

CYPRUS ANVIL MINING CORPORATION

CARMACKS COAL PROJECT

1982 MINE PLAN

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S U M M A R Y

The 1982 Carmacks mine plan calls for recovery of approximately 21,000 tonnes of coal, mined at a ratio of 10:1. This year's coal represents the last economical surface mineable coal known within the Carmacks project area. An additional 20,000 tonnes, or one year's supply, would cost in excess of \$250.00/tonne in 1981 dollars.

Mining methods will be similar to methods used during last year's project. The mine plan calls for deepening both the Phase I and III areas approximately 50 feet.

To complete the project, reclamation of 25 of 28 acres disturbed is scheduled. Five of the six areas disturbed by mining will be reclaimed. Re-establishing vegetative cover in the reclaimed areas will be monitored for a period of three years.

1. 1982 PROPOSED MINE PLAN

1.1 GENERAL:

The 1982 Carmacks coal project will involve mining coal from the Phase I and Phase III areas. Waste rock from Phase I will be used to reclaim the 1979 pit and most of the Phase II pit. Waste from Phase III will be used to complete the reclamation of Phase II and Phase I pits. Trenching in the immediate area will also be reclaimed.

A minimum of 21,000 BCY of coal should be recovered - 10,500 BCY from Phase I and 10,500 from Phase III. This is based on 80% recovery of the available coal.

CARMACKS COAL PROJECT
APPROXIMATE PIT VOLUMES IN BCY

PHASE I:

<u>Section</u>	<u>Coal</u>	<u>Conglomerate</u>	<u>Siltstone/ Sandstone</u>	<u>Total</u>	<u>Strip Ratio (80% Recovery)</u>
612500	-	6,000	-	6,000	-
600	-	7,000	-	7,000	-
700	1,400	10,200	2,600	14,200	12.0
800	1,500	15,300	3,300	20,100	15.4
900	4,200	17,200	7,100	28,500	7.5
613000	4,300	21,700	7,400	33,400	8.8
100	<u>2,100</u>	<u>11,100</u>	<u>3,200</u>	<u>16,400</u>	<u>8.6</u>
	13,500	88,500	23,600	125,600	10.6

PHASE III:

<u>Section</u>	<u>Coal</u>	<u>Conglomerate</u>	<u>Siltstone/ Sandstone</u>	<u>Total</u>	<u>Strip Ratio (80% Recovery)</u>
614050	1,000	3,600	1,900	6,500	7.4
100	1,200	6,700	1,600	9,500	9.0
150	1,600	7,900	3,900	13,400	9.2
200	1,700	8,000	3,700	13,400	8.6
250	1,600	6,700	2,900	11,200	7.8
300	1,500	6,700	2,400	10,600	8.0
350	1,400	9,300	2,900	13,600	10.0
400	1,100	8,100	1,900	11,100	11.7
450	1,300	7,900	1,800	11,000	9.7
500	1,200	7,100	1,500	9,800	9.0
550	(poss.)	4,000	-	4,000	-
+ Access	-	<u>900</u>	-	<u>900</u>	-
	13,600	76,900	24,500	115,000	9.5
	<u>16,000</u>	<u>88,000</u>	<u>26,000</u>	<u>130,000</u>	
TOTAL	27,100	165,400	48,100	240,700	10.1

Coal 80% Recoverable = 21,200 BCY
 \$155,200.00
 \$8.70
 \$765,600.00
 \$151,000.00
 \$5.53
 \$160,000.00

Total \$1,232,100

cost/tonne \$77.

1.2 MINE GEOLOGY:

The general structure of the coal seam dips at 70° west and strikes due north. The coal seam varies in thickness from 8 to 15 feet. In the 1982 mining areas no fault blocks have replaced the coal, although the Phase III seam is displaced at 614,250 N by a fault. However, the coal is expected to remain inside the pit limits and the coal loss from faulting should be minimal.

Most of the overlying till has been removed in past years, leaving less than 3,000 BCY of till to be mined. No reject coal is expected in 1982.

The foot wall side of the coal has thin, discontinuous, alternating beds of siltstones, sandstones, and mudstones that conform to existing structure. The hanging wall of the coal is similar to the foot wall, with thin beds of siltstones, mudstones, and muddy shales which continue from one foot to 30 feet (averaging 25 feet) west of the coal. These beds are adjacent to the relatively massive, homogeneous, upper conglomerate that has an average thickness of 130 feet. The conglomerate continues beyond the 1982 pit limits.

1.3 PHASE MINING:

The long, narrow, relatively shallow nature of the 1982 mine design is ideally suited to phase mining. The mine plan is divided into three areas - two pits to be mined and one pit to be reclaimed. The phase method provides for short waste haul cycles by backfilling the preceeding mined out phase. Once backfilling of a phase is complete, a till cover is laid over the waste rock providing a suitable base for revegetating the disturbed area.

1.4 PIT DESIGN:

The Phase I and Phase III pits are designed to yield the least expensive 20,000 metric tonnes of coal available at the Carmacks mine.

The pit slope design for the hanging wall incorporates a 59° overall slope with 50 foot high benches at a 68° slope and 20 foot wide berms. The foot wall has the same bench and berm dimensions with a 60° overall wall slope and a 70° slope between benches.

Ramps are designed at a 10% slope and are 40 feet wide. Ramps and benches on the coal seam are 45 to 47 feet wide to allow room for an excavator to mine coal 15 feet below the pit floor. Mining 15 feet below the pit floor is necessary to achieve the required coal tonnage.

1.5 MINING METHOD:

The 1982 Carmacks mine plan involves widening and deepening the existing Phase I and Phase III pits. Initially, the existing pit crests shall be mined back to the 1982 pit limits in conjunction with developing the access ramps. Waste can be mined in 15 foot benches down to the elevation of the coal seam. Coal can be mined using the outlined coal extraction method and the pit developed accordingly. Development plans for the two pits are provided and should be followed.

1.6 PHASE I PIT:

Work should begin on the Phase I pit first. Both pit walls must be pushed back to allow for a greater mine depth. Drilling should start on the hanging wall as it contains the greatest amount of waste rock. Benches of 15 feet deep are removed for the length of the pit until the pit floor is at the same elevation as the coal seam. A 10 foot keyway approximately 30 feet long must be dug on the hanging wall side of the coal seam. Next a 15 foot deep coal section 30 feet long can be removed by the excavator. Mining waste in 15 foot benches can continue after the coal has been removed.

The remaining 1979 pit will serve as the initial waste dump. Then the existing trenches and the Phase II pit will contain the remaining waste from Phase I. The dump design is shown in the pit reclamation drawing.

The Phase I pit should be three quarters complete before mining of the Phase III pit begins.

1.7 PHASE III PIT:

Mining of the Phase III pit will be similar to Phase I except for the ramp system. Phase III utilizes a switchback ramp system which should be developed at the same time as the hanging (west) wall pushback. Again, most of the waste material is in the hanging wall. When the Phase III pit has been expanded and the pit floor is at the same elevation as the coal seam, the same mining procedure for coal extraction and pit development should be followed.

The Phase II pit will be the initial waste dump.

Upon completion of the Phase II pit reclamation, the Phase I pit will become the final waste dump. The dump design is shown on the pit reclamation drawing.

2. COAL EXTRACTION METHOD

To limit coal loss and contamination of coal with waste, the successful contractor will be obligated to use the coal extraction procedures outlined.

A keyway between the coal and the hanging wall contact must be dug prior to extracting the coal. The keyway's purpose is to allow the complete recovery of coal along the contact as well as to reduce dilution from the hanging wall waste rock.

The keyway shall be 10 feet in depth, as wide as the backhoe bucket, and about 30 feet long. An hydraulic backhoe is the only type of equipment suited for this job. Then the backhoe can dig the coal to a depth of 15 feet. This will allow the mining of 15 foot waste benches to continue. It is important that the keyway depth remain constant along the length of the excavation.

The coal is loaded by the backhoe into conventional tandem rear dump trucks and hauled to the coal stockpile at the loadout facility near the highway.

3. BACKFILLING - 1982

(1) AVAILABLE FILL:

	<u>Waste (BCY)</u>	<u>30% Swell (BCY)</u>
Phase I	112,000	146,000
Phase III	101,000	<u>131,000</u>
TOTAL		277,000

(2) TO BE FILLED:

1979 Pit	45,000 BCY
Phase II	120,000 BCY
Phase I	<u>110,000 BCY</u>
	275,000 BCY

(3) PROFILES OF PHASE I AND II:

Show fill elevations.

- a. Rock hauled into old pit and dumped for pit length at the desired elevation.
 - Shallow slope toward hanging wall.
- b. Incorporate a drainage ditch adjacent to the hanging wall.
- c. Free dump rock loads next to East wall (foot wall side).
- d. Bulldoze stockpiled till from east pit crest to cover waste rock.

4. RECLAMATION

Reclamation scheduled for the Carmacks project following this year's mining totals 25 acres. Five separate areas of the six disturbed are to be reclaimed. Two areas, the 1979 and 1980 waste dumps, totalling nine acres, have been re-topsoiled and are to be seeded this spring.

The 1979 pit is 80% backfilled and should be ready for till (topsoil) recover the first of June, assuming a May 1st. start-up. Phase II of the 1980-82 pit should be backfilled by mid-July and Phase I by mid-August. Till recover and seeding could then be completed the first week of September. Till (topsoil) cover is to be relaid to a depth of two feet.

Till (topsoil) distribution to disturbed areas is as follows:

<u>Disturbed Area</u>	<u>No. Acres</u>	<u>From Till Stockpile</u>	<u>Volume Cu. Yd.</u>	<u>Scheduled For Recover</u>	<u>Scheduled For Seeding</u>
1979 Waste Dump	3	-	-	Completed	June 1
1980 Waste Dump	7	-	-	Completed	June 1
1978-1979 Pit	7	South End	22,000	June 15	June 20
Phase I	4	South End/Phase I Foot Wall	13,000	July 20	July 25
Phase II	2	North End/Phase III Foot Wall	6,000	August 20	August 25
Access Roads	<u>2</u>	North End	<u>9,000</u>	September 1	September 5
TOTAL	25		50,000		

RECLAMATION

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Till (topsoil) ~~distribution~~ ~~in~~ ~~disturbed~~ areas is as follows:

<u>Disturbed Area</u>	<u>Sq. Acres</u>	<u>From Till Recover</u>	<u>Volume Cu. Yd.</u>	<u>Scheduled For Recover</u>	<u>Scheduled For Seeding</u>
1979 Waste Dump	3	-	-	Completed	June 1
1980 Waste Dump	7	-	-	Completed	June 1
1978-1979 Pit	7	South End	22,000	June 15	June 20
Phase I	4	South End ~~Phase II~~	13,000	July 20	July 25
Phase II	2	North End ~~Phase III~~ ~~Wall~~	6,000	August 20	August 25
Access Roads	2	North End	9,000	September 1	September 5
TOTAL	25		50,000		

Soil horizons in the mine's vicinity are shallow, similar to grey wooded soils, vary in depth from two to four feet, and are underlain by bedrock. For those reasons, the topsoil and till are recovered and stockpiled together.

Four till/topsoil stockpiles exist and are located as shown on the site plan. Approximately 70,000 cu. yd. till are located in these stockpiles.

Before Phase I waste rock stripping can begin, approximately 3,000 BCY of till needs to be stripped from the hanging wall and 6,000 BCY of till relocated from the foot wall till stockpile. Till from both areas is to be restockpiled 50 feet east of the existing Phase I foot wall till stockpile

Preparing moderate level areas ($< 3:1$ slope) that have been recovered with topsoil/till will initially require smoothing or levelling, using a grader. This is to be followed by harrowing to a depth of four inches maximum, to reduce compaction and lump size. Seeding and fertilizing are next, followed by a final harrowing.

Preparing slopes of greater than $3:1$ for seeding requires grading, harrowing, and cultivating using a chisel cultivator, following the land contour. Cultivator furrows are essential in reducing erosion and trapping needed runoff. Seeding and fertilizing these slopes is to follow cultivation.

Cyprus Anvil will provide seed mixes and fertilizer to the contractor. Seeding and fertilizing is to be done using broadcast type equipment. The contractor will be obliged to follow procedures and rates established by Cyprus Anvil.

5. BLASTING METHODS

The rock in the 1982 mine plan is comprised of three types of sediments. The rock type, seismic velocity and specific gravity all vary accordingly.

