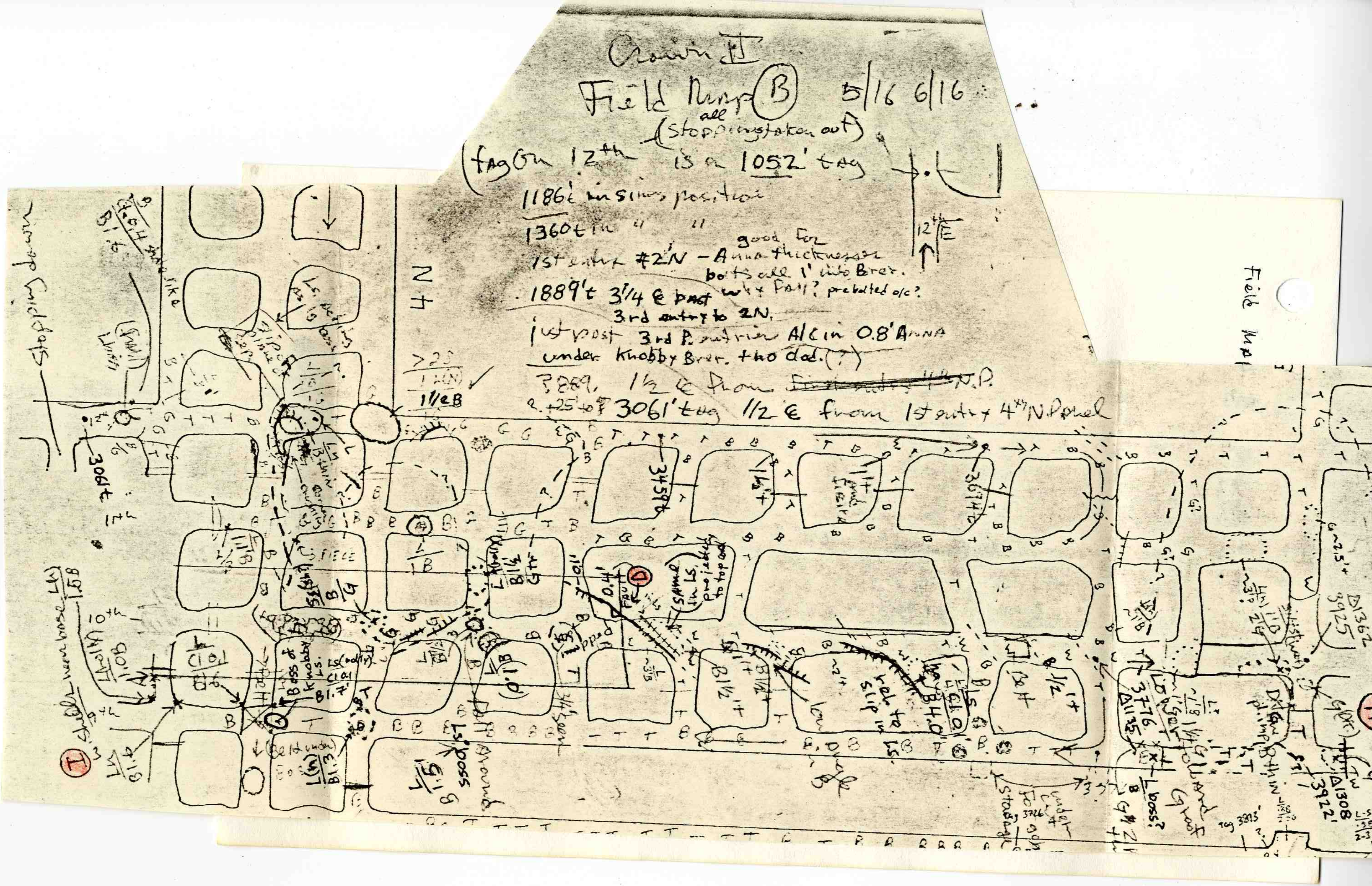
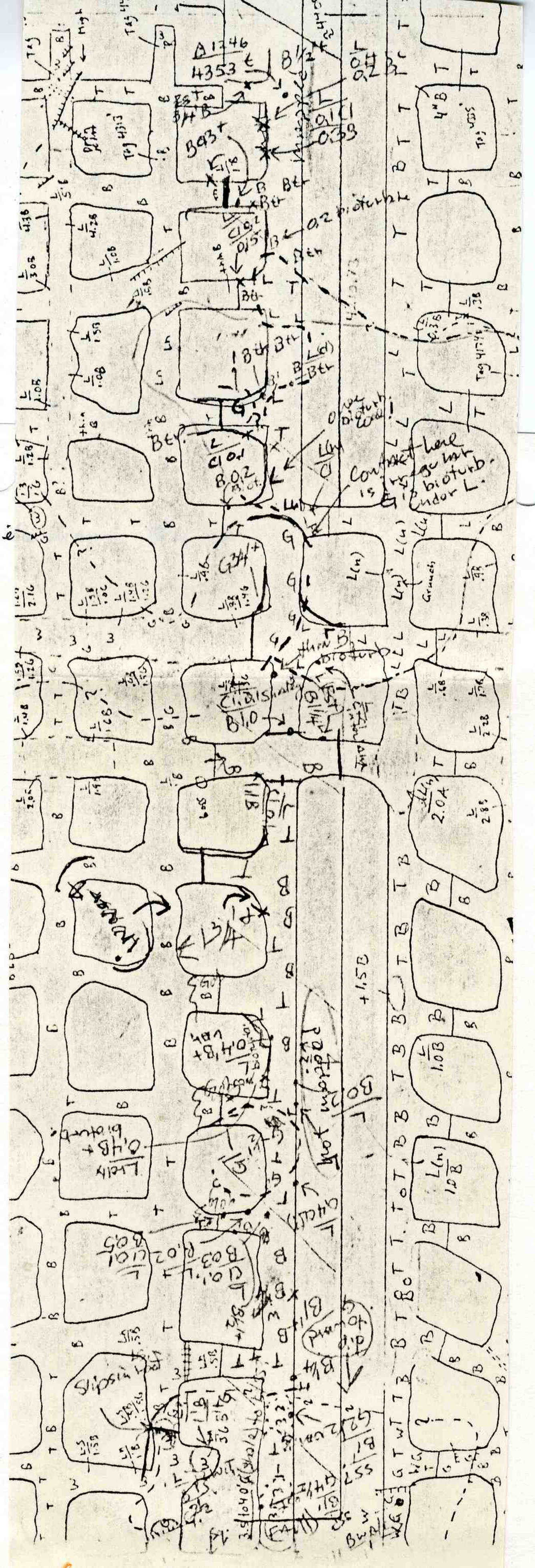

Cavern II
Field Map (B) 5/16 6/16
(all stoppings taken out)
(tag on 12th is a 1052' tag
1186t in same position
1360t in " "
1st entry #2N - Anna thicknesses good for
bolts all 1' into Brev. w/ Kf Fall? predated o/c?
1889't 3 1/4 E past 3rd entry to 2N
just past 3rd P. entries Al C in 0.8' Anna under knobby Brev. tho odd. (?)
3061't tag 1/2 E from 1st entry 4th N. Panel
12th E
N
3459t
3674t
3061t
Stoppings down
rel. to slip in LS.
Ls. boss
around
low drag in B
Holland Graaf
Δ1362 3925
Δ1308 3922'
3776 Δ1135
Field Map


A 1346
4353
0.2 bioturbate
Contact here is irregular bioturb. under L.
Grunch
+1.5 B

Future Research comments

I spoke to Bill D. about what we would like him to comment on - i.e, botanical significance (if any) of types and variety of plants and their quality/mode of preservation relative to depositional environment. He said he would produce a list of species & comment on the above. He was much impressed to find he could distinguish the two primary lycopod species from pyritized leaf scars on coal bedding planes; the stigmaria impressions in the roof were also impressive. If sufficient material is available, Bill indicated it might be worth a small study. I concured & indicated a remapping of the whole area was in order; the lithologic data is equally important to understand the environment & the reconnaissance mapping done so far is insufficient to give much help except for the "big picture" (See Nelson notes; Mar 28-30)

Deficiencies in the mapping prev. done were noted by Mahaffy & myself; the compilation did not contain all previous data. Further, the erosion-effected area or "channel" area as I call it, was defined on the map by a s/L(n) line(S representing Ss. or siltstone of the Anvil Rock/Lawson interval). The problems with this are 1) this division is rarely observable & thus usually inferred, and 2) assumes there will always be a "s"/L(n) boundary.

I planned a remapping of the "channel" affected area, defining it as the "area of later (post-dep.) erosion of Anna sh. or lower units". This will clearly define the area (w. many obs. points) and will allow mapping of L(n) as a separate phenomenon. A new basemap with footages was created for

this purpose (to 3000' N. only).

I believe the following working hypothesis should be considered for the L(n) in the vic. of the "channel"-area; The knobby/nodular Ls. is a product of the partial erosion of the Ls. (prob. as a lime mud) and the subsequent pene-contemporaneous deformation of the Ls. (lime mud?). Poss. causal mech. is the triggering of ~~the~~ reversed density gradient instability between the ls. & bk. shale (muds) and/or locally between sandstone channels/lenses and the ls. muds; slumping at the "channel" banks may also be a trigger mechanism for this deformation.

Samples

Coal balls were taken at "site B" (prev. mapped by Ledvina-early notes) just under "G" roof, near B roof, NNW of shaft.

Dick Harvey requested samples of roof lith. from immed. above the #6; C-2 & C-3 (below) were for this purpose as was the Ss. sample B-9 previously taken. Vit. reflectance checks see also A-6+B-9

Crown II C-1A Anna sh. (poss. w. shells) (split?)

(C-1B & C were taken just around corner)

Crown II C-1B Basal Anna w. Orbiculoidia

Crown II C-1C Basal Anna, (poss. w. shells) (split)

Crown II C-2 "lawson" sh. (Note E.) (CP-2038 to RDH)

Crown II C-3 Coal in lawson interval (Note B) (CP-2039 to RDH)

[over: See Addenda]

May 16/17 notes

Addenda

Sample Crown II C-1A (which was very pyritic & falling apart) was disassembled by DeMaris & Jacobson on Aug. 15, '78

The shells present were largely casts & were poorly preserved. The best preserved shell was a 65 X 32mm pelecypod, prob. Edmondia. Russ felt that examples of both Edmondia and Solemya, were present averaging somewhat smaller than the one measured (above); the pelecypods were mostly whole half-shells with a few poss. broken shells. Jacobson also noted one durithyris planoconvexa and some gastropod frags. (brach.)

One piece of C-1A was retained with very poorly preserved shells.

June - Aug.

Freeman United Coal Mining Co. Crown Mine II,
June 13, 1978
Notes by John Nelson

Mapping faulting area in Main South on scale of 1" = 50'. Phil DeMaris and Bill DiMichele are in the Main North checking plant fossils in the Lawson Shale.

Stop numbers continue from previous visit.

(14) Major roof fall in heavily fractured area. NE-trending fractures penetrate all exposed units; coal, gray shale, black shale, and sandstone. Fractures are more closely-spaced in shale than in sandstone. Fractures are planar, vertical to steeply-dipping, lack slickensides or visible displacement.

(15) Large normal fault in 4th Main South. Strike and dip of main fault plane vary somewhat; average about 140/45°NE. Displacement about 3.8' on west rib, 3.2' on east rib.

At this location the fault shows what could be termed "false drag." The bedding in the coal on the footwall is gently folded upward toward the fault plane, and the bedding on the hanging wall is folded very slightly downward. Effect is more noticeable on west rib. On the east rib a small clay dike-type fault with strongly convergent bedding intersects the main fault.

Two sets of fractures are present in the coal; one set trends parallel, the other perpendicular to the main fault. Away from the fault the fractures are vertical, but approaching the fault the parallel set turns to approximate the dip angle on the main fault. In the main fault zone and 1-2 feet to either side, displacement has occurred along these fractures. Most offsets are normal but apparent reverse movement also has occurred. Right in the fault zone the fractures are so closely-spaced that the coal is pulverized.

Slickensides are common in the main fault zone. They trend nearly in dip direction showing in some cases a small component of right lateral movement. My opinion is that the fault shows features of oblique-slip but that the last movement was essentially vertical.

(16.) North of fault in 4th Main South, the NW-SE trending fractures in the black shale and top coal are dominant over the NE-SW trending set. Locally the NW-SE trending joints are quite intense, closely-spaced and contribute to slabbing of roof shale. But northwards the NW-SE trending set gradually diminishes and the NE-SW set becomes the primary set.

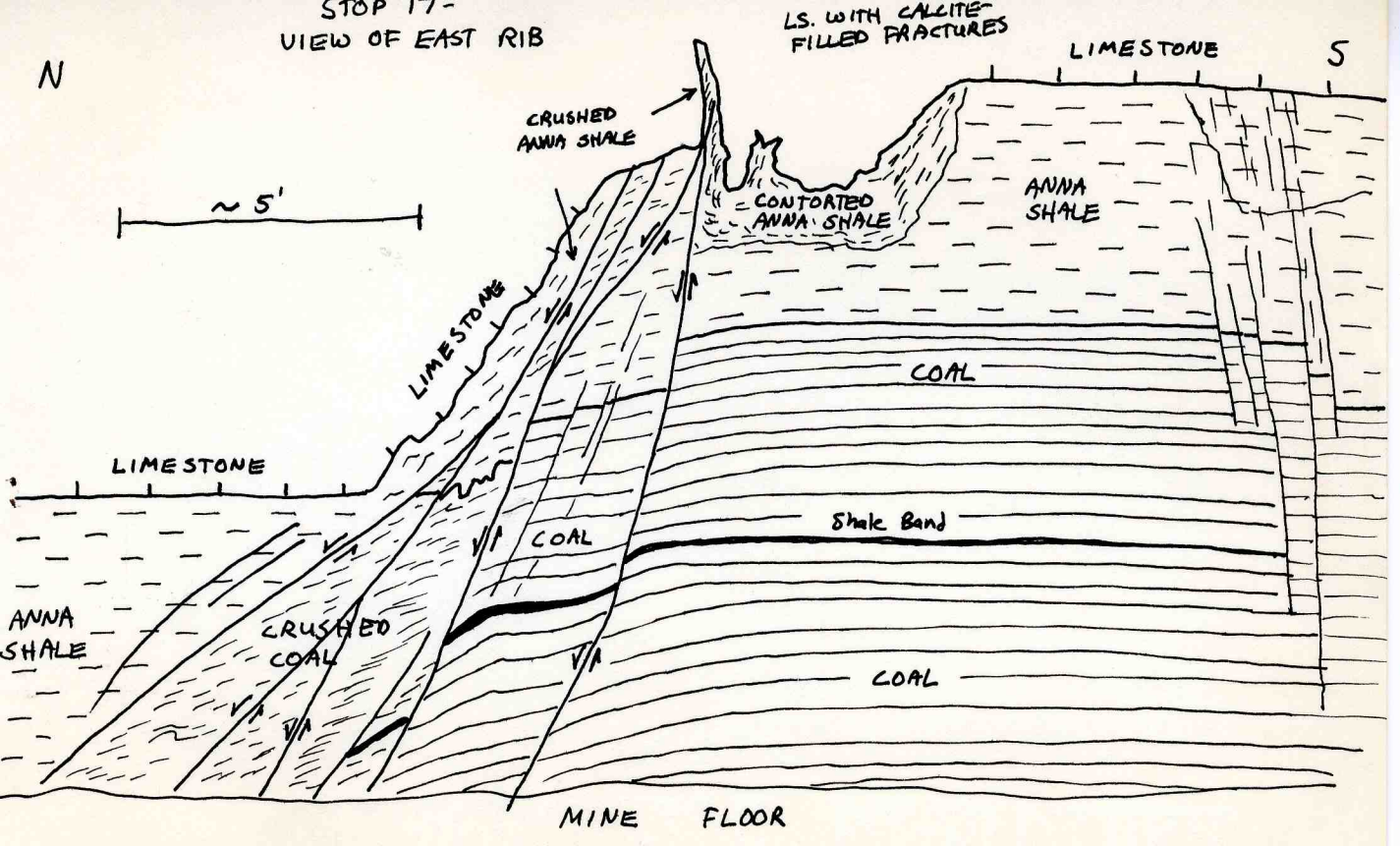
(17.) Normal fault in 9th Main South. See sketches (over).

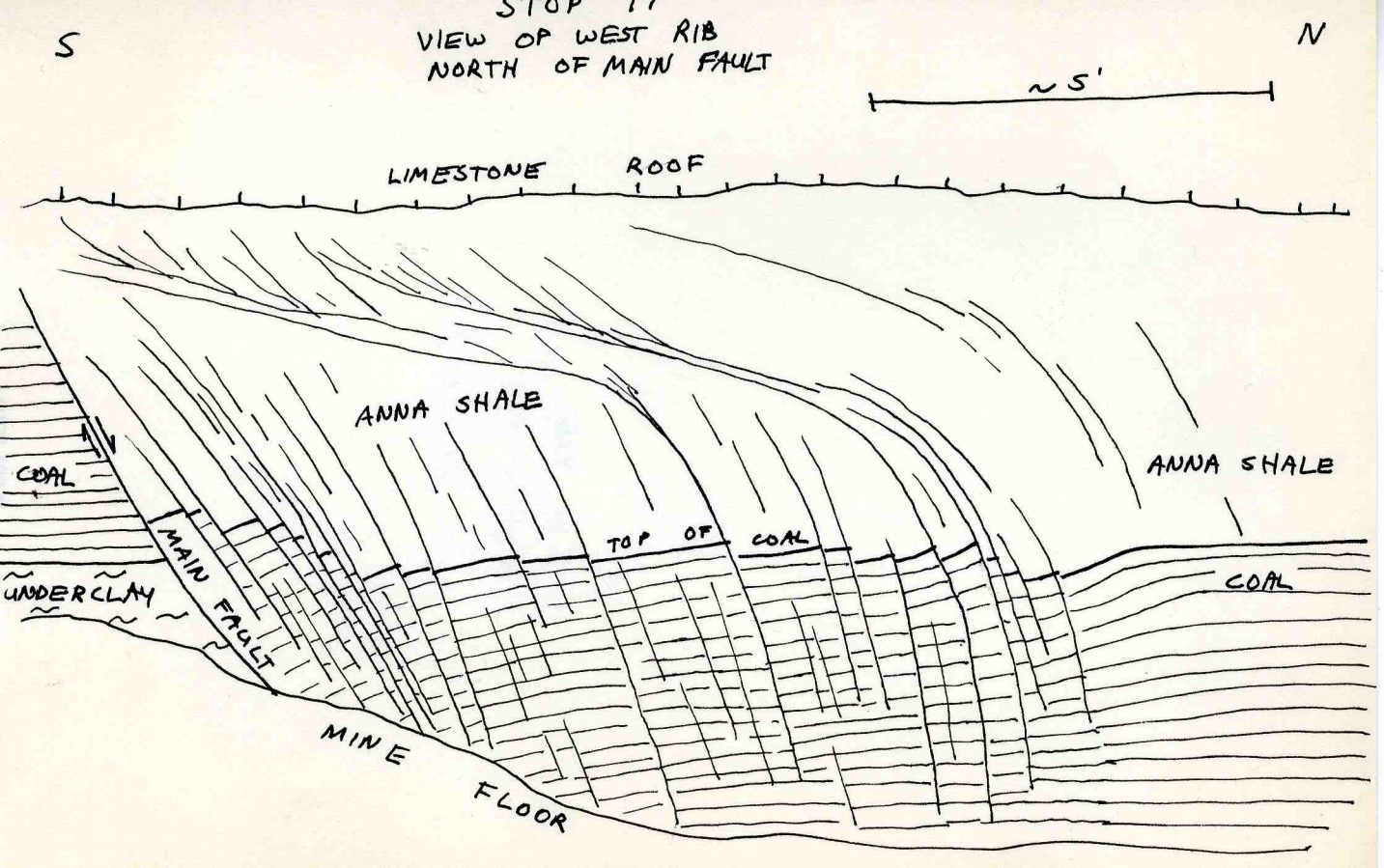
Trend of faulting is 137° (NW-SE). Multiple faults are present. Overall vertical displacement is about 7 feet.

On the east rib the basic pattern is multiple high-angle normal faulting. The faults are nearly vertical in the upper portion, and they diverge and become shallower downward. Slickensides are vertical or slightly oblique (right-lateral component). On same layers drag is shown; coal and shale are crushed. Limestone has multiple calcite-filled fractures parall with faulting and occasional cross-fractures (trending NE) filled with calcite or squeezed-in black shale.

Notable feature is black shale squeezed upward into limestone along main fault plane. Shale is squeezed up at least 2 feet across the full width of the entry. Shale-limestone contact is very irregular in fault zone. The upper part of the black shale is squeezed and contorted, bounded by high-angle fractures that extend up into the limestone.

About 12 feet south of the main fault are a series of SW-dipping high-angle fractures along which the coal is displaced aobut 0.6 feet. The 137° fractures are


STOP 17-
VIEW OF EAST RIB
LS. WITH CALCITE-FILLED FRACTURES
N
S
LIMESTONE
CRUSHED ANNA SHALE
~ 5'
CONTORTED ANNA SHALE
ANNA SHALE
LIMESTONE
COAL
LIMESTONE
Shale Band
COAL
ANNA SHALE
CRUSHED COAL
COAL
MINE FLOOR


STOP 11
VIEW OF WEST RIB
NORTH OF MAIN FAULT
S
N
~5'
LIMESTONE ROOF
ANNA SHALE
ANNA SHALE
COAL
MAIN FAULT
TOP OF COAL
COAL
UNDERCLAY
MINE FLOOR

about 30 feet south of the main fault; and NE-trending fractures become dominant.

North of the fault (best seen on west rib) the coal is penetrated and offset by a great many high-angle fractures which show vertical slickensides. Nearly all displacements are down to the northeast but locally reversals of this trend are seen. The fractures steepen downward and tend to merge in the roof, becoming almost horizontal in the Anna Shale. The fractures die out about 50 feet north of the main fault, and NE-trending fractures again take over. Still farther north, NW-trending fractures again increase in intensity.

(18.) Strike-slip fault and perculiar limestone "roll" in 9th Main South. This has been previously described (see Note 6, John Popp, Jan. 11, 1978.)

Here, and in the adjacent entries to the east, it is difficult to map a through-going strike-slip fault. Elements of lateral movement are clearly present; however, most of the stress appears to have been relieved along fractures that trend roughly 120° and branch southeastward off the main fault line. Most fractures appear to be tension cracks, but some compressional zones are present as shown by pulverized coal and small reverse faults.

The limestone bulge is not like a typical "boss" or "bulge" found commonly in areas of lithologic change. The "white top," reworked shale and clay dike type faults associated with limestone "bosses" are not present. True, there is a gray shale wedge and two small typical "bosses" to the south, but they seem to be unrelated. The coal is sharply folded underneath the big limestone roll. It clearly seems to be related to the faulting, but how I am not sure. Possibly the sediments were not fully compacted at the time of faulting, and the limestone squeezed or slumped downward.

The two directions of jointing in coal and black shale are very intense, closely-spaced, and locally open fractures are present. Intensity of fracturing diminishes away from strike-slip fault zone.

Another Interpretation of Stop 18

The following is interpretation reached in the office after returning from the field.

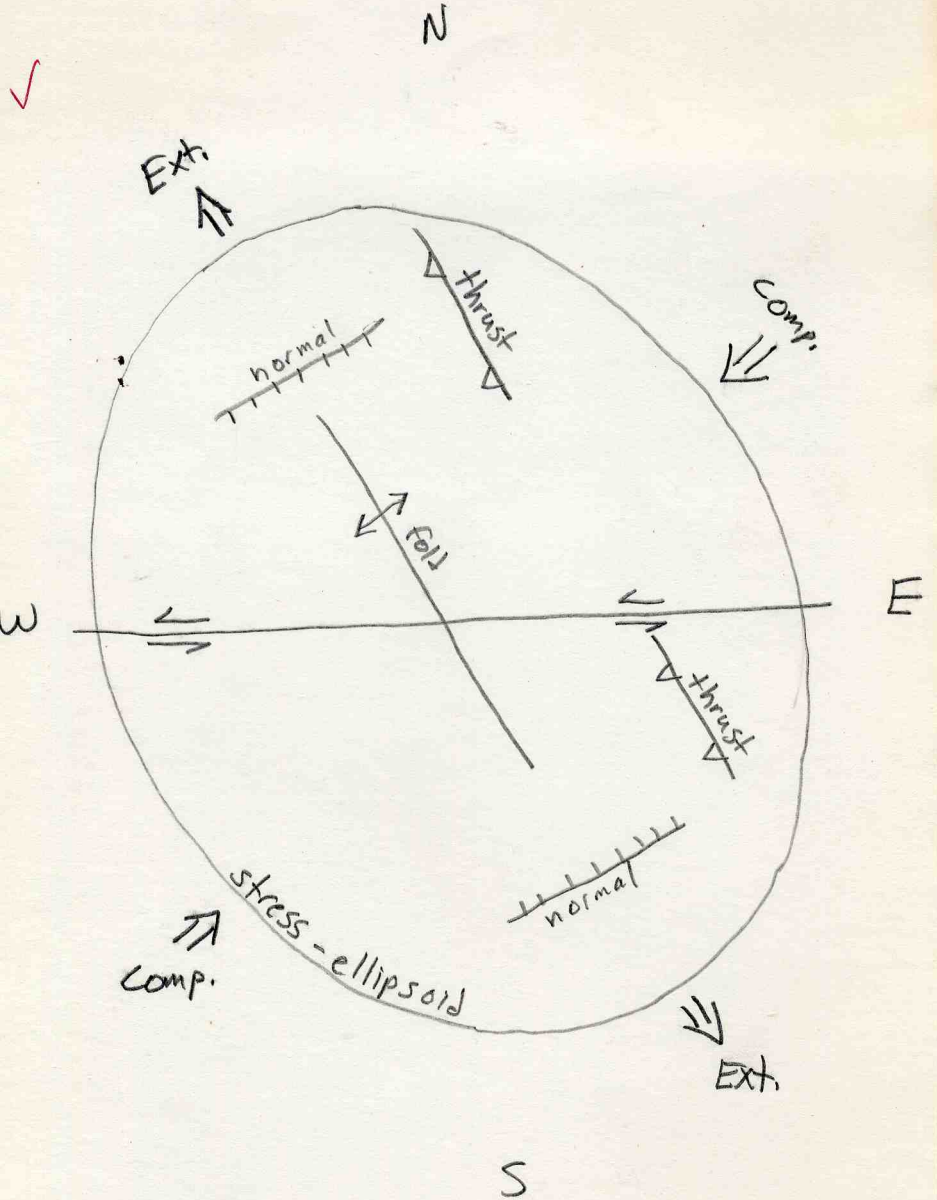
Theoretical considerations of left-lateral wrench faulting, and studies of other known strike-slip faults indicate that a certain pattern of structures should be associated with a left lateral fault. The pattern can be shown on a stress-ellipsoid (over)

For an east-west left-lateral fault maximum compressional forces are orineted NE-SW producing folds and reverse faults whose axes trend NW-SE. Maximum extensional forces are roughly at right angles to compression and produce normal faults or open fissures trending NE-SW.

