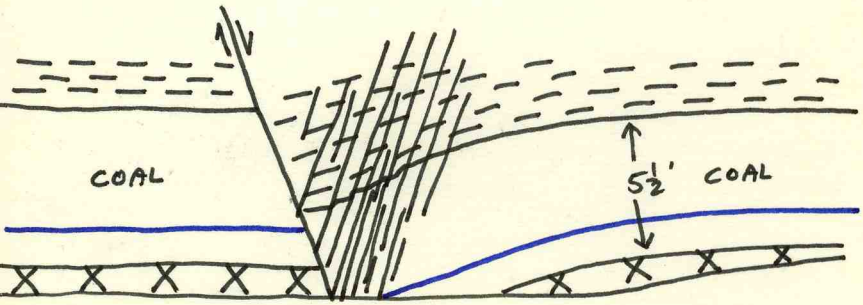
5.) Here is a third fault northwest of and "en echelon" with the fault of Stop 1. Sketch below shows structure. This fault dies out northeastward forming a bundle of fractures, as usual.

6.) Large faults in line with fault of Stop 5 may represent a continuation of that fault. Largest fault trends N 50 E/75 SE and has about 5 feet of throw with the southeast side down. This fault has a zone of gouge roughly half a foot wide (width varies). About 15 feet to the southeast is another fault with northwest side downthrown about 1½ feet; it forms a graben with the 5-foot fault. The smaller fault is not a single clean break, but rather is


Map- Stops 1-4.
N
1
2
3
4
0.8'
5½'
72 FT
NW
SE
COAL
COAL
Cross- section at
Stop 2

Faults at Stop 5

SE NW



composed of a multitude of tiny fractures dipping 45 to 60 degrees NW. The coal is not appreciably folded or tilted in the fault zone. Slickensides on the 5-foot fault are vertical, signifying dip-slip motion.

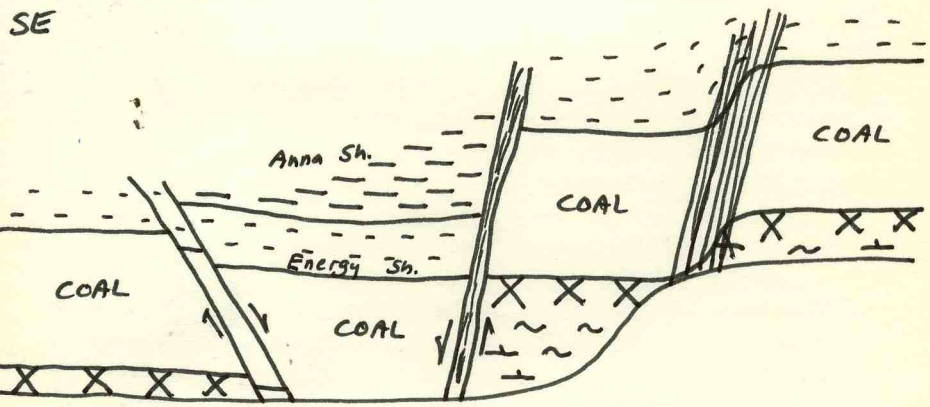
Additional faults, mainly with the southeast side downthrown, lie northwest of the 5-foot fault and strike parallel with it. The roof is severely fractured and is in dangerous condition along the faults.

In the next crosscut to the southwest the structural pattern is similar except that the direction of throw is reversed on the northwesternmost faults. See sketch (over).

The coal is overlain by about 2½ feet of medium gray, poorly laminated, finely silty Energy Shale. The contact of this with the overlying black Anna Shale is sharp, erosional in nature, finely irregular. The two shales interfinger along the boundary, with little wispy streaks of one penetrating the other. Small pytitized fossil fragments are common in the basal few inches of the Anna Shale (i.e. "bastard limestone").

So to generalize, we have examined a region of short, discontinuous high-angle normal faults forming "en echelon" pattern. Pat has mapped additional faults which we did not visit. The larger faults we saw have the southeast side downthrown, so they are antithetic to the major normal fault, which we are about to visit. Faults terminate at their ends in sets of closely-spaced steeply dipping fractures. There are no indiactions of strike-slip movement. These faults appear to be normal gravity faults, produced by horizontal extension of the strata along a NW-SE axis. The right-handed, "en echelon" offset of fractures, as observed at Stops 2 and 3, possibly relates to the overall right-lateral

Faults at Stop 6



nature of the Cottage Grove Fault System. In other words, the faults were formed by horizonaal extension, but as they were forming the ground also was undergoing right-lateral wrenching, producing offset in the trends of the fractures.

7.) Major normal fault cuts off the coal against a face of solid rock. This is the same fault that was encountered at the end of the Southeast Mains southeast of No. 3 Shaft, and it continues along the southeast faces of all the rooms and entries here. The fault surface is well exposed. The main fault is planar and trends N 40 E/60 NW. Additional faults with shallower dip are seen southeast of the main fault, in the footwall. The rock in the footwall is medium gray well-laminated, firm micaceous silty shale and/or siltstone. It is overlain at roof level by a thin bed of brownish-gray coarse-grained argillaceous limestone.

According to Pat, the throw on this fault, as determined by drilling, is about 38 feet down to the northwest. My own examination of the drilling records confirms this. Electrical logs of holes drilled by Freeman very close to this site indicate a persistent 1-foot-thick limestone below the Briar Hill (No. 5-A) Coal and 38 to 40 feet below the top of the Herrin Coal. This limestone probably is the one observed here in the footwall of the fault.

Slickensides are present along several of the fault surfaces. Some indicate pure vertical dip-slip movement; others are inclined, indicating oblique slip. The oblique slippage may reflect rotation of slices of rock within the complex fault zone. The fault does not necessarily have a horizontal component of movement.

Approximately 30 feet northwest of the normal

fault, and roughly parallel with it, is a prominent strike-slip fault. This fault consists of several nearly vertical, subparallel faults with tilted and folded blocks between. The structure is quite complicated but unfortunately there is too much dust and debris on the ribs to see many details. Horizontal slickensides and mullion are very well developed on the fault surfaces. A lot of water is dripping out of the fractures in the roof.

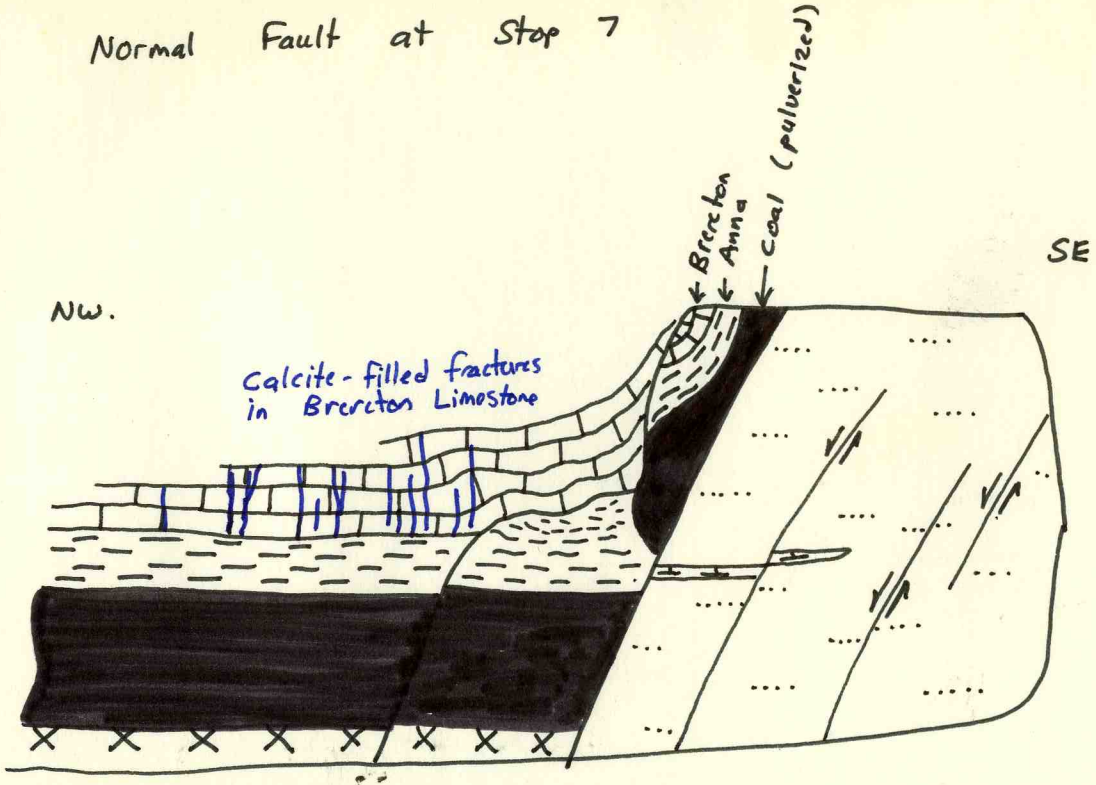
In the next place to the northeast the same faults are visible. The strike-slip fault trends N 45-50 E and is straight and nearly vertical. There is very little vertical component of slip. The coal and adjacent rocks are contorted along the fault; once again, horizontal slickensides and mullion are prominent.