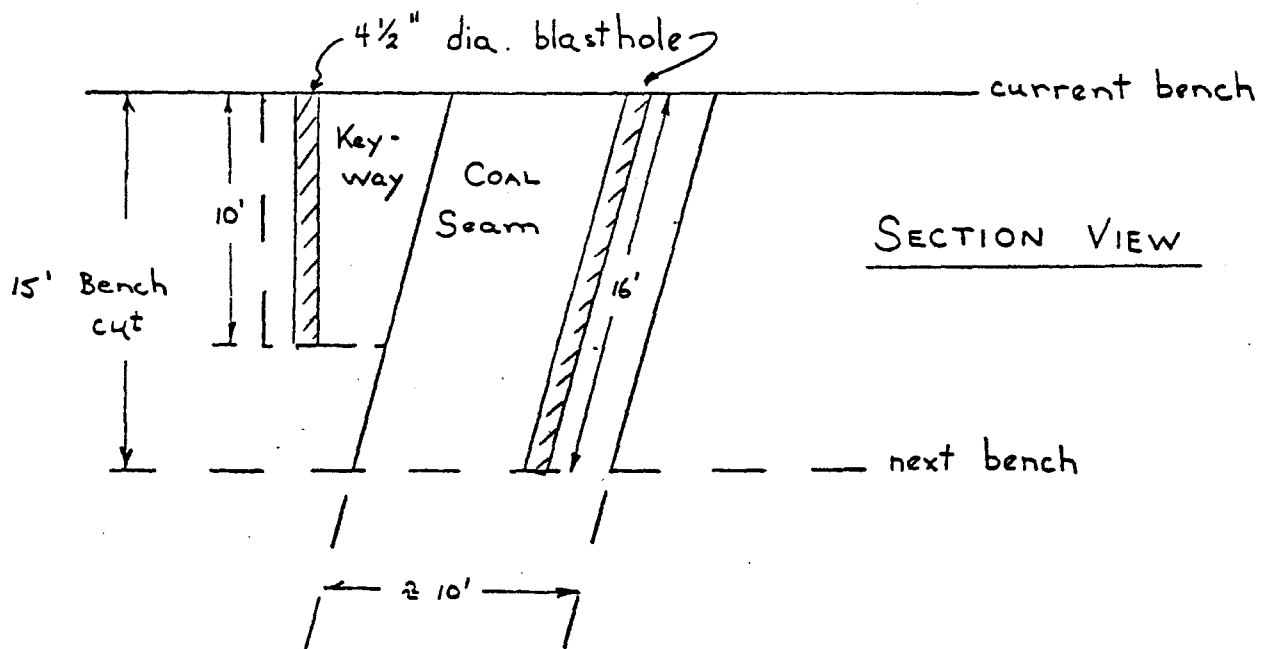
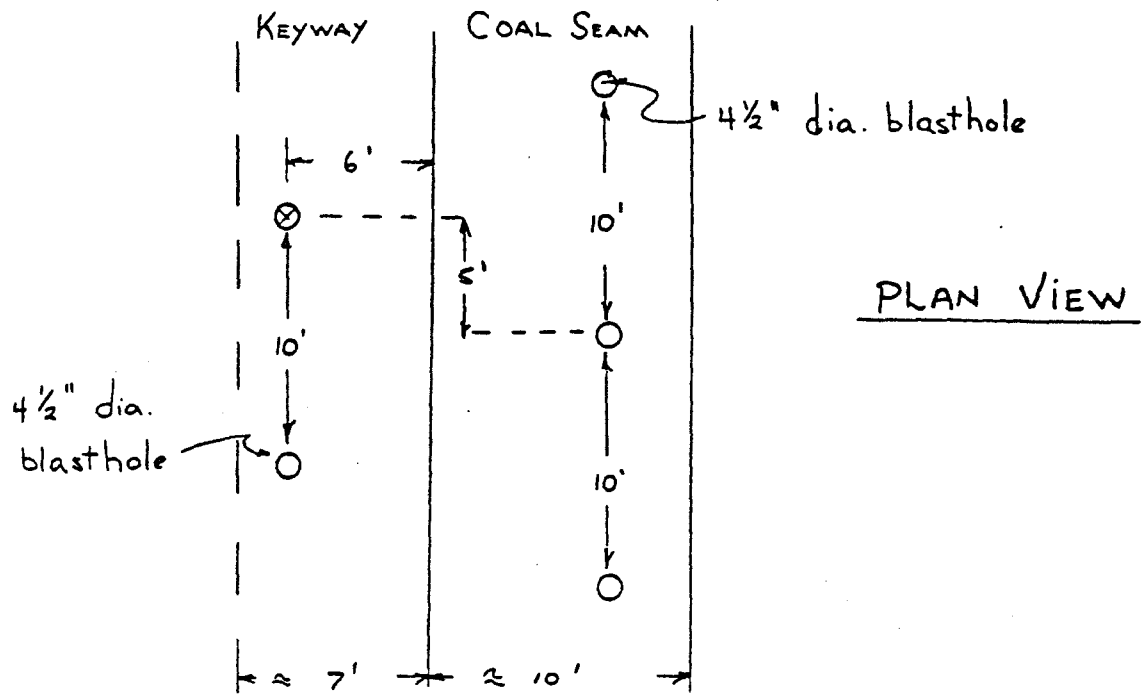
ROCK PROPERTIES:

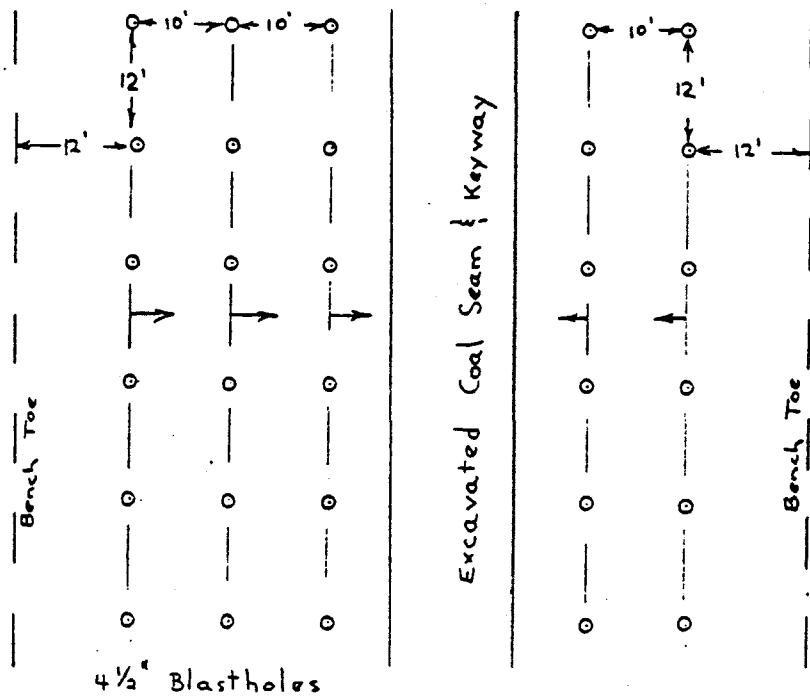
<u>Rock Type</u>	<u>Mohr's Hardness</u>	<u>Density gm/cc</u>	<u>Seismic Velocity ft./sec.</u>
1. Conglomerate	Medium (6)	2.60	up to 12,000
2. Siltstones, Mudstones	Medium-Soft (4)	2.55	up to 11,000
3. Coal	Soft (1.5)	1.60	up to 10,000

ROCK VOLUMES IN BCY:

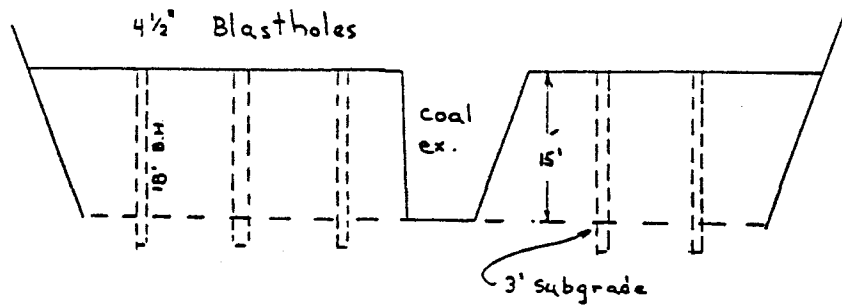
<u>Rock Type</u>	<u>Phase I</u>	<u>Phase III</u>	<u>Total</u>
Till	<3,000	minimal	<3,000
Foot Wall (siltstone, sandstone, mudstone)	23,000	24,000	48,000
Hanging Wall (conglomerate, siltstone, mudstone)	86,000	77,000	163,000
Coal	<u>13,500</u>	<u>13,500</u>	<u>27,000</u>
TOTAL	125,500	115,500	241,000

COAL SEAM & KEYWAY BLAST PATTERN

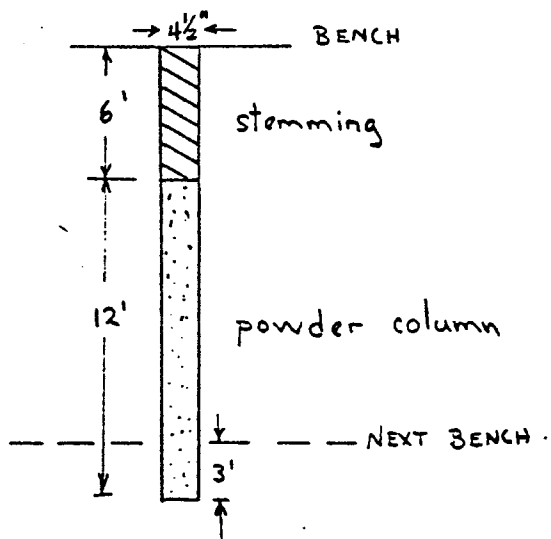




PLAN VIEW



SECTION VIEW



WASTE ROCK BLASTING

BLASTING COAL:

The coal seam and the keyway should be blasted together. This will be done ahead of the larger waste rock blasting. Using this blasting sequence will reduce rock contamination in the coal and keep the roadways in good useable condition.

For the length of the coal excavation, one 4 1/2 inch diameter blasthole every ten feet shall be drilled down the dip of the coal to a depth of 15 feet. One three inch by 16 inch stick of Water Gel, or about ten pounds of AN/FO, could be used to shake up the coal.

In the keyway, one vertical 4 1/2 inch diameter blasthole ten feet deep shall be drilled six feet out from the hanging wall side of the coal seam every ten feet for the length of the coal excavation. These keyway blastholes will be staggered between the coal blastholes. Two sticks of three inch by 16 inch Water Gel, or about 20 pounds of AN/FO, should be used to blast the keyway.

BLASTING WASTE ROCK:

After the coal has been removed, the waste rock blasting can proceed.

The most economical blast pattern for a 15 foot bench cut seems to be a ten foot by 12 foot pattern utilizing a 4 1/2 inch diameter blasthole. The overall depth of the blasthole must be 18 feet, which would include three feet of subgrade drilling. This size pattern will require approximately 63 pounds of AN/FO and one 3" x 16" stick of Water Gel to initiate the AN/FO. The resulting powder column will be 12 feet and require six feet of stemming material.

The blasting sequence should initiate rows of blastholes which are parallel to the longest open face, which means breaking the blast pattern towards the excavated coal cut. Delays between each row should be used to eliminate severe wall damage in the pit.

6. SURVEY CONTROL

Cyprus Anvil survey crews will provide sufficient control points for the contractor to lay out slope staking, elevation control, and development pick-up. Cyprus Anvil survey crews will do a topographical survey before and after the mine development. Month end surveys will be conducted by Cyprus Anvil crews to establish interim payments.

Cyprus Anvil will have available an engineer on site to provide direction or clarification of limits, coal quality, etc.

7. CONTRACTORIAL OBLIGATION

The successful contractor for the 1982 Carmacks coal project will be obligated to carry out the terms of the 1982 contract using mine practices provided within the mine plan and in compliance with the Yukon Mining Ordinance.

The contractor is obligated to mine to design limits. Mining beyond design, not authorized by the Company's Engineer, will not be approved for payment.

8. EQUIPMENT REQUIREMENT LIST

8.1 RECLAMATION EQUIPMENT:

- 2 20-30 cu. yd. Scrapers
- 1 Farm-type Tractor - 40 HP Size
- 2-3 Section Oscillating-type Harrow (or drag-type)
- 1 8-12 ft. Chisel-type Cultivator
- 1 Broadcast-type Seeder-Fertilizer (tow-type)

8.2 MINING EQUIPMENT:

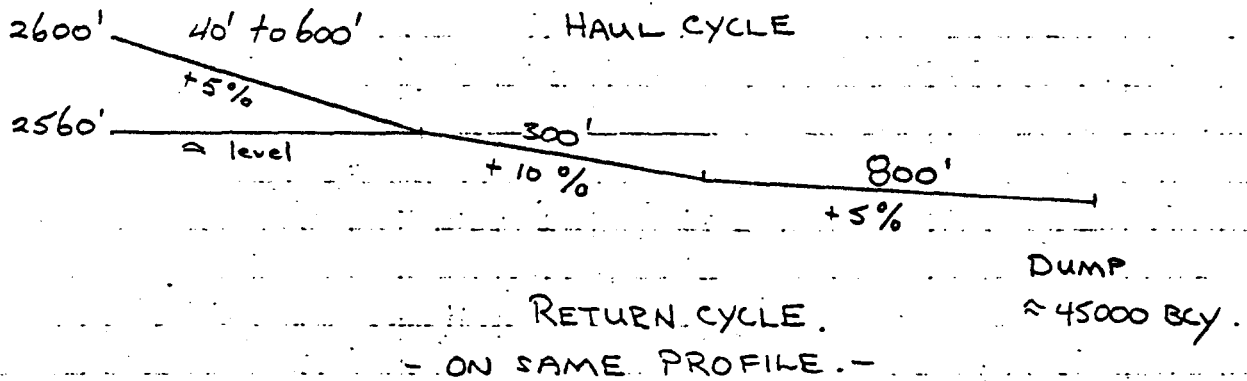
- 1 6 cu. yd. Front End Loader
- 3 35 T. Off-Highway Rear Dump Trucks
- 2 D-9 Ripper Cats, or Equivalent
- 1 D-6 Bulldozer, or Equivalent
- 1 14-G Motor Grader, or Equivalent
- 2 Air Track Drills and Compressors
- 1 Dewatering Pump and 500 ft. of 4 in. Hose
- 1 2 1/2 - 3 cu. yd. Backhoe Cat 245, or Equivalent
- 3 15 T. Tandem Rear Dump Trucks

APPENDIX 1
HAUL ROAD PROFILES

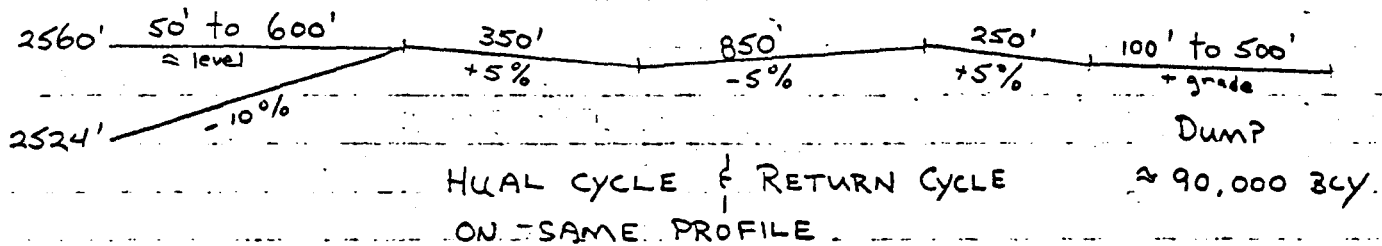
PHASE I HAUL CYCLE PROFILE.