We have seen abundant examples of NE-SW open fractures in this fault system. The most striking examples are in the 2nd panel south.

The limestone bulge at Stop 18 possibly is a fold produced by the compressive forces. It is oriented the correct direction, slightly south of east. In the two entries east of Stop 18 are several reverse faults trending ESE to SE, lending additional support to the hypothesis.

Possibly the sediments were not fully compacted at the time of faulting, and the limestone squeezed or slumped downward.


N
Ext.
thrust
comp.
normal
fold
W
E
thrust
normal
stress - ellipsoid
comp.
Ext.
S

JUNE 14, 1978

Mapping alone in strike-slip fault zone in 1st Panel S. Since our earlier mapping Freeman has driven rooms west off the panel. Wisely, they have left a pillar of coal along th the main line of the fault, but fault-related problems have been encountered in rooms north of the fault.

I am using a 1"-50' scale base map. The rooms are sketched in by hand. Conditions for study are fair in the rooms. The ribs are rather heavily coated with coal dust. Only a few places could not be examined in detail due to water on the floor or unsupported top.

Numbers refer to locations on field map.

(1.) Location is near end of last room south of fault zone. Primary joint direction in black shale roof is about 053°. Several of the joints are open with light gray or tan clay filling. The joints extend through the entire coal seam, and are vertical or steeply dipping. No evidence of displacement on the joints. In the coal the secondary fracture set trends 135°. Just northeast of this point, 133-135° fractures in black shale are almost equally prominent with the 053° fractures. Clay is present along both joint sets.

We are clearly in the zone of fault influence. Though there is no evidence of vertical movement on the fractures, some extension has taken place, opening the fractures and allowing clay intrusion. I presume the clay was washed in by circulating waters.

(2.) Note in top coal a horizontally striated surface trending 165/ 88°W (almost perpendicular with main fault zone): striated plane is traceable only about one foot; northward it continues about 4 feet as a crushed zone along which the two fracture sets noted above are greatly intensified. I regard this feature as a second-order strike-slip fault, such as has been described in some of the literature on wrench faulting.

(3.) Two parallel sets of open fractures trending about 052/80° NW. They are traceable for over 100 feet and affect roof plus full height of coal seam. Locally

Small displacement (down to NW) has occurred. Clay filling is present in places.

They extend downward into coal as very closely spaced "en echelon" fractures. No slickensides are observed.

(4.) Very prominent jointing (fracturing) in black shale. 053° set has thin calcite fillings; possibly clay; 134° set has little or no calcite. No indication of movement, either vertical or extensional, but both sets are very intense. Spacing varies from about 0.5' to several per 0.1:

(5.) Main strike-slip fault zone, as described by H.-F. Krausse (Note).
In this area the four feet or so of Anna Shale has fallen or been mined down, exposing the bottom of the Brereton Limestone. There is no clearly-defined fault plane. Rather there is a zone of crushed coal and rock about two feet wide. Not much displacement has occurred; the coal top is at the same level on both sides of the fault. I get the impression that the main action is an intensification of the 053° and 134° fractures.

Material is pulverized but no slickensides noted. South of the main fault is a small fault or fracture zone trending 165°/90. Almost no vertical displacement has occurred; indefinite horizontal slickensides in the coal and a healed fracture in the limestone indicates its presence. Probably another 2nd order strike-slip fault, as at Stop 2 (this visit).

Both the 053° and 135° fractures are very prominent in the coal and black shale. Many 053° fractures are seen in the limestone, but no 135° fractures. Many fractures are open; locally coal and shale are pulverized. There appears to have been slight vertical adjustment but no major displacement in this area.

The huge roof fall in the intersection to the east has continued to grow since last visit, and water is still dripping along fault zone. Near the top is a black band which appears to be the No. 7 Coal. The fault zone extends to the very top of the fall; it appears as a narrow gouge - filled graben.

(6.) Face mined close to, but not into fault. Black shale roof is weak and has slabbed about 2 feet up. Two directions of jointing (053° and 133°) are very intense; spacing less than an inch in most places, but little actual movement. One of the NE- trending fractures shows about 0.2' displacement at the top of the coal; downthrow is to the NW. The roof contains many irregular fracture surfaces that again are not true faults.

(7.) Strike-slip fault at face trends 110°/65N-90° dip. Horizontal slickensides are prominent in coal. At the east end where it enters the face the disturbance is quite heavy with the coal downthrown about 0.5' to the north. At the west rib no vertical displacement is apparent; the fault appears to be dying out rapidly. The limestone roof is cut by the fault.

To the east another strike-slip fault is present, dipping south and forming a "graben" with the first. This fault dies out before reaching the west rib.

Coal fractures at face trend 050° and 131°; same as joints in black shale.

My interpretation is that here the mining stopped just short of the main east-west fault. The strike-slip faults at the face are branching off the main fault and dying out away from it. See sketch (over)

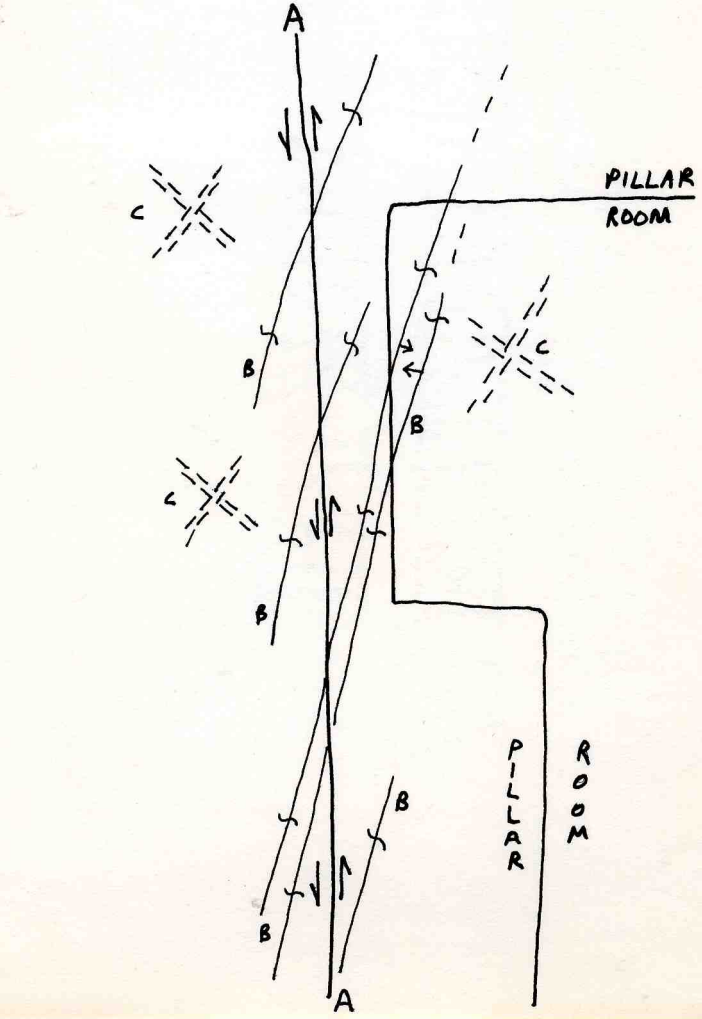
(8.) Structural pattern at this face is similar to that observed in 2nd Panel South; with a series of parallel open fractures filled with breccia. The roof is limestone with about half a foot of "clod" at the base and locally, thin Anna Shale.

Interpretation of Faulting at Stop 7 (Map view)

A - Main Left-Lateral Fault

B - Strike-slip faults branching off main fault

C - conjugate fractures (joints)



The fractures trend 051° and diminish to the northeast. They are quite straight and parallel, and are nearly vertical. Most are wider in the roof and narrow downward in the coal. The coal is displaced down to the southeast on several of the fractures. The displacement and the width of the fractures decrease to the northeast.

Most of the fractures are filled with breccia consisting of angular fragments of limestone, coal and shale in a soft clayey matrix. On one fracture the filling extends at least 5 feet down into the coal and is 0.35' wide. On most of the fractures the breccia does not extend very deep into the coal. No slickensides are present. Crystalline pyrite, fine-grained and brassy in color, is present in places.

I interpret the fractures as extension fractures caused by wrenching. Movement probably was oblique as the walls of the fracture pulled apart, and broken chunks of rock fell or were washed by water down into the open crevices. (but see Note 9 on the matter of oblique movement).

Note gas bubbling out of floor at this location.

(9.) Several fractures of the type noted at Stop 8, but lacking breccia filling, are present. The directional trend is about 051°. One of the fractures displaces the coal 0.4' down to the southeast on the west rib. On the east rib there is no appreciable displacement.

Near the middle of the entry this fracture intersects a slip fracture trending 160°. The slip fracture is low-angle, with vertical slickensides, and evidently is a compactional slip or "clay dike-type fault." The fracture penetrates and offsets the slip. The slip appears to be displaced straight down; there is no appreciable horizontal offset. Therefore, the 051° fracture is a normal fault with little or no strike-slip component.

The slip is offset in several places by other 051° fractures. In each case the movement is down to the southeast, with no appreciable strike-slip offset.

(10.) In travelway just south of main strike-slip fault and huge roof fall. The two directions of fractures (053° and 133°) are very prominent. This is the best example I have seen of fractures in the limestone and the only place where 133° fractures are common in the limestone (though subordinate to the 053° set) Due to extreme fracturing of coal and shale, ribs are very dangerous; close examination is difficult.

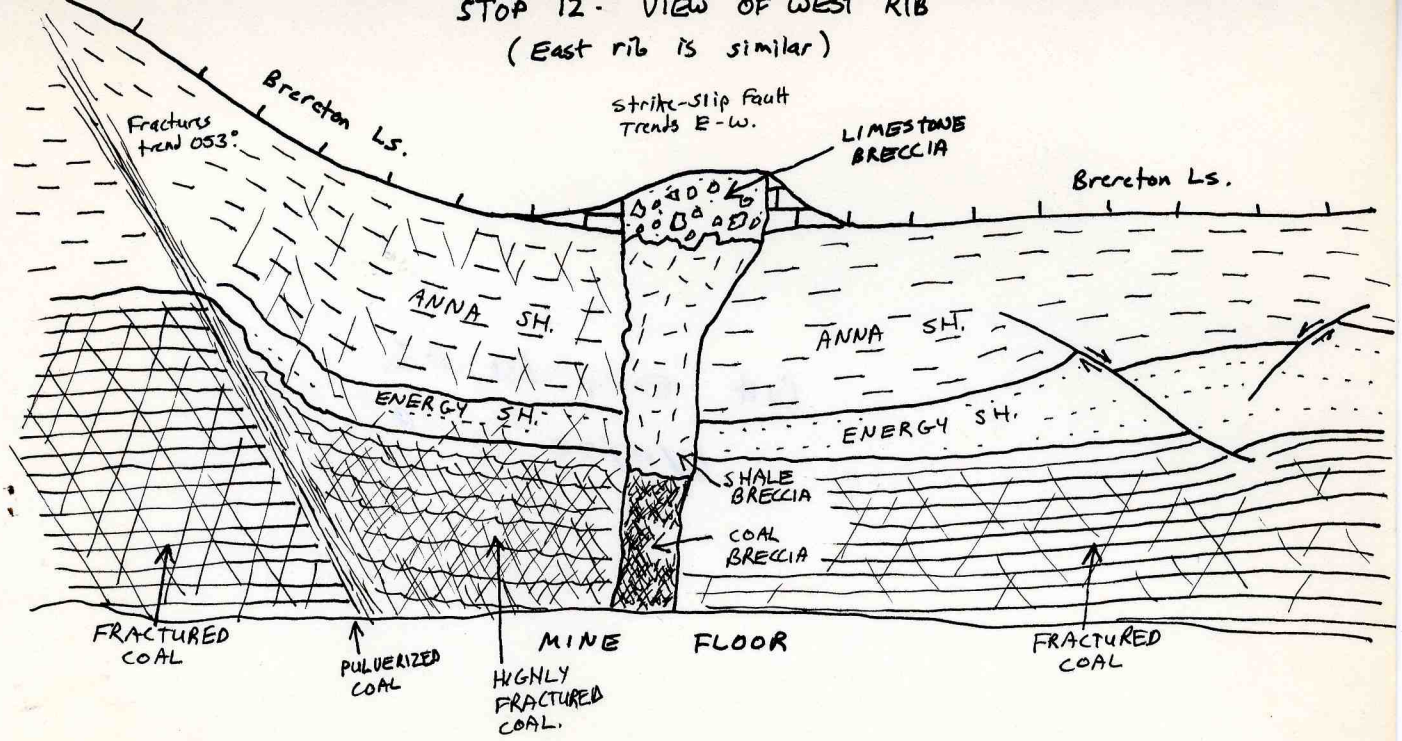
Some of the053° fractures show displacement. The northwest side (toward the strike-slip fault) is downthrown and displacement increases to the northeast. Along the 053° fractures I have seen so far, dip and displacement are almost always down toward the fault, and throw increases toward the fault.

(11.) In crosscut between belt and travel entries, 053° fractures and faults are very prominent. Some have displacements up to a foot on the north rib, rapidly diminishing to SW. A few faults with the downthrown side to the southeast are also seen, contradicting the statement made at Stop 10. In most cases the "wrong way" faults are antithetic to larger faults that dip toward the main strike-slip fault.

Roof fall is actively working. Despite cribs I am not encouraged to stay in the vicinity.

(12.) Strike-slip fault zone on belt entry. Belt has been removed, enabling better view of fault than was available before.

STOP 12 - VIEW OF WEST RIB
(East rib is similar)



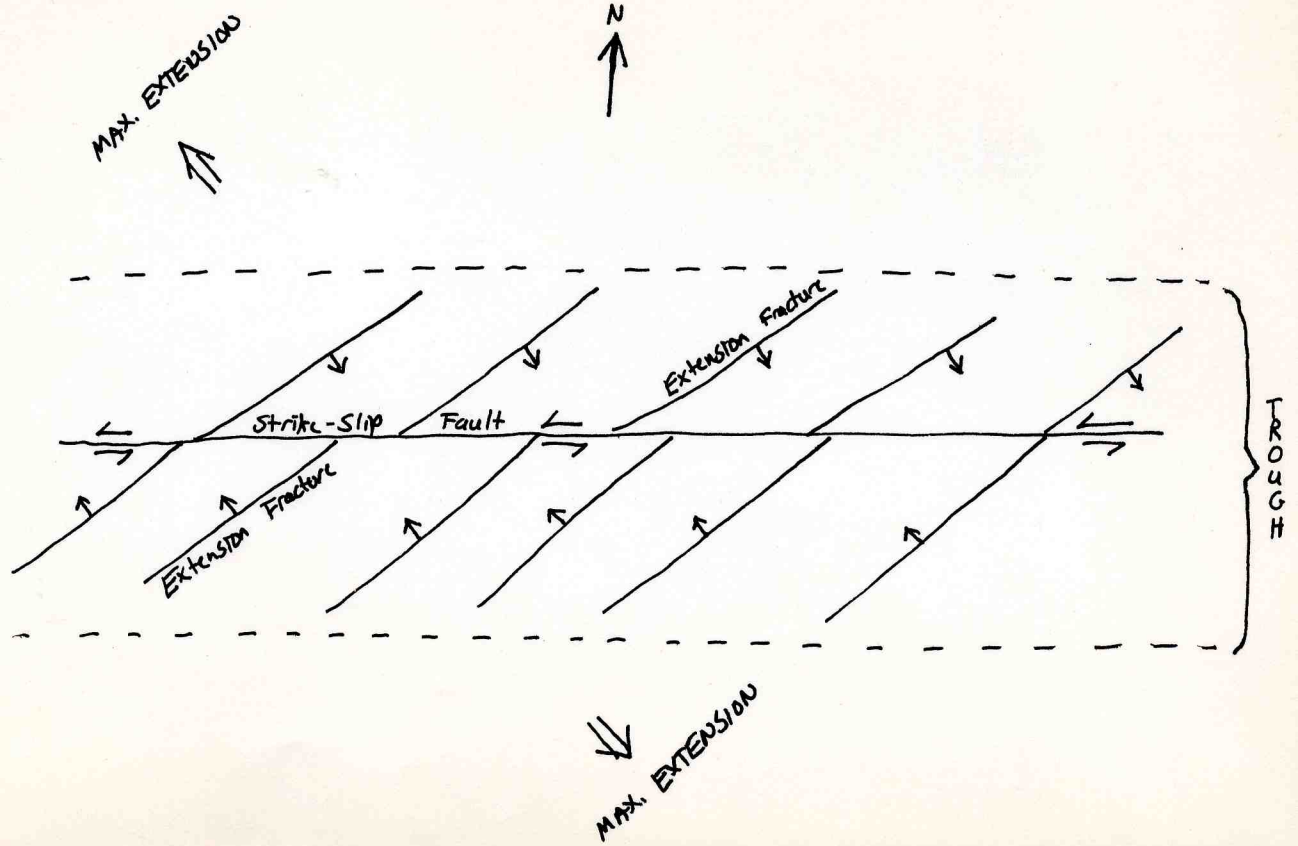
An east-west trending strike-slip (?) fault lies along the north edge of the zone. It is a fairly narrow funnel-shaped breccia zone. Stratigraphic horizons are not displaced vertically across it. The breccia is downdropped a few inches in sort of a graben. No slickensides are visible.

South of this the coal and rock are extremely fractured. The two main directions are about 045°/75 SE and 127/85 SW, 046/76-81 SE, 127/84 SW southward rotating to 053°/90 and 133/90°. About 8 feet south of the strike-slip fault on the west rib, the coal is puluerized and downthrown to the northwest along a series of NE-trending fractures. The pattern is very similar on the east rib where another 050° fracture set displaces the coal down about 1 foot to the NW.

We can visualize the fault zone as an elongate E-W trough, with the strike-slip fault in the axis. On both sides of the trough (here mainly on the south side) the coal is downthrown into the trough along NE-trending fractures. See sketch map.

I should also note that a thin (less than a foot) layer of Energy Shale underlies the Anna Shale here. It is found on both sides of the strike-slip fault and does not change much in thickness across it (precise measuremnt not possible due to fracturing). This shows that the lateral movement must be quite small; probably a few feet at the most. Much of the stress produced by wrenching is taken up along the NE-trending fractures.

IDEALIZED PATTERN IN FAULT ZONE VICINITY OF STOP 12



January 17, 1978

Mapping alone in strike-slip fault zone in 2nd Panel South, using 1"-50' scale base map. Since previous mapping Freeman has mined completely through the faulted area; the face is now about 500 feet south of the fault zone. Conditions for study are rather poor due to heavy coating of rock dust on roof and ribs. Much of the base map is sketched by hand.

(1.) In the westernmost (intake-air) entry the fault zone is marked by a zone of intensely fractured and brecciated coal and rock. The zone trends roughly 055° and is about 18 feet wide.

Vertical displacement has occurred along several fractures. See sketch.

Overall the fault zone is an asymmetrical trough or graben with a rise in the coal to the southeast. The largest displacement is down to the northwest at least 3.4 feet. Northwest of this a pair of smaller faults form a small horst that appears to diminish in size to the northeast.

The coal and limestone are intensely broken into an angular breccia with a matrix of pulverized material. Displacement generally occurs on a narrow zone rather than a well-defined fault plane. Only one fault plane, with apparent horizontal slickensides, was found along the west rib.

Tracing individual fractures is rather difficult. In the middle of the fault zone, it is impossible. The fractures in general diminish to the northeast.

(2.) Two very prominent sets of fractures are present. The primary set trends 057-058 and is especially marked in the black shale. Numerous 057-058° fractures cut the coal; two of them show marked vertical displacement on the west rib, decreasing toward the north-

Stop 1 - Generalized Profile of West Rib.

[width of view about 60 feet]

South

North

east. The limestone shows rather faint 057-058° fractures. The other set of fractures trend 130° and are not seen in the limestone. No displacement noted on the 130° fractures.

(3.) Closely-spaced series of fractures trending 052° in black shale roof. Fractures contain a filling of light brown silty material up to 0.15' side. To the northeast the filling material changes to an angular shale-limestone-coal breccia with a silty matrix; up to 0.25' wide at north rib of crosscut. In the coal seam the fractures are marked by a nearly vertical zone of crushed coal. They appear to be increasing to the NE (toward the main fault zone) and die out in entry to west.

(4.) Main fault in 2nd entry from west (travelway). Profile of entry is very similar to that of entry to west (Stop 1) with the fault zone lying along the axis of a trough much steeper on the south than on the north.

The fractures very clearly lie in an "en echelon" pattern. Individual fractures trend 050° but the zone runs roughly E-W. On the west rib the largest fracture has at least 4.5 feet displacement down to the northwest. It probably links with the Breccia-filled fractures at Stop 3. Across the entry on the east rib it has only 0.4' displacement. The largest fracture on the east rib has at least 3.6' displacement but has almost no displacement on the west rib, and dies out another 30 feet to the southwest.

The coal and limestone are shattered at Stop 1. In the roof angular blocks of limestone are jammed together and recemented. No water seepage and surprisingly little roof failure has occured.

(5.) Fracture set north of main fault zone also is showing a clear "en echelon" pattern. Individual fractures trend 050°; however, the system as a whole is trending nearly east-west. At this location the "en echelon" arrangement is clearly visible as individual fractures are out along strike. (Map pattern is schematic; actual system is too complex to show at this scale.)

(6.) Very complex area (previously described in notes 5, 1/24/78.). The system here is characterized more by parallel faulting than by "en echelon" faulting as at Stop 4. Individual faults maintain their throw over longer distances; but the pattern is extremely complicated.

On the south rib is the wide breccia-filled graben, as described in earlier notes. The miner has cut out more of the floor since previous visit, allowing observation of the underclay. The breccia does not extend more than a few inches into the underclay, but is sheared off rather abruptly against the coal on the northwest, downthrow side. It appears that the underclay failed by plastic rather than brittle behavior; that is, it probably flowed into the open crevasse rather than breaking into fragments. This would be about as expected.

Northwest of the breccia-filled graben are dozens of fractures along which the coal is displaced, mainly down to the northwest. No attempt was made to map any but the largest of these.

(7.) Main fault zone in belt entry is becoming narrower to the east. The form is similar to that at Stops 1 and 4; the fault system lies along the north flank of a ridge in the coal. Here the northernmost large fault is downthrown to the southeast and it curves from an 050° heading to nearly east-west. Farther east is apparently becomes a strike-slip fault. The other fractures seem to join the E-W fault and do not cross it.

(8.) Location in rooms driven east of panel, along fault zone. Detailed study is difficult because of rock dust, bad roof conditions, and complexity of geology. It is an area of transitional roof, with a gray shale pod to the south (center near roof fall) and numerous small slips and clay dike-type faults.

Failure along east-west fault zone is a combination of strike-slip or oblique movement and extension fractures. The fault zone is trending a little north of east overall, and is entering the long pillar left between the two sets of rooms.

On the north rib several fault planes with horizontal slickenside are present. Trend is quite variable but averages about 075°. They appear to grade into extension fractures. The coal and shale are very highly fractured, with dozens of small displacements visible, mostly less than an inch. The largest displacements occured to the east along a series of planes trending about 065°. There are faintly visible oblique-trending slickensides which indicate approximately equal components of left-lateral movement and normal displacement down to NW.