The large normal fault is cleanly exposed and shows compound fractures (see drawing, over). The main fault is planar and trends N 45 E/50 NW. The well-laminated silty shale of the footwall is truncated cleanly and displays no drag, although several small subparallel faults displace it. Northwest of the main fault is a large slice of crushed coal and rock. The thin limestone, seen in the footwall at the previous stop, is not apparent here.

The silty shale contains numerous thin parallel laminae of white calcareous sandstone, and also lenticular beds of soft, medium brown very fine-grained limestone (?).

8.) Good view of strike-slip fault about 200 feet southwest of Stop 7. Here the fault shows vertical movement, the northwest side downthrown about 5 feet. Near the main fault the beds are crushed and contorted and offset by small reverse faults. The direction of folding or drag is not consistent.

Normal Fault at Stop 7



The fault also is exposed in longitudinal section along the northwest rib of the entry between Stop 7 and 8. Several smaller strike-slip or oblique-slip faults branch away from the main fault, assuming a southerly trend. The coal on both sides of the main fault is overlain by Anna Shale. No clear indication yet of the direction and amount of strike-slip motion.

9.) Oblique-slip fault, noted in passing. Fault trends N 30 E and dips SE at a variable angle. The southeast side is downthrown about 3 feet. Slickensides and drag folds indicate component of horizontal movement.

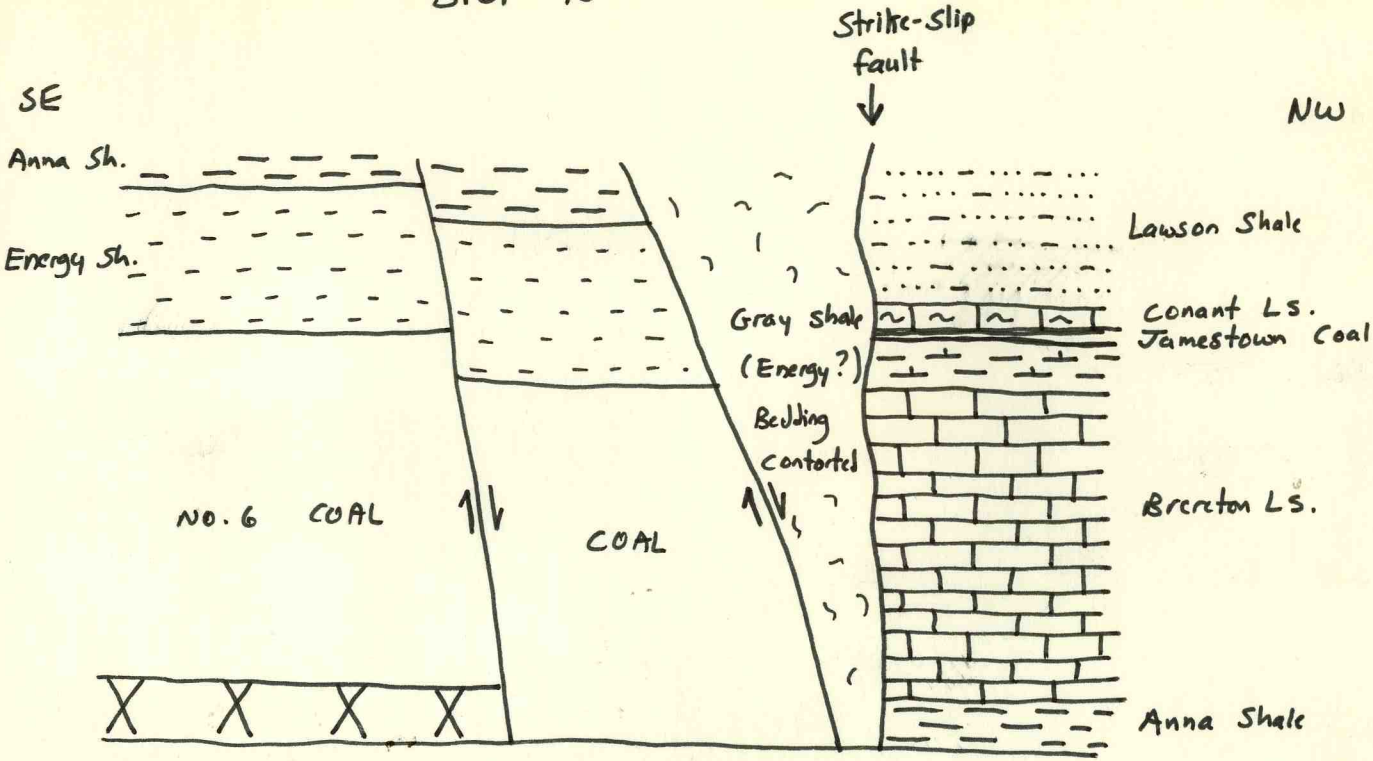
10.) Complicated structure produced by the intersection of two faults. A normal fault strikes roughly N 30 E and had the northwest side downthrown 6 feet or more. Intersecting it is a strike-slip fault trending about N 45 E. This probably is the fault observed at Stops 7 and 8. It has very prominent horizontal slickensides and mullion. The fault plane is nearly vertical, but sinuous, as shown in the sketch (over).

From the available exposures, in the little time we have, we cannot determine whether one fault offsets the other. I suspect both normal and strike-slip faults may be the same age, formed in the same action.

Also seen here is a clear subdivision of the Energy Shale into a lower dark gray, thinly laminated member and an upper, lighter gray, poorly laminated member. The lower dark unit is roughly 2 feet thick but its thickness varies along the rib. The contact between the two shales is sharp, possibly an erosional surface. The Anna Shale overlies both with definite unconformable contact.

The Brereton Limestone, thin Jamestown Coal, Conant Limestone, and lower part of the Lawson Shale can be seen on the northwest rib where they have been downthrown by faulting.