WASTE:

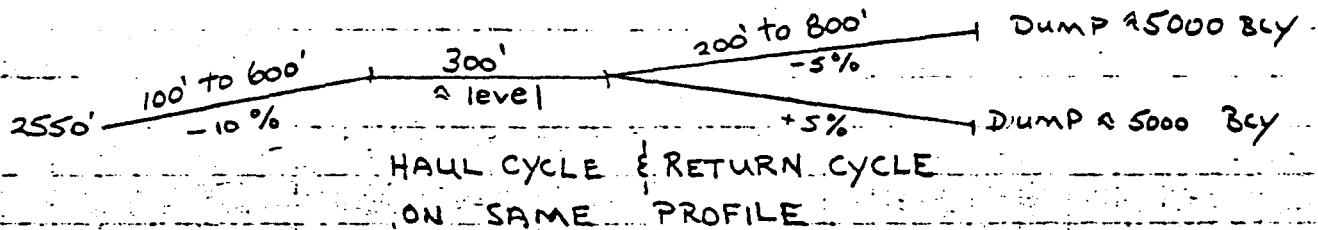
from Phase I to 1979 Dump.



from Phase I to Phase II WASTE DUMP:

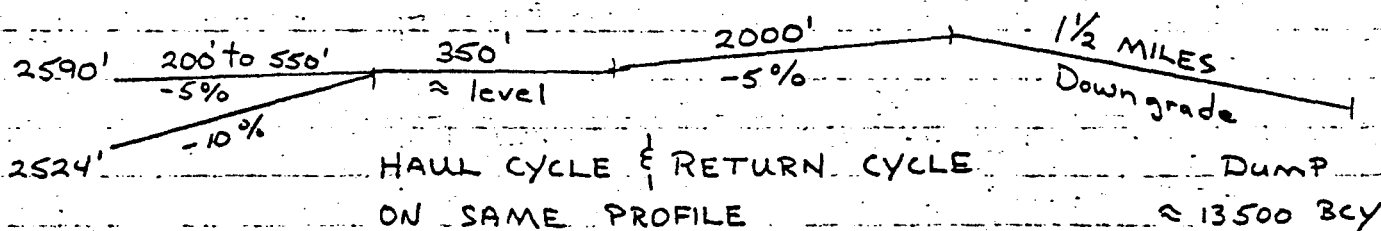


from Phase I to Various TRENCHES:



COAL:

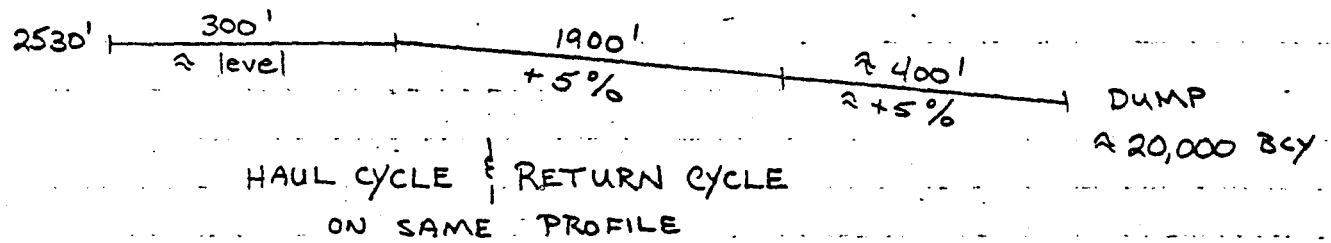
from Phase I to LOAD OUT FACILITY:



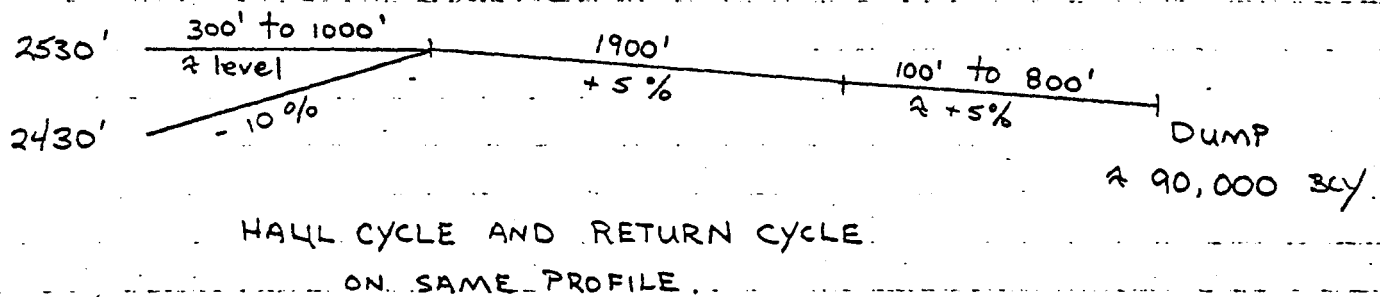
PHASE III HAUL CYCLE PROFILE.

WASTE.

from Phase III to Phase II Waste Dump:

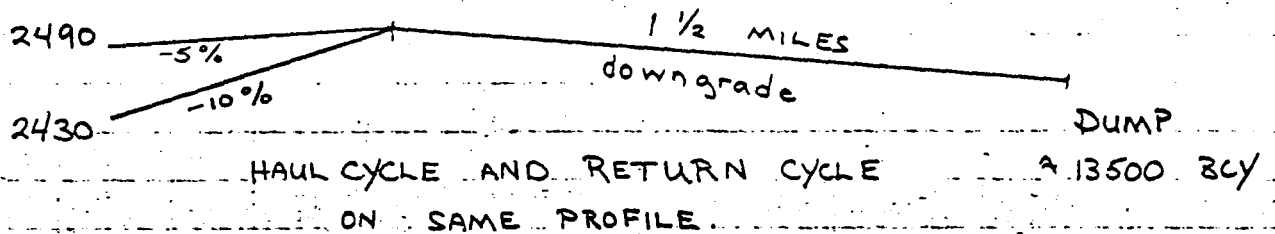


from Phase III to Phase I Waste Dump:



COAL:

from Phase III to Load Out Facility:



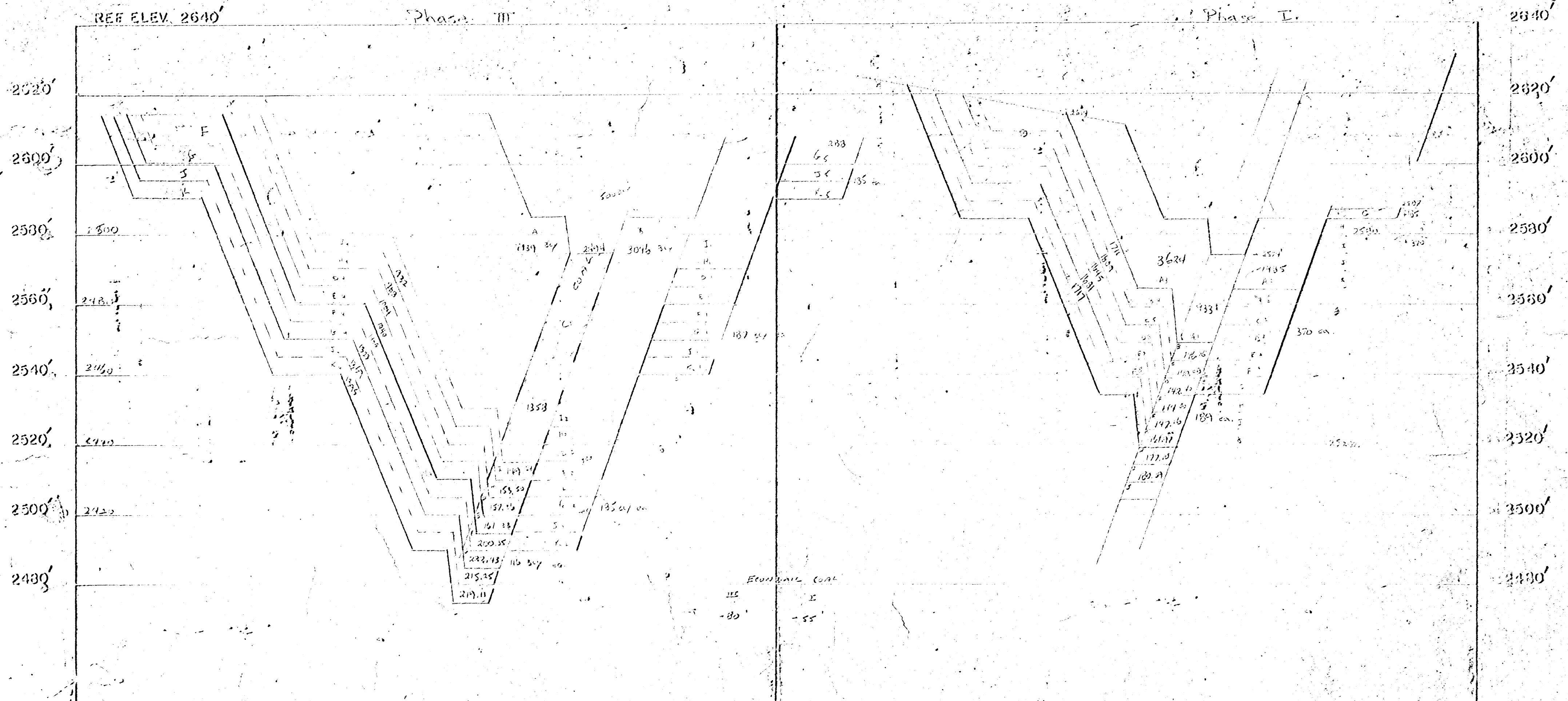
CARMACKS COAL PROJECT X-SECTION NO

1981 MINING PLAN

scale: 1 inch = 20 feet

LEGEND

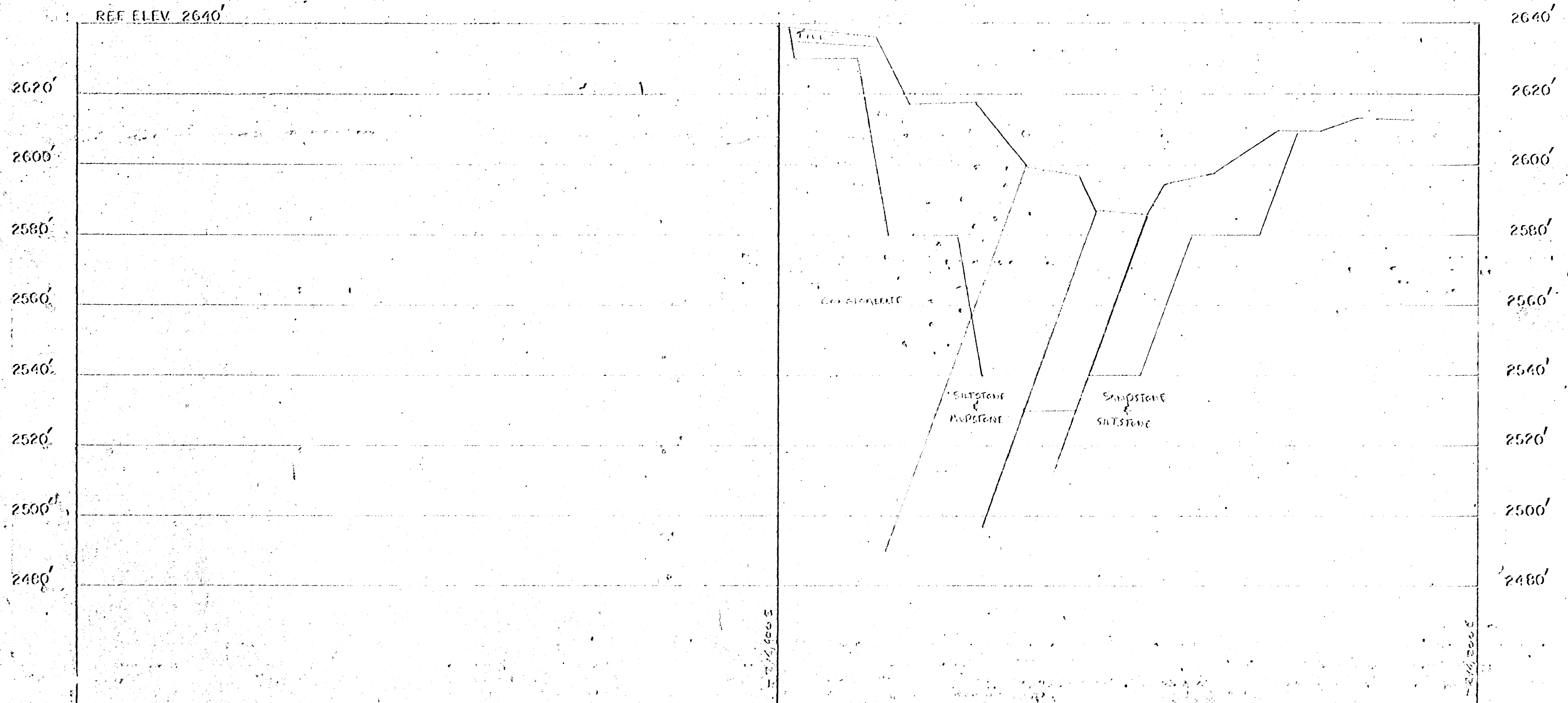
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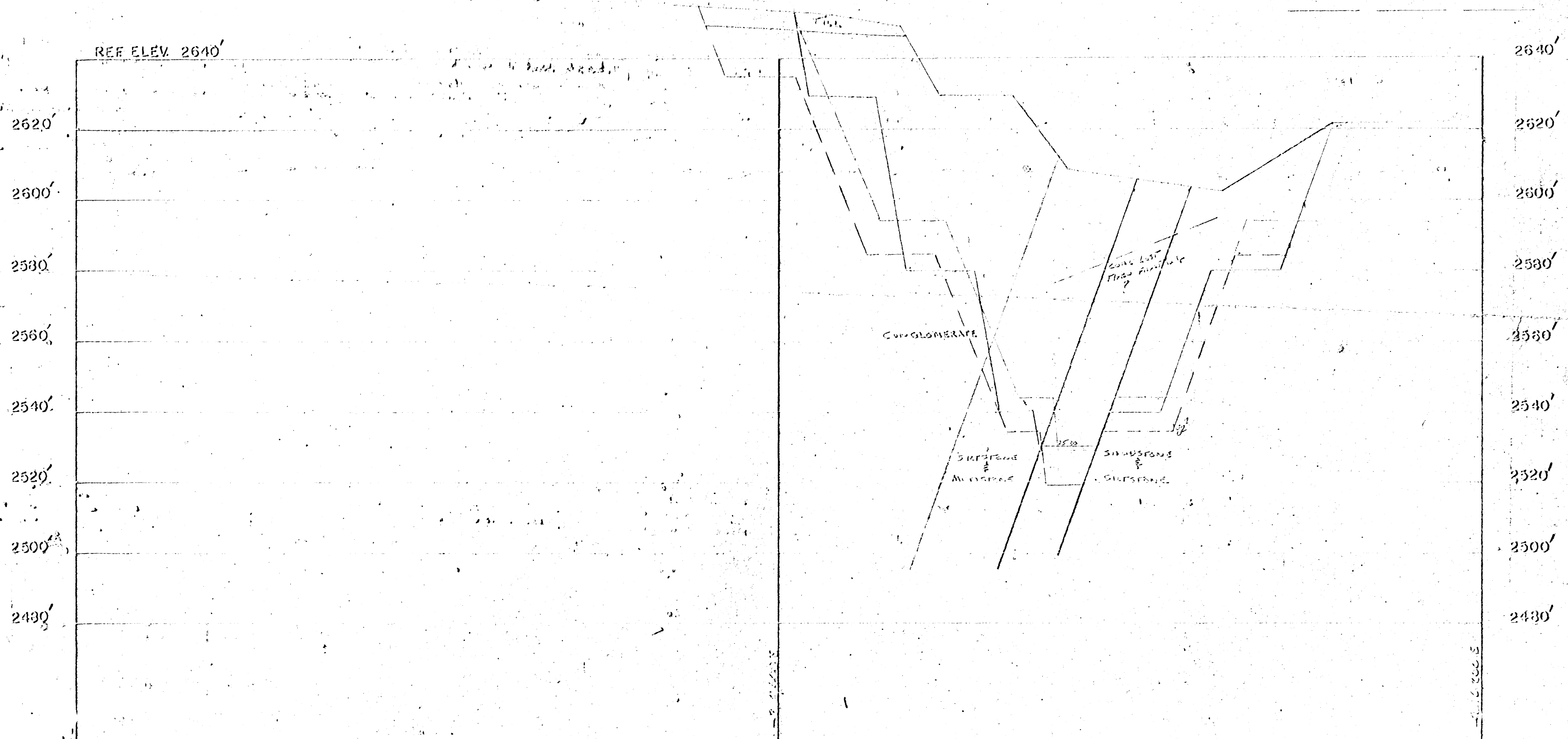
CARMACKS COAL PROJECT X-SECTION NO 413.000 N
1981 MINING PLAN scale: 1 inch = 20 feet