(9.) Rather poorly-defined fault appears to combine strike-slip and extensional action. It seems to trend slightly north at east along the centerline of the entry, then veers off on a heading of 055° and enters the north rib. Definite roughly horizontal slickensides are seen along a portion of the 055° segment. At the north rib it is primarily an extension fracture downthrown about 1 foot to the northwest. The coal is pulvirized along the NW - dipping fracture plane but no slickensides are present.

Many slips and clay dike-type faults are present in the area, but it is not possible to show relative ages or displacements of them by the strike-slip fault.

(10.) A rather irregualr, sinuous east-west trending fracture is seen in this entry. Along it the conjugate fractures in the coal and black shale are greatly intensified, and locally coal is pulverized on the fracture itself. No slickensides are visible. The top coal has fallen out in places; the feature resembles a "kink zone." It may be a "kink zone," but, if so, is unusual for this mine. I speculate it is a minor, 2nd-order strike slip fault along which most stress was relieved by extension fracturing. It does not intersect a rib, where a better view might be obtained.

General Remarks

The set of rooms north of the fault were examined briefly. To the east a number of NE-trending open fractures were noted in the top coal and roof shale. No actual faults were noted; the last room to the east could not be checked due to water on the floor.

The map pattern indicates that the main fault is trending about 080° in the pillar between the two sets of rooms. As seen at stops 8 and 9, probably it bears a combination of pure strike-slip and extensional fractures. It clearly does not have a wide zone of "en echelon" fractures as it does at stops 1-7.

On this three-day visit I have gained a definite impression that in most places pure strike-slip movement does not exist on this fault system. Rather, there is a combination of strike-slip movement and twisting of the strata, resulting in NE-trending "en echelon" extension fractures. In the Main South strik strike-slip movement dominates, but still in most places significant extension has occured. In the main entry of the 2nd Panel South exclusively extensional movement has taken place. The rooms east

3 (1 of p.)

of the 2nd Panel, and most of the 1st Panel South, show varying combinations of the two types of movement.

The above finding does not change, but actually reinforces my opinion that the overall action is left-lateral wrench faulting. The pattern of faulting is very similar to that reported on numerous other strike-slip faults described in the literature.

Mine Notes - Freeman Crown II, Macoupin Co.

Trip: June 13-15, 1978 by Phil DeMaris and John Nelson w. Bill DiMichele on the 13th.

Coverage: Mapping in N. Mains "channel" area Day 1 w. DiMichele & Day 2 (2 maps)

Evaluation & some mapping in E. Mains sample area (6th & 8th E. entries)- 1 map

Quick trip to 3rd S. Panel (1 map)

Photos by DiMichele

Samples; D-1 to D-5

Addenda; Notes by DiMichele

Mapping in the N, Mains "channel" area

After our last visit we decided this area was interesting enough to merit more botanical sampling & more through geologic mapping. Day 1 was used to photograph & recover primarily botanical data while getting some roof data; day 2 was used for more intense mapping; the continuity of the small channel sand bodies was recognized & mapped. The value of mapping stigmaria root■/rootlet impressions in the roof as an indicator of the upper coal (mapped "Bn" (Boney) where seen) was also recognized on this trip by Bill & I.

As we walked in we saw another prob. fusinized "tree trunk" on 1st N. , W. rib, just short of 12th cross-cut at mid-seam; this one was smaller than most; did have lateral thin fusain band away from "body".

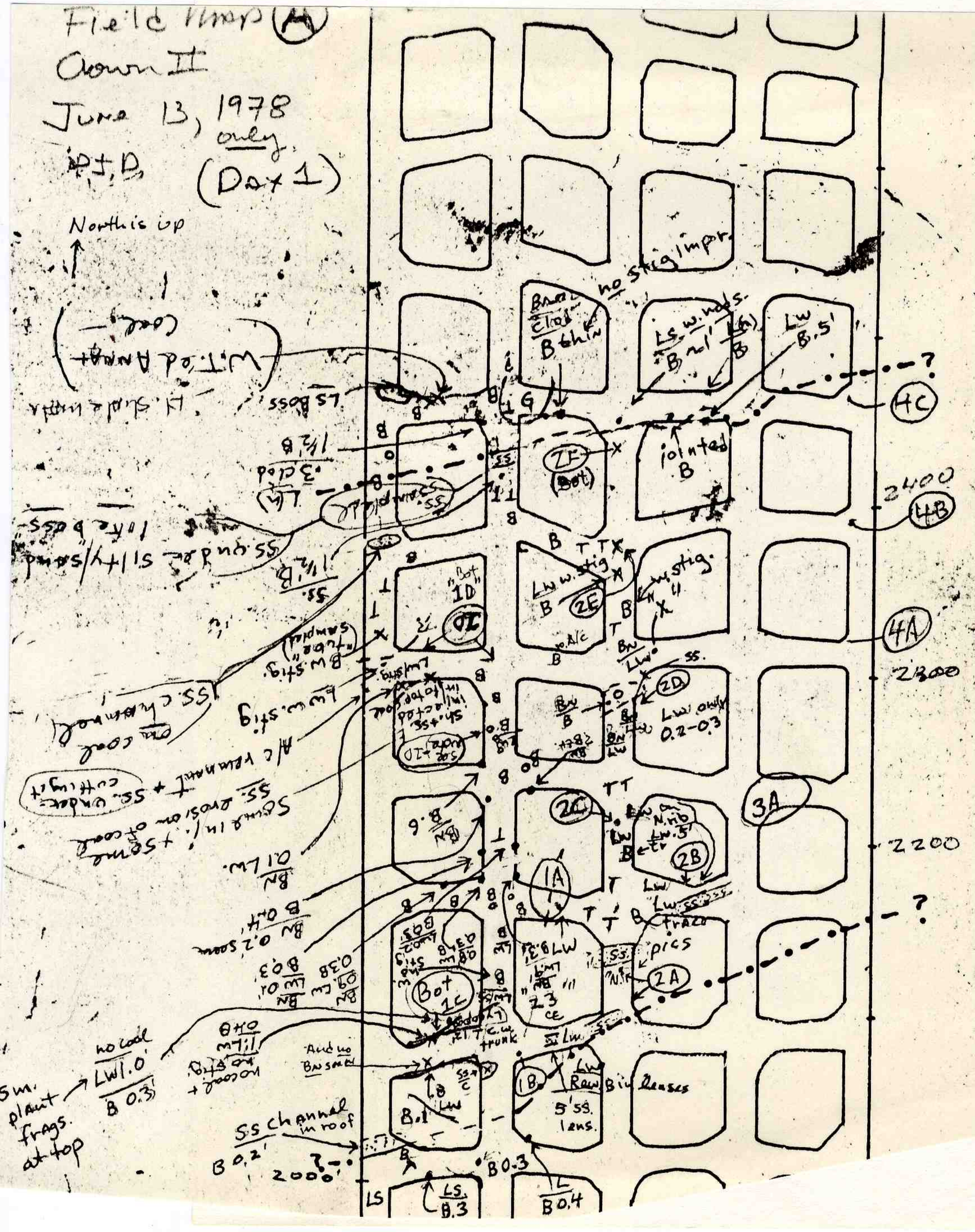
Bot. site 2A (See Map A)

Ss. channel on coal here with lobate load-casts present. Ss. has impressions of large ribbed stems (lycopod) on the #6/Ss. contact-probable #6 peat material.

6/13-15/78

Map (A)

Field Map (A)
Crown II
June 13, 1978
only
(Day 1)



In cross-cut to E. Ss. is not continuous (cut-down) but a nice 5' wide Ss. lens is present & was photographed after painting to increase contrast(no dist. structure noted w/in); see neg. # 2. One spot here showing reworked Anna & silty shale w. Ss. above.

Bot. site 1B

Shale-filled log pieces (?) in roof; one 8" in diam. at slight angle to plane of t.c. in t.c. Coal dips slightly here under prob. Ss. channel; deff. pyritic Ss. on pillar cor. just to W.

Bot site 1C

Lower 0.6' of Lw has less impressions; Bill sampled leaves 0.8' above coal (#6) contact. Prob. shale-filled stem in top coal, o.2' below contact; apparently not related to Ss. in area. (Comment 7/3/78; Nelson (see May 2 notes, site 21) apparently mistook these shale-filled wood pieces for coal balls; there are no coal balls in t.c. here)

Bot. site 2A-North

Bill gets photos of ferns & pteridosperm petioles. I map E-W Ss. lens in roof; locally appears to cut out Lw.; has bk. carb. material above it - prob. related to the boney coal development noted else where. Bill notes Neuropteris & lg. ribbed petioles in one spot; both frags. & fairly well-preserved frond segments. On E. rib as lens (ss.) thins there is carb. material with thin sheet ss. ($\frac{1}{4}$"-1$\frac{1}{2}$" var.) - also Ss. laterally related to plant frags. layers in the lawson sh. Lw. alternates between an unbanded shale w. well-preserved plants and thinner plant hash layers. Pyrite nodules and pyrite present on coal/shale contact.

Bot. site 1A

Where Lw is on the #6 (S. rib) it is finely banded; dark at base (inc. reworked Anna?); 0.7' seen here. Very few plants; varved appearance; Bill suggests pool of water near stream.

Bot. site 2B

Ss. lens, 2⅓' wide. 5" thick (max.); trends roughly ENE in roof. In N. rib here there are traces of coarse Ss.; very pyritic where it is on the coal. Lw. at rib predominates; no coal or stig. rootlets seen in 1.2' visible. Bill notes prob. Cf. mariopteris & photographs it (neg #)

Bot. site 2C

Lw. roof with much plant debris at base. Large calamites trunk o.4' above coal: 28cm. wide at center, 120cm. exposed length; 185mm. betweem two prominent center nodes-ribs average 3.3 mm. apart here. Specimen has some depth-was shale filled (Lw.) Nice Sphenophylum taken here by DiMichele.

Lw. roof over coal here; rootlet (stig.?) impressions/ compressions are pyritized traces in top coal. Bill notes possible allithopteris also.

Bot. site 2D

Roof is thin carb. Lw. w. abundant stig. impressions; upper "Bn"* coal above that; to N. seq. rests on remnant Anna w. a/c. Trace of Ss. on corner with remnant a/c photographed (Neg. 10); a/c is undercut by Ss. on S. side; only a trace of Anna shale left under the center of the conc.: conc. seems further compacted+slightly broken - it is unclear whether it is a result of gravity (undercutting period) or under compaction. Samples D-1 and D-2 on Ss. taken here. "X" on map markes spot where fall reveals the "upper coal"

* later called "upper coal" + still later ('82+) "Linden" coal AS IT WAS planned to be named. P.J.D

at 5" thick with a hard (not Ss.) unit above. This spot could be sampled by climbing on crib a little; future coal sample spot?

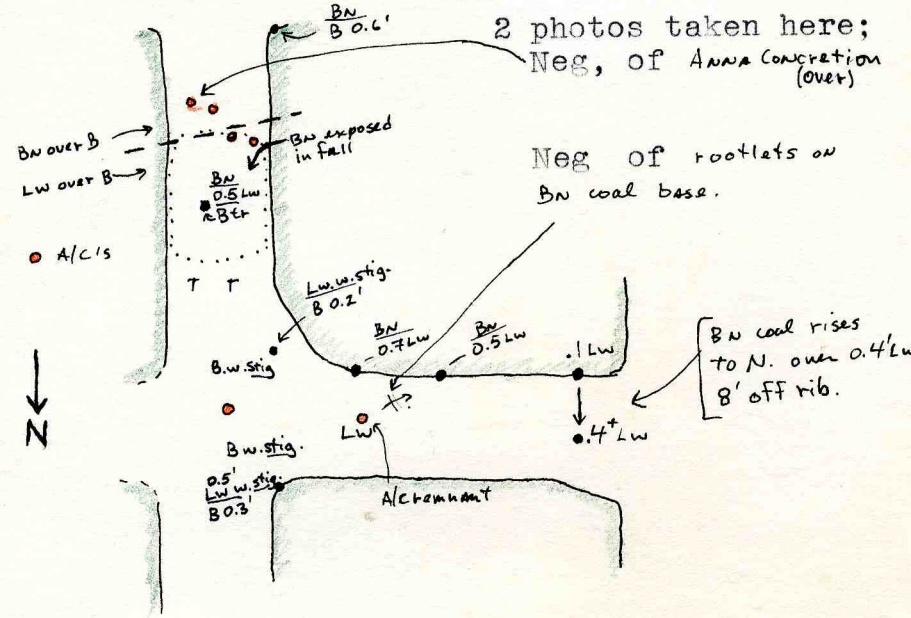
Bot. site 2E

Thin Anna roof w. stig. impr.; ½' Lw. w. stig. above ; no upper coal seen, but inferred.

Bot. site 2F

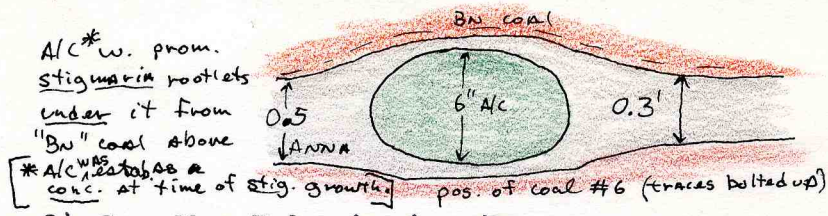
At W. rib ; 0.8' Anna below 1' Lw. with coal traces & stig.(but not abundnat); no "upper" coal proper seen , but believed to be above. Med.-sized calamites also seen here. Shale and ss. in roof appear to undercut Brereton, w. some Anna remnant below. Ss. under Brereton here at edge/ contact area. Normal situation is Brer. over 1½' Anna. Lawson has slip // to contact & some prob. slumping.

Bot. site 1D (Map) S. to top



p. 5 of 10, plus 4 maps

Sketch of Neg # 13 site:



(Day 2) See Map B beginning here:

Note: sealing on N. Mains won't be finished until more cribbing is done & until after mandatory 2 week vacation in mid-June.

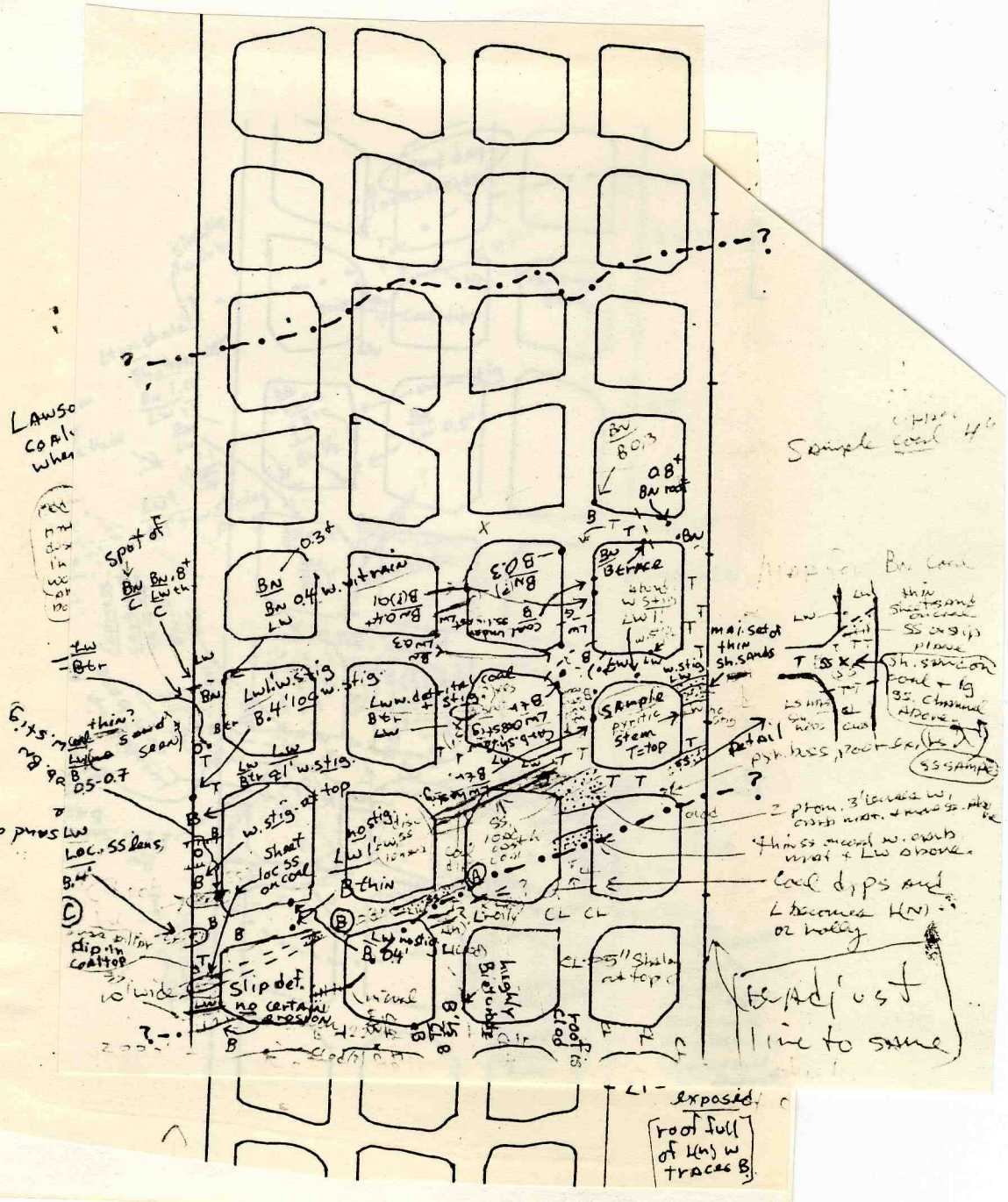
I began by checking some Ss. exposures on the 1A entry and then went to the 2nd, 3rd & 4th N. at the S. side of the erosion affected area, ending up mapping S. on the 3rd.

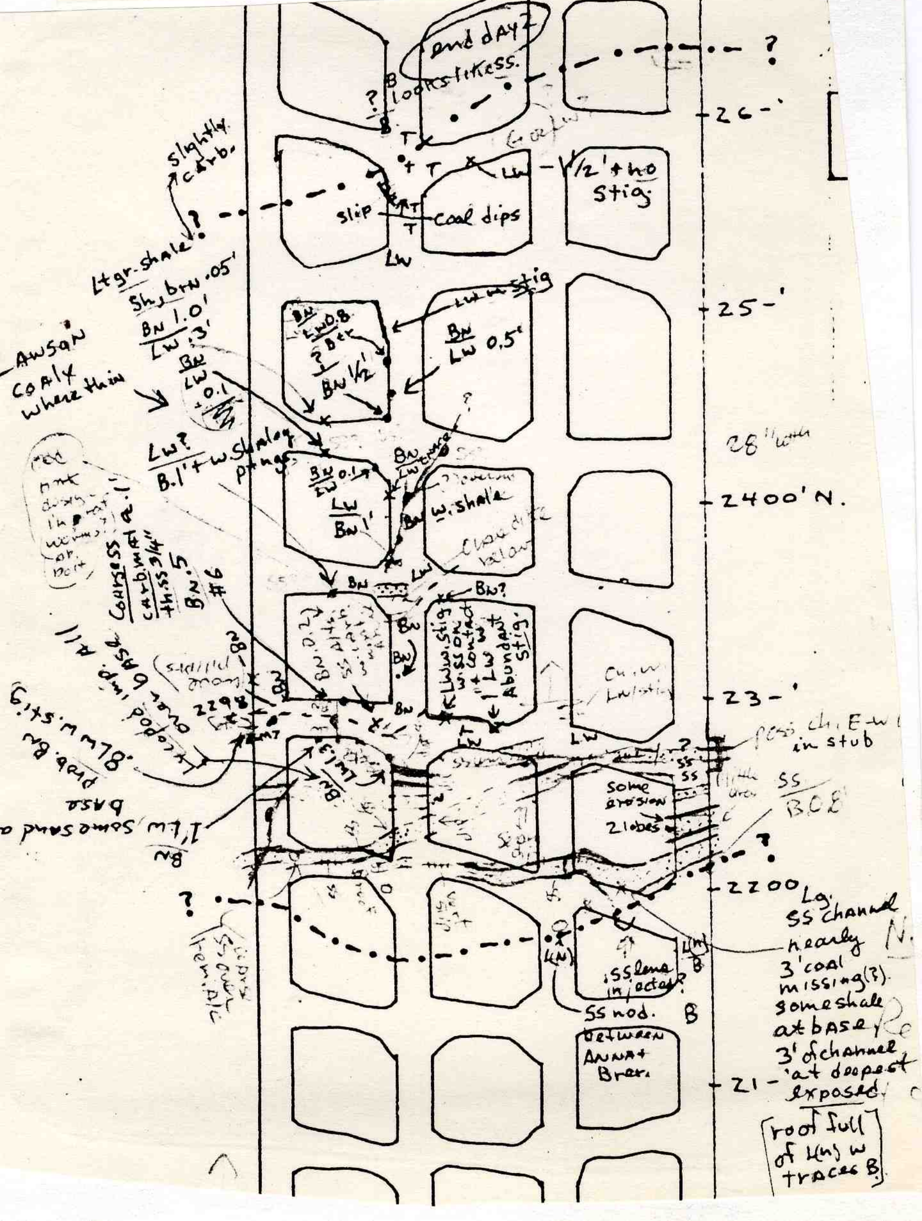
A. Two irreg. fractures in top coal with coarse sand in them allowed projection of the Ss. channel into the rib corner. The channel just to the north was mapped liberally; in some places it is one lense - in others it is "stacked" sm. leses with carb. partings in between. Just to the S. the sand body is seen only on the W. rib line -was earlier taken for a Ls. boss. That it lines up with L(n) just to the ENE (trend of affected area boundary) suggests partial erosion of the Ls. (limey mud?) leaving load casts of Ss. on the limey mud(?) easing the creation on L(n) and even nodules by reverse density gradient effects.

This poss. mechanism should be considered for all roof areas with L(n) , esp. in the N. mains. The Brer. limey mud may have been more easily erodable than expected, because my mapping so far has not revealed any erosional outliers (Nelson notes one I have not checked at ca. 2450' N on the 3rd N (Note 19, Mar. 28-30 trip)). See his sketch.

6/13-15/78

Map (B) - 2 parts





end day 2
looks like ss.
26-'
slightly carb.
Lt gr. shale
1/2' + no stig.
slip
coal dips
Sh, brn .05'
BN 1.0'
LW .3'
LW w. stig
BN
LW 0.5'
25-'
AWSAN coal x where thin
LW?
B.1' + w. shaley p+ngs
LW
BN 1'
BN w. shale
2400'N.
28"
BN?
#6
23-'
2298
in stub
SS
B.0.2
some erosion
2 lobes
prob. BN
8LW w. stig
1' LW some sand
2200
Lg. SS channel
nearly 3' coal missing (?)
some shale at base
3' of channel at deepest exposed
SS nod.
between Anna + Brer.
21-'
roof full of L(n) w traces B.

B. Sm. pyritic sand intrusion (injected?) into top 1' of coal; marks prob. position of a Ss. channel at top of coal here (is in-line with other Ss. spots). Prob. small Ss. body or zone of ss. lenses projected through this spot.

C. Dip in top coal on both ribs & exposure on the W. rib allows further projection of a sm. Ss. channel/channel system here.

Evaluation & some mapping in E. Mains Sample Area

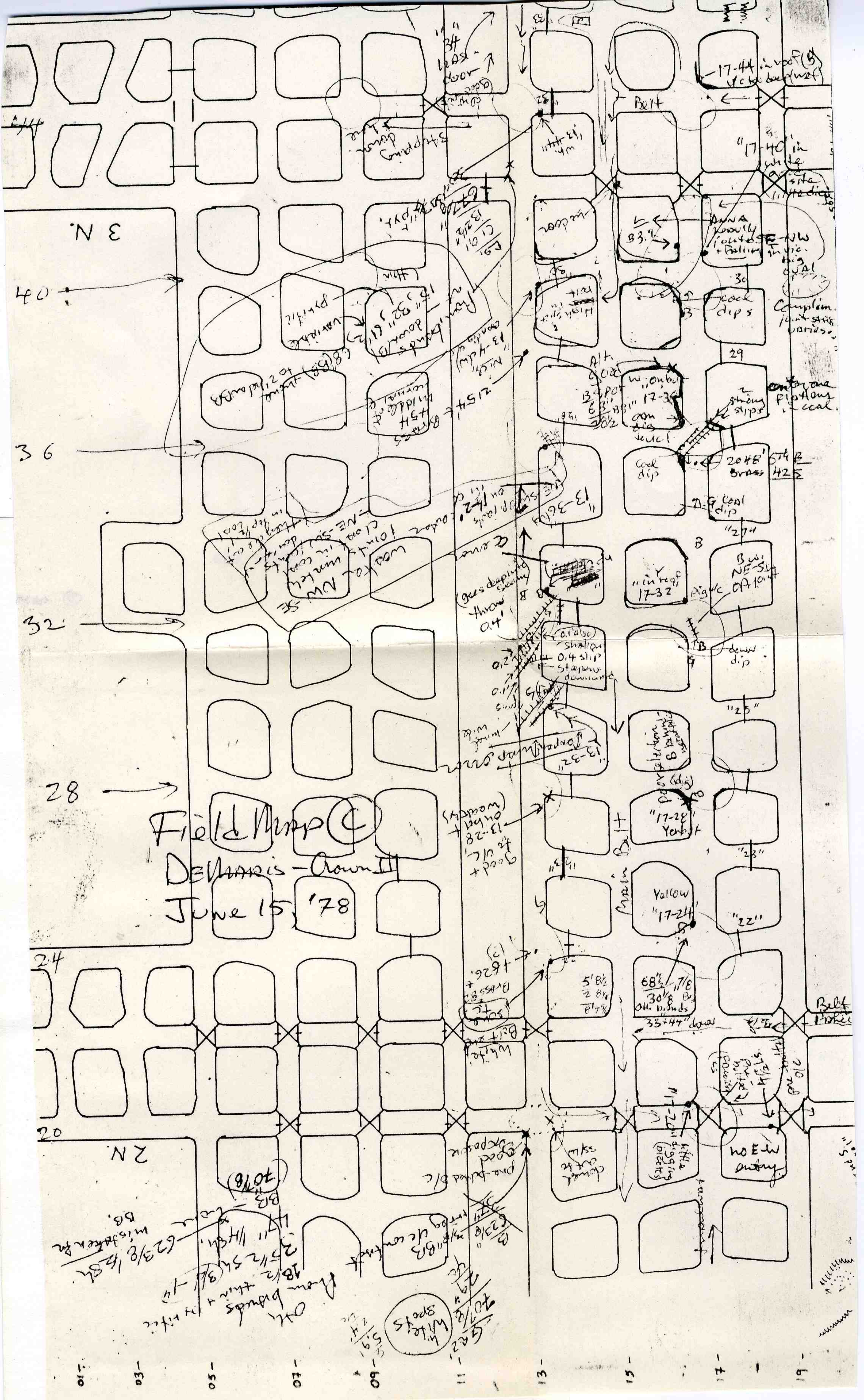
Lay-out of sample points on the 6th & 8th E (between 2nd & 3rd panels) continued (See map C); some thickness data taken; not completed before lunch of day 3; Met John for lunch in the 2nd S. panel.