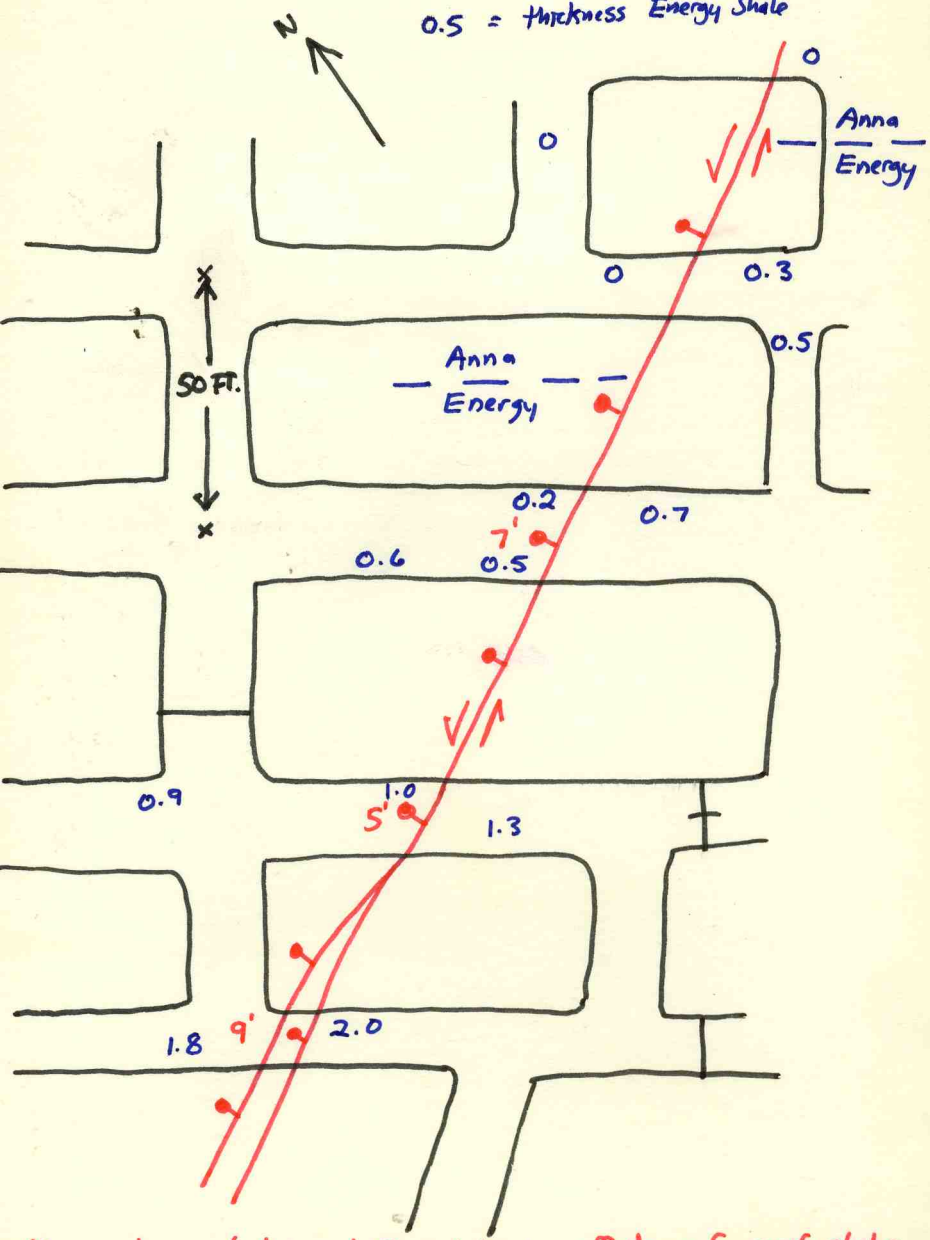
STOP 10



11.) See sketch map (over). Strike-slip fault offsets lateral boundary between Anna Shale in the roof. The offset is roughly 50 feet in a left-lateral direction. Precise measurement is not possible because the changes in thickness of the Energy Shale are very gradual and the edge of the Energy Shale cannot be picked with precision. This is the lower, dark member of the Energy Shale. The difference between Anna and Energy Shales is subtle and may be gradational. Nevertheless there is no doubt about the left-lateral offset.

The main Cottage Grove fault, north of here, is right-lateral and trends roughly N 70 W. Our left-lateral fault, therefore, is a good example of a conjugate or second-order strike-slip fault. It makes about a 65-degree angle with the main fault, about as expected for a conjugate fault.

STOP 11 (SKETCH MAP)



Map demonstrates left-lateral offset of roof shales

Visit to Orient #4 Mine, Freeman United C. C.
Shaft Mine, Herrin (No. 6) Coal
Sec. 29, T. 8 S., R. 4 E, Williamson Co., IL
Feb. 8, 1983
Notes by D. K. Lumm
Field partner: W. J. Nelson
Accompanied by: Mr. Pat Peterson, Mining Engineer,
Freeman United C. C., Mt. Vernon, IL

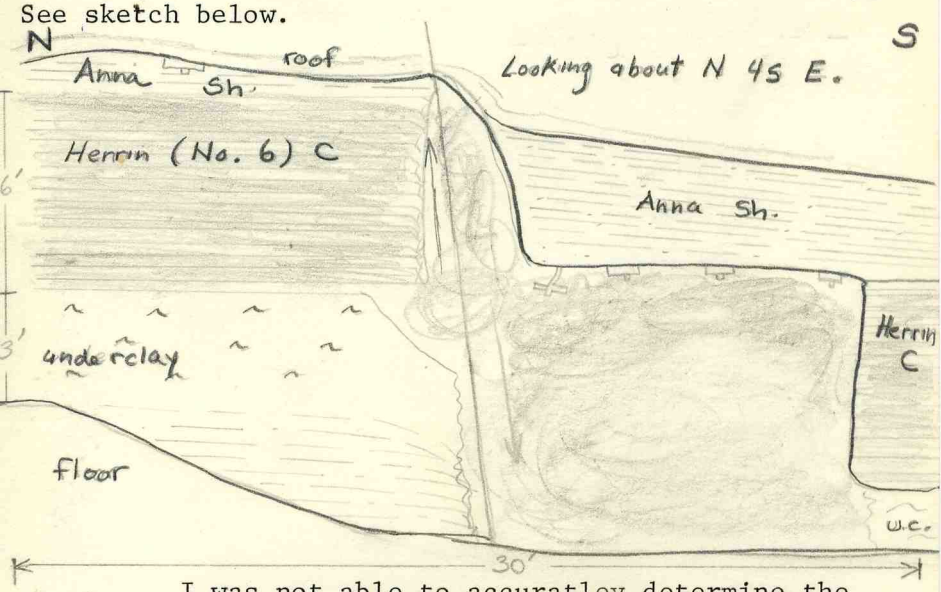
Purpose of visit is to examine normal and strike-slip faulting of subsidiary faults of the Cottage Grove Fault Sytem. The subsidiary faults strike about N 30-60 E and connect with the master fault located as close as 1500' to the NE. The amount of vertical displacement is reported to vary from 1'-40'. The amount of horizontal displacement is unknown. Most of these faults occur nearly parallel to the 3rd East- a set of entries trending about N 55 E. See my map.

Current mining practice is continuous, pillars are not pulled. Most entries are oriented approximately N 45 E. Mining is advancing toward the SW and is projected to turn S in a year or so. The mine is entirely south of the master fault where the displacement is down to the N. The regional dip is to the N at about 50'-200' per mile. Depth to coal is about 300'.

In Mine Tour

Stop 1. Intersection in return entry connecting with 2nd SE, 340' S.L., 960' E.L., SW SE SE Sec. 30, 8 S., 4 E.

High angle normal fault is exposed at 4-way intersection. The fault is nearly parallel to the strike of the entry and trends N 40-45 E. It cuts very near to the rib/roof contact on the N side of the NE entry. See sketch below.



I was not able to accuratley determine the trend or dip of the fault because of the lack of a smooth planar dip surface. Face cleats and butt cleats are given below.

Face cleat	Butt cleat
N 42 W	N 50 E
N 44 W	N 52 E
N 45 W	
N 48 W	

Stop 1 (con't)

There is a small zone of pulverized coal near the fault. There is no fault gauge present, it probably existed before mining but being considerably weak fell out where a void space now exists. Coal shows slight to moderate amount of norm-1 drag.

The blue band is approximately 1"-1½" thick and occurs about 12-14" above the base of the seam.

The Anna Shale forms the immediate roof. It is typically developed: black, fissile, with pyritic fossilized fragments and is about 5.5'-6.0' thick.

The Brereton Limestone is exposed at the very top of the roof along the fault. It is out of reach for study.