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Feb 9/81	<i>gao</i>	



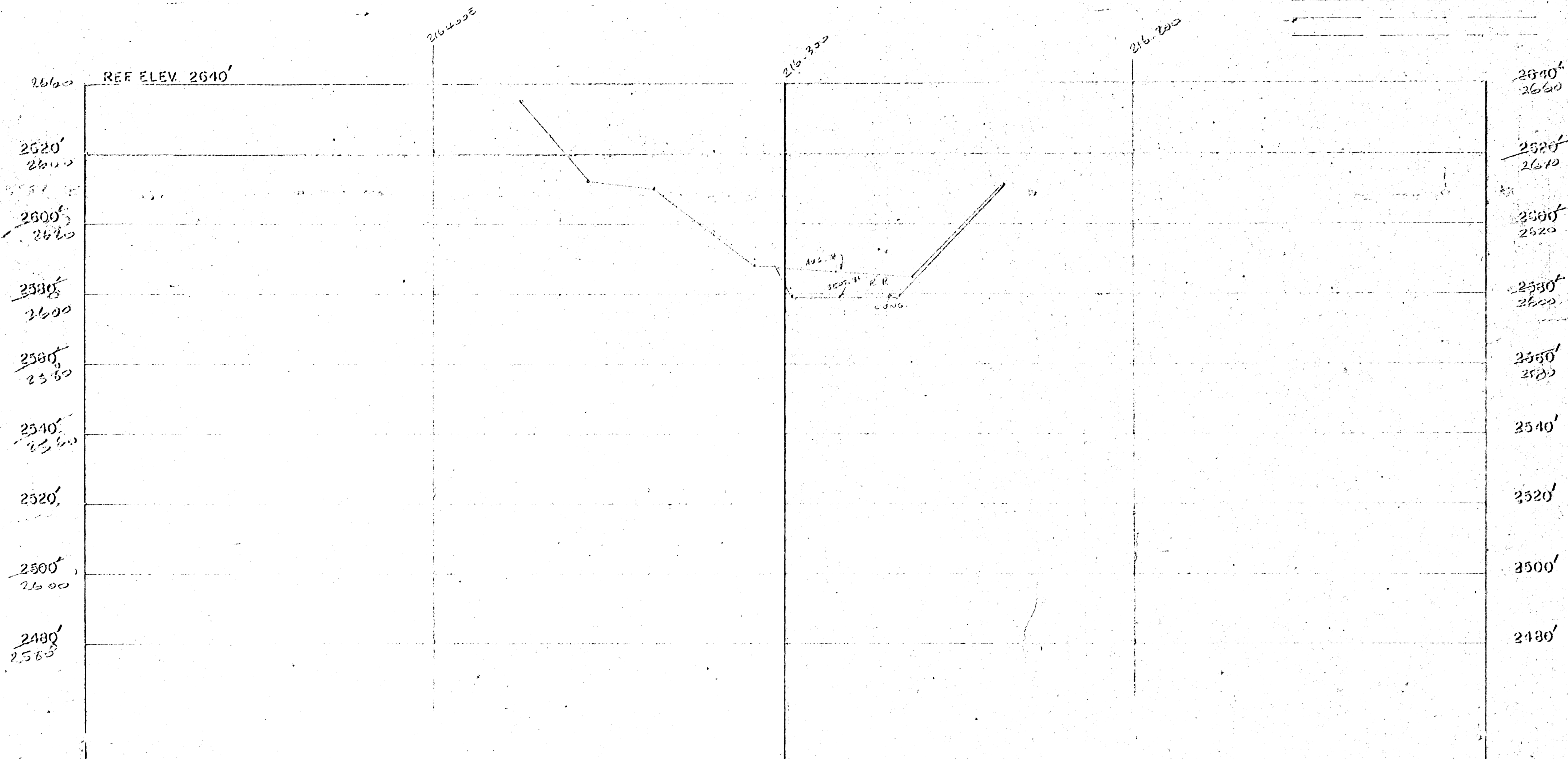
LEGEND

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CARMACKS COAL PROJECT X-SECTION NO 613.250
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LEGEND

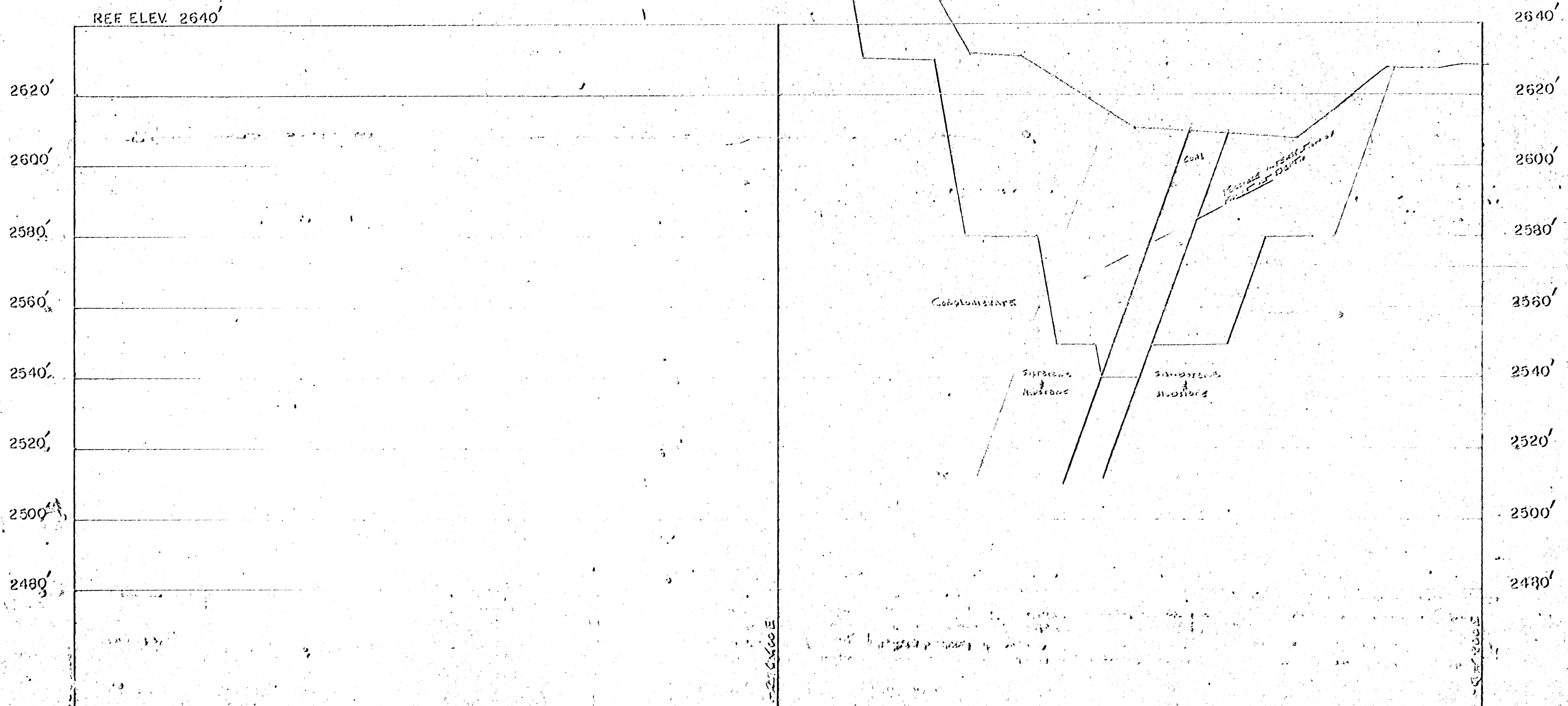
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CARMACKS COAL PROJECT X-SECTION NO 213,500N
1981 MINING PLAN scale: 1 inch = 20 feet

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2/27/81	<i>[Signature]</i>	



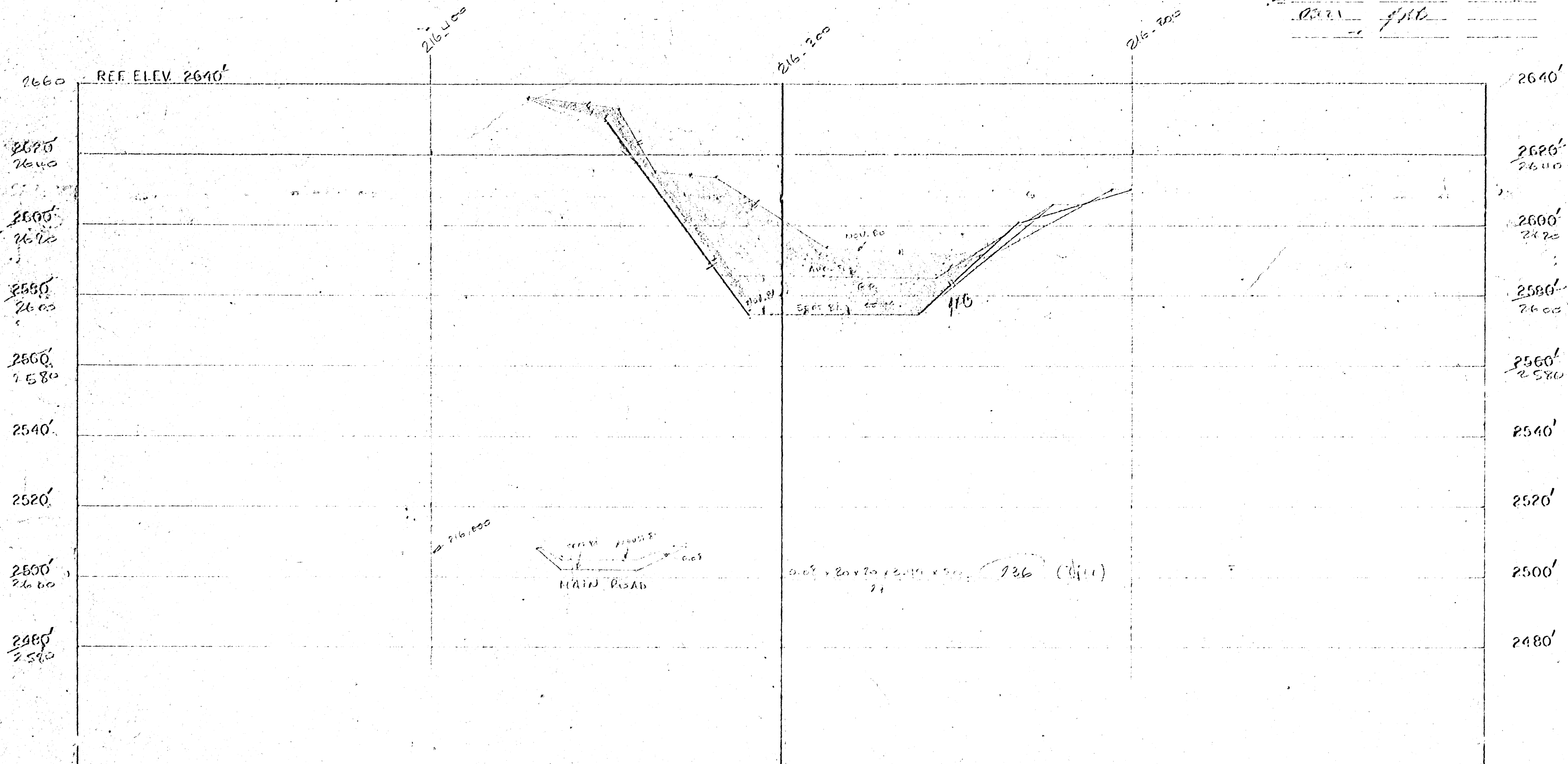
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1981 MINING PLAN scale: 1 inch = 20 feet