John showed me the interesting "hinged" extension faults assoc. with the strike-slip fault system he is mapping. I took one detailed thickness measure in the 2nd S. panel at 790' S. on the "B" entry (SW cor at 778' tag & brass #1136); Anna roof/ 62¼" to B.B. (B.B. 7/8" to 1¼" variable)/29½" coal to u/c. Other prom. ptngs. at (down) 14" (thin & pyritic), 18 3/4" thin shale, 30" 3/4" sh. with pyritic nods., 41" ½" carb sh. with coal stringers, 55 3/4" ca. ¼" carb. shale; none seen below B.B.

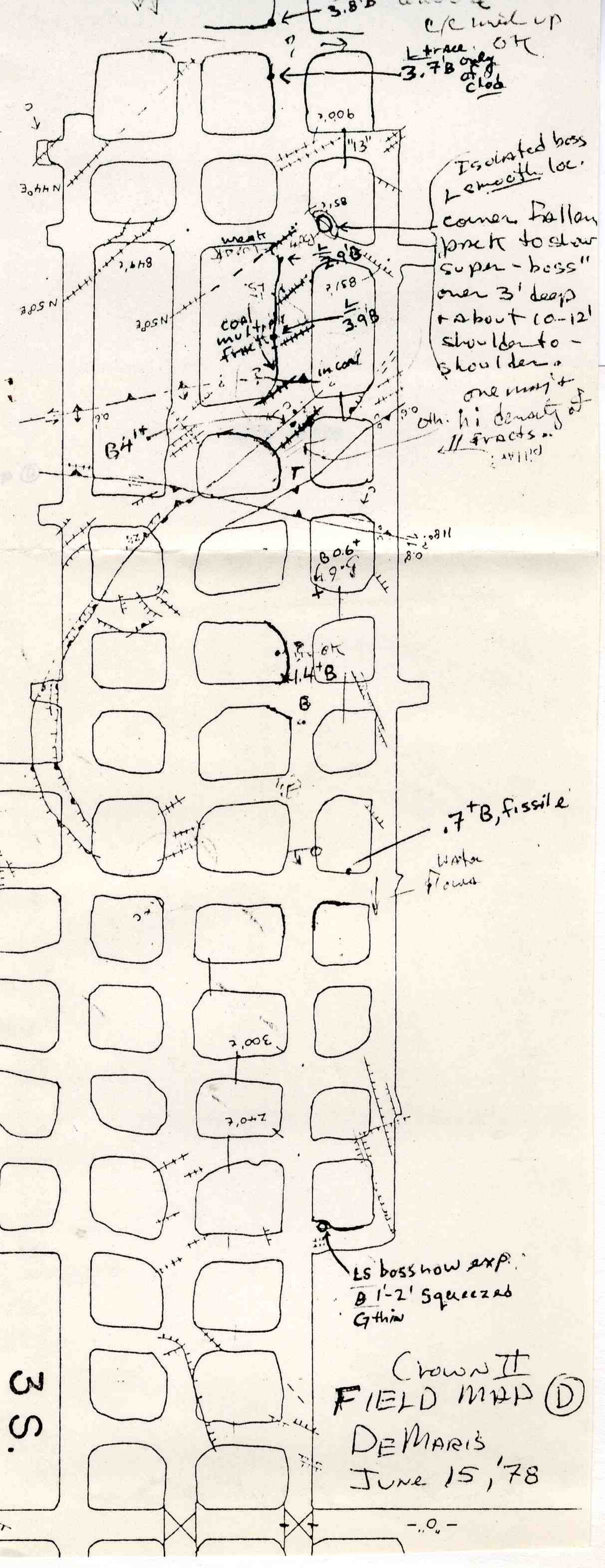
Map C was finished up after lunch.

Quick trip to 3rd. S. Panel (See map D)

I had only 1 hour to try to tie-up some loose ends here; took a couple of B. thicknesses, mapped a couple of "bosses" which were exposed by rashing coal, and



Field Map C
DeMaris - Crown III
June 15, '78
3 N.
2 N.
40
36
32
28
24
20
Belt
Main Belt
coal dips
Yellow "17-24"
"22"
"23"
"25"
"27"
down dip
coal dip
2 strong slips
0.4 slip


3.8B
C/C wind up OK
L trace 3.7B only of clod
7,006
"13"
Isolated boss L smooth loc.
corner fallen back to show "super-boss" over 3' deep + about 10-12' shoulder to shoulder. one may + oth. hi density of // fracts.
7,158
weak
L 2.9B
coal mult fract
L 3.9B
in coal
B4'+
B0.6+
1.4+B
.7+B, fissile
water flows
7,003
7,042
LS boss now exp. B 1'-2' squeezed G thin
3S.
Crown II
FIELD MAP D
DeMaris
June 15, '78

tried to "touch-up" missing structural features expected to be present on the B entry- stopped at 1017 tag. Much more is mined & available for mapping. The face boss says they have less water problems at face and are bolting the Anna (B.) roof again.

Photos by DiMichele (see p. 8 to 10; plant only pictures not included) except for

Samples: D-1 to D-5

(Note; pyritic plant taken(on Map C) at 2200' N on 4th N.): shallow exposure w. no stig. seen; given to DiMichele, but was not identifiable & thus not numbered)

D-1 Ss. form 2D site; shows coal/ss./ carb. shale; ss. is pyritic (check this).

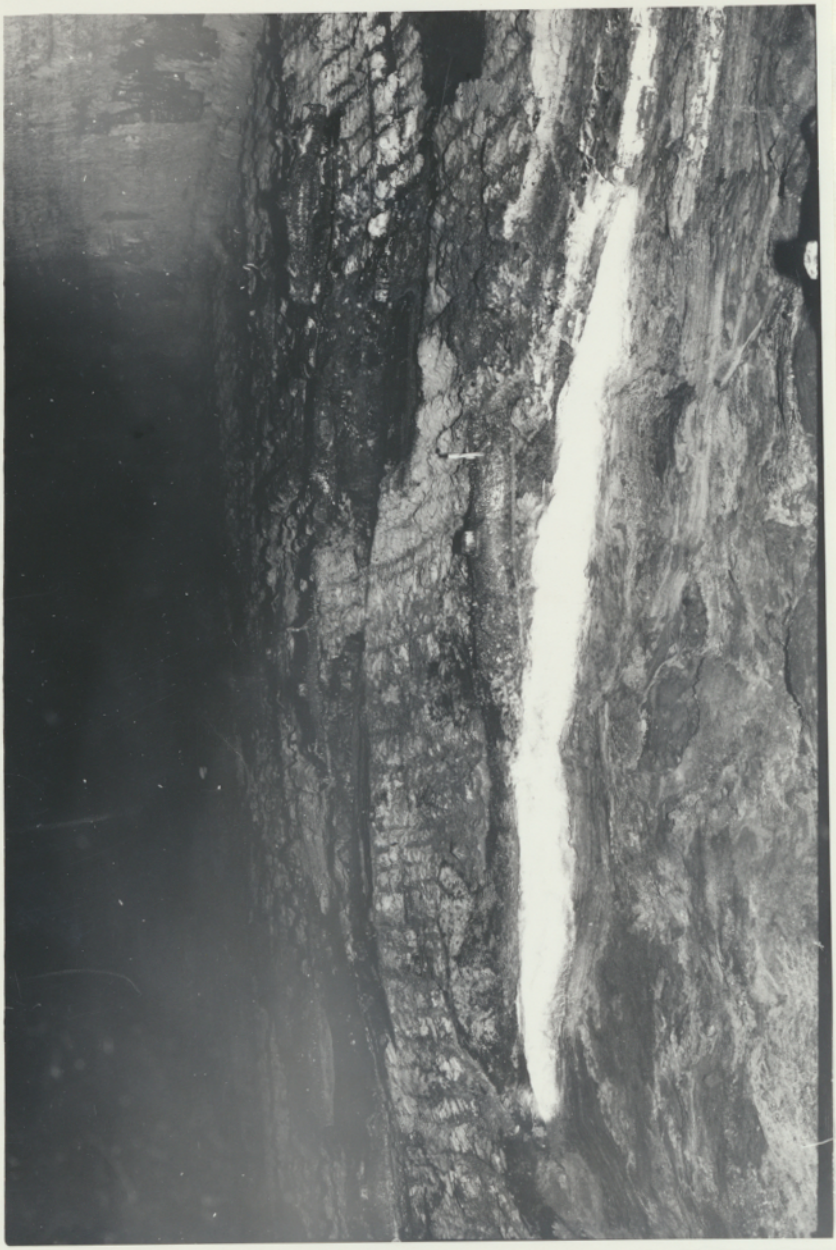
D-2 Ss. from 2D site; small piece of prob. Anna shale in it; also seen in neg 10.

D-3 Ss.; from 1st N. at ca. 2430' N. from linear channel; shows traces of Anna shale on surfaces & some inclusions.

D-4 Anna "tube" portion ; very pyritic; form 2330' N. on entry 1A.

D-5 Ss. from lg. shannel in roof at 4th N. at 2160' N.

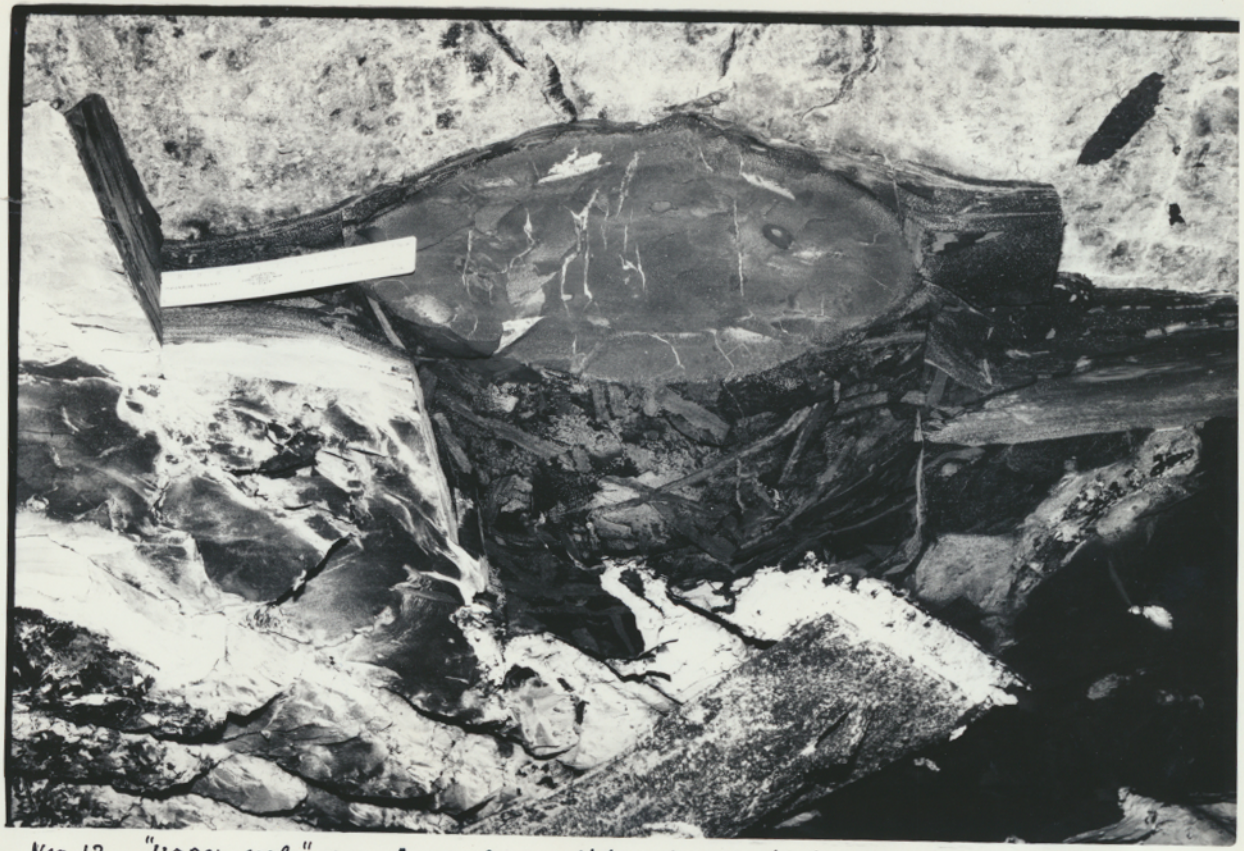
Addenda follow p. 10



Neg. 2 SS. channel (here) at 2A (cut down a Fall or in foreground

(emphasized w. paint) PJD

Neg 10 "N. of Site 2 D" Ss. channel (small) undercutting an ANNA Conc. remnant.



Neg 13 "Upper coal" over Anna Cone. – Note stig. rootlets under cone.

Mine Notes - Freeman Crown II, Macoupin Co.

Trip: June 30, 1978 by Phil DeMaris

Coverage: Detailed Mapping in the N. Mains "channel" area; espec. Ss. bodies.

Sample D-6

Addenda; Continuity of sh. partings in the #6 in Crown II

Detailed Mapping in the N. Mains "channel" area

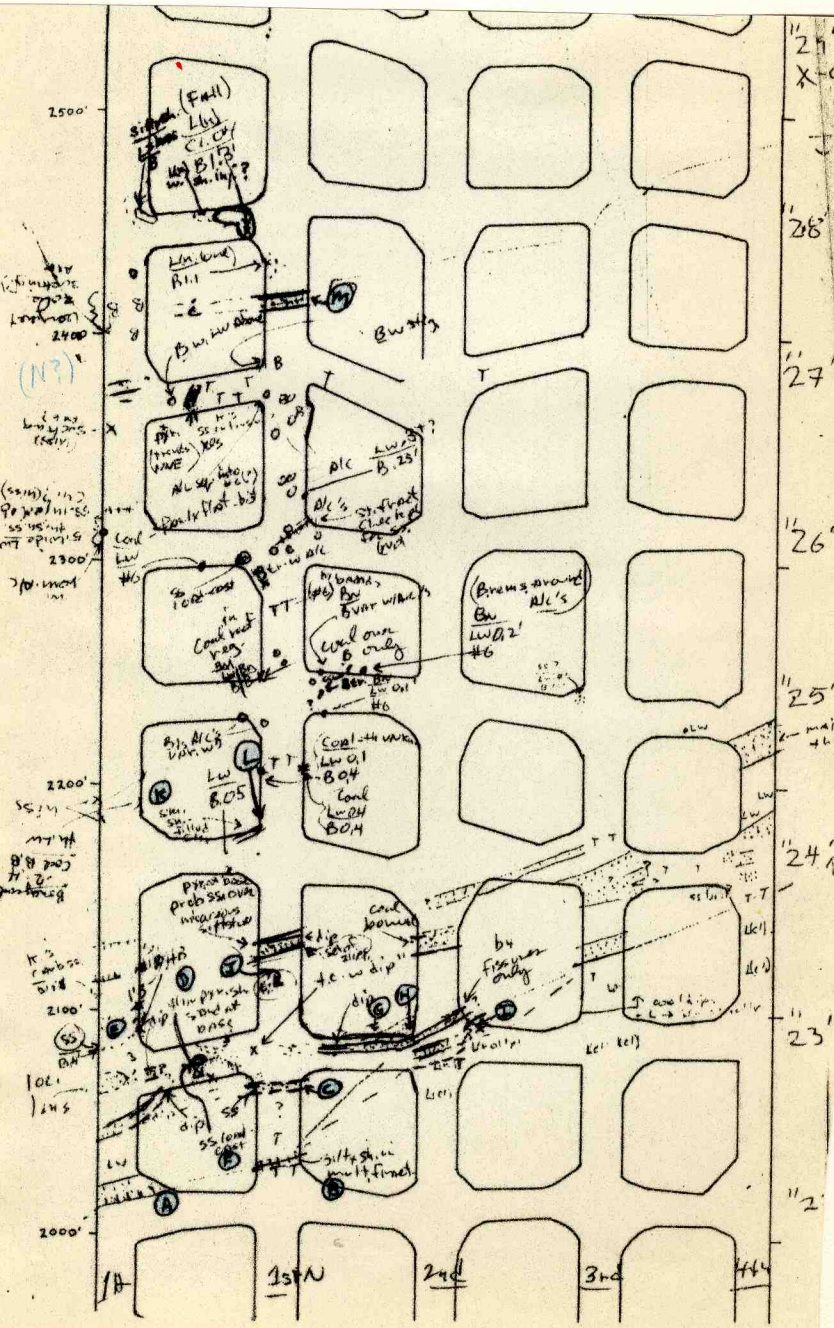
(A) (See map A) Linear sand body of fairly coarse sand having rounded appearance; at no place deffinite erosion of coal here (coal consist. dips under it , however. At pillar there is a trace of Anna sh. under (0.06' & squeezed) a coarse sand; it's bottom 1/8th" is pyritic. Locally there are spots of shale in top coal & infilled "wood" pieces in roof which are unrelated to the Ss. present.

(B) Silty shale in multiple fractures in top coal on same strike as ss. body at site A, above.

(C) Coal dips on E. rib under prob. channel and top coal has pyr. siltstone & Ss. injection. On the W. side there is a poor exposure of a Ss. loadcast - pyr. Ss. scratches steel

(D) One foot Lw. over face B. on S. rib. (On N. rib -?-) 1.2' Lw seen over o.3-0.4' B.; upper Lw. has less full plant parts - saw one 1' stem & 1 fern frond; many separate leaves & frags. Basal Lw. mottled. Ss. exposures hissing & are quite wet.

Field Map A, 6/30/78



"2" X-cuts

"Line ... of ANNA Shaft coal unit as plotted on 1"=100' prob alluvial line

Field Map (A)

June 30, 78

[Site (N) is after (M) in seq. - prob. on entry 1A but loc. unknown exactly.]

(E). Abrupt thickening of B. across a ENE line. Only Ss. exposed here is on W. rib - is humming (air escaping?); Ss. is a 1-1½" thick lens just over B.

(F). Ss. loadcast, 1½' across (N-SΦ) & teardrop shaped; headed E; down down 0.4' into Anna which is intact to E. side.

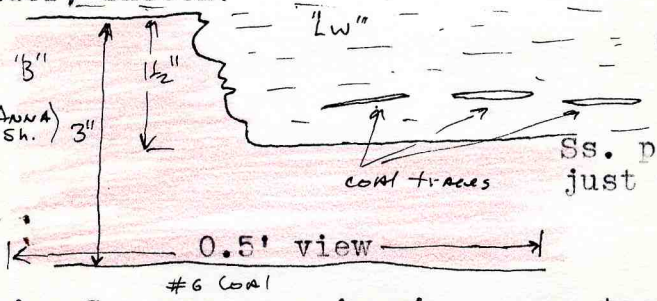
(G). Ss. lens (prev. sprayed white & photographed - see June 13-14 notes) is on the coal (w. loc. traces of Lw.) & Lw. above. It trends due E-W or N. 85° E, transv. exposure measures 5.1' wide & 0.3' thick max. Lens-shaped, it tapers gradually to rounded edges. Appears to grade lat. to Lw.

(H). Coarse Ss. loadcast onto coal.

(I). Ss. over thin clod. in direct lateral assoc. with knobby Brereton Ls. About 2 sq. ft. exposure; coarse Ss. exposed with no specific features except that it seem to under lie the edges of the Ls. nodules (density grad. effects?)- but clod is not especially disturbed. The "big picture" here is that the coal bowed slightly below this area, and this char. has been helpful in projecting and finding exposures of the Ss. Since "B" is not present, my "B or lower erosion line" is staggered into the rib here.

(J). Fairly even erosion of B.(Anna roof); Lw. over thin sheet Ss. w. carb partings loc. at base of Lw.; Lw. has plant stem casts at base.

(K). Shale-filled micro channel cut in B and filled w. Lw. & traces of thin Ss. (prob. flow on line over viewer's left shoulder) sketch:

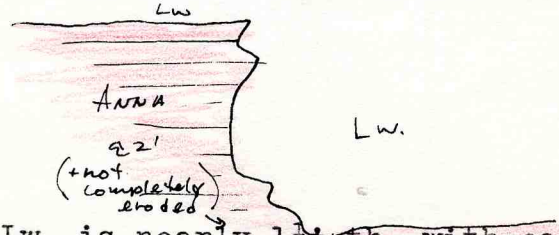


No major Ss. was seen in vic.; were traces of coal in the Lw. fill material.

(L). No trace in entry of sm. micro-channel seen in crosscut (appeared to flow on a WSW-ENE line); roof seq. #6 coal, 0.3' B, 0.7' Lw. , upper coal, flat-bottomed w. large. stigmaria impression below it.

(M). Ss. channel; 1.2' B remaining with clear erosion on E. rib. Ss. alternates with thin disc. layers of gr. shale. Ss. med-grained. Central exposure looks like a large load structure, ovate in E-W direction. On the E. rib, slip below feature steepens downward ending in pyr. "goat beard" below the B.B.

(N). (site not on map by error; prob. on 1A) New fall gives better exposure of angular erosion of Anna with Lw. fill-in material;



Lw. is nearly 1½' th. with coal traces at top-prob. stig. rootlets in Anna sh. below.

I walked out the 1st N. then E to get to the base of the 11th N. The prominent "low" in the seam between the 8th & 9th crosscut on the 1st N. is matched by a low in the seam between the 6th & 7th crosscuts on the 11th. N.-which also has "G" (Energy sh.) roof. This may be a pre- #6 deposition low (trough?) which might be interesting to check coal thickness values across.

- - - - - - - - - - -

(beginning on 11th N. - field map B)

⑥. Lg. ss. slump feature (no erosion seen) w. "boss" appearance; appears to be a transverse exposure (Bauer notes) but is in fact a longitudinal exposure. Slump extends 25' to E; lots of filled-in plant part casts.

Ⓟ. Much Ss. alternating w. gr. silty shale; some of Ss. is dk. Highest units exposed are thin-bedded gr. silty shales. Ss. has eroded coal slightly on E. rib.

Ⓠ. Anna roof with spots of tough (limey) blk. calc. shale; did not look like Anna concs. Sampled material (D-6) to examine it further.

Ⓡ. B. roof on N. rib here; at point is a Ss. loadcast on thin B. roof. Apparently there is "G" roof to the W. (Nelson notes of Mar. 28-30 ; 10 discuss this) although there is no Anna over Energy exposure; Energy does have locally char. pyrite X-tals at base. Too much top coal in vic.