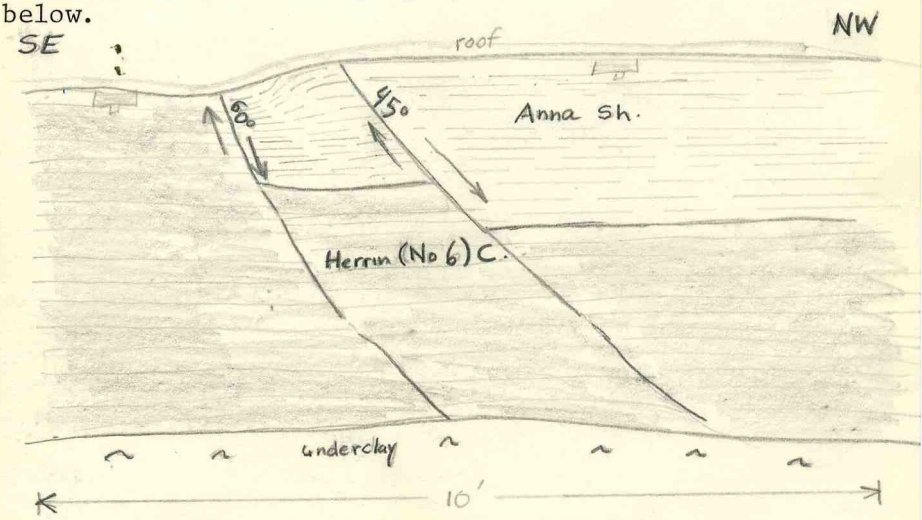
The underclay is soft but grades downward into a silty shale.

Stop 2. SW corner of rib at 3-way intersection of return entries off of 2nd SE; 310' S.L., 1070' E.L.; SW SE SE Sec. 30, 8 S., 4 E.

A normal fault occurs on SW rib at 3-way intersection. Fault plane dips 53° N. Trend cannot be determined accurately; fault is exposed on only one rib. See sketch below:

Stop 3. Middle of NE facing rib in 2st crosscut connecting intake and return entries; 0' S.L., 1440' E.L.; SE SW SE Sec. 30, 8 S., 4 E.

En echelon normal faults are located in crosscut. Faults trend approximately N 50 E. Some normal drag and fault gauge present. See sketch below.



Stop 4. 1st entry NW of single entry connecting 2nd East and 3rd SE, 460' N.L., 1310' E.L.; NW NE NE Sec. 31, 8 S., 4 E.

Oblique slip faulting can be detected on the SW facing rib. The amount of vertical displacement is estimated to be approximately 10'-15' feet, based on the juxtaposition of a hard, dense limestone (Brereton Limestone) downdropped against the No. 6 Coal. The amount or direction of horizontal offset cannot be determined. This shearing is marked by a prominent fracture in the roof trending N 38 E. The length of the fault is probably no more than 70' as the trace does

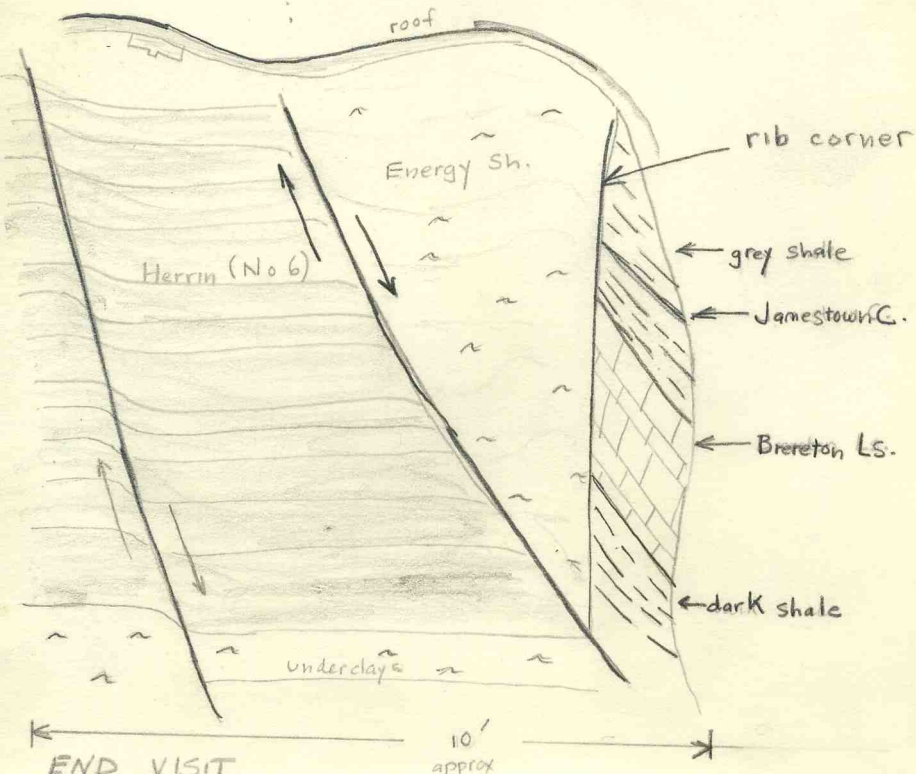
Stop 4 (con't)

not penetrate the adjacent crosscuts. The displacement is down to the SE. One slickensided surface of Energy Shale pitches approximately N 35-40 E.

Stop 5. SE facing rib at elbow turn of northernmost entry of 3rd East, 1200' N.L., 2440 E.L.; Sec. 31, 8 S., 4 E.

En echelon high angle normal faults having a component of strike-slip can be seen on crosscut rib which makes a right angle bend to become an entry. See sketch below.

Oblique view of oblique-slip fault.

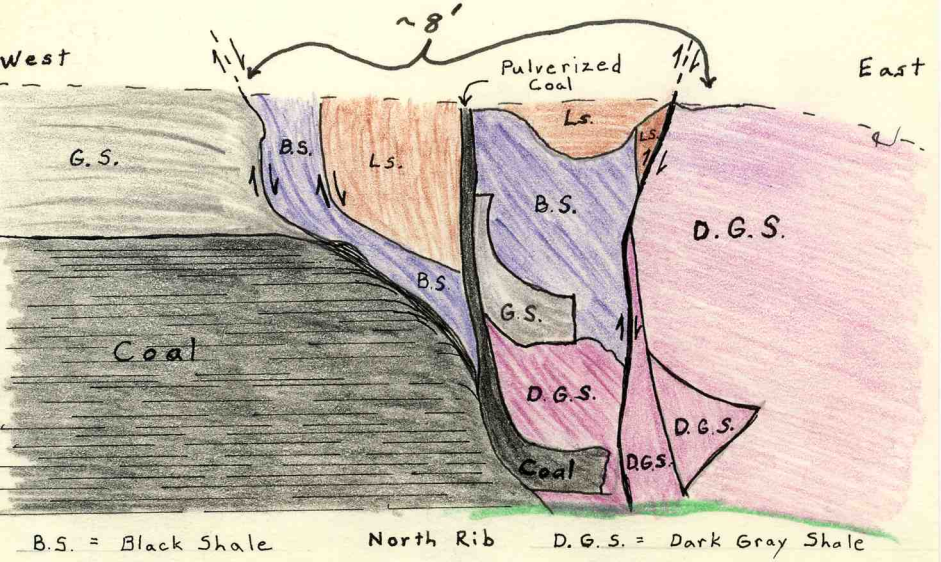


Freeman United C.M.C. 6/21/84
Orient No.4 Mine

Notes by Steve Danner on a visit with Gene Robertson. Purpose of visit was to observe a fault that had been encoutered at the face of the 8th East Mains on the southeastern edge of the mine.

The new fault was encountered just a day or two prior to our arrival. It is located about 400 to 500 feet east of the 1st Main North off the 8th Main East (600'from SL, 1300' from WL, SW$\frac{1}{4}$ Sec. 32, T.8S., R.4E., Williamson County). It is a high-angle normal fault that is down-dropped to the east. It trends about N20-30°W. The fault has been encountered in the four northernmost entries of the 8th Main East, but can be seen in only the 1st and 4th entries because of caving at the face of the 2nd and 3rd entries. The sketch on page 2 shows the fault in the 1st entry. The miners abandoned the face as soon as they hit the fault.