LEGEND

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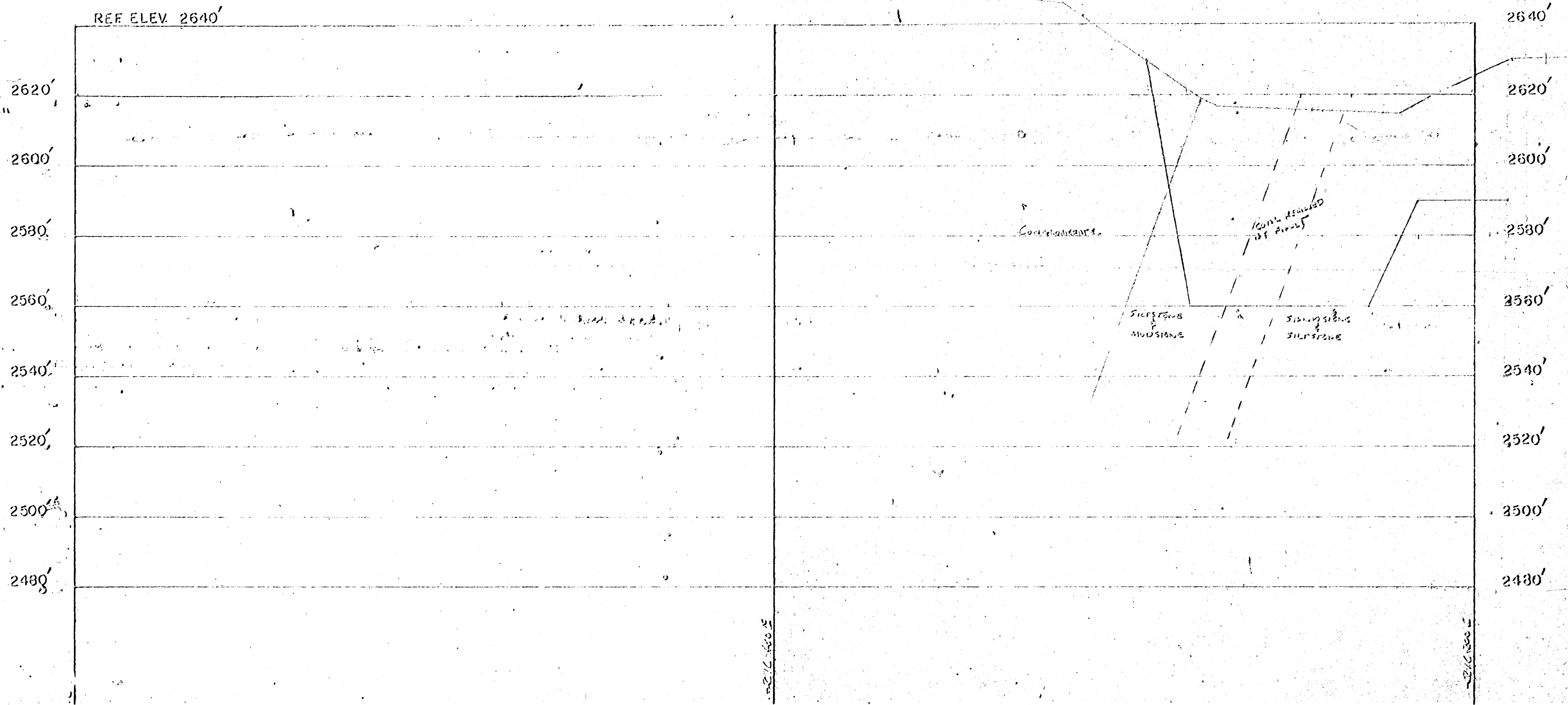
DATE 0001 DRAWN BY JLB CHECKED BY _____



CARMACKS COAL PROJECT X-SECTION NO 615.400.N
1981 MINING PLAN scale: 1 inch = 20 feet

LEGEND

DATE	DRAWN BY	CHECKED BY
12/12/81	JLB	



CARMACKS COAL PROJECT X-SECTION NO 613-450

1981 MINING PLAN scale: 1 inch = 20 feet

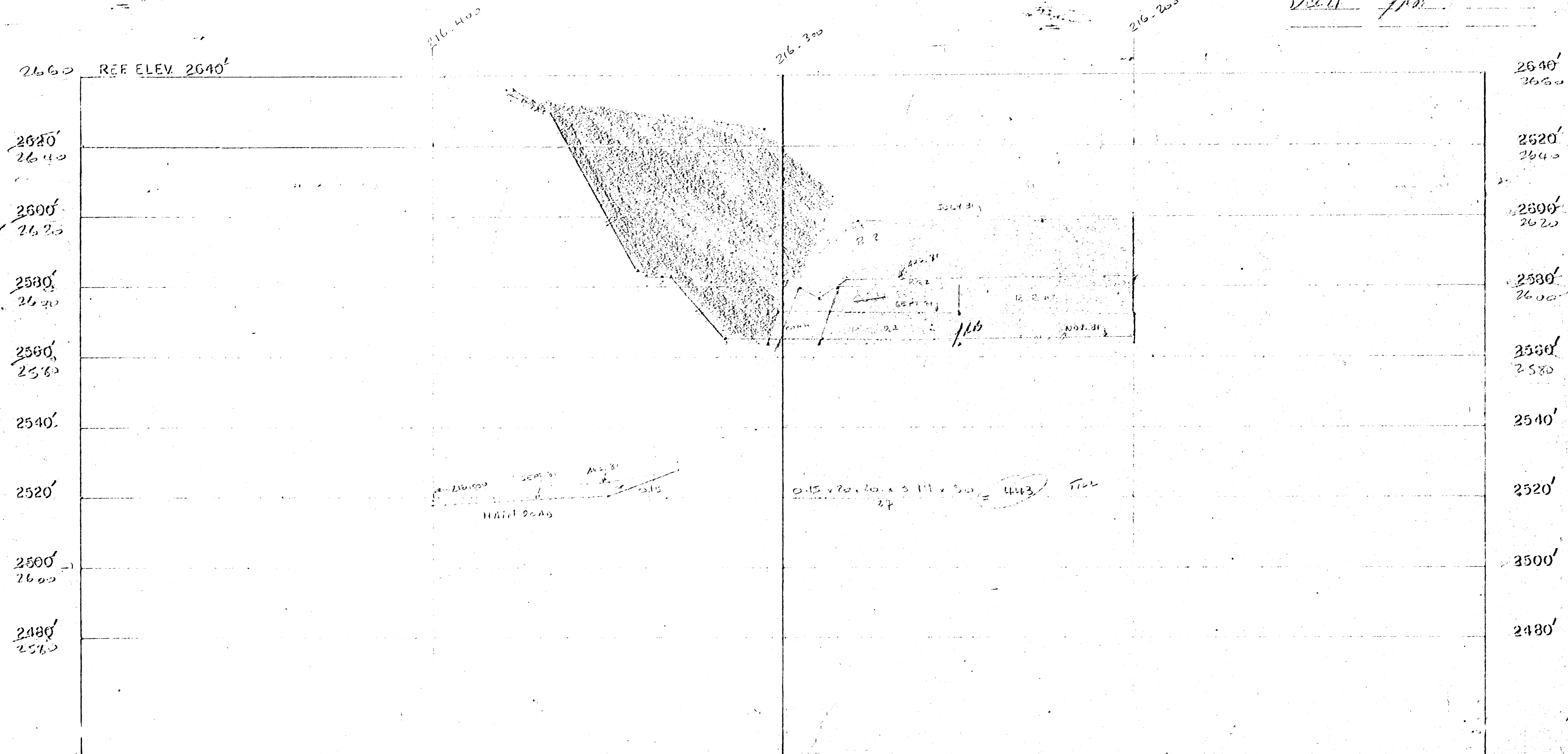
LEGEND

DATE

DRAWN BY

CHECKED BY

Dec 21



CARMACKS COAL PROJECT X-SECTION NO 613,500 N
1981 MINING PLAN scale: 1 inch = 20 feet

LEGEND

DATE	DRAWN BY	CHECKED BY
Feb 21/81	JLB	
Feb 21/81	JLB	
Feb 21/81	JLB	



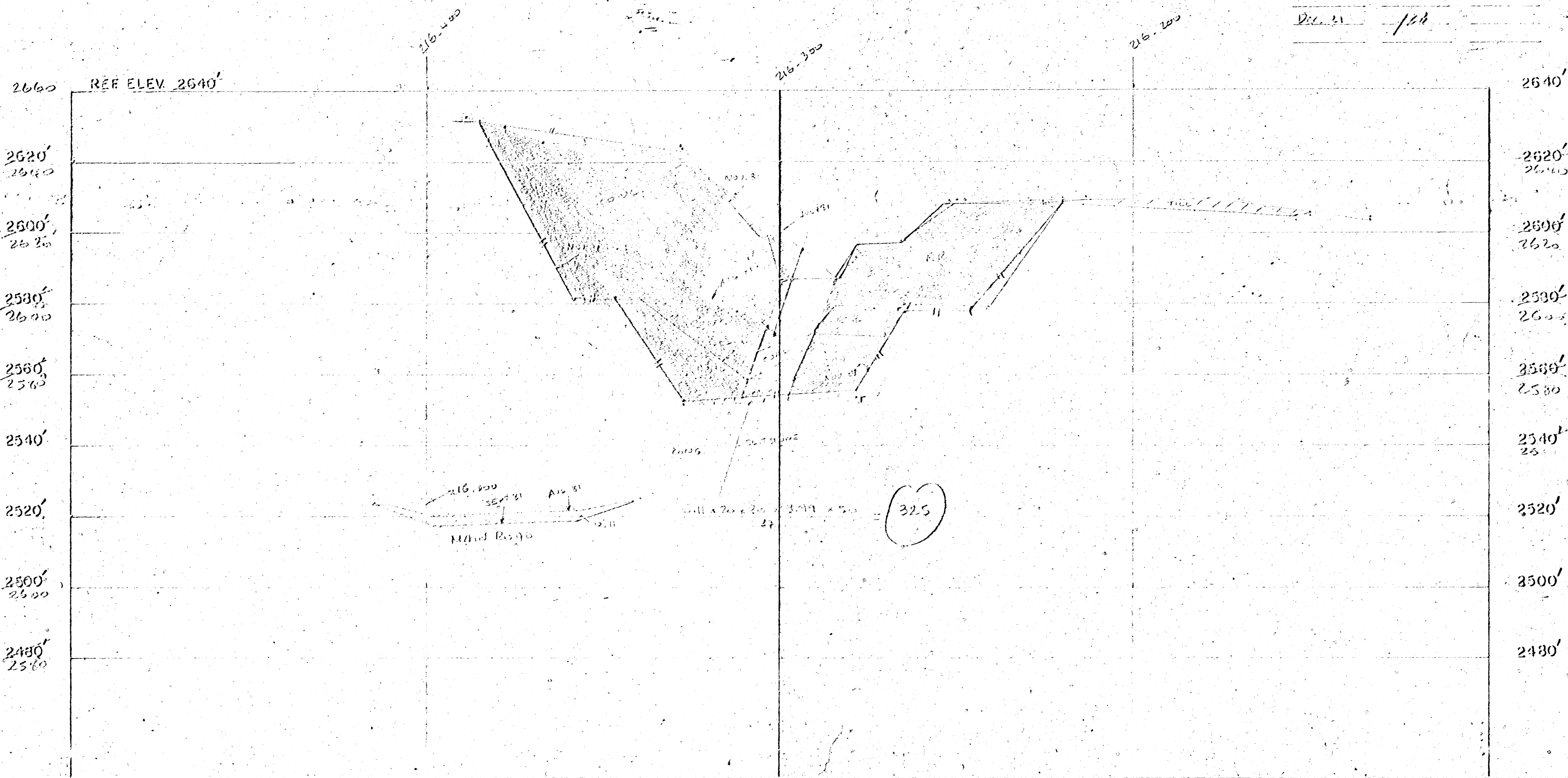
CARMACKS COAL PROJECT X-SECTION NO 613-550 1981 MINING PLAN scale: 1 inch = 20 feet

LEGEND

DATE DRAWN BY CHECKED BY

Dec. 31

JOB



CARMACKS COAL PROJECT X-SECTION NO 613,600 N
1981 MINING PLAN scale: 1 inch = 20 feet

LEGEND

DATE	DRAWN BY	CHECKED BY
8/23/81	JMB	
Dec 21	JMB	



CARMACKS COAL PROJECT X-SECTION NO 613-650

scale: 1 inch = 20 feet

DATE _____

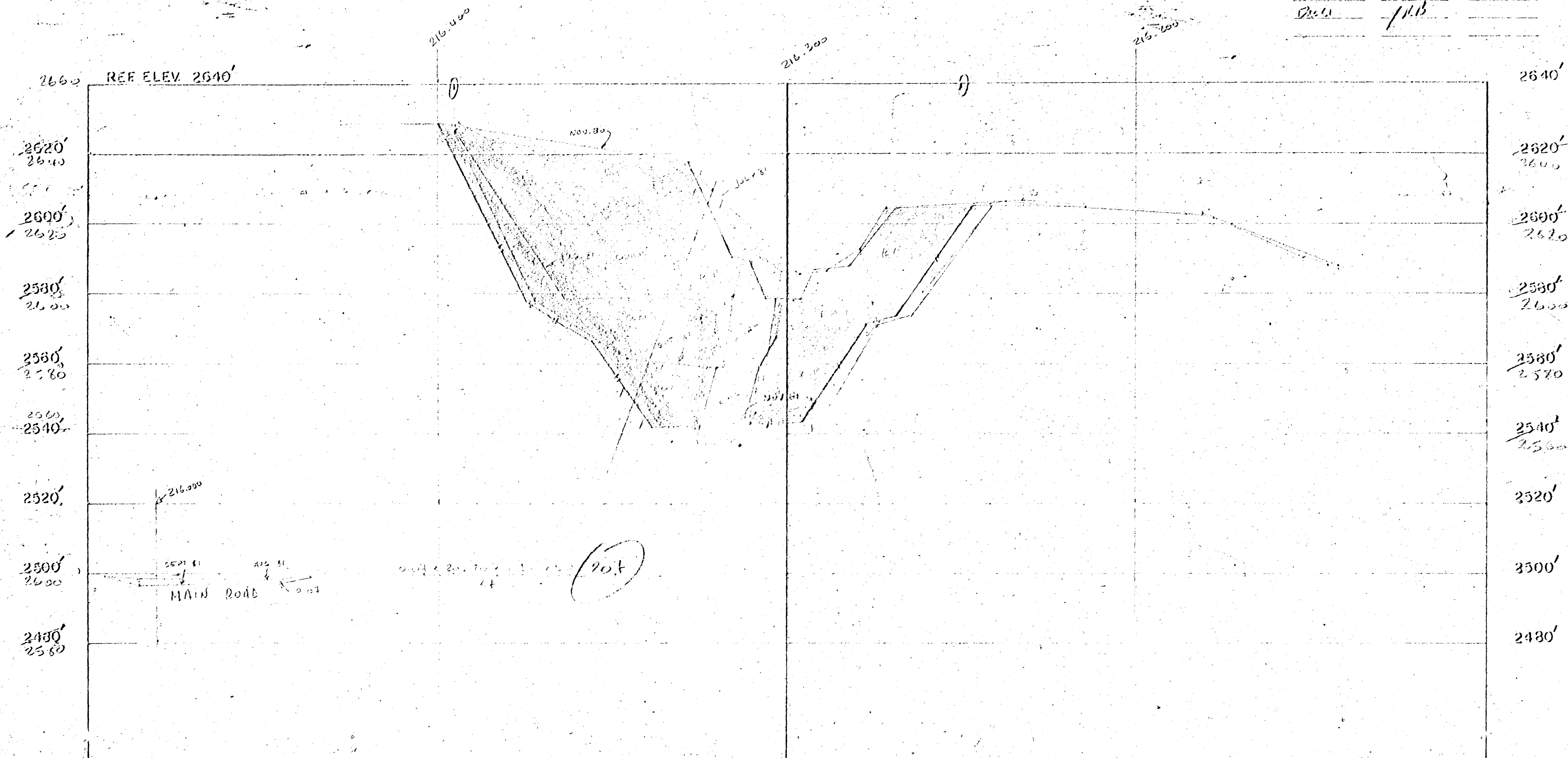
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1. *Journal of the American Medical Association*, 1997; 277: 1033-1038.