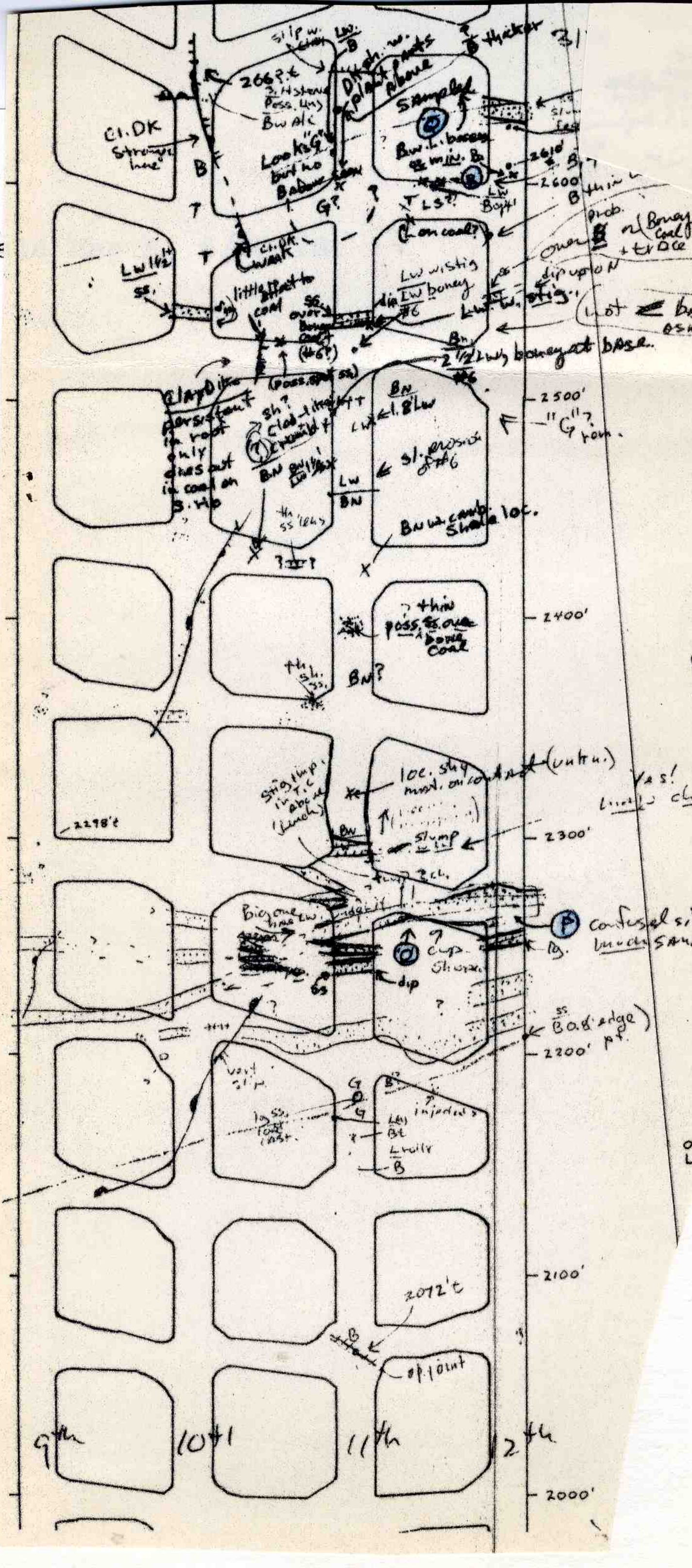
Sample

D-6 (above) Calc. blk. shale in area of Anna sh. roof. Site Q. Specimen has

has fine calc.-filled vert. fracture and a poorly preserved orbiculoidea - Bob is trying a thin section.

ote on mining progress; Projection on supt. wall shows 12th E entry at 240' N & 1st & 2nd N. panels projected 3000' N. or further. They may intersect the "channel" around 2400' N. ; now they are at 1700' N. and 1650' N., resp. If trends continue there may be more mining problems assoc. w. "channel" to the E.

ddenda Continuity of shale partings in the #6 coal here in Crown II is also of interest to me. The attached 2p. note bears on the continuity of perhaps 5 parting (inc. B.B.) I consider mapable. In turn, an internal coal stratigraphy helpful for sampling and coal thickness variation can be developed using these partings. Planned mapping (see previous notes) is on the E. Mains between the 2nd & 3rd panels.


Cl. DK
Stronger line
Sampled
Clay Dike
persistent
in roof
only
dies out
in coal on
S. rib
BN w. carb. shale loc.
poss. ss. over
boney coal
slump
confused sit
dip
2072't
op. point
2298't
2600'
2500'
2400'
2300'
2200'
2100'
2000'
9th
10th
11th
12th

Field

June

6/30/78

Addenda p.1

6/78

Crown II; Summary of #6 coal shale parting data to June 13-15,78 trip preliminary to research in grided sample area in E. Mains

Col. A; Note D (3rd S. Panel) Jan 24-5 (my notes) under "G" roof

Col. B; Note H (3rd S. Panel) Jan 24-5 (my notes) under "G" roof

Col. C; Field Map (3rd S. Panel) Jan 24-5 (my n.) under "B" roof

Col. D; 9th S., 1831' S. (My Feb. 7-9 notes)under "B" roof

Col. E; 10th S., 1640' S. (My Feb. 7-9 notes) under "B" roof

Col. F; E. Mains Grid position "21-20" (Mar.28-30 notes);"B" roof

Col. G; N. Mains; 9th N, ca. 2200' N. (Note I; March 28-30 notes) ("Lw" roof; "B" previously)

Col. H; N. Mains; 1A N. (Krausse Field Map) 1640' N.;"Ls." roof

Col. I; 8th E. near pos. 3rd panels (June 13-15; Map C; "B" roof

Col. J; E, Mains Grid position "13-20"(June 13-15; Map C;"G" roof

Col. K; 2nd S. Panel; "B" entry 790' S.(June 13-15,p. 6);"B" Roof

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These columns have varying degrees of detail & the assumption is made that some parting may have been missed (or were indeed locally missing) when mapped. The overall picture does support continuity of several major bands, esp. 2.0, 3.0 & 5.0 ("Blue band") There is some confusion about the band(s?) above the 2.0 ; this will be resolved during mapping. The 4.0 carb. shale band, if it is continous, could easily have been missed because of it's nature. I have not yet seen a shale or shaley band below the B.B.

Mapping and desc. of these partings is the first step in the development of an internal stratigraphy of the #6. I feel it will be of immediate help in answering questions of "why" & "how" coal thickness varies: whether coal is missing/not deposited, and form the framework for researching lateral variations in coal parameters; providing that the shale partings prove to be time markers.

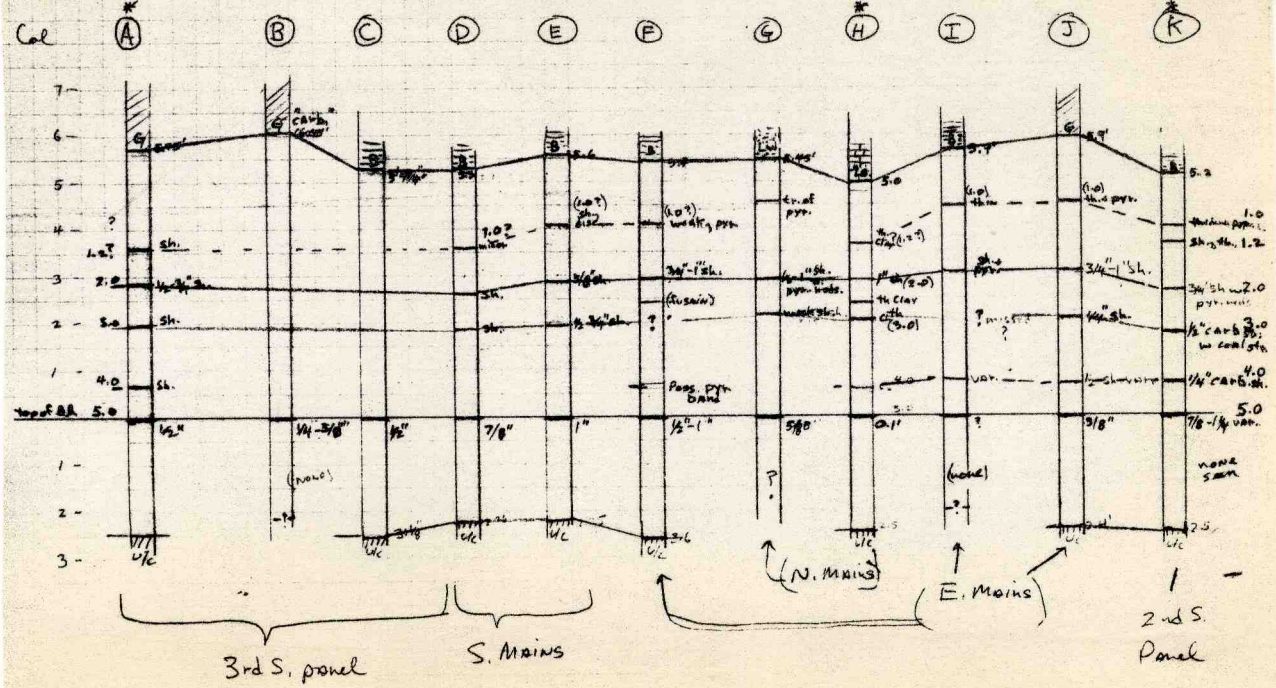
p.j.d.

Crown II Slate parting data

to June 13-15, 1978 trip. (Not all 4c-B.B-roof data included - only (B) + (C))

*[A, H + K are most detailed]

[Parting #s (1.0, 2.0, 3.0 etc.) are arbitrary.]



Addenda p.2

Mine Notes - Crown II(Freeman), Macoupin Co.

Trip: Aug. 17-18, 1978 by Phil DeMaris

Coverage: Mapping in N, Mains(1 to 4)
Mapping in the 2nd N, Panel
Mapping in the N. Mains (9 - 12)
Samples E-1 to-8

Introduction

I spoke to "Hap" Combs Aug.14 PM & he indicated;

1) the N. Mains are not sealed,
2) our second preliminary report was received
3) 1st and 2nd N. panels are scheduled to go to 3000' N. of the 12th E. Main (so much for the vaunted "zero-zero" co-ord. system!); they are at 2000' N. now and there is a water problem at the face of the 2nd N.

Hoping to finish mapping the "channel" area of the N. Mains, I set up a trip for Thurs.-Fri.

On arriving at the mine I spoke to "Hap", Jim Boulton & met Paul Kocurek. The 1:200 & 1:400 maps are only updated every 6 mos. Kocurek commented on the Virden "N" & "S" mines; only had a 1908 map & mine closed in 1912. I told him this was the best we had (Nance had checked earlier); I suggested he project the mine workings using production figures from Mines & Minerals figures. We should not do this because decision to buy coal hasn't been made yet. He also wants Oil & Gas maps for this area.

Paul K. also commented that they hit workings of the Farmerville mine (Crown I) which was full of water nearly to the roof; it was pumped out & caused no further prob-

lems, i.e. was not an active source of water problems thereafter.

Mapping in N. Mains(1A to 4)

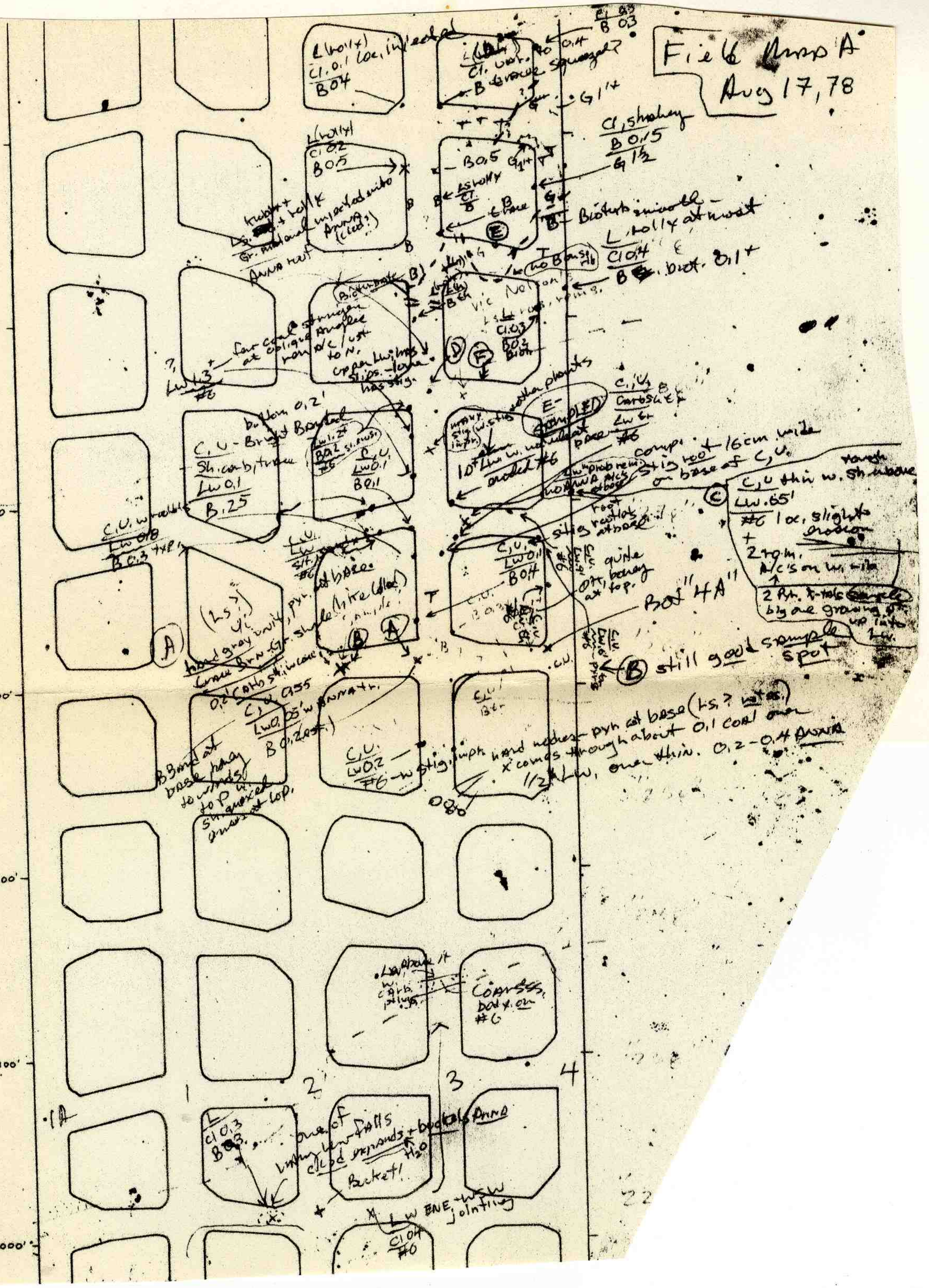
On the 1st N. , noted clay dike below "G" roof between 13th & 14th crosscut; trends NE-SW and is fairly strong; stronger on W. rib where it "Y"'s and goes below B.B.; clay filled in oly top couple feet. Roof is Anna; "G" just to N.w. Ls. bosses present.

On the 1st N. between th 18th & 19th Cross-cuts, W. rib (from mid-pillar & toward NE corner of the pillar) are a series of small Ls. "bosses" down into the top coal (displacing a couple inches of "clod" material, at most 0.4' from the base of the Ls. This would be mapped as L(n). Assoc. with this effect are lenticular bodies of "clod" in the top of the #6. On the E. rib there is flat-bottomed Ls. and "clod" lie over Anna 0.3-0.5' thick; i.e., no such effect. Around the NE corner of the pillar going W, the bosses are small bumps; there is still much coal in the clod. A moderate amount of "mixing" seems to be the rule and the mixing seems more intense where the roof is knobbier. This effect may occur during compaction; the Anna may act as a buffer to this effect; the clod being more shale-like might also buffer this effect (later note; Check of compilation shows area to West has L(n) roof)

(See field Map A)

A. Roof bolted here desc. hard, gray unit, pyr. at base(Ls?) brn-gray shale like"clod", tr. Carb.Sh.0.2' w. conc. C.,U. 0.55' Lw. 0.05'w. Anna tr.

8 0.2' (est.) →


Field Map A
Aug 17, 78
Box "4A"
B still good sample spot
1
2
3
4
1A
2000'
2100'
2200'

Field Map (A)

B. Cut exposure described & Ls. sampled (E-1)

Ls.(?); hard, brown-gray only .05'exp.
Brown carb. shale, trace
Coal, upper 0.50' boney toward top
"Lw." 0.65'
Ss.,coarse, trace
6 coal

C. Just W. of desc. section (see Map) in roof coal is very thin & boney, with hard, flat-bottomed unit above it, pyritic at base. Interval from top of #6 (only slightly eroded locally) to hard unit is 0.8'. Ten feet to the N. a 10' long stigmaria impression noted in roof in med. to dk. gray carb. shale over lighter gray carb. shale (all "lw.").

D. Ls. nodule (Sample E-2) appears to be knobby and nodular Brereton which sits on bioturbated Anna about 0.4' thick. Many of the nodules are pronounced protrusions, as if plunging down into the Anna. Further examination indicates that some nodules are completely sep. from the body of the Ls, but they seem to be bioturbation burrows 0.1' to 0.15' diam. Where these "tubes" are not present, the Ls. base seems to represent a set of interlocking sub-hemispherical masses, some with more pronounced "points" pointed down. A silty shale is above some of the nodules of ls. with typical "lw." above that. Slightly to the S. here, the Lw. seem more common on the Anna. On W. rib 2 low-angle slips are present in coal in vic. of fusain mass; vitrain on slip planes(Krausse interested).

E. Excellent cross-section in cross-cut of the end of a Gray sh. ("Energy"?) roof area. Anna is thin or absent to W. side. I marked 12 spots, 4' apart here for descriptions.

From W. to E. (p. 4 of 10, plus 3 maps)

(Position)	Coal *th.	"G" thickness	"B" th.	Other?
1 8' off rib-line	45"	none	0.1' bioturb.	L (rolly)
2	46"	.25', .5' past contact	0.1' bioturb.	L (?)
3	46 7/8"	9 1/2"	0.15' bioturb.	(brach. sampled) fossils med. dk. gray shale w L 0.2' (fl. bottomed-nod.?)
4	45 1/4	16 1/2"	0.●20' bioturb	L 0.15 (prob. edge of module) 0.1' clod
5 low-angle slips in coal	44 3/4" slip affected	16 3/4"	thin?	?
6	47"	east + 2 1/2" adj. 14 1/2" +/- due to slip.	0.4'	L?, gray w. ENE-SSW slips "hosted" clod irreg contact to "B"
7	45"	19 3/4"	0.35'	Ls, gray, 'rolly' 0.1-0.2' clod, shaley 0.3 contact 1/8" clod 0.06' slightly irreg
8	44 5/8"	17"	0.3' Slightly biot.	clod 0.4, shaley typ. top 0.1'
9	44."	16 1/2"	0.3' top bioturbate	L, flat-bot. clod 0.3, shaley
10	46 1/4"	8 1/2"	0.15' bioturb. at top.	L, flat-bot. clod .35'
11	46 1/4"	none	0.2'+ bioturb.	L clod 0.4', shaley + lighter at top
12	44 7/8"	none	0.2' very bioturb.	L, flat to 'rolly' at most. clod 0.5', shaley

* measured to persistant mid-seam shale band w. pyrite.

Banding of the "G" shale appears roughly // to the coal contact, near the contact, but the band-to-cal interval does thin toward the edge of the pod; in one case a band-to-coal thickness looses 2½" over 8' horz. (vic. pos. 9 to 10). On the E. side, the last 3' of the "G" shale to Anna shale contact shows clear truncation of "G" shale bedding (primarily darker banding) planes. At all points, the "G" sh. to Anna shale contact has coal on it, and usually also some coal in the base of the Anna shale proper. On close examination, there is some irregularity of the "G"-to-coal-to-Anna contact due to presence of very small nodules on the "G"-to-coal boundary, which also lie at angle to "G" bedding, and which "bump" up the later thin coal and the Anna.

The coal/Anna contact is "clean" away from the feather edge of the "G" shale, except for one nodule 0.4' away from the "G" (point 11) (A shell hash has been noted in E. Mains mapping by myself earlier at this position) On the W. side of the "G" shale area, deffinite truncation of bedding can only be seen on first 1' on contact; too broken up elsewhere.

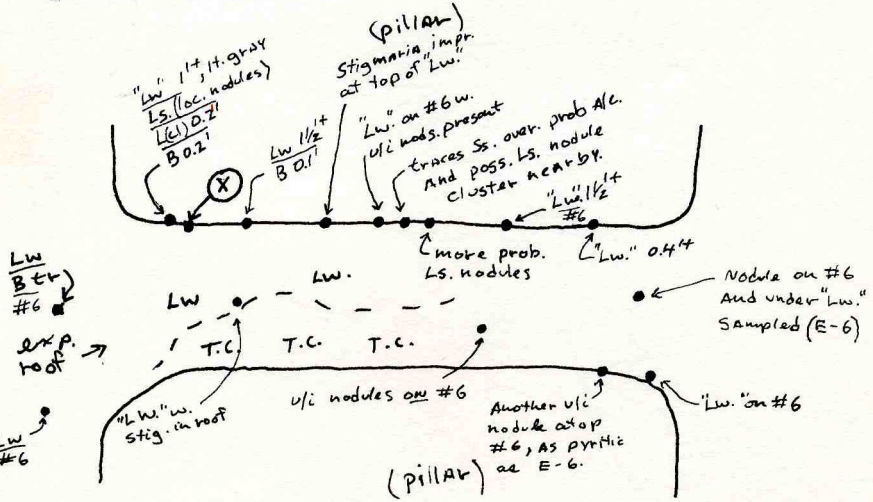
The Brereton Ls. is only known to be thin on this side also (W. side; see table) A little coal was in the "G" shale at this end and was roughly with bedding. The coal/Anna contact is more "dirty" on this side; but situation is confused by intense bioturb. of Anna.

To the S. side of the crosscut is a difficult-to- interpret (atypical?) roof section (poss. benched Brereton?):

Ls.(prob.), hard, bioturb. tubes at base
Dk.Gr. shale (Marine*)w. shell impress.
Ls. (Brer?),lt. gray nodules in shaley matrix
Clod, lt. gr., weak
"G" shale 0.2'
#6 coal

*Marine infered from Brachiopod Neospirifer found in same unit (sample E-5, point 3) across crosscut.

F. Examined area where Nelson reported probable erosion of Brer. and Anna shale (Mar. 30 notes; stop 19). I hoped to find ls. nodules (erosional remnants ?)as sketched by Nelson. There are several nodules which may be Ls. nodules (one was sampled) but some are not; it is virtually impossible to distinguish eroded calcitic Anna conc. remnants from argil. ls. remnants (See the samples) Sketch:

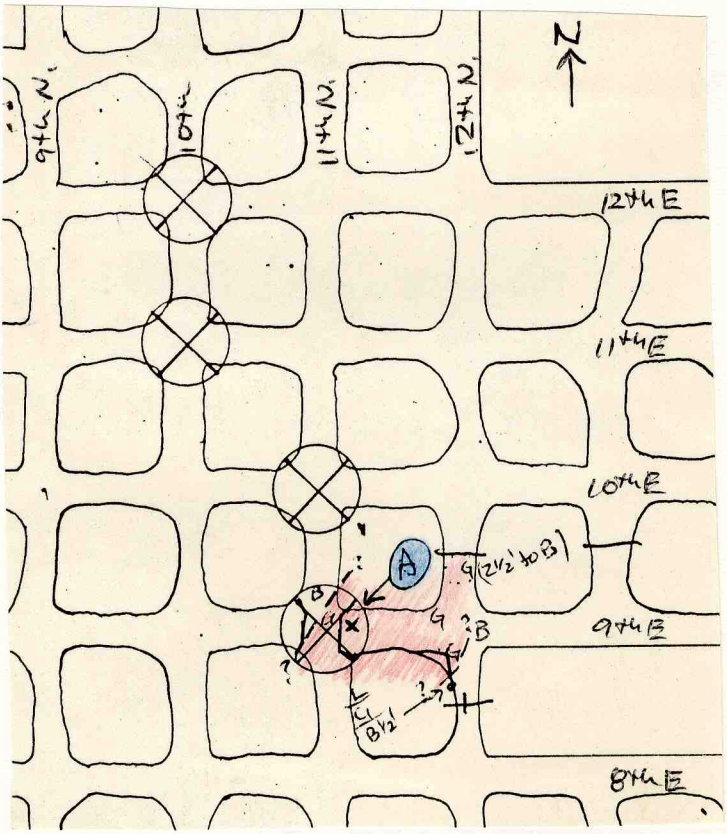


At point "X" we have fine Ss. on and to the E. side of a Ls. nodules (also notes earlier by Nelson). Ss. grades upward into a finely silty shale (v. sm. mica flakes present). There is, then, clear erosion of Brer. & Anna on the N. rib; the erosional outlier pictured by Nelson involves inference (is not a view) and the condition of the to p of the presumably partially eroded Brereton is speculative, being based on the exposure at "X" only, matched with exposures further west.

Mapping in the 2nd N. panel

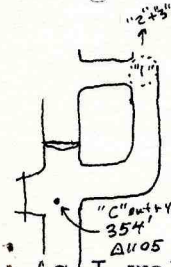
I took an odd route across the "bottom" area and found an interesting exposure trying to find the 11th E. (note A)

Note A (Map)



At the "X" the exposure appears to be 2' of "G" shale, about 1' of Anna sh., and at least 4½' of flat-bottomed Brereton Ls. This exposure is not especially noteworthy to me except that it contradicts the "normal" pattern of roof as reported to Freeman Coal in two "preliminary reports" on our mapping.

In the 2nd N. panel; water draining from coal ribs; little stub to E. at base of panel has gas & water & is marked "don't cut".



Noted tag where "D" entry branches off the "C" entry; then walked to face with an Examiner on "D"; 3 conseq. "1","2","3" roof-fall in "G" roof to siltstone; now fairly dry. (Sketch-map)

As I walked the "D" entry I confirmed the presence of "lawson" and SS. roof. The face boss complained of"Sticky shale" at face which was difficult to drill; they had switched to auger-type drill and were still getting them stuck; for comment on this see note B (follows). In this vicinity, they drilled 12' without hitting competent strata & were barxely able to tighten some bolts. Face boss (Carl Griffin) says similar area was hit in the 1st N. panel and they are "out of it"; it was hit"further south" than in this panel.