The sketch below shows the fault in the north rib of the 4th entry. The miners have advanced the



B.S. = Black Shale
G.S. = Gray Shale

North Rib

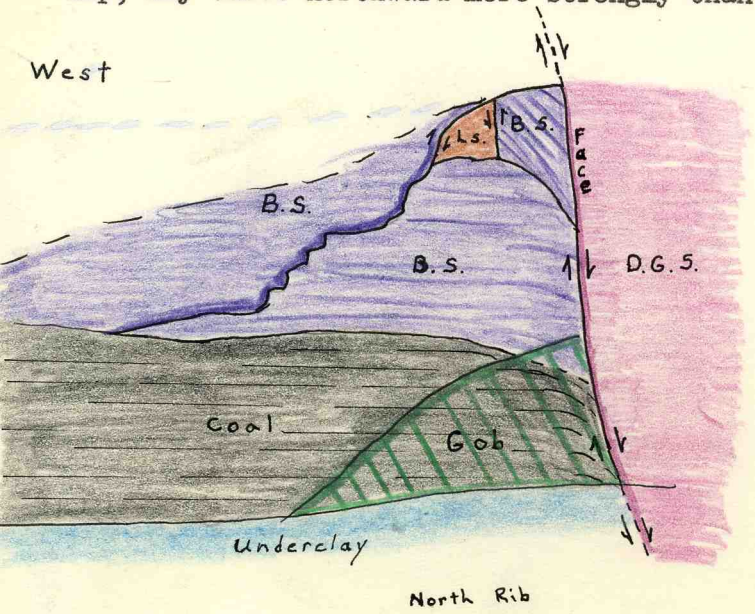
1" ≈ 4.0'

D.G.S. = Dark Gray Shale
L.S. = Limestone

face about 40 feet beyond the fault, and down a rather steep grade. At the time of our arrival they had just bottomed out at the top of a hard limestone. It appears that the vertical displacement may exceed 25 feet.

The fault zone contains very little gouge. It consists mostly of displaced blocks of the three shales and limestone. The Herrin Coal in this area is overlain by 3 to 8 feet of gray Energy Shale, which in turn is overlain by the black Anna Shale. This shale is probably several feet thick and is capped by the Brereton Limestone. The dark-gray shale in the sketches is probably equivalent to the Lawson Shale, which may be 15 to 20 feet thick. Conceivably, this fault could have as much as 35 feet of throw. For the miners' sakes I hope it isn't.

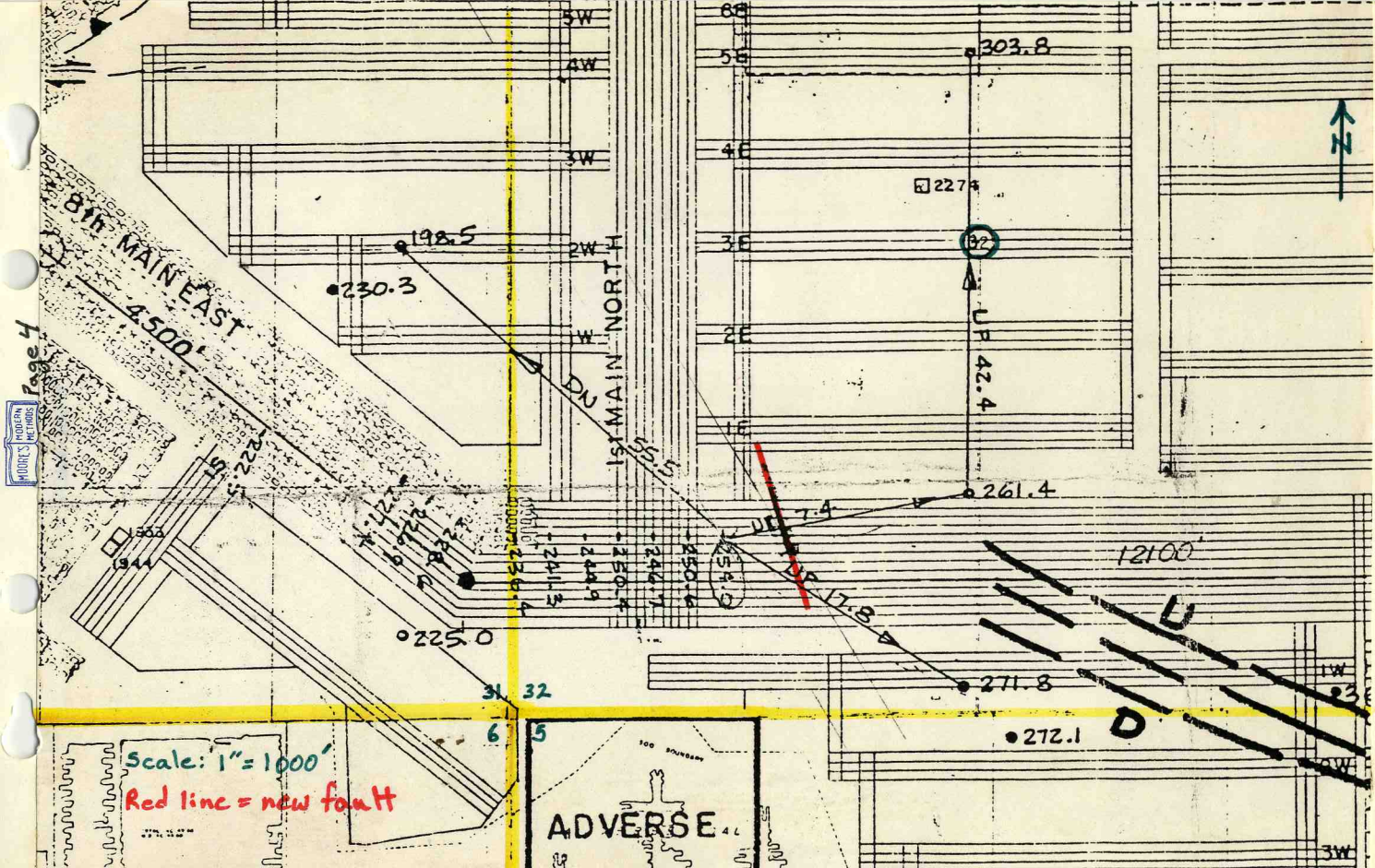
The strike of the new fault does not line up with any previously mapped faults in that area. It is possible that the NW trending fault, shown in the SE corner of Sec. 32 on the company mine map, may curve northward more strongly than expected.



However, the throw of that fault is opposite of the throw of the newly encountered fault. Although there are numerous coal test holes in the vicinity of the fault, the top-of-coal elevations are of little help in sorting out the structure. I'm afraid the miners are going to have to find out what is happening the hard way.

Page 4 of these notes is a copy of the south-eastern-most workings of Orient #4, showing the mined areas and the projected workings in the vicinity of the new fault.

SKD


8th MAIN EAST
4500'
1st MAIN NORTH
5W
4W
3W
2W
1W
1E
2E
3E
4E
5E
6E
198.5
230.3
303.8
227
42.4
261.4
7.4
17.8
271.8
272.1
225.0
12100'
Scale: 1" = 1000'
Red line = new fault
ADVERSE
31
32
6
5
Page 4