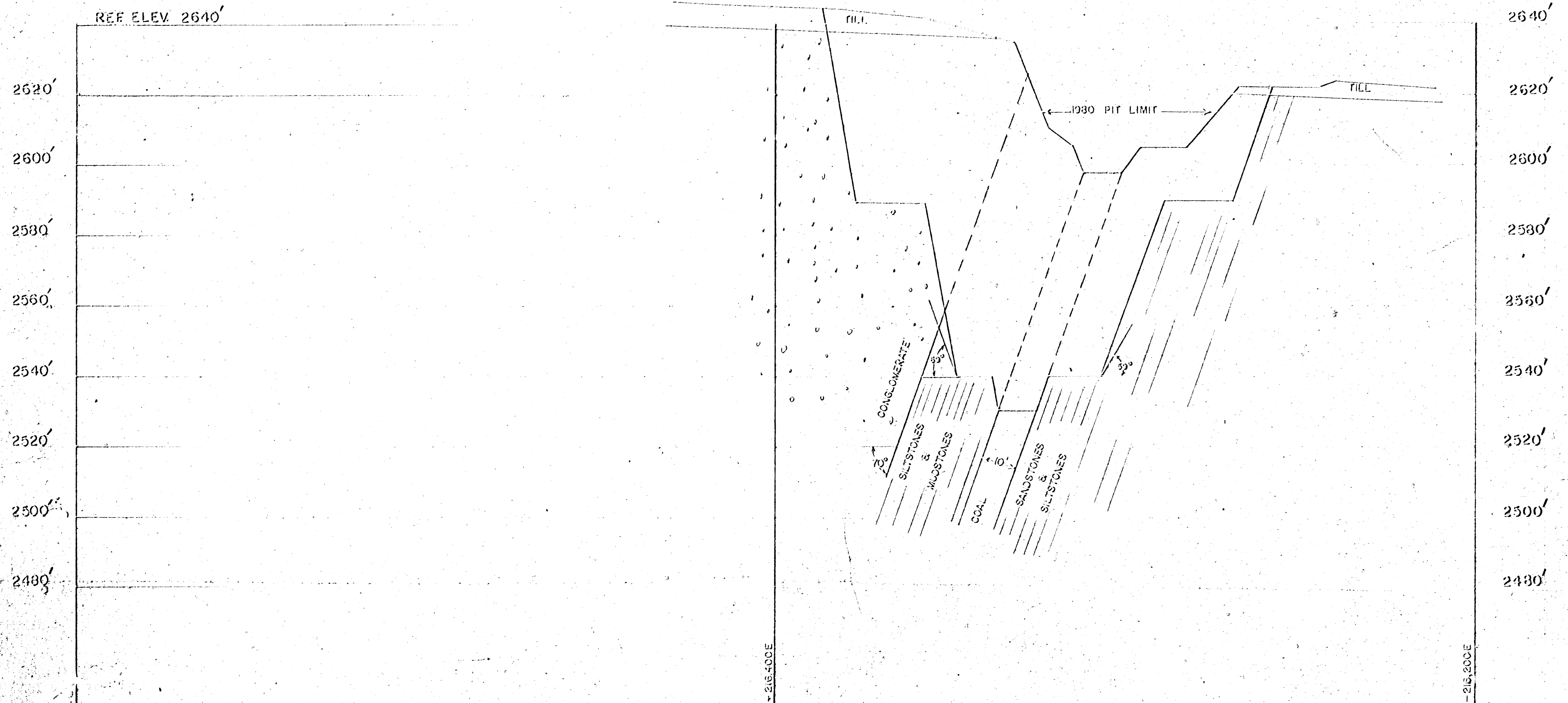


CARMACKS COAL PROJECT X-SECTION NO 613,700 N
1981 MINING PLAN scale: 1 inch = 20 feet

LEGEND

DATE	DRAWN BY	CHECKED BY

TYPICAL CROSS-SECTION



CARMACKS COAL PROJECT X-SECTION NO 613-750

1981 MINING PLAN

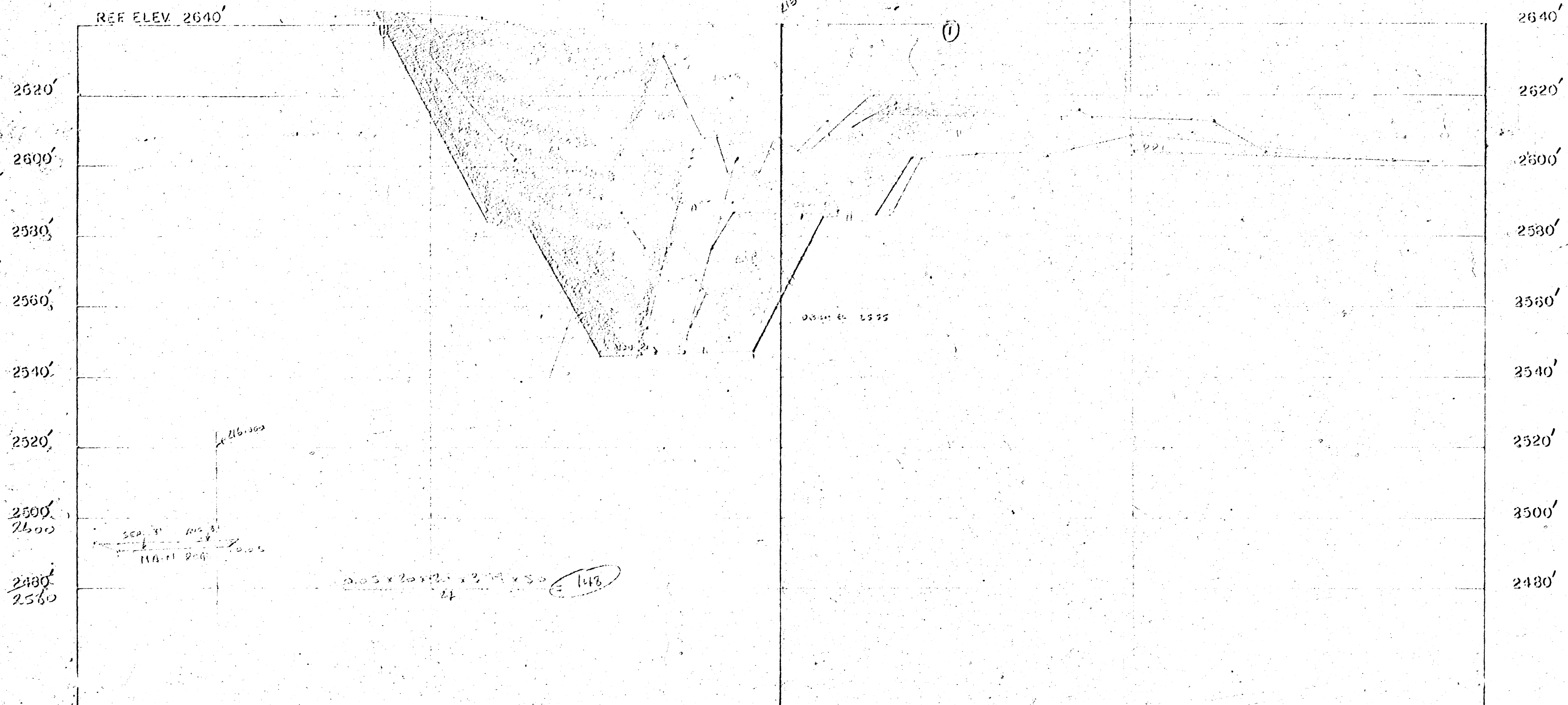
scale: 1 inch = 20 feet

LEGEND

DATE	DRAWN BY	CHECKED BY
Dec 21	JLB	

Dec 21

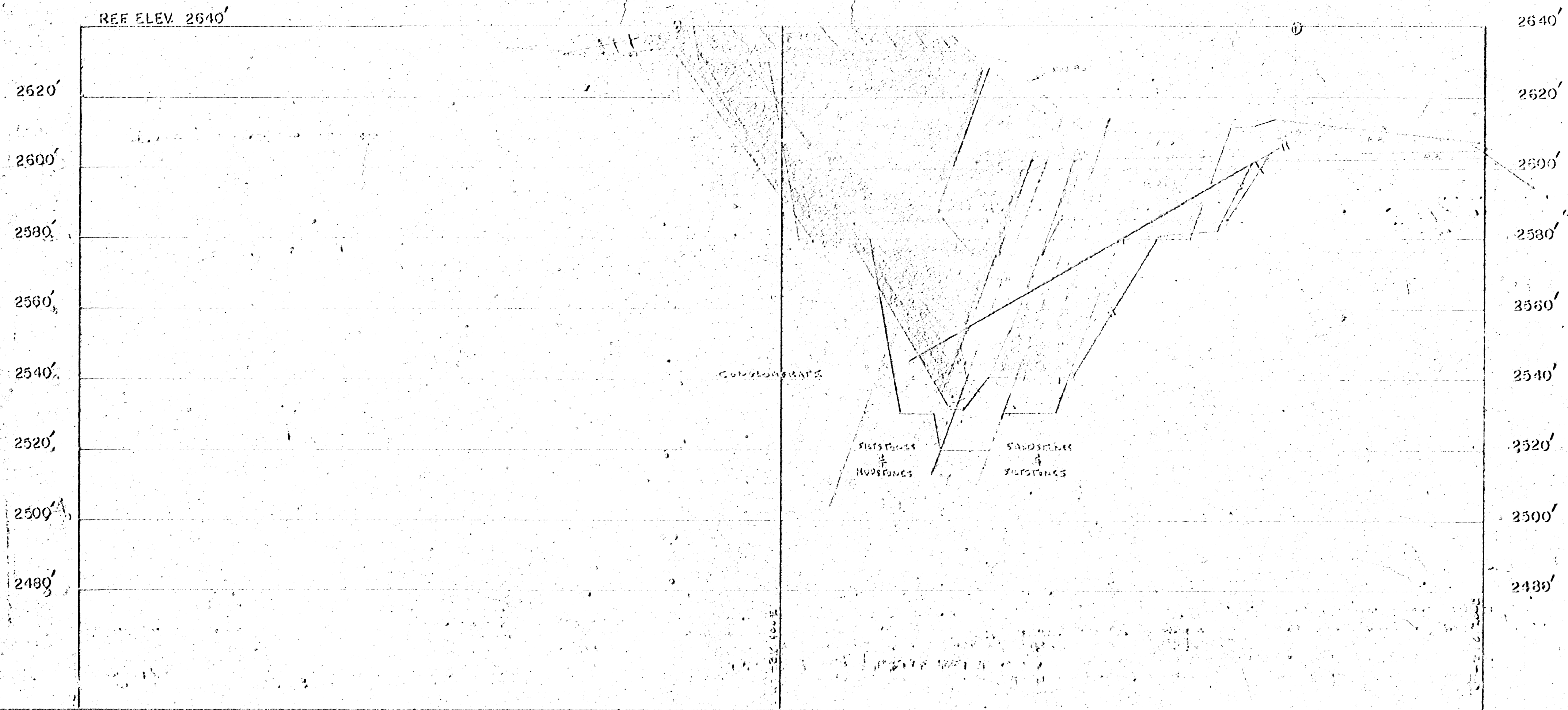
JLB



CARMACKS COAL PROJECT X-SECTION NO 613,800 N
1981 MINING PLAN scale: 1 inch = 20 feet

LEGEND

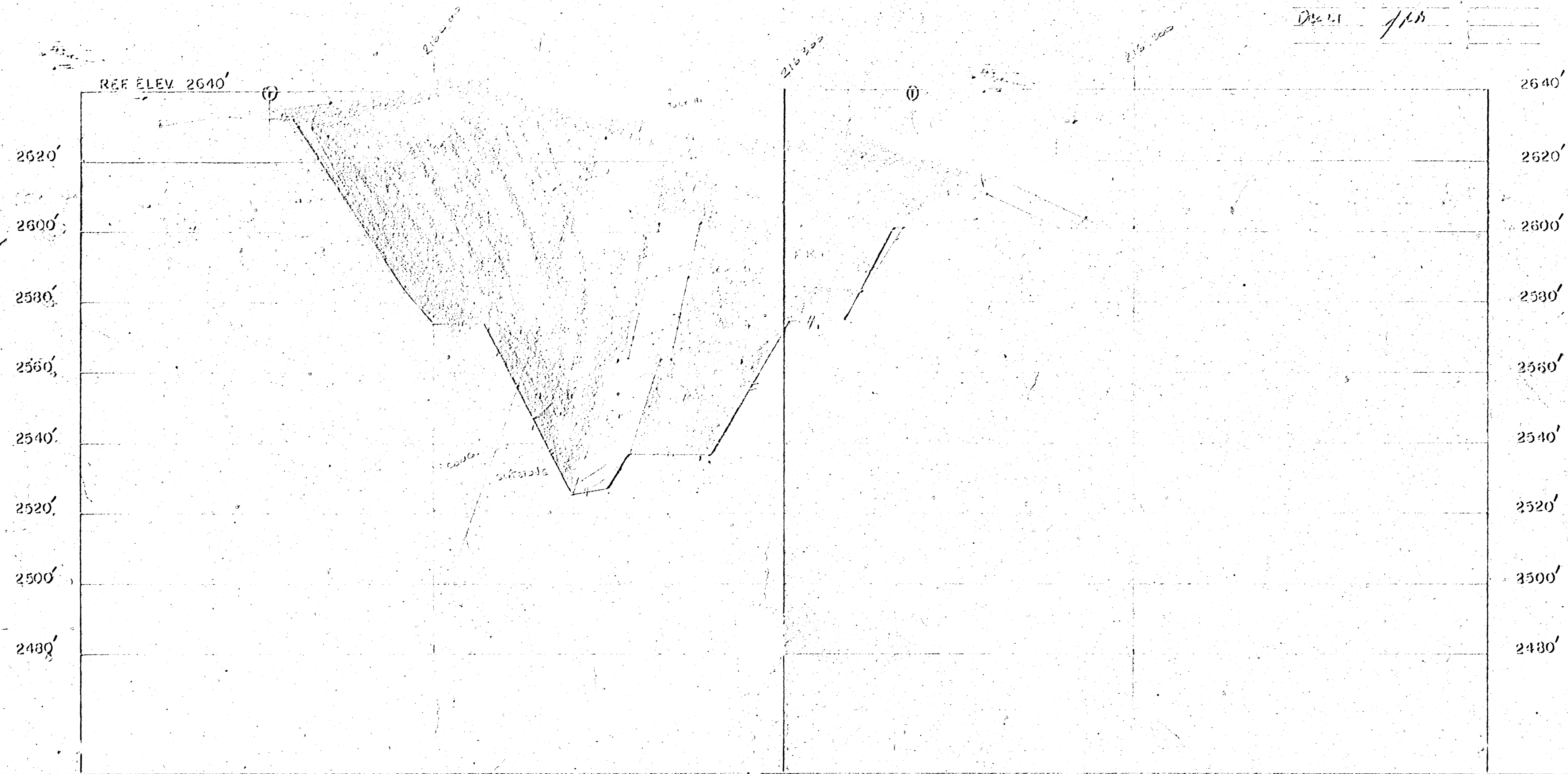
DATE	DRAWN BY	CHECKED BY
Feb 2/81	JLB	
Dec 11	JLB	