B (on Map B) Several auger-type roof drills left in roof here; apparently the "Sticky shale" area the face-boss mentioned. The "G" roof here may be directly overlain by Anvil rock#"Lawson" interval shales. Area is quite wet; several 120" bolts in vic; bolters also say no solid rock is present.

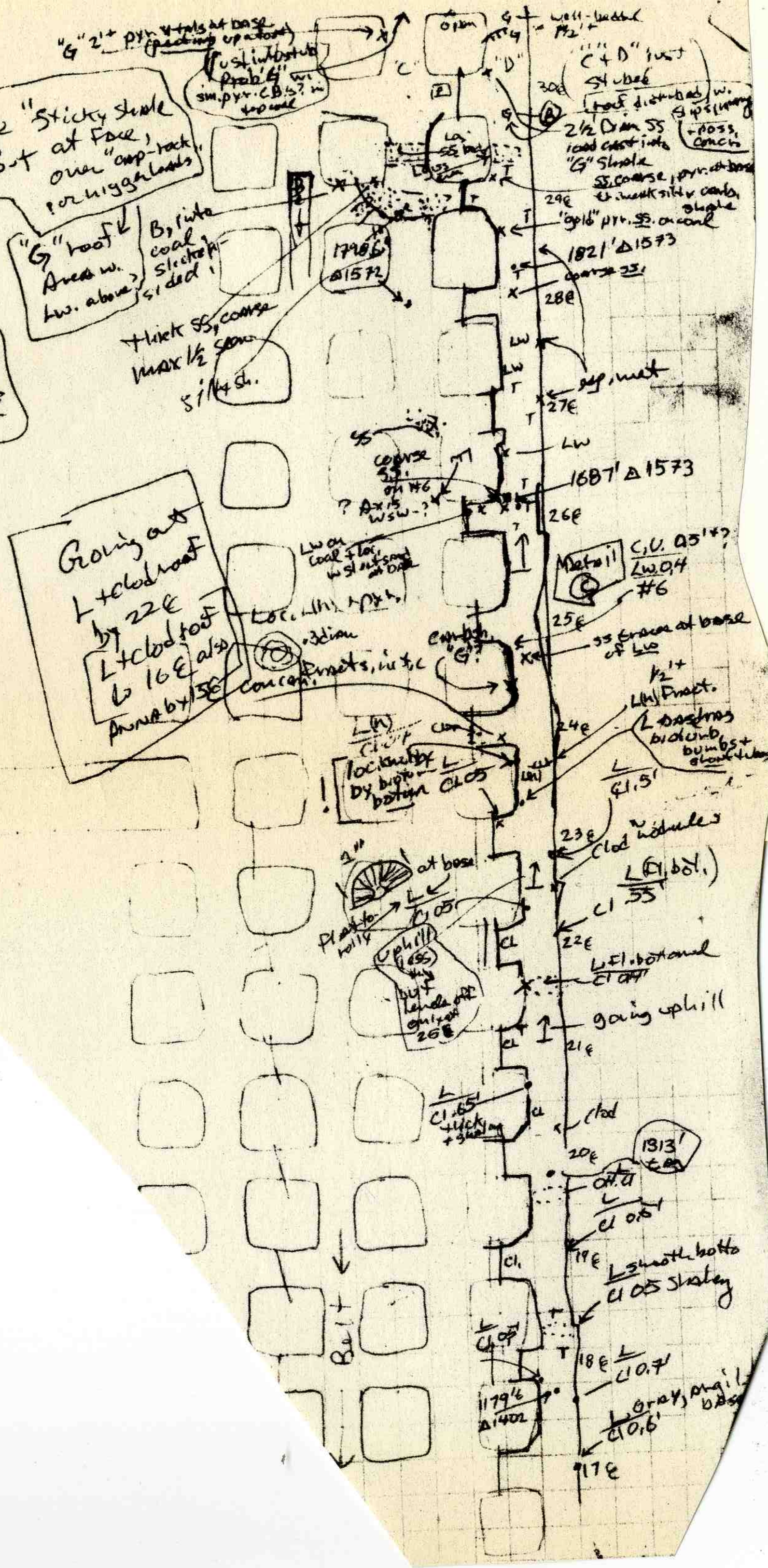
C. (After numbering cross-cuts from the south to the 17th c.c., I mapped going north) First confirmed "erosional sequence" in roof noted here. (See detail map) Shale atop the #6 is lt. gray, silty, fairly hard, dry, and full of plant compressions (coal traces in profile) In vertical exposure (wet) slightly brownish-gray, but lighter than wet

FIELD MAP (B)
Aug 18, 78

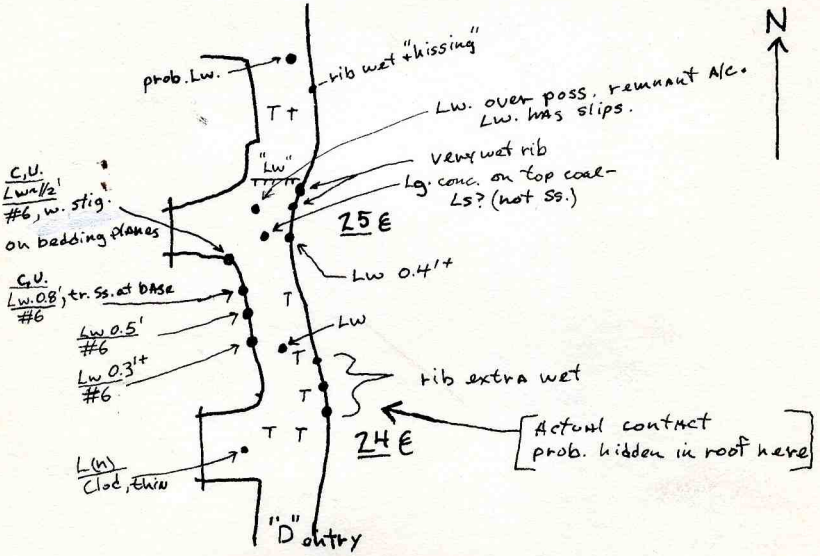
Griffin,
Carl, Inez Boss

Claude Mitchell
Fossils in 10th + 11th E

Griffin says
1st N. hit this
area further S,
and is out of it.



"G"(Energy) shale. "G" shale locally has prominent pyrite crystals at base, and plenty of pectins; the "Lawson" has no pectins and only a little pyrite at its base. Detail map:

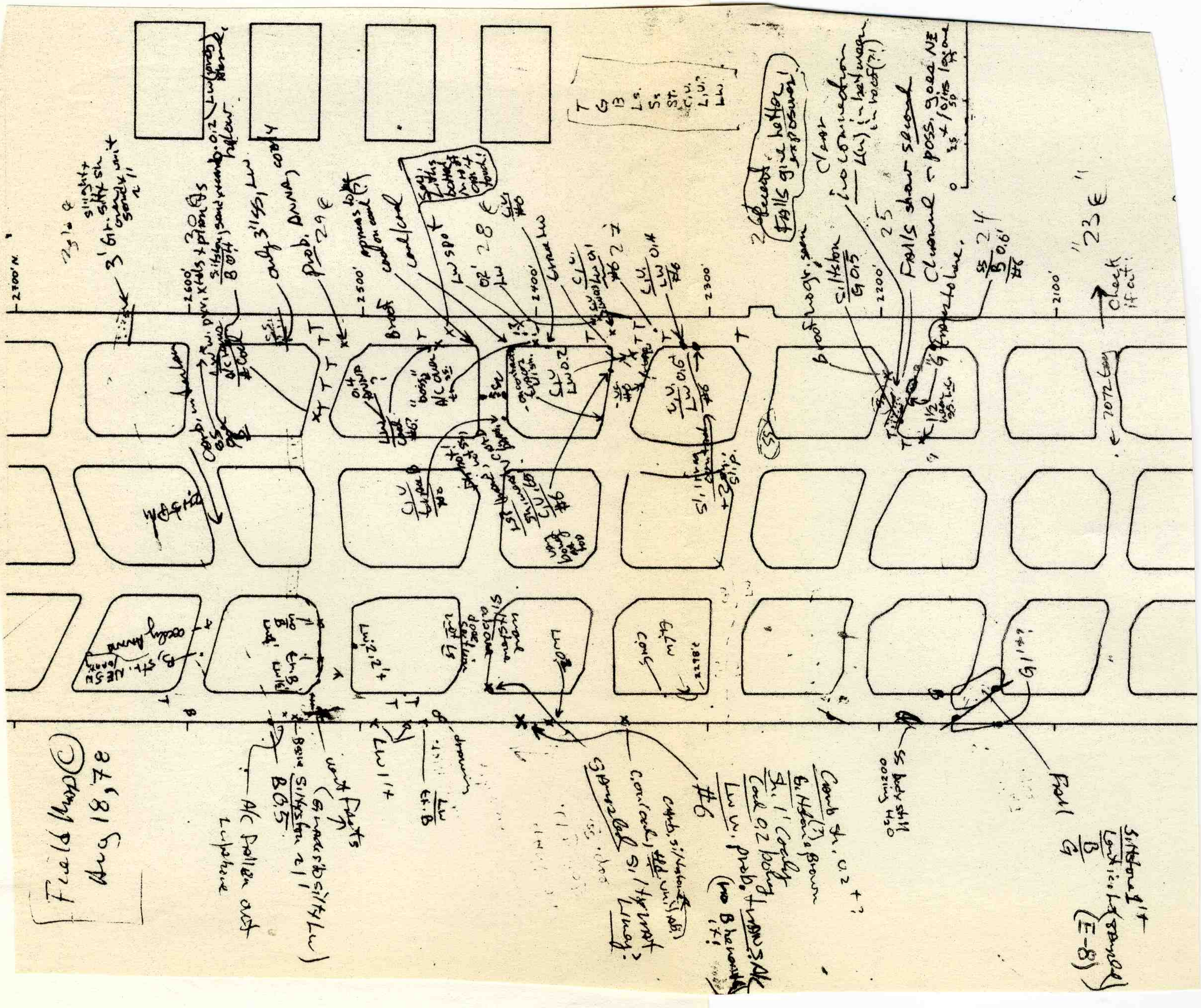


Mapping in the N. Mains (9 - 12)

This was the last planned "touch-up" mapping for the N. Mains & was concentrated in areas mapped early & in less detail. (See Map C) Mapping somewhat hurried. While driving home, the roof seq. vic. 2180' on the 11th came to mind.

The sequence; thin "G", w. "knobby" Brereton Ls. above, and presence of Ss. body immediately to the North (1-2 feet) suggests the possibility of erosion of "G (exposure just to S. thickens in this direction and absence of Anna sh. is otherwise not very explainable). This possibility is also

Field Map ©


Field Map © Aug 18, 78
2700' N
2600'
2500'
2400'
2300'
2200'
2100'
29 E
28 E
23 E
Check it out!
Fault

supported by the Ss. in the roof laterally and at or slightly below the position of the L(n) on the rib, and the odd Ss. lense noted before between Anna traces and L(n) further E. on the rib.

Samples Crown II E-1 to E-8

E-1 Site B; probable Ls. above "upper" coal.

E-2 Site D; Ls. nodule; apperas to be knobby Brer. from atop bioturb. Anna.

E-3 3rd. N @ 2400'; calc nodule atop coal in "lw."- prob. a/c/ remnant.

E-4 Site C; 2 large pyrite crystals growing on remnant a/c in "lw." roof.area.

E-5 Site E, point 3; Brachiopd Neospirifer in dark shale apparently over thin or (benched?) Brereton.

E-6 Site F; nodule bolted into roof (see map); nodule under Lw., poss Ls. (or a/c?)

E-7 9th N @2420'; Limey siltstone in Lw. roof area.

E-8 9th N. @ 2150' N. Base of thin, lenticular ls. (Brer.) from fall exposure.

Mine Notes - Freeman Crown II - Macoupin Co.

Trip: August(?) 31-Sept. 1 1978 by H. F. Krausse: notes +others - see notes
and discussion by P. J. DeMaris

Coverage: Field checks in North Mains
(original map is attached)

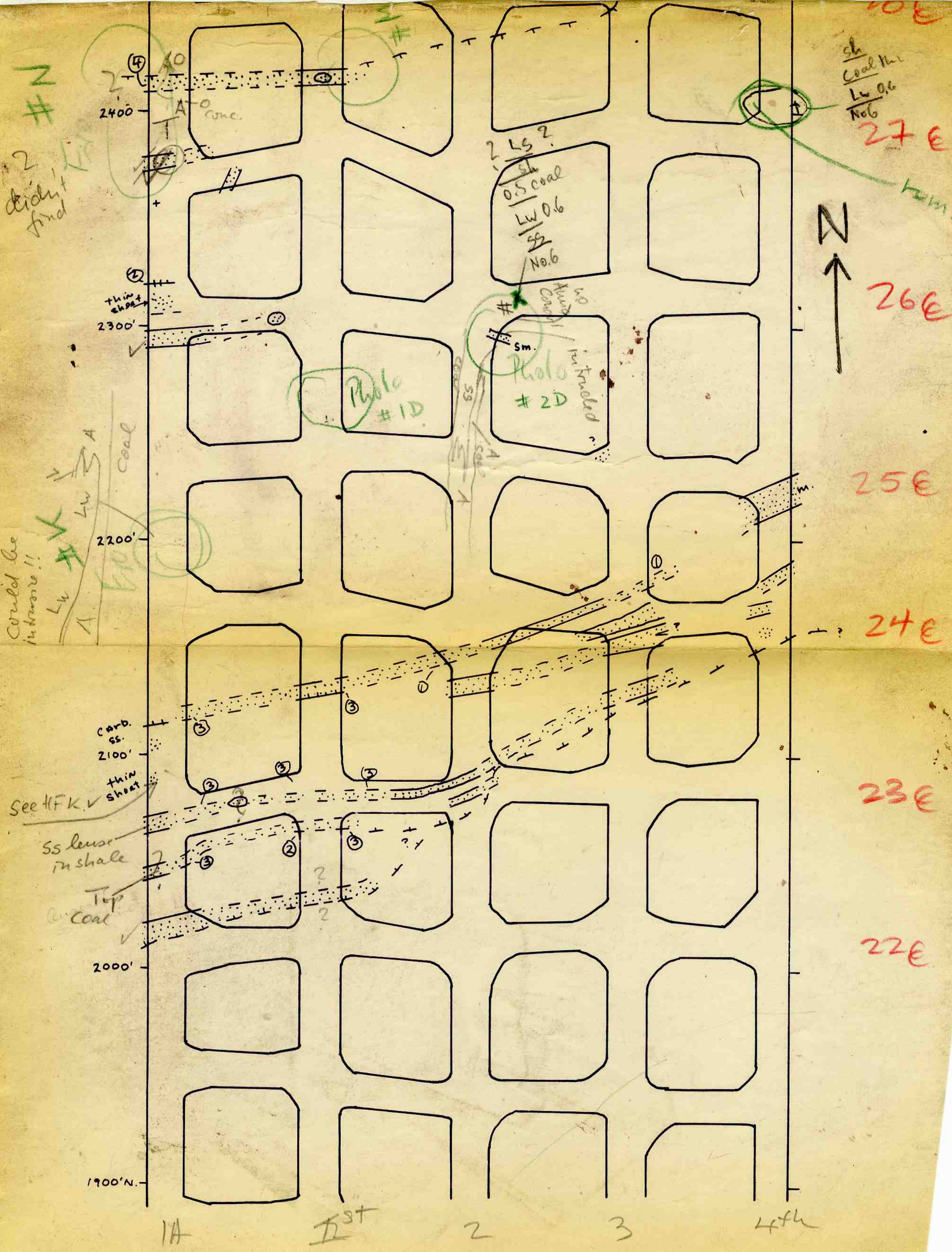
Date: January 25, 1982

Fred made trip soon after July 6, 1978 (date of map) to check some channel exposures in the North Mains. Notes have not been found to date. Base map is the sandstone map with scale of about 1" to 67'. My notes of problem/interesting exposures are in red pencil with one note in green pencil at 27th cc on 4th N. Fred's field notes are in pencil with notes in green pencil probably made before the trip, some noting photo positions.

Reviewing the notes on the map by entry.

Entry IA - Fred failed to find the sandstone exposure which I found on the W. rib at 2045'. He says "see (HFK's) notes" for sandstone at 2080'. At 2200' Fred sketches "LW" undercutting Anna, and says "could be intrusive." Fred did not find sandstone at 2420', but of course it was inferred by excessive water when mapped (see key), it is likely that Fred did not recognize this.

Entry 2 (no notes on 1st) - Fred went right to the exposure at 2300' (discussion, p. 2 see), produced a similar description of nearby roof fall and declared the feature in the siltstone as "no Anna concretion". Just to the south the siltstone with sandstone lenses clearly lies


2400
2300'
2200'
2100'
2000'
1900'N.
27E
26E
25E
24E
23E
22E
1A
1st
2
3
4th
N
#N
sh
coal the
Lw 0.6
No6
LS
sh
0.5 coal
Lw 0.6
ss
No.6
no through coal
intruded
sm.
Photo #1D
Photo #2D
A° conc.
2 didn't find
thin shoot
carb. ss.
thin shoot
See #FK.V
ss lense in shale
Top coal
coal
Could be intrusive!!
Lw
sm.

Map #7
7/78

Notes?

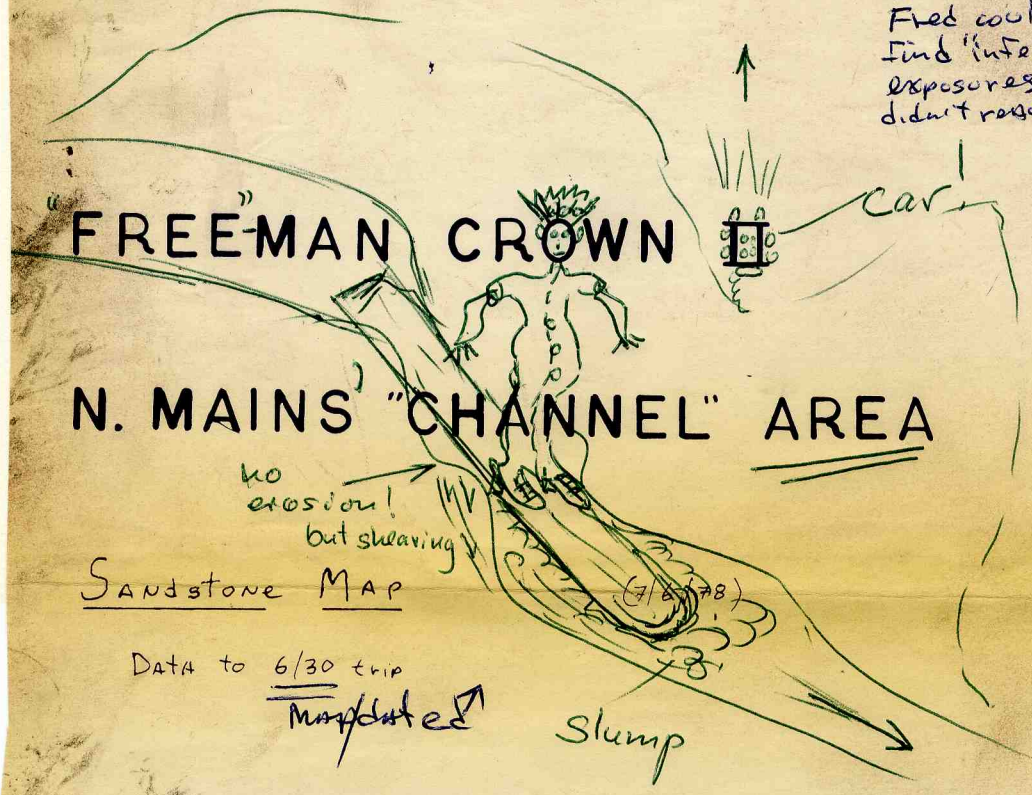
FCMCA TV II

Trousse's Map from August(?) '78 trip - 2 (was July or later) Fred couldn't find "inferred" exposures - didn't need key!

Map, pt. 2

7/78

"FREEMAN CROWN"



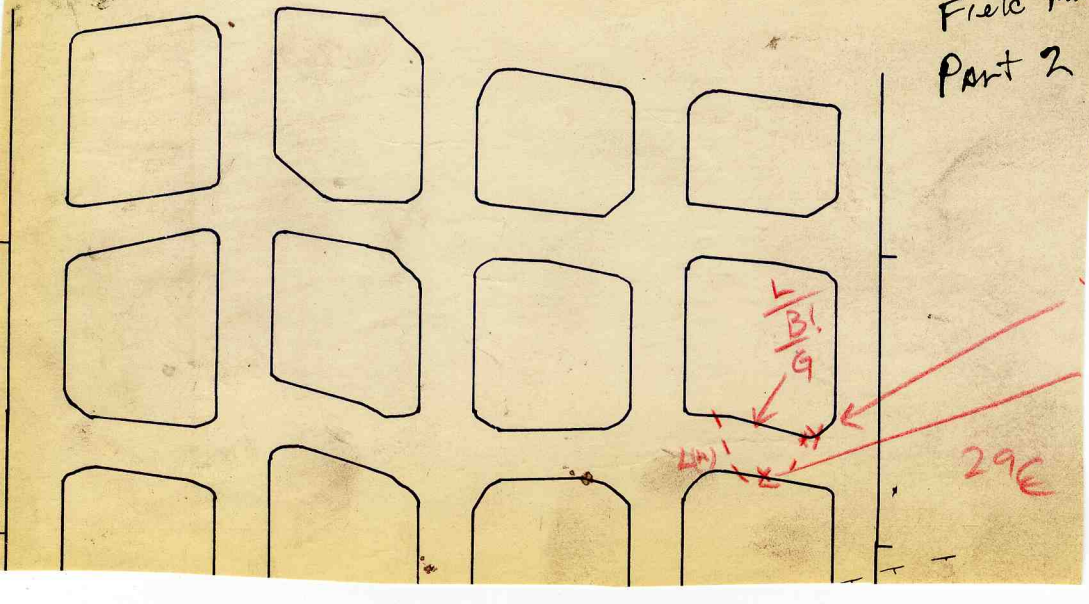
N. MAINS "CHANNEL" AREA

SANDSTONE MAP

DATA to 6/30 trip

~~Map dated~~

Field Map Part 2



under a couple foot long "rider" of Anna - Fred sketches this and declares this to be "intruded". There is no comment on the small 55° channelet beside the "non" Anna concretion. (See photo in June 13-15 notes)

Entry 4 - (no notes on 3rd) Only comment is on roof fall at 2400 - one E rib he notes No. 6; Lw. 0.6'; coal, thin; shale. The remnant Anna concretions I believed I identified here are not commented on.

Discussion - The problems that this case shows are typical. I asked Fred to check and comment on some exposures; he checked, disagreed with me, but did not discuss it with me.

Fred doubted that the object in the siltstone (Lawson) at 2300'N on the 2nd N. (see photo in earlier notes) was an Anna concretion, completely isolated through erosion. I feel, and the photo supports, that it is, and that there is a trace of Anna left beneath it. It was either undercut in place (a sandstone channelet is along the south side) or moved only a short distance. Further, other concretions in various stages of erosion have been seen before and since, including one found in sandstone probably carried during erosion.

It is unclear whether Fred acknowledged that we were dealing with an erosional channel from these notes. I believe he did, but consistantly sought to find deformation whereever it could be found, including some places it was not to be found. That makes it hard to judge when Fred really is serious about a matter (see map, p. 2).

Assuming Fred was serious about: 1) the a/c at 2300'N. and 2) the undercutting of Anna at that site and on 1A. I offer the following:
1) The Anna concretion arguments are stated above. The feature has received some erosion, and the pyrite (normally diffused) is recrystalized, but this was seen in all of the isolated a/c's and even those around which erosion had just began. Granted, this feature is beginning to break up, but there is nothing else found in these sediments that looks anything like it.
2) Undercutting of Anna. Both the Anna and Brereton Limestone were partly lithified at minimum; this is demonstrated by Anna and Brereton pebbles in the channel lag. In the high-energy regieme of the channel with rapid in-filling, there is no doubt that undercutting occurs and is preserved in the record. Not only is it seen here, but in later field notes. Some deformation of the fresh sediments into the Anna is likely, and probably modified and accentuated both exposures, but the dominent process clearly is erosional undercutting.

FREEMAN UNITED COAL MINING CO. CROWN MINE II
Aug. 31-Sept. 1, 1978
Notes by John Nelson on visit with H.-F. Krausse and Dr. Claus-Dieter Reuther. Preceding notes, made taken on this trip (see p. 3)

Dr. Reuther is visiting the Survey from Germany. He is an acquaintance of Fred, and teaches geology at the mining school in Clausthal-Zellerfeld. This is his first visit to an American coal mine. The primary purpose of the visit is to introduce Claus to our work; he will be spending about two months at the Survey and will work on projects related to coal mining geology.

The trip preparations were made hurriedly and so we found ourselves repeating work done last week by Phil DeMaris, and we do not accomplish very much new work.

We visited the 2nd Panel North to check for Lawson/Anvil Rock immediate roof, not knowing that Phil had already discovered it last week. We walked in via the travelway (C Entry). We had no map.