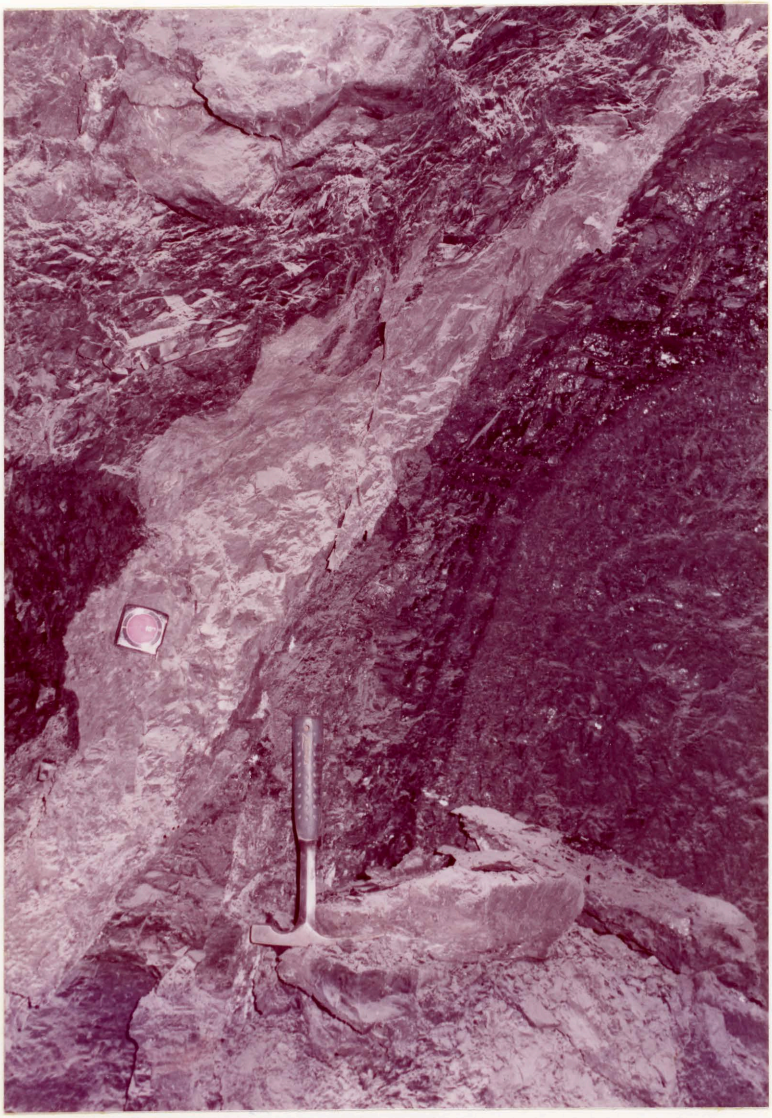
Series of photos by Eugene Robertson, showing fault zone in 8th Main East near 1st Main North, Orient No. 4 Mine.

This view shows dragged and brecciated rock along normal fault. Tape measure rests on light gray Energy Shale on downthrown block; black Anna Shale overlies Energy Shale to left. Fault plane about 6 inches to right (west) of tape); Herrin Coal to right of fault.

Up is to right.

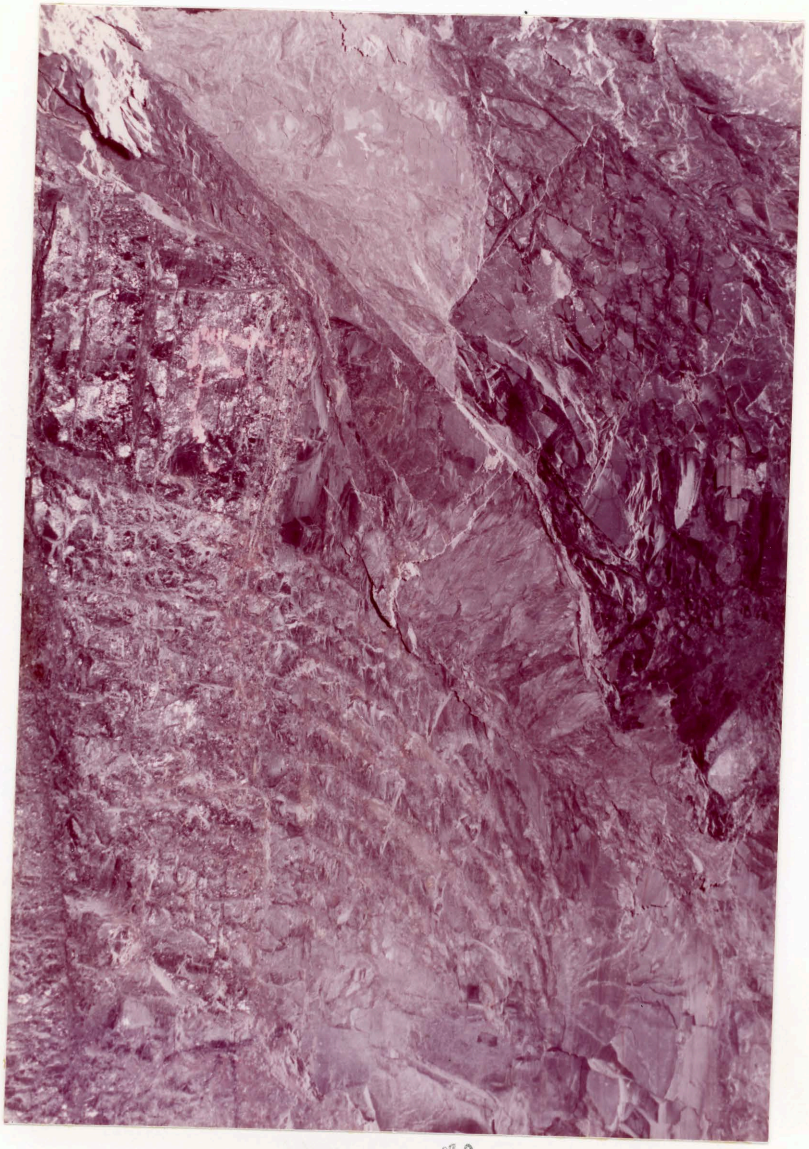
mn-45-027.tif

A more complete view of the fault zone, same site.