CARMACKS COAL PROJECT X-SECTION NO 612 850
1981 MINING PLAN scale: 1 inch = 20 feet

LEGEND

DATE	DRAWN BY	CHECKED BY
Dec 11	JFB	



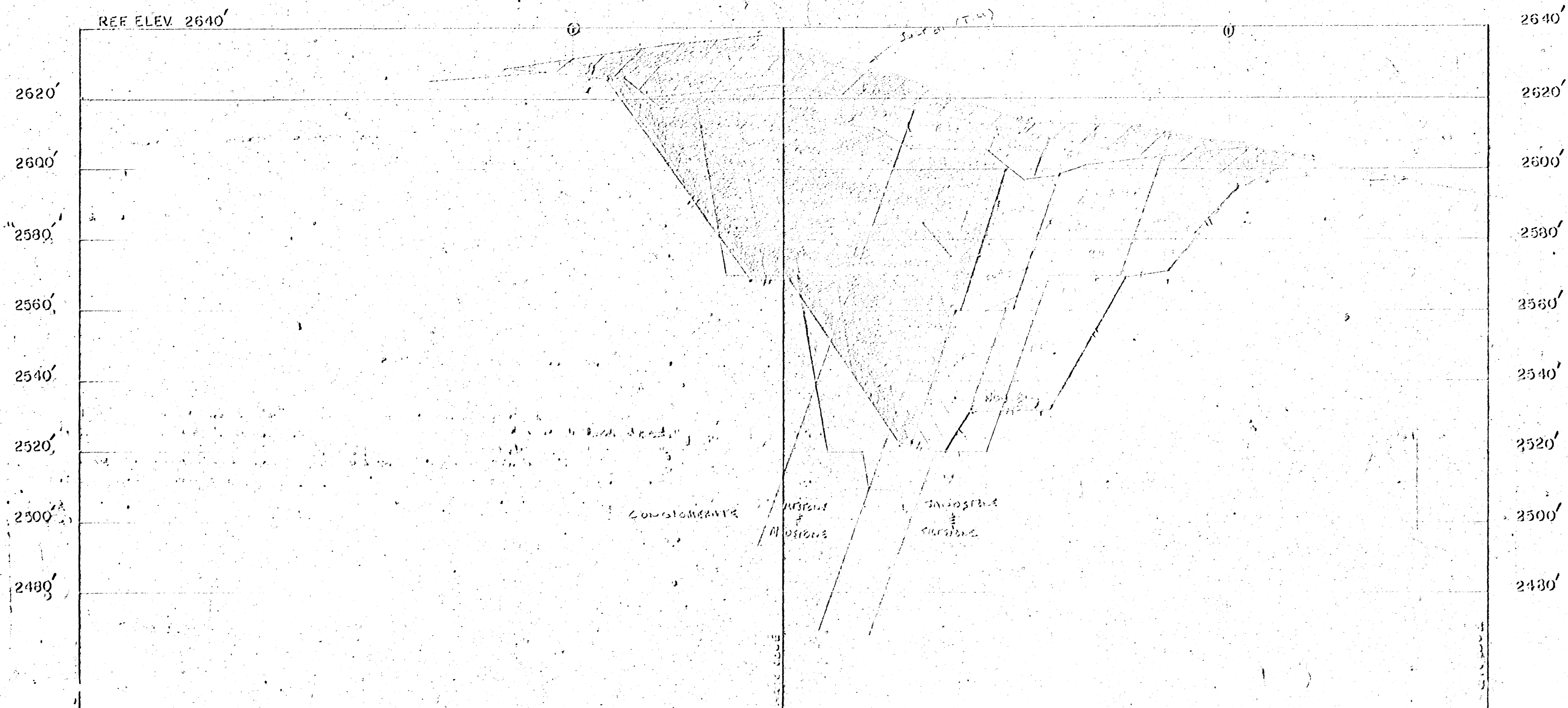
CARMACKS COAL PROJECT X-SECTION NO 615,900 N

1981 MINING PLAN

scale: 1 inch = 20 feet

LEGEND

DATE	DRAWN BY	CHECKED BY
Feb 21/81	JLB	
Dec 81	JLB	



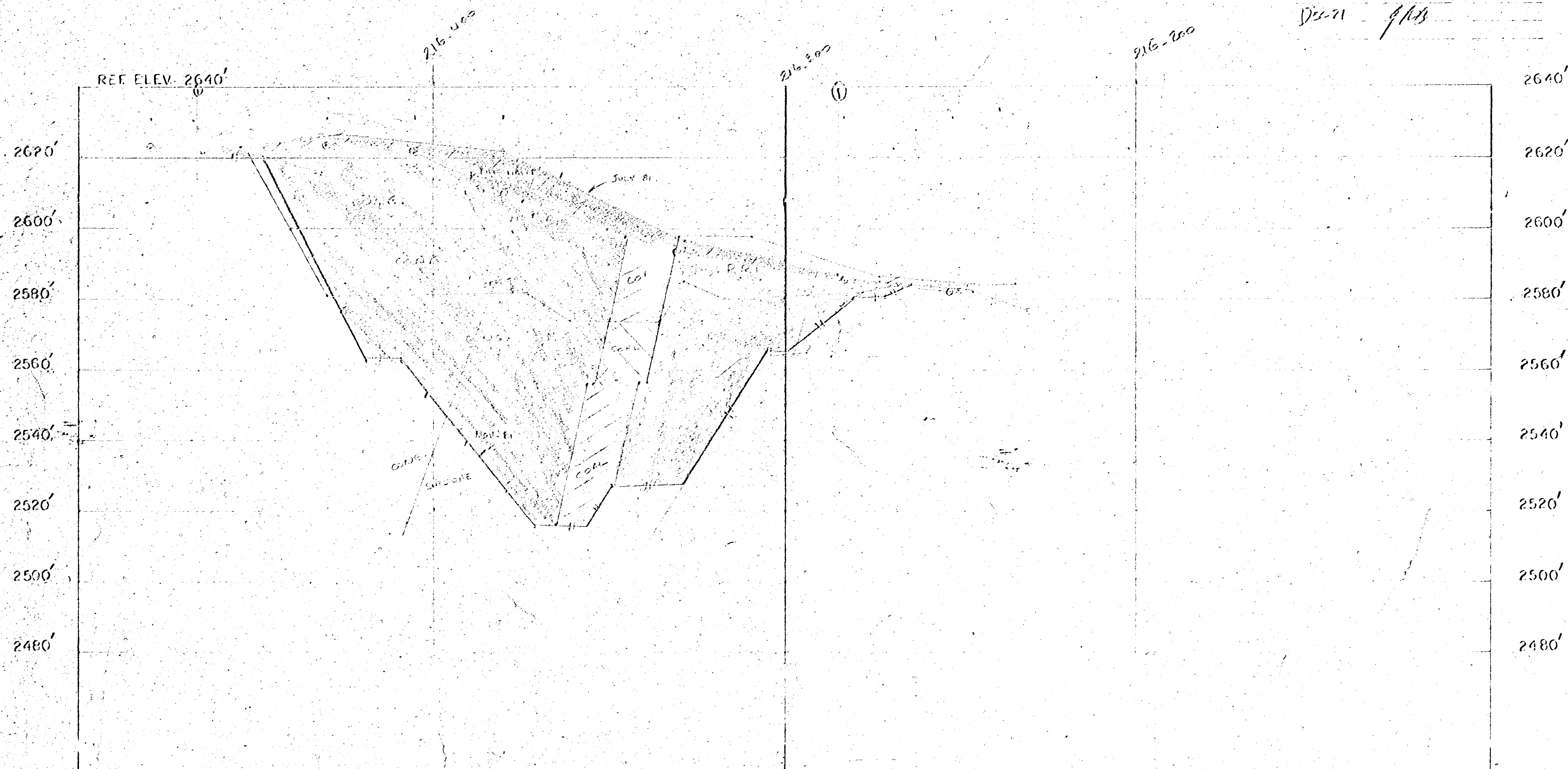
CARMACKS COAL PROJECT X-SECTION NO 613-950

1981 MINING PLAN scale: 1 inch = 20 feet

LEGEND

DATE: DRAWN BY: CHECKED BY:

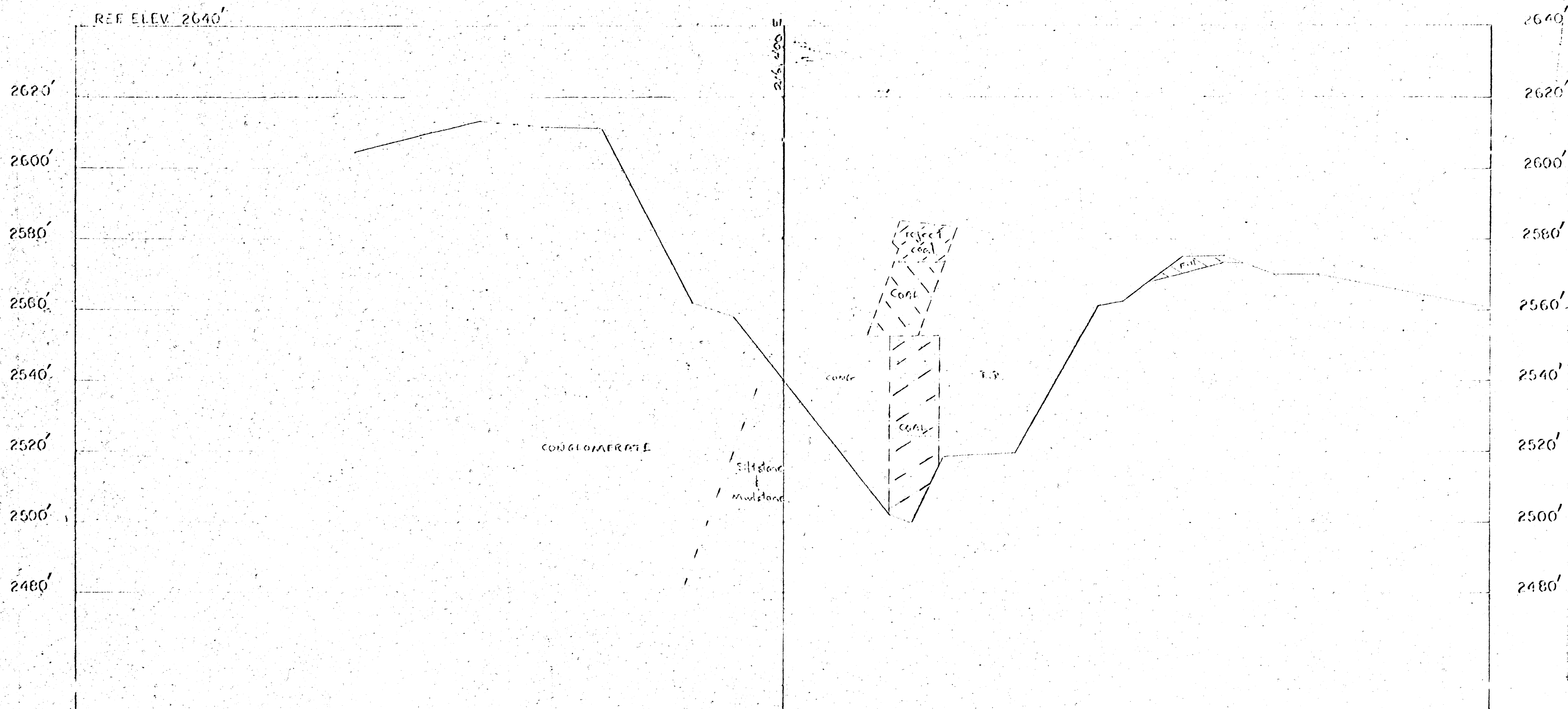
DEC-71 JAB



LEGEND

CARMACKS COAL PROJECT X-SECTION NO 614, 000 N
1981 MINING PLAN scale: 1 inch = 20 feet