At Crosscut 26 the first indication of Lawson Shale in the immediate roof was observed. The roof consists of shale, medium-dark gray, poorly bedded, hard, micaceous, containing abundant plant debris and large Stigmarian rootlets. The latter are usually a good indication of Lawson, rather than Energy Shale.

At Crosscut 27 the immediate roof is sandstone; light gray, very fine-grained, micaceous, argillaceous and highly carbonaceous with abundant coaly partings and plant remains. The sandstone is finely and irregularly laminated. Only the base is exposed, but it is quite obviously sandstone like that exposed in the Main North.

Some of the plant fossils are very well preserved and might be interesting to a paleobotanist. Fred identifies Sigillaria, but many other leaves and parts of plants are present.

In Crosscut 31, between the belt entry and the

travelway, the top surface of the coal is very irregular and it is directly overlain by massive sandstone. Possibly some erosion took place before the sandstone was deposited.

A large volume of water is flowing from the roof at the face of A Entry (return-air). The place is not yet bolted so we cannot examine it directly. About 20 feet south of the water seepage, we can see fine, dark gray shale (Energy ?) overlain by sandstone like that at Crosscut 27. In the belt entry, due east of the dripping place, the roof is dark gray fine shale (probably Energy) with no sandstone visible above. Roughly three feet of the dark shale has faleen out here. The continuous miner is breaking through a cross cut to the east of the belt entry. As we watch a large mass of shale falls on the head of the machine- no one is hurt.

The water flow in Entry A is inby Crosscut 32; a survey tag at the intersection reads 1984'.

In Room 30 west of Entry A, the immedaite roof is Anna Shale, but we cannot see what overlies it. Farther west in the same room, sandstone and sandy shale replace the Anna in the immedaite roof. At one place we find tiny pyritized goniatite shells, about one millimeter in diameter, in sandstone. Goniatites are marine fossils and are not known in fresh water, though it is possible they could be washed into an estuary by tides or storms.

In places a layer of coal, usually bony and micaceous, occurs within the Lawson Shale, but we are not able to see more than the base. As in the Main North, the Lawson/Anvil Rock Roof is very stable, and no large falls have occured, so not much of the roof sequence is visible to study. The roof is also quite dry, with the exception of the one place at the face of Entry A.

South of the sandstone roof area in the rooms west off the 2nd Panel North, several major roof falls have occured. Their exact location is not known because we have no map.

In one fall the roof sequence is (from the top):

Base of Bankston Fork Limestone (?)

6-7' Sandstone, light gray, very fine-grained, hard, micaceous, argillaceous. Falls in slabs 0.5-1.0' thick. Grades upward into massive or poorly laminated siltstone or fine sandstone. Sharp lower contact:

0.5' Shale; appears like "clod" or limestone transition, but no limestone present.

1.8' Shale (Anna), black, fissile, with phosphatic lenses near top.

1.2' Shale, dark gray to black, with many fossil fragments; appears to be a form of "bastard limestone".

Top of Herrin (No. 6) Coal.

In this fall no indications were seen of erosion at the base of the sandstone. It is more like the typical sequence in the south part of the mine, though the sandstone is rather thick and massive.

In other nearby falls, the view was poor, but the sequence appeared similar to that described above.

September 1, 1978

In the morning we first went to an overcast at the west end of the 9th Main East, where Phil DeMaris reported finding gray shale overlain by thick black shale and 4-5 feet of Brereton Limestone. We found conditions were as reported. Such a sequence is found in several places in the mine, but is relatively uncommon. In most places the Anna and Brereton are thin or absent above gray shale.

Claus and Fred then went to the Main North to check some more of Phil's observations. I went to the faulted area in the 3rd Panel South. A 1"-100' scale field map of the area I visited is included with these notes.

In the 3rd Panel South the company has now mined considerably south of the strike-slip fault, and has also mined some rooms in the fault zone east of the panel.

(1) Main fault area on travelway now is dry; it was very wet six months ago. Base of Brereton Limestone is exposed in this area. Numerous fractures are seen in the limestone. See sketch map (over).

The main fault trends slightly south of east. Several NE-trending fractures intersect it, but are not seen to cross it. Also there are several small fractures parallel to the main fault.

The displacement on one of the NE-trending fractures definitely changes: it is a "scissors" fault. This fracture branches into three separate breaks near the main fault.

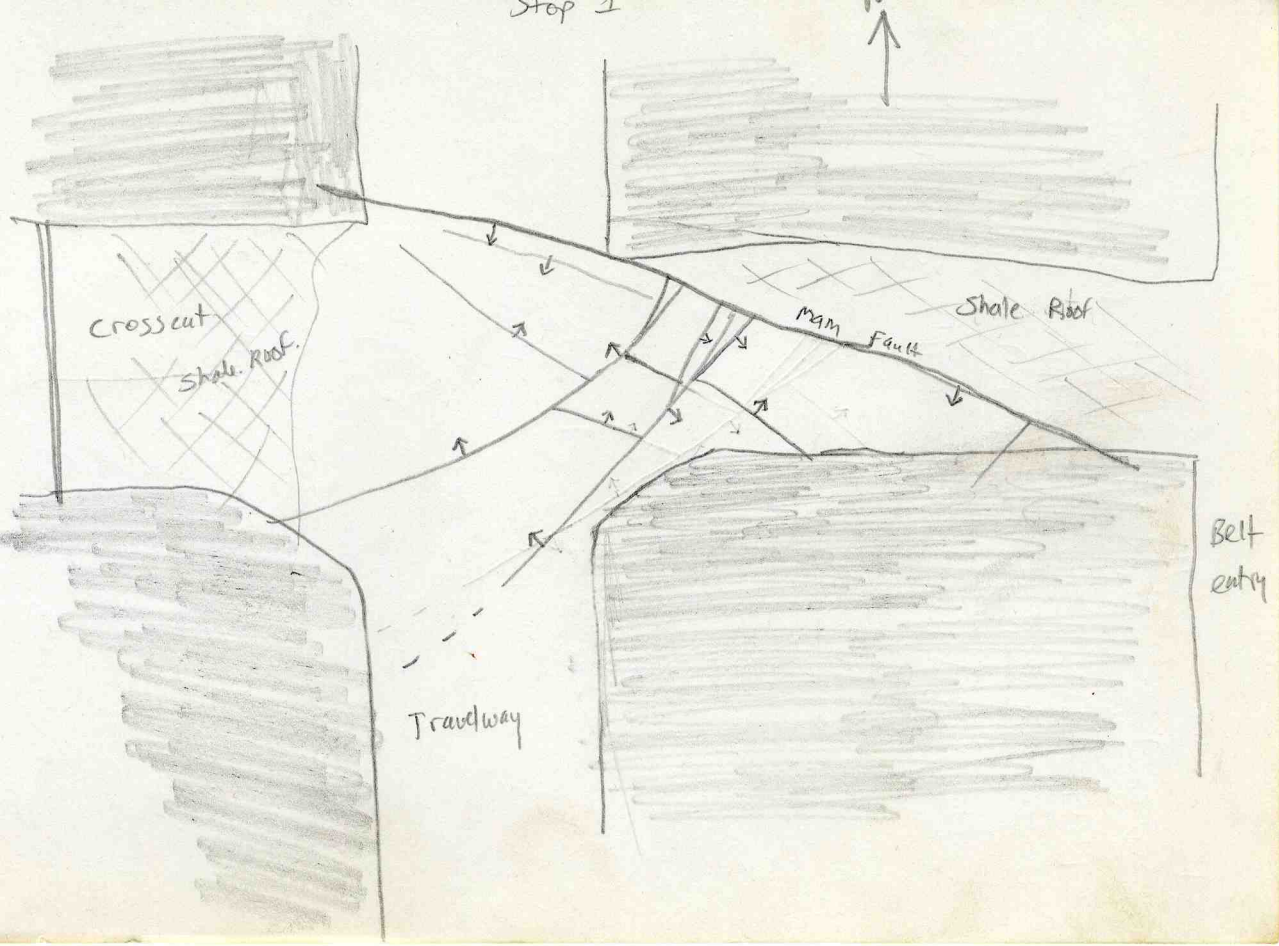
Two of the small fractures parallel with the main fault are truncated and apparently offset by the NE-trending fractures. Probably several feet of strike-slip movement has occured on the NE-trending fractures but I cannot definitely match up any of the offset fractures to enable a determination of the amount and direction of lateral movement.

This area should be mapped at a scale of 1"-50' and the fracture pattern carefully plotted.

(2) This area south of the main fault has many open fractures, which six months ago were making much water. Now there is only a trace of seepage from the roof.

(3) An unusual occurence of gray shale (Energy Shale) All shale has been mined to base of Brereton Limestone but rock dust tends to hide the structure.

The shale forms an elliptical pod about 50' X 100' (actually part of a larger dumbbell-shaped pod-see map). The maximum thickness is a little over two feet. It thins gradually toward the edges of the pod.


Stop 1
Crosscut
Shale. Roof.
Main Fault
Shale Roof
Belt entry
Travelway

The lithology is unusual for Energy Shale at this mine. It is much darker gray and more competent than usual. The lower part is dark gray, quickly grading upward to grayish-black. The shale has fine, faint parallel laminations throughout and is highly carbonaceous. The upper part contains a great abundance of finely divided coal and fusain particles, along with much pyrite. Near the contact with the Anna Shale, small pyritized fossil shells are common.

Though the color is nearly identical, the contact with the Anna Shale is generally sharp and distinct, because the Anna lacks visible coal and carbonaceous debris.

The Anna Shale thins toward the gray shale pod, and is about one foot thick over the highest part of the pod (see map). However, it maintains its fissile character and does not show the burrowing and reworking usually seen in Anna Shale that overlies gray shale.

The limestone also is continuous above the gray shale. Its lower surface is smooth to slightly irregular.

The Anna-Energy contact appears to be slightly unconformable- a little erosion of gray shale occured. But the Anna Shale also off-laps the gray shale pod. Intervals within the black shale are reduced in thickness as they cross the gray shale. Some of the lower laminae seem to pinch of on the flanks of the gray shale pod.

I would speculate that after gray shale deposition an inversion of topography took place in the coal swamp, causing the gray shale to stand as a topographic high. When the black shale was laid down it buried the gray shale but thinned over the top of the pod. Limestone deposition probably was not influenced by the presence of the gray shale here, because the Anna Shale was thick enough to bury it.

(4) Another pod of gray shale similar to that at Stop 3 (actually the two are connected-see map). In places the upper 0.5' of the gray shale is so fossiliferous that it can be called a "bastard limestone".

(5) Strike-slip fault in belt entry-only slight water dripping. Ribs are very loose but the roof appears to be solid.

Claus and Fred re-joined me for the afternoon. The following observations were made in their company.

(6) Huge roof fallin rooms between two strike-slip faults that trend roughly east-west. The southerly fault crosses the south edge of the fall. The northerly fault is not visible, but its projected line crosses the north edge of the roof fall. The southerly fault trends about 070/85 S and the slickensides are nearly horizontal (they plunge about 23 degrees to the west).

Estimated section of strata:

5-6' Siltstone or shale, (?) greenish.
1' Limestone, (?) brownish.
1-1½' Shale, (?) greenish.
2-3' Limestone (Bankston Fork), brownish.
5-6' Sandstone (Anvil Rock), light gray, laminated.
4' Limestone (Brereton), gray, nodular-bedded.
2.8' Shale (Anna), black, fissile.
Top of Coal.

Highly unusual that both Brereton and Bankston Fork Limestones are broken in the fall, although they are thick. The faults evidently are responsible.

(7) Another huge roof fall through thick Brereton Limestone. Same position relative to faults. We cannot see into the fall due to the great mass of fallen

material. At the south edge of the fall the Brereton Limestone has dropped down "en masse" along the plane of the strike-slip fault. Horizontal slickensides are plainly visible on the fallen limestone, which, like that at Stop 6, is nodular-bedded and four to five feet thick.

On the east side of the fall, very near the fault, small compressive folds are seen. Their axes trend about 080, suggesting left-lateral shearing on this fault. This is consistent with observations elsewhere along the fault.

8.) A third huge roof fall between strike-slip faults (only the south fault actually visible). Estimated section in fall:

5' plus	Sandstone (Anvil Rock), light gray, laminated locally cross-bedded; some bedding surfaces have ripple marks.
4.6'	Limestone (Brereton), brownish, nodular bedded, contains thin wavy shale partings.
1.1'	Shale (Anna) black, hard, fissile.
Top of Coal.	

The southerly fault plane, at south edge of roof fall, trends 108/80 S and has roughly horizontal slickensides. Near the top of the coal the striations plunge gently westward. The fault cuts through the Brereton Limestone; higher we cannot see. South of the fault are many nearly vertical fractures in the limestone, trending 060-070. Close to the fault Fred counted 27 fractures within one foot.

9.) Still another huge fall. This one is just south of the fault, but many NE-trending open fractures are seen, which weaken the rocks. Estimated section:

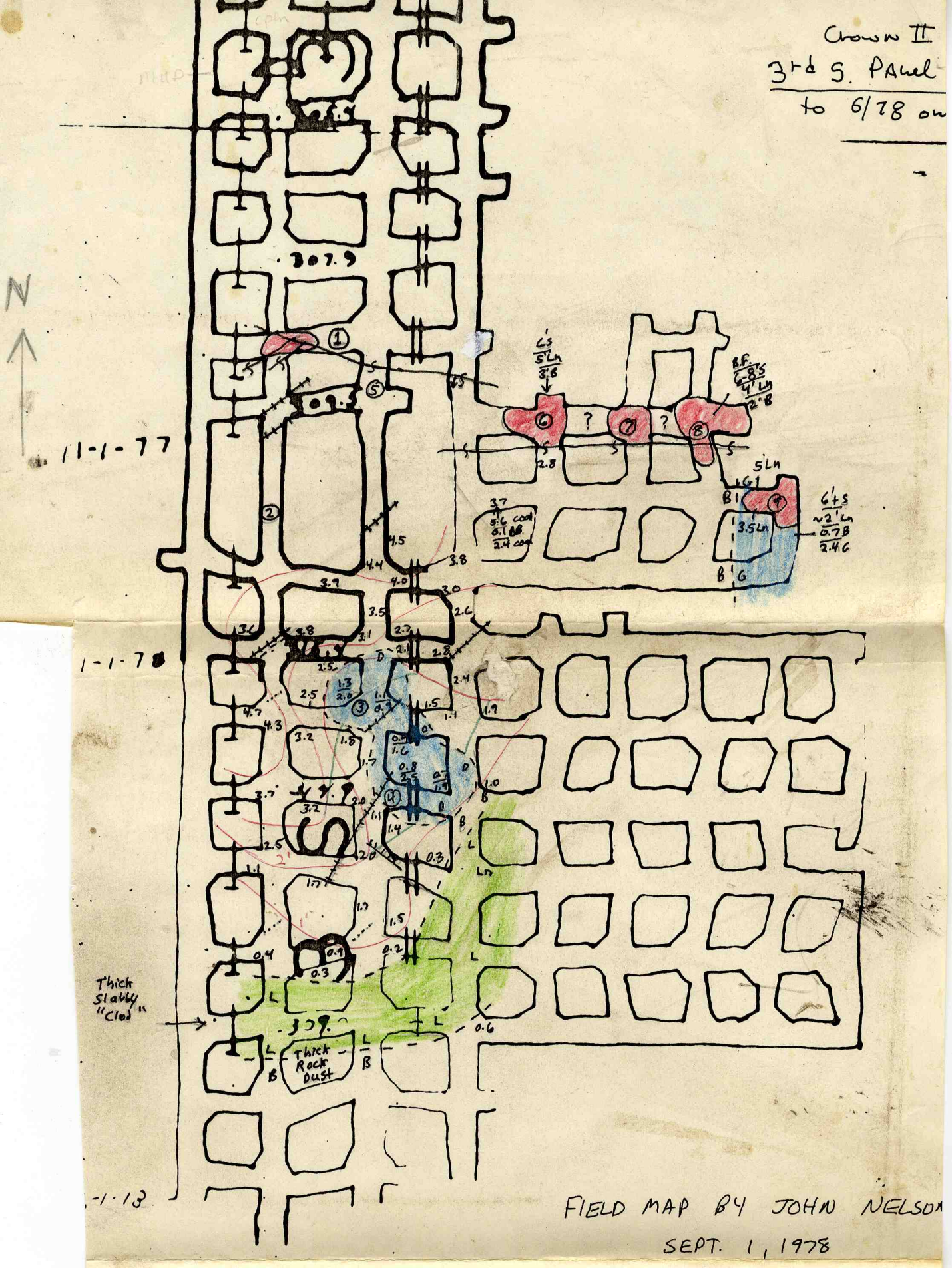
Top-	Base of Bankston Fork Limestone?
2'	Shale (?), white to reddish.

1' Limestone (?), reddish-brown.
6-8' Sandstone (Anvil Rock), light gray, thinly laminated and cross-bedded.
3.5-5.0' Limestone (Brereton), brownish, fractured, nodular bedded. Thins to south and east.
0.5' Shale (Anna), black, fissile. Sharp contact:
1.6' Shale (Energy), medium gray, soft; thickens to south and east.
Top of Coal.

At southeast corner of fall, where Energy Shale is thickest, limestone is still about 2 feet thick but is nodular bedded.

The four falls illustrate the danger of mining into the strike-slip fault zone. Three falls were probably caused directly by the faults; the fourth (Stop 9) by the associated open fractures.

Crown II
3rd S. Panel
to 6/78 ou



FIELD MAP BY JOHN NELSON
SEPT. 1, 1978

- Strike-Slip Fault
- Open Fracture
- Joints
- D — Dark Gray Shale Roof
- L — Limestone Roof
- 4.3 — Anna Shale thickness, feet
- Roof Fall
- (2) — Location of stop described in field notes.

Sept.- Dec.'78

FREEMAN UNITED COAL MINING CO. CROWN MINE II,
MACOUPIN COUNTY

October 17, 1978

Notes by John Popp on a visit with Ross Brower, Hydrogeology Section, Joe Cervik and Al Sainato, U.S. Bureau of Mines, Pittsburgh, and Charlie Sanford, Hap Combs, and Roger Nance of Freeman.

The purpose of this visit was for members of the Survey and Freeman, familiar with the water problems at Crown II, to meet with the U.S.B.M. officals. Joe and Al are with the Methane Control and Ventilation Group and have drilled holes underground methane drainage and water infusion. Apparently Freeman wants to see if these techniques can be applied to the water problems at Crown II.

After discussing the mapping problem undertaken by the Coal Section and the resulting reports, we went underground for a first-hand look. We went directly to the 1st and 2nd Entries of the West Mains where there has been a persistent water problem. There was a fair amount of water at the face, and I pointed out weakly developed joints in the Brereton Limestone, which was overlying thin Anna Shale. The joints trended NE-SW and parelleled joints in the Anna Shale.

The Bureau of Mines officials were impressed with the presence of clay dikes and the accompanying roof and water problems. Sainato especially felt that the "clay veins" blocked the movement of gas and water. Roger Nance and I expressed our feeling that the clay dikes are associated primarily with changes in lithology which is accompanied by roof problems and water.

From the West Mains we went to the 1st Panel North off the Main East where we briefly looked at a small fault. From the north panels we went to the 3rd Panel

South and looked at the open joints in the Brereton Limestone.

No definite conclusions were reached during our visit. The Bureau officials were to meet with the Freeman officials to discuss the possibility of drilling. We left copies of our preliminary reports on the geology at Crown II with the Bureau officials.

December, 1978

I spoke with Maurice Deul, research supervisor of Cervik and Sainato at the Bureau, about developments concerning Crown II. Apparently the Bureau will try to drill at Crown II if they are asked.

Mine Notes - Freeman Crown II - Macoupin Co.

Trip: Nov. 7-8, 1978 by Phil DeMaris and Pete Johnson

Coverage: Mapping and Sampling of Ss. and coal on 1st - 4th N. Mains
Detailed Seam Desc. at Ⓘ
Sample Set "F" -1 to -7

Mapping and Sampling of Ss. and Coal on the 1st - 4th N. Mains

Purpose of trip was to examine Ss. exposures for sed. structure & samples for thin sections for paper on channel. Pete came to look at the coal & sample the "upper coal" in the channel area.

As we walked in on the 1st N. Pete took chalcopyrite crystal from the clay-dike fault at 1920' N.(from base of slope).

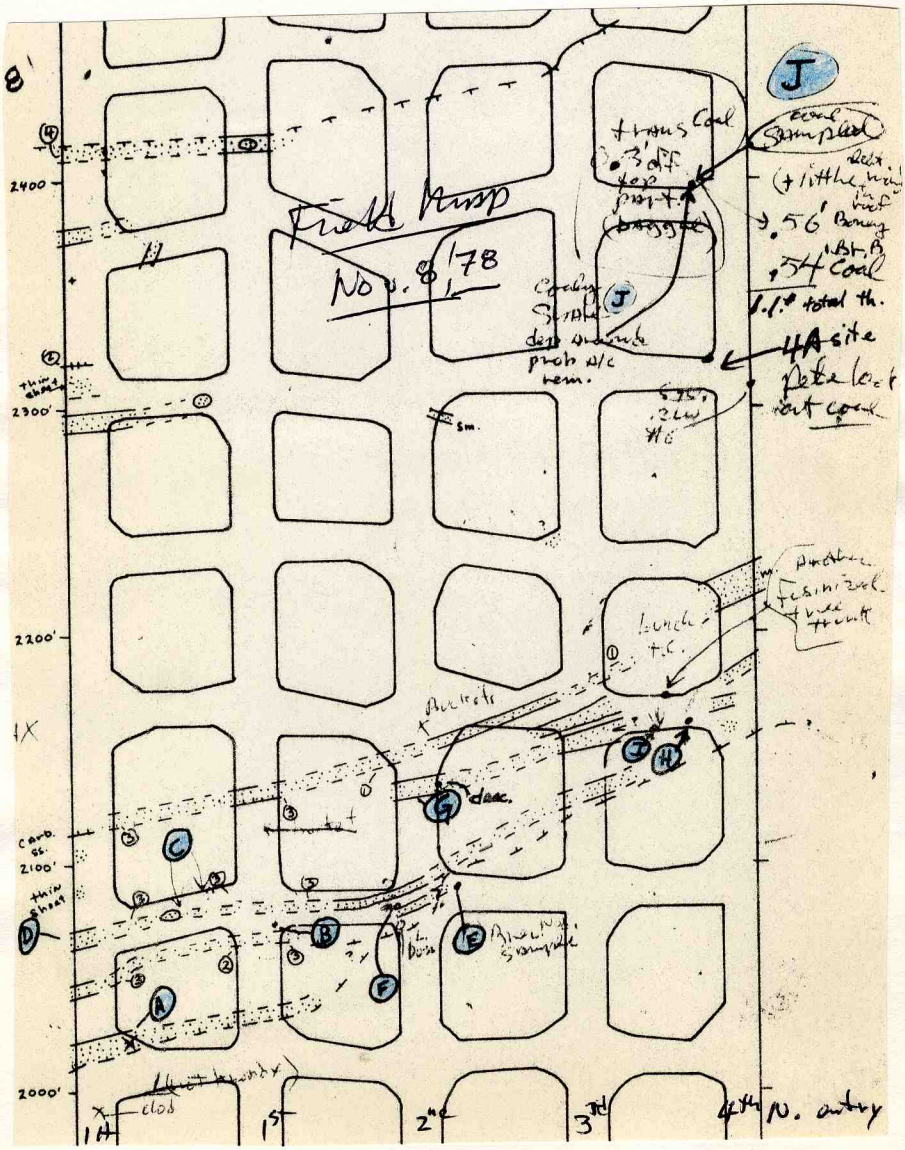
(See field map)

Ⓐ. Sample of coarse ss. taken from base of impressive channel (pieces; F-1 and F-2 for thin section).

Ⓑ. Pete examines what I prev. called "shale filled/cast wood pieces" & reports one contains silty-sandy shale that is pyritized; poss. a piece of sigilaria; lots of sulfides present. Pete takes two bags here; second with woody appearing substance (same place) partly mixed with coaly material. Woody mat. at one point grades to thin fusain. Pete calls material "lignitic".

Ⓒ. Rib exposure shows thin, micaceous Ss. with prob. cross-ripple lamination above 1.4' "Lw" shale; Anna is also continuous on rib here (eros. contact); examining transverse cut through a lens

11/8/78 Field Map.



which is 0.9' wide and o.1' thick; cross-bedding shows Flow toward WSW (Pete). Load-cast in entry also shows cross-ripple lam.-sets .05' high dipping S; suggest same flow but exp. not as good.

(D). Lens of Ss. examined; has laminar bedding; is on Anna sh. & has shale above. Plane laminations predominate in three sub-lenses. Best exp. lens shows med-to-coarse grained Ss.; sm. nodule (conc.) within this samples (Crown II-F-4); large mica flakes present; thin section this one; north side of north sublens shows simultaneous deposition of Ss. and silty "lw" shale, at one point in alternation. (Pete also takes sample). Direction data inconclusive here.

(E). Good exposure; roof well-weathered over the humid summer; exposure in center of enrty sampled - portion of prob. Brereton Ls. nodule over coaly "clod" (we are right at the edge of the "channel" area!) taken from roof; sprayed "up" side white. (sample F-3 for thin section to examine for deformation) Older exposure at rib (N.) now better exposed it shows Ss. at the level of the base of the Brereton- Ss. has plant hash in it and is sitting on the "clod" of the Brereton (& the Brer. is not present). Exposure certainly the result of erosion and/or density gradient deformation.