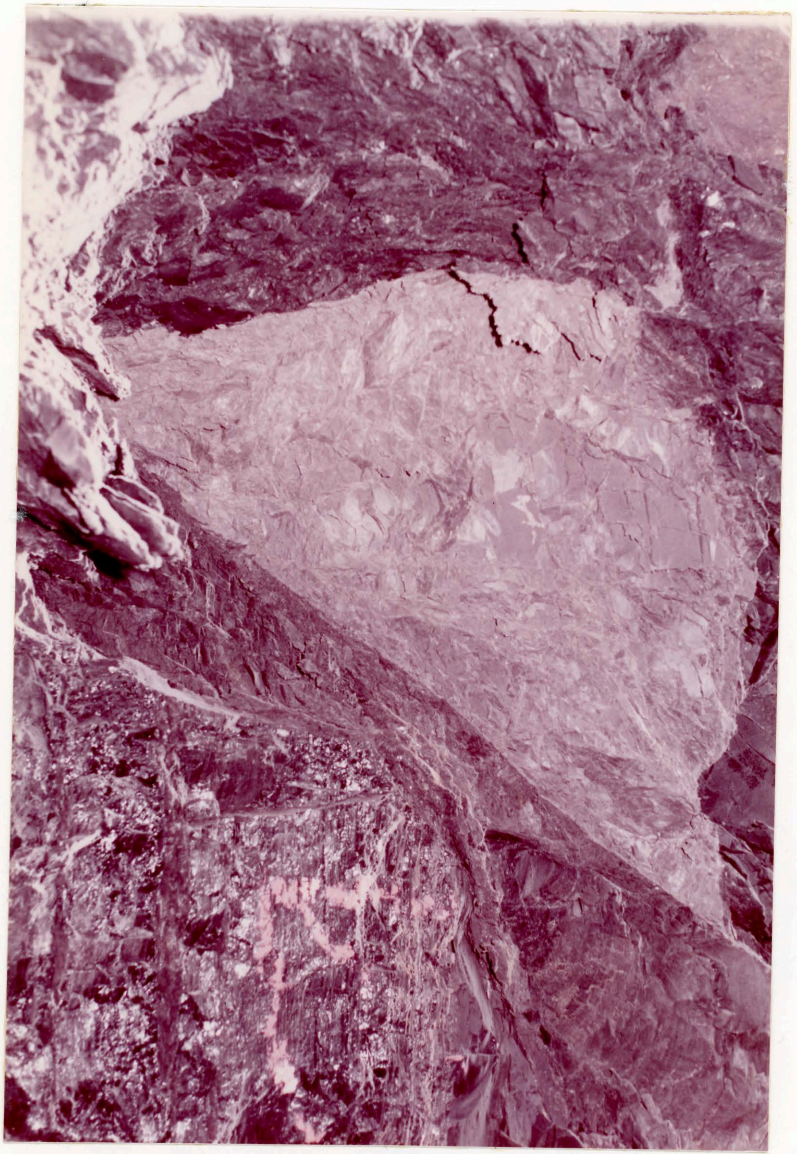


mn-45-028.HP

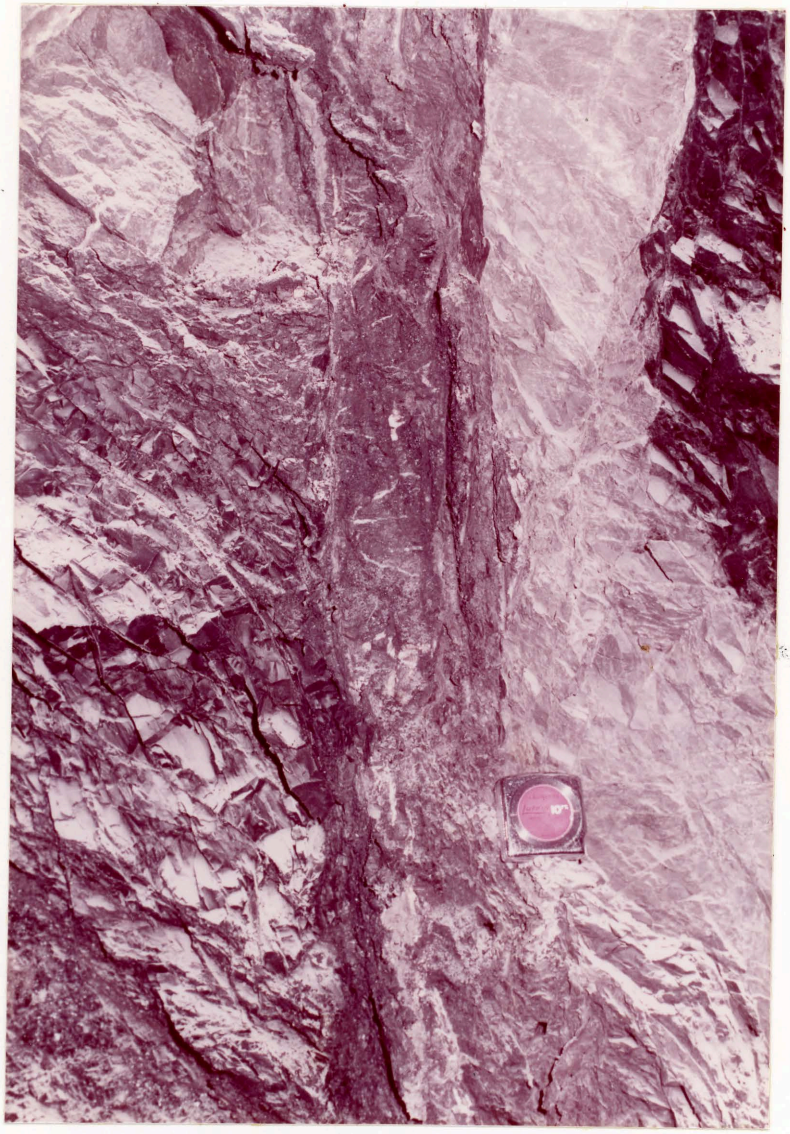
View above and to right of last (top is to right). Note variation in width of fault zone; a lenticular slice of relatively unfractured Energy Shale between two gouge-filled planes.



Same location: another slice of Energy Shale along fault zone.

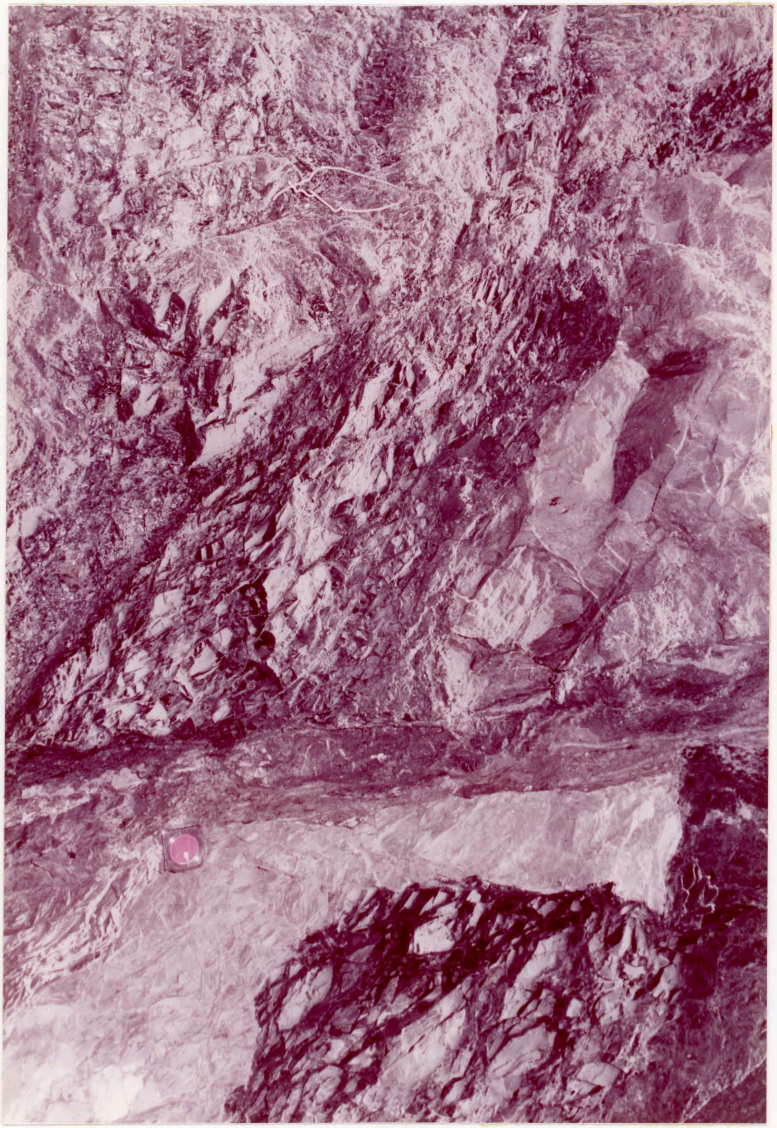


View of fault on north rib of same entry. Energy and Anna Shale on right, downthrown block dragged to nearly vertical position; coal and shale left of fault are dragged and heavily sheared.



MA-45-031-AP

North rib, view from farther back. Top to right.



Another view; gouge along fault plane.

Same place, rock dust cleared off for a better view.

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FREEMAN UNITED, JOPPA ENERGY DISPUTE CLOSES ORIENT 4 MINE

Operations have been suspended indefinitely at Freeman United Coal Co.'s Orient No. 4 mine near Marion IL in the wake of a sharp cutback by the mine's primary customer, the Joppa Electric Energy plant. The coal company also reduced the work force at the Crown II mine near Virden IL, blaming a soft coal market for that work force reduction.

Freeman held a contract to supply Joppa with 700,000 tons of Orient No. 4 mine coal which should have run through Dec. 31, 1989. According to George Rice, president of Joppa, the contract with Freeman called for a maximum delivery of 700,000 tons annually through 1989. But the utility's major industrial customer cut back power purchases, prompting Joppa to make a corresponding cut in coal purchases.

Another official at Joppa said the utility had become unhappy with coal prices. "We cancelled the contract because of costs," he said. The utility and coal company entered into a negotiated settlement which ended the contract, Rice explained.

Joppa will go to the spot market sometime this summer, Rice indicated. "We've had some good offers," he said, although there has been no final decison on a new supplier or the amount to be purchased.

May 25, 1987 • COAL WEEK

FREEMAN CASHES IN CONTRACTS; A BUYOUT OR SELLOUT IN THE WINGS?

Lost contracts and an over-active rumor mill are turning 1987 into a forgettable year for Freeman United Coal Company, which has become the center of rumors that it will be bought by Consolidation Coal and speculation that the company is getting ready to get out of the coal business.