DATE FEB. 5/82 DRAWN BY KWS CHECKED BY

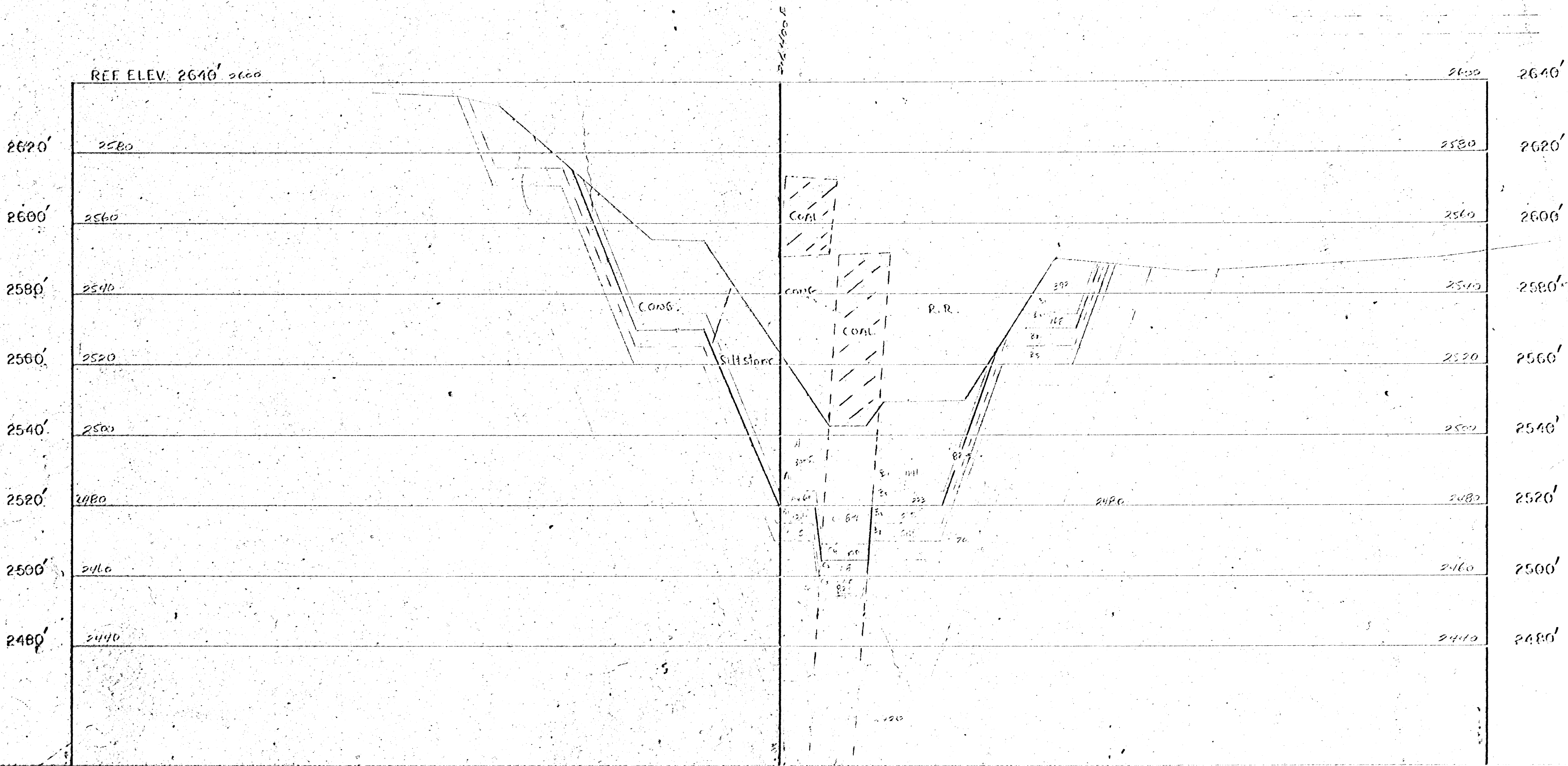


W

LEGEND

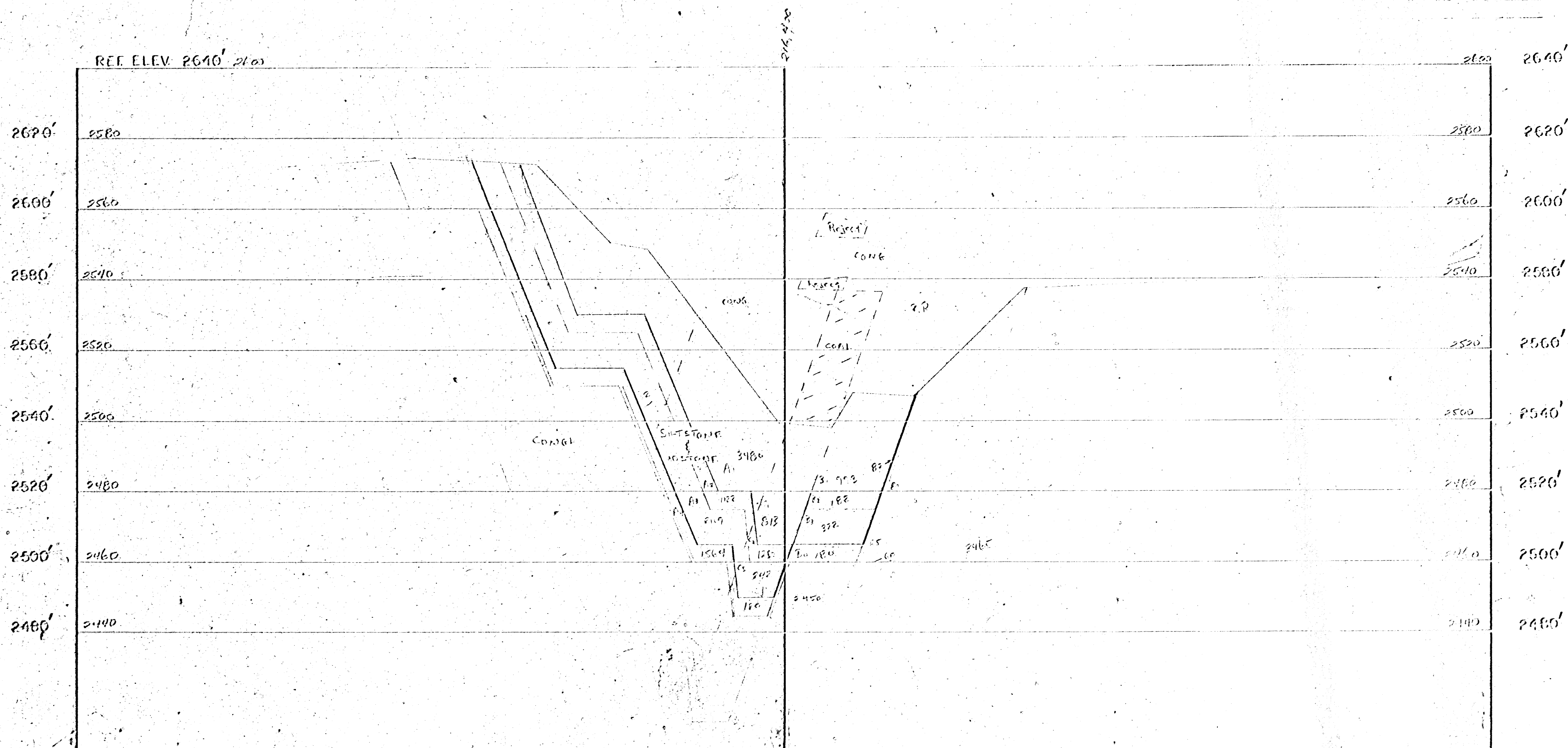
CARMACKS COAL PROJECT X-SECTION NO 614,650 N
1981 MINING PLAN scale: 1 inch = 20 feet

DATE FEB. 18/82 DRAWN BY K. J. [unclear] CHECKED BY [unclear]



scale: 1 inch = 20 feet

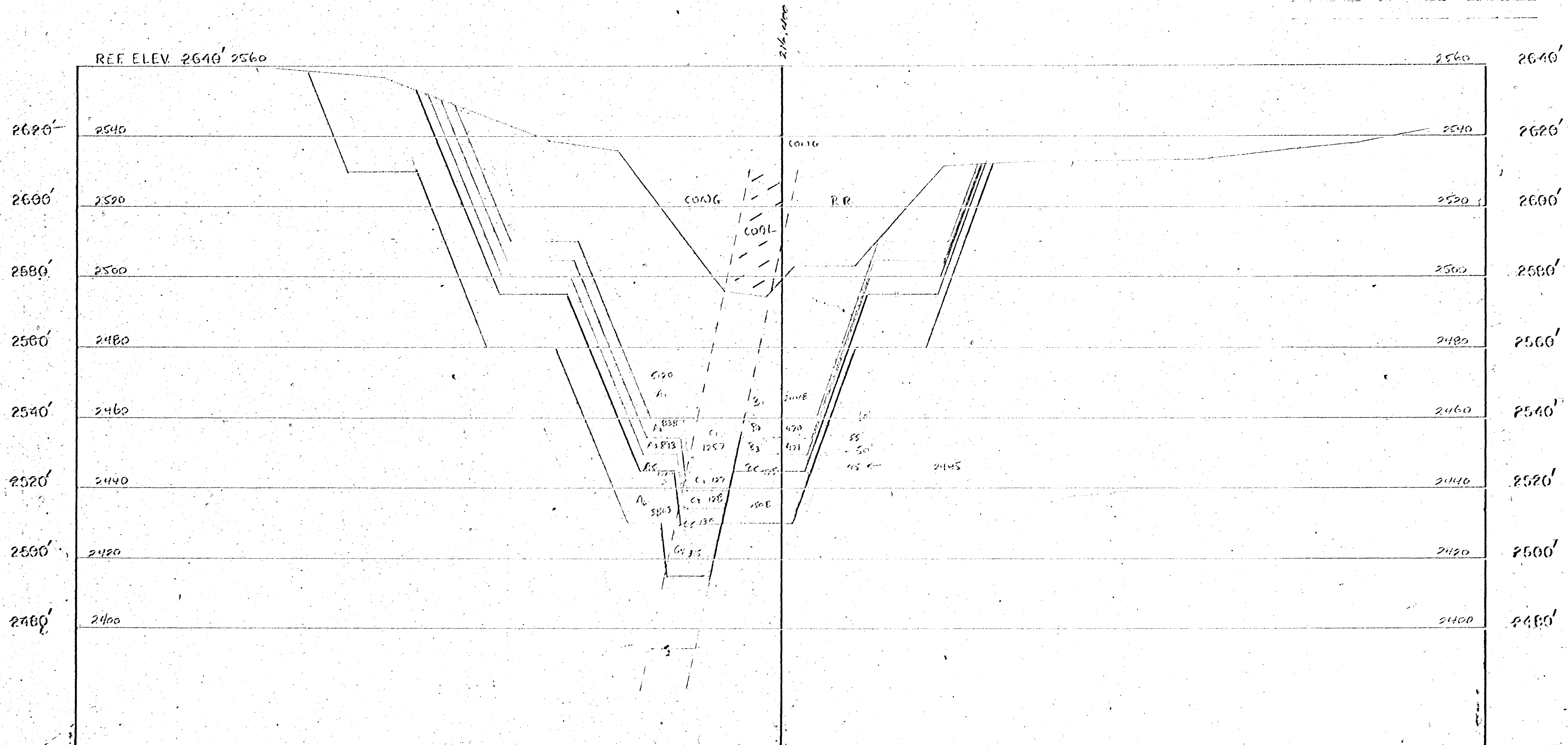
DATE FEB 12/87 DRAWN BY Koss CHECKED BY _____



LEGEND

CARMACKS COAL PROJECT X-SECTION NO 614, 150 N
1981 MINING PLAN scale: 1 inch = 20 feet

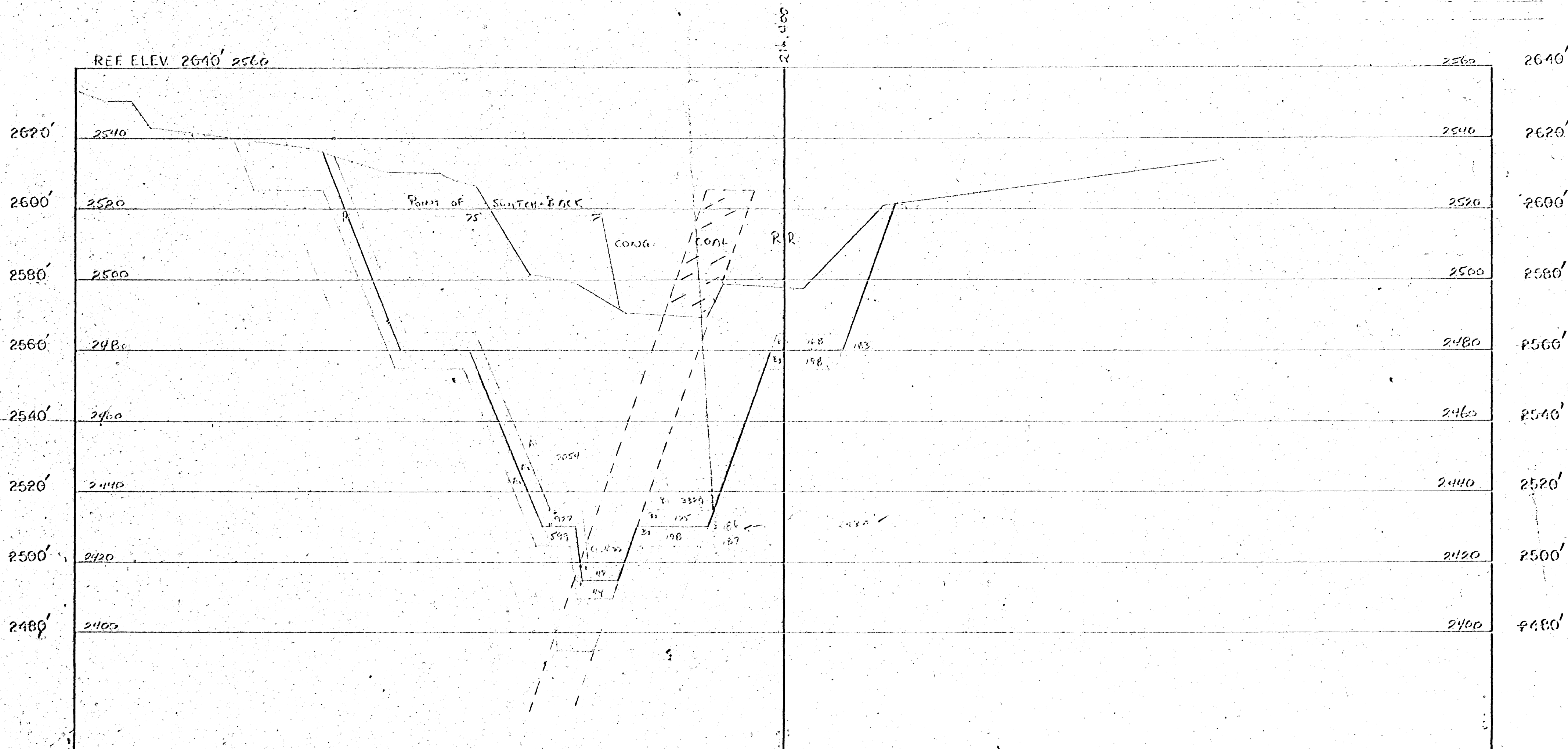
DATE FEB 18/82 DRAWN BY K. J. CHECKED BY



CARMACKS COAL PROJECT X-SECTION NO 614, 200
1981 MINING PLAN scale: 1 inch = 20 feet

LEGEND