(F). Large calamites cast and sm. lepido-dendron cast in base of med.-to-coarse Ss.

Ⓖ Several Ss. lenses interlaminated with carb. material on E. rib.

Sequence:

Ss. examined with handlens; is coarse with good sorting; carb. material within has high reflectance & is not fusinized.(Pete)

Ⓗ 2 pieces of a nodule from top coal sampled (F-5); object is gray, pyritic mass which projected down into the top coal; has appearance of a sm. ls. "boss"; base has crenulate surface; could be eros. outlier or slumped part of ls. (for thin section)

Ⓘ Pete & I describe seam here in a top coal area. Measured 4.61' coal to B.B. (which is .07'), with 2.54' coal below B.B. to u/c. We began at a prominent bench which has a min. (sample) of 0.7' (prob. 0.7') coal above which was not described. I also took a #6 coal sample for Russ Peppers for palynology here (8' West) on rib where coal was easier to get. I took small blocks of coal from full seam (corresp. to a channel sample), inc. top coal. Coal loss to channel (above) judged minimal if any. **Detailed Seam desc. in next section***

Ⓙ Pete samples "upper coal" where it is 1.1' thick (lower .54' is bright banded, upper .56 is quite boney.

Detailed Seam Desc. at (I)

(for background, see note (I))

Abbreviations: Clar Clarain
Min. = mineralized Vit Vitrain
M = Marker (PRS) Br. bright
Bnd. banded
F-B fine-banded

(top)	thickness (cm.)	
Clar	7.0	
F-B Clar	5.0	
Fusain	2.0	- Locally persistant
Clar	11.2	
Fus.& vit-	1.0	(interbanded)
m Shale	0.5	- persistant
Clar	3.8	
F-B clar	4.2	
Vit	0.6	
F-B Clar	0.8	
Vit	0.3	
F-B Clar	3.0	
Clar	8.2	
Min. Fusain	1.3	
Vit	0.4	
Clar	2.7	
M Shale	1.3	laterally grades to shale W.
Fusain	1.1	with shale & vit. bands; also
Br. Clar	1.5	lenses & nods. of chalco-py
Clar	2.5	rite.
Vit	0.6	
Clar(dull)	1.2	Seq.
M "Bone"shaley coal	1.1	interrelated
Br. Clar	0.7	
Durain -	1.5	(Grades lat. to bedded chale
Vit	3.0	copyrite)
Clar	1.0	
Fusain	0.3	
Clar	1.5	

excluded from face channel

Durain	1.0	
Vit	0.3	
F-B Clar	4.8	
Vit	1.6	
Clar	2.0	
M Shale -	0.5	(grades lat. to pyritic lenses
Clar	0.7	
F-B Clar	4.6	
Vit	0.4	
F-B Clar	5.6	
Br.Bnd.Clar	0.7	(grades lat. to vit.)
F-B Clar	3.8	
Vit	0.7	
F-B Clar	2.5	
Fusain -	0.1	(grades lat to vit)
F-B Clar	2.8	
Vit -	0.1	(grade lat into 0.7 vit)
F-B Clar	14.7	
Vit	0.7	
F-B Clar	5.6	
Br.Bnd.Clar-	1.0	(primarily vitrinite)
F-B Clar -	3.2	(at top; grades to clar to-
Durain -	1.2	(thickens ward bottom)
Clar	2.7	lat. to 1.6)
Fusain -	1.5	(thickness lat. is 4.0; is
Clar	6.6	lat. persist.)
Br.Bnd.Clar	1.5	
C.B.V.	2.8	(Bright Clarain, vitrinite rich)
F-B Clar(dull)	3.8	
M Shale, gray	2.1	"Blue band" (excluded from F.Channel)
Br.Bnd.Clar	1.2	
F*B Clar	7.7	Seq.
M Durain-->	0.2	(grades lat. into pyr. dull
F-B Clar	2.3	layer(fusain?)-further lat.
Br.Bnd. Clar-	0.7	is 1.5 durain)
F-B Clar	1.6	pinches out lat.)

lost ~10cm on first taking - recheck of orig. notes suggests thick is 14.7 cm PSD. 12/81

pyr.Fusain-	0.6	(local lens)
F-B Clar	4.6	← Pyr. fus. 0.5 cm.
Clar	6.8	
Pyr.Fusain-	1.5	(lenticular here, but persist
F-B Clar	5.6	lat.)
Vit	0.4	
F.B. Clar	5.9	
Vit	0.4	
Fine-Bnd,Clar	6.6	
Clar	4.4	
Vit	0.8	
Clar	5.8	Seq.
F-B Clar	4.5	
Vit	0.7	
Clar	1.9	
F.-V.pyrtzd	1.2	
Vit	0.5	
Durain-	1.3	(v. well indurated)
Vit	2.3	
F-B Clar	7.5	

underclay-end of record - - -

1/81 Submitted to Proximate Anal.

.70 underse. pant
4.61 dese. above BB
.07 BB
2.54 below BB
7.92' (or 7.91')

[Did not convert from metric as a check]

PJD Did 12/81

5.38
.07
2.52
T = 7.97

Sample Set "F"(1 to 6)

Crown II- F-1

Ss. sample for base of channel sand in roof at site (A). (thin section)

Crown II -F-2

Ss. sample from base of channel sand at (A), east of F-1 near rib corner. (thin sect)

Crown II F-3

Prob. Brereton Ls. nodule, oriented, for thin section, at (E).

p 7 of 7, plus 1 map

Crown II F-4

Ss. nodule for lens; oriented, for thin section. at (D)

Cronw II F-5

2 pieces of a pyritic, poss. ls. nodule in top coal, at (H).

F-7

Crown II, #6 seam, (I) palynology sample is also: C-21350 maceration # 2506 Summarized below by Peppers - data used as typical Crown #6 by DEMARIS + MAHAFFY in 1979 PAPERS.

Crown II F-6

The "upper" coal, sampled at (J) will be given petrographic analysis.

CP's -- 2084 Br. Bud Lower portion (~.50') pellet
2085 Trans. (.05') (lump + pellet)
2086 "Boney" Upper portion (~.55') (mulle-marthened) pellet

Project name: "ARC" Anvil Rock Channel(s)

↑ clean coal done on "reconstituted" channel C-20623

Demars

Relative abundance of major spore taxa in Herrin (No. 6) Coal in Crown 2 Mine, Sec. 14, T. 12N., R. 6W., Macoupin County (maceration 2506) For sample details see Mine Notes of Nov. 7-8, 1978, site (I).

	by Percent	by Plant groups
Lycospora granulata	76.0	78 percent Lycopods
L. rotunda	.5	
Cappasporites distortus	1.5	
Thymospora pseudothiessenii	13.0	18 percent Marattiaceou (tree ferns)
Laevigatosporites globosus	2.0	
L. minutus	1.5	
Punctatisporites minutus	0.5	
Apiculatisporites lappites	1.0	
Granulatisporites minutus	0.5	0.5 percent Filicales
Laevigatosporites desmoinesensis	2.5	2.5 percent Sphenopsids
Florinites pellucidus	1.0	1.0 percent Cordaites

Note: Pteridosperms are under-represented or absent from spore analyses because Schopfipollenites, the pollen of Medullosa, is so large that it is seldom observed in

Jan. '79 - June '79

FREEMAN UNITED COAL MINING COMPANY CROWN MINE II
February 27-28, 1979
Notes by John Nelson on visit with Phil DeMaris

Mapping in 1st Panel North off the Main East.

1.) On Entry C (travelway) about 2000' inby the Main East is the southernmost exposure of the channel-fill units in the roof. A small fall has occured, but since the roof is heavily dusted and the entry is very high, detailed examination is difficult.

Along the west rib I can observe in places remnants of the Anna Shale. Immediately overlying it is shale and sandstone. The shale is medium to dark gray, smooth or finely silty, poorly laminated, carbonaceous, containing pyrite tetrahedra. The sandstone appears to be a basal "lag" deposit; brownish, fine-grained, densely cemented with pyrite, contains abundant coarse mica and large angular clasts of black shale. Also in the exposure are what appear to be eroded concretions from the Anna Shale; oval masses of dark brown, fine-grained very hard dense rock with abundant pyrite. The relationships are not very clear because of the dust but it appears that the sandstone occurs only in thin beds or lenses just above the erosional contact.

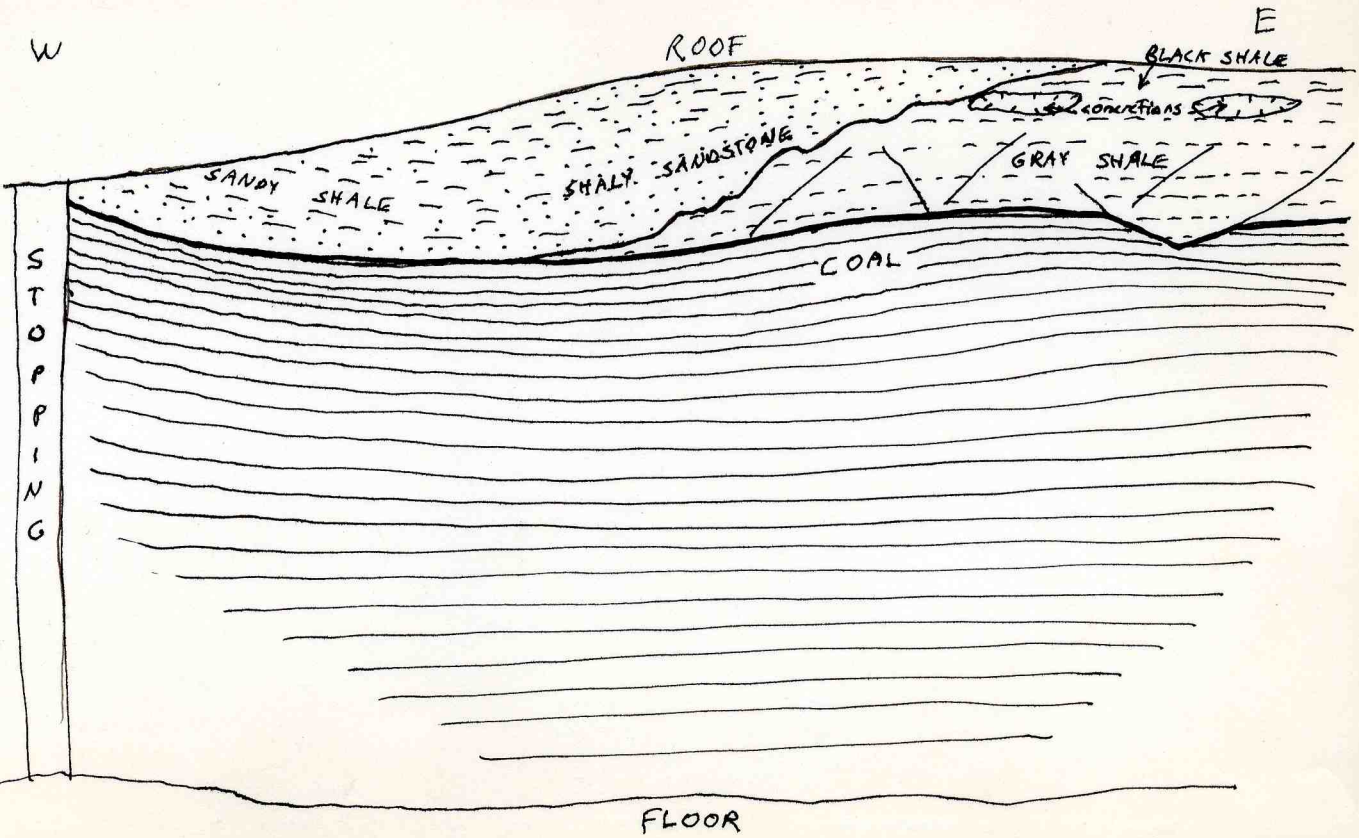
Northward in the exposure no black shale is present and gray shale directly overlies the coal. No sandstone is observed. Tetrahedra of pyrite are common at the base of the shale.

2.) Sketch of feature on north rib. See also Phil's Note B for today.

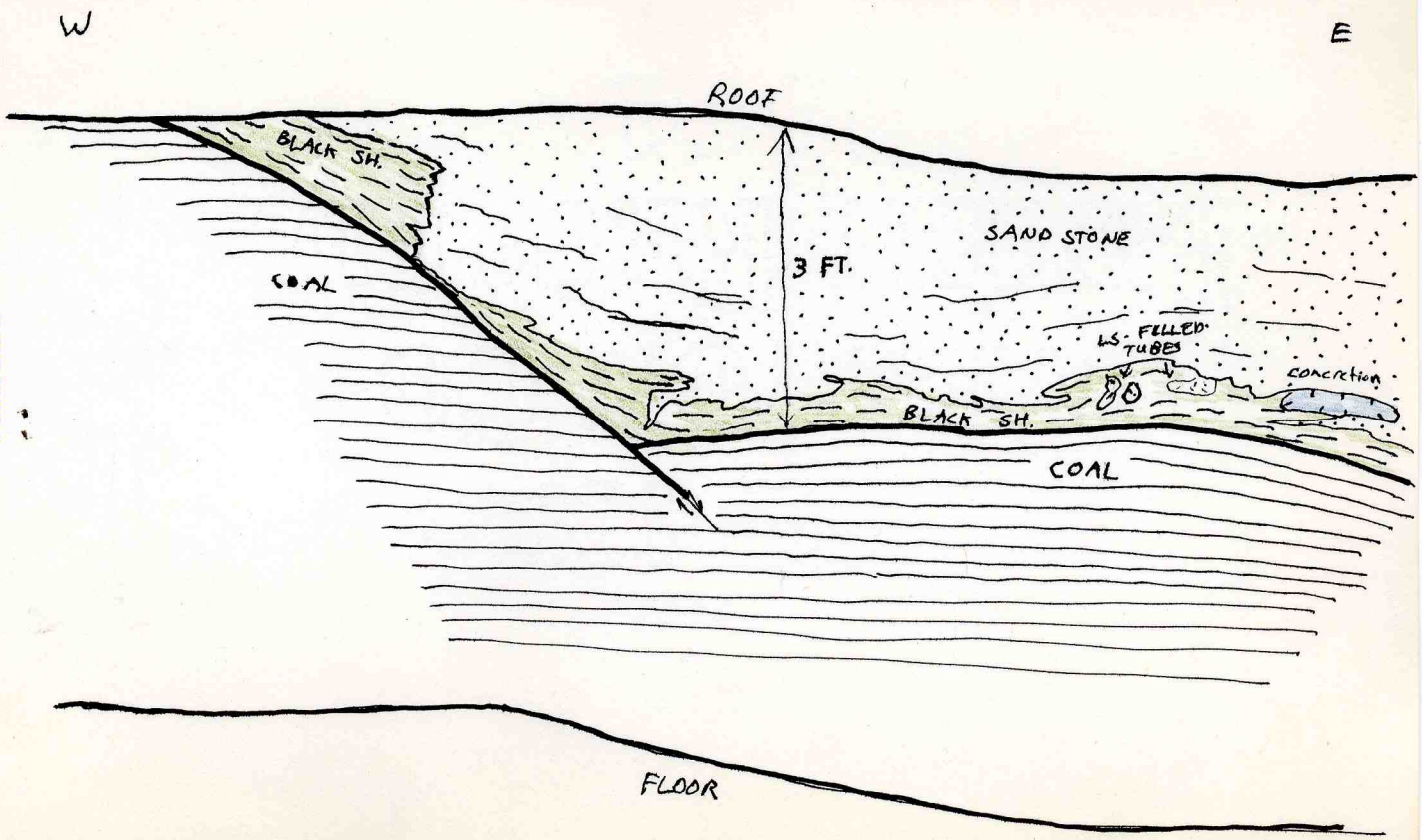
This is a small erosional channel filled with sandstone and sandy shale. It appears to strike in a northeasterly direction, but this is hard to tell. Beneath the channel the gray, finely laminated shale (Energy) and black shale (Anna) are truncated with an irregular, clearly erosional contact. The coal is bowed down slightly but none of it seems to have been eroded.

The main material filling the channel is sandstone,

Stop 2 Looking North



STOP 3- Looking North



light gray, fine-grained, well-cemented, very argillaceous with numerous streaks of gray shale and small fragments of black shale, probably eroded from the sides of the cut-out. The sandstone is very micaceous and unevenly laminated. Along the contact to the east it appears slumped and there are many micro-faults. Upward and westward it grades into silty or sandy shale containing laminae of sandstone.

Over the belt at least three feet of Energy Shale are seen and the sandstone is not visible. In the next entry to the west the channel is hidden by top coal.

3.) (See also Phil's Note C) Large protrusion of sandstone into the top of the coal. The coal is not eroded; it is overlain by a thin layer of deformed Anna Shale. The top of the Anna Shale definitely has been eroded with an irregular contact to the sandstone above. Concretions and lime-filled burrows in the shale likewise are eroded. Small veinlets of sandstone and lateral "splits" of sandstone are squeezed into the black shale. See sketch (over).

The coal is displaced along large slips that are rather hard to see due to rock dust. Water and orange slime are seeping from the sandstone. The floor is deeply rutted around here, and on the travelway a plank road has been constructed. Evidently the area was much wetter when first mined.

In most places where the Anna Shale is closely overlain by sandstone, the Anna Shale is mottled, discolored, and softened, probably by the action of water.

I would interpret this structure as a slump or load feature formed after the sandstone was deposited. It is not a channel in the coal.

4.) (See also Phil's Note E) Interesting exposures in a large roof fall which extends eastward through the crosscut:

At the top of the fall is sandstone, light gray, fine-grained and very hard. The lower surface is very irregular and bumpy, like limestone "bosses". The sandstone bulges downward along an east-west line, again like the bulges of limestone we have observed in some areas.

Below the sandstone is about three feet of black shale, much deformed by slips. Into the upper part of this shale large amounts of sandstone have been intruded between layers as "sills" and also vertically as "dikes" or fracture fillings. Some beds of sandstone are over 0.5' thick. The sandstone contains sharply angular, rotated fragments of black shale, and elsewhere the shale is totally fractured, with sandstone filling the cracks. In the lower half of the shale only thin laminae or dikes of sandstone are seen, and these are rare. No sandstone was observed to touch or intrude the coal.

I think this feature may have formed in the same manner as limestone "bosses"; that is, by loading and slumping. Around limestone "bosses" light-colored clay or shale frequently is intruded into the coal and the Anna Shale. Here the same process probably operated, but the intruding medium was sand. We can tell that the Anna Shale must have been somewhat brittle, but not completely lithified, when the intrusion occured.

5.) Large fall; cleaned and cribbed, view not very good. Irregularly laminated sandstone overlies 2½-4' of black shale. Here no intrusion of sand into black shale was observed. Minor seepage of water.

February 28, 1979

6.) In this area the Anna Shale is thin or absent, with sandy shale and sandstone overlying. In places sandstone may have intruded the shale, as at Stop 4.

In the stubbed crosscut to the north the Anna Shale is entirely missing and a good exposure of

Anvil Rock sandstone and shale can be seen. The shale is medium to dark gray, poorly laminated, very silty to sandy, micaceous, carbonaceous, and contains abundant coalified stems and other plant material. Thin lenses and laminae of sandstone occur in the shale, mainly at the base. On the west rib the scoured contact with the Anna Shale is visible. Below sandstone the Anna Shale tends to be discolored, mottled, and softer than usual.

7.) At corner of pillar sandstone directly overlies very thin Anna Shale. Samples were taken of both lithologies. The following is a description of these samples, made in the office.

One sample includes about 1" of sandstone in contact with 3/8" of Anna Shale. The shale is black, hard, smooth, fissile, and well-jointed. One Orbiculoidea is present. Slight brownish discoloration of the shale is noted on the bedding surface.

The sandstone is light to dark gray, stained yellowish. It is medium to coarse grained and very poorly sorted. It appears to contain small rounded fragments of black shale and probably limestone, up to 1/8" in diameter. The upper surface of the sandstone is a parting of dark gray, micaceous, highly carbonaceous shale.

The contact between black shale and sandstone is a knife-edge, essentially horizontal, but some very small irregularities can be seen.

The other sample is sandstone, about 2½" thick, with the barest film of Anna Shale clinging to the base. Lithologically it is much like the other sample, but is even coarser near the base, with abundant fragments of dark shale and limestone. One such is lens-shaped and over 5/8" long. The sandstone is crudely banded and, toward the top, has irregular partings of dark shale and coalified plant debris. It is calcareous, due to included fragments of limestone. Also it is pyritized, and in one place small crystals of sphalerite are seen.

These samples turned over to Dick Harvey for analysis in thin-section.

8th Panel South and Adjacent Part of Main East

On the morning of the 28th we visited the face of the 8th Panel South to check on the cause of the large volume of water that reportedly was entering the mine there.

The main influx of water was at the belt entry, which has been driven about 350' inby the Main East. Water is seeping from both the roof and the coal. In a couple places a steady stream of water is flowing from the roof.

The coal is overlain by 2 to 3 feet of Anna Shale, which was mined with the coal, leaving the base of the Brereton Limestone as the top of the entry. The lower surface of the limestone is fairly flat, except in the easternmost entry, where it is irregular with small "bosses".

The heaviest flow of water is from roof bolt holes Ed Banovic, asst. to the superintendent, informs us th bolts are 36" mechanical bolts. Resin bolts have not been tried in this section.

Also there is considerable seepage along northeast trending fractures in the limestone. The fractures mostly appear closed, but locally there are small openings along them. In several places the fractures are seen to be composed of many small cracks lying in an "en echelon" pattern.

The seepage from the coal occurs along NE-trending vertical fractures like those in the roof. Some cracks in the coal may lead to joints in the roof. In other places fractures in the roof extend downward as "em echelon" breaks in the shale, similar to "goat beards" Still other fractures appear to lead into low-angle slickensided slips in the Anna Shale.

I would conclude (1) that the limestone is rather thin, and overlain by water-bearing sandstone, and

(2) that the fractures are the same type we have seen elsewhere in the mine, associated with the strike-slip fault, and (3) that the strike-slip fault probably lies only a short distance ahead of the face of the 8th South.

In a large roof fall on the 1st Main East one crosscut inby the 8th Panel South, the following section was observed:

TOP- Limestone, medium-dark gray, fine-grained, pyritic dense, hard, mixed with green shale. Irregular lower surface. (Description from pieces fallen to floor).
6' Siltstone, light and medium gray, thinly laminated, micaceous, breaks into thin slabs.
1-2' Limestone, brownish-gray, argillaceous, nodular.
0.5' Shale, black, with crumpled bedding.
2' Shale, dark gray, thinly and evenly laminated, with crystals of pyrite at base.
COAL.

A small amount of water was dripping from this fall and the floor was wet.

Farther east along the 1st Main East, small amounts of water were dripping from roof bolts and along NE-trending joints in the roof. The roof is mainly black shale. No large faults were seen. At the face of the 2nd Main East, a fall exposes sandstone overlying about half a foot of nodular, unevenly bedded limestone, with about 2 feet of black shale below that. Resin bolts were used in this area, and failed to hold. The area has been cribbed but the cribs are collapsing.

An unexpected set of faults and fractures were found in the 4th Main East due north of the 8th Panel South. The faults trend ESE-WNW and extend in both directions (see Phil's map). Horizontal slickensides indicate strike-slip movement. Vertical displacements

are small; less than a foot, and are not consistent. The faults branch and curve in the coal, and the roof rock is closely fractured. In some places the fault makes a single clean break in the limestone, but divides into a great many small fractures, or even gouge, in the coal.

The fractures extend into the 6th Main East where a huge roof fall has occured along them. The Brereton Limestone is 4-5 feet thick in the fall, and is virtually shattered by faulting. Prominent open fractures occur at right angles to the faulting. Westward the entry is completely blocked by cribbing and fallen rock.

The faults continue to the 8th Main East, but are not very conspicuous there. No attempt was made to study them in detail.

More mapping of these faults clearly is needed. For now, I will speculate that they are subsidiary to the main east-west trending strike-slip fault. Small strike-slip faults with a similar trend were observed in the 3rd Panel South. These faults are somewhat longer, but otherwise look the same. The stress field set up by left-lateral shearing would be expected to produce northwest-trending compressional features, either anticlines or thrust faults, possibly with a component of strike-slip movement.

Mine Notes - Freeman Crown II, Macoupin Co.

Trip; Feb. 27-8, 1979 by Phil DeMaris & John Nelson

Coverage; Mapping in 1st N. Panel
Mapping in 8th S. Panel & vic.
Photos of several features (last)
IX-ICC Abstract on Anvil Rock Ch.

Mapping in 1st N. Panel Sample CII-G-1

Mapping was done here specifically to outline the areas effected by the Anvil Rock channel(see Abstract). John & I began by mapping the "C" and "D" entries, resp., beginning by 1600' N. at least. Notes;

A. Fall shows first evidence of channel presence. Column:

Silty sh. w. plant-compresseions; 1' seen.

Sand lenses +traces loc. on Anna

Anna sh. 1.4'(typ.), loc. with Anna concs.

Channel contact should be brought slightly S. of this exposure; thickest Anna seen is 2'- prob. more laterally. Feature sketched below shows Ss. lens on Anna; compactional(?) deformation has moved Anna over edge of ss.