Locked into high-priced Freeman contracts during a falling spot market, Union Electric Company negotiated a buy-out in May for Electric Energy's Joppa plant with the Chicago-based coal producer. Union Electric now handles coal buying for Electric Energy. Similar discussions with Hoosier Energy resulted in the Indiana utililty's agreeing to pay $86.5 million to buy up the remaining 22 years of a Freeman contract.

"We hope to terminate the Freeman contract in the near future," said Dale Winter, manager of power supply for Hoosier Energy. the deal is awaiting federal approval.

The Hoosier Energy contract was originally signed in 1977 and renegotiated in 1984. It called for Freeman's Crown III mine in east-central Illinois to supply 1 million tons of coal a year.

Crown III is still operating, though union officials fear cutbacks are likely. When Electric Energy pulled its contract, Freeman's Orient #4 mine was closed indefinitely.

Freeman held a contract to supply Joppa with up to 700,000 t/y through Dec. 31, 1989. The small southern Illinois utility has not yet replaced the Orient 4 tonnage said Electric Energy president George Rice.

Pat Harrington, manager of group purchasing for Union Electric in St. Louis, confirmed the Orient 4 contract was "completely terminated" in May. He declined to reveal terms of the agreement. Harrington did add, however, that the utility is not renegotiating its contract with Freeman's Orient #6 mine.

United Mine Workers officials told *Coal Week* they had heard UE wanted to trim the Orient 6 contract, which they said was in the $42/t range. Even more alarming, union officials said, Freeman may be on the selling block. "Freeman has a cash-flow problem," insisted one union source who said he got his information from a company official.

Freeman vice president Jim Ryan scoffed at rumors that his company might be for sale. "You don't have time to clear up all the rumors," he said with a laugh. Turning serious, Ryan said Freeman is "in business to mine coal" and has no plans to change despite some contractural setbacks.

But one coal industry analyst disagreed, saying Freeman is getting ready to cash out of an Illinois Basin coal market he called "deplorable."

Freeman United Coal Co. Orient No. 4 mine
Williamson Co. 12-3-80

Pat Peterson: geologist w/ F-U

#3 Portal

Loc A: Intake air:

~ 8' gray shale, 3-4' blk sh, & ls cap. Ls heavily fatured; several fractures trending NW w/ ~ .5' of vert. offset. Gray sh rather brittle & flaguy. Oil stains present locally.

Loc B:

Vert fault, 85° from horiz.; ~ 1.1' displ trends N40E; ~ 2' gray sh under 3+' of blk sh. East side down dropped.

Loc. C: stub for 6 East:

Near vert fault, coal & shale butt up against ls. Trends N40E; parallels jointing; blk shale over ~ 2-3' of gray. Top of Anna exposed at base of ls wall. Some water, not bad. Coal seam rises 2-3' ~ 30' before fault, Rise of seam is due to 4 to 6 synthetic faults. Offsets are nearly vertical, from 2"

to 1.0' of vert displ. Coal & shale dip ~10° into fault.

Thurs ~~10-4, 9:00 a.m.~~:

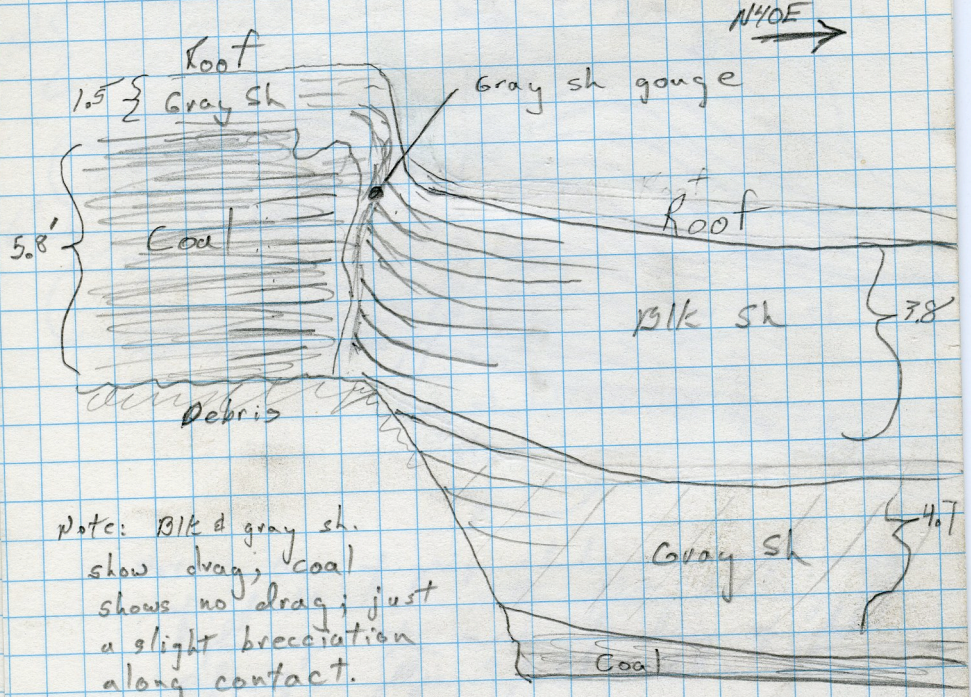
~~7th West: multiple Faulting~~

Loc. F: Series of Faults crossing NW-SE entry; faults tread N 80 E; most distinct fault dips ~45 to South. At least 8' of vert displacement; varies from sharp contact to ~6" of gouge; dun drop to south. Cutns both oblique & horiz slickensides. Coal is brecciated along fault w/ no visible drags

Down side of fault is a block ~32' long

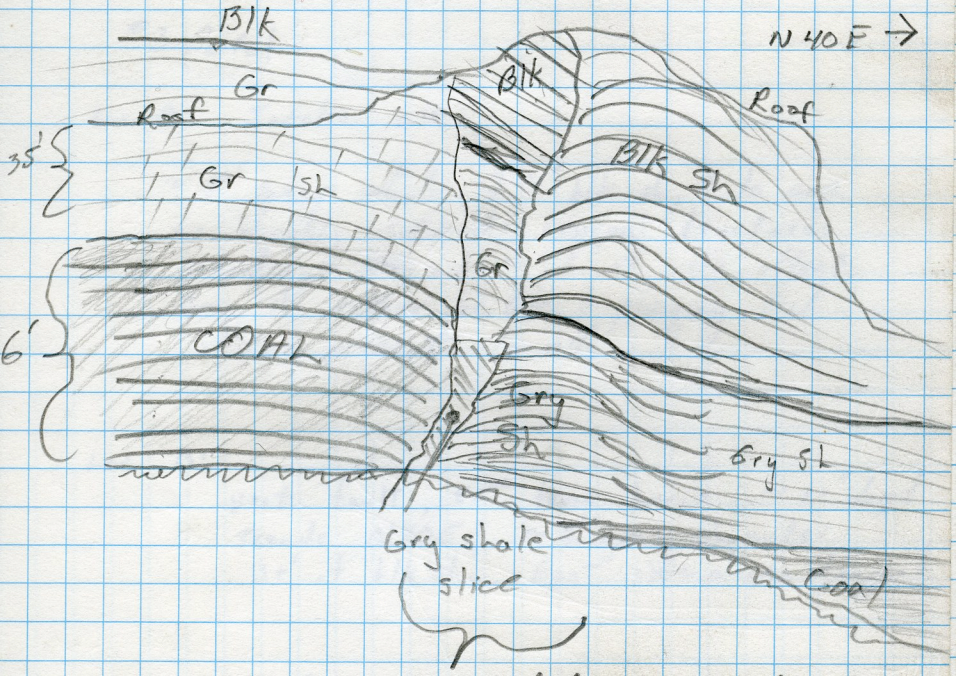
Thurs Dec 4, 1980; 9:00 a.m.

Stop 1: 2 "major" Faults:
Trend N 85° W
North side of northern most fault is dwndrpd ~ 15°



Note: Blk & gray sh. show drag; coal shows no drag; just a slight brecciation along contact.

Stop K: Continuation of northernmost fault from stop J. Trend N 85 W; Horizontal slicks on fault



Note: Base of gray shale on north side of fault has rather flat bedding. The higher up the more bending of bedding planes. This fold continues thru black shale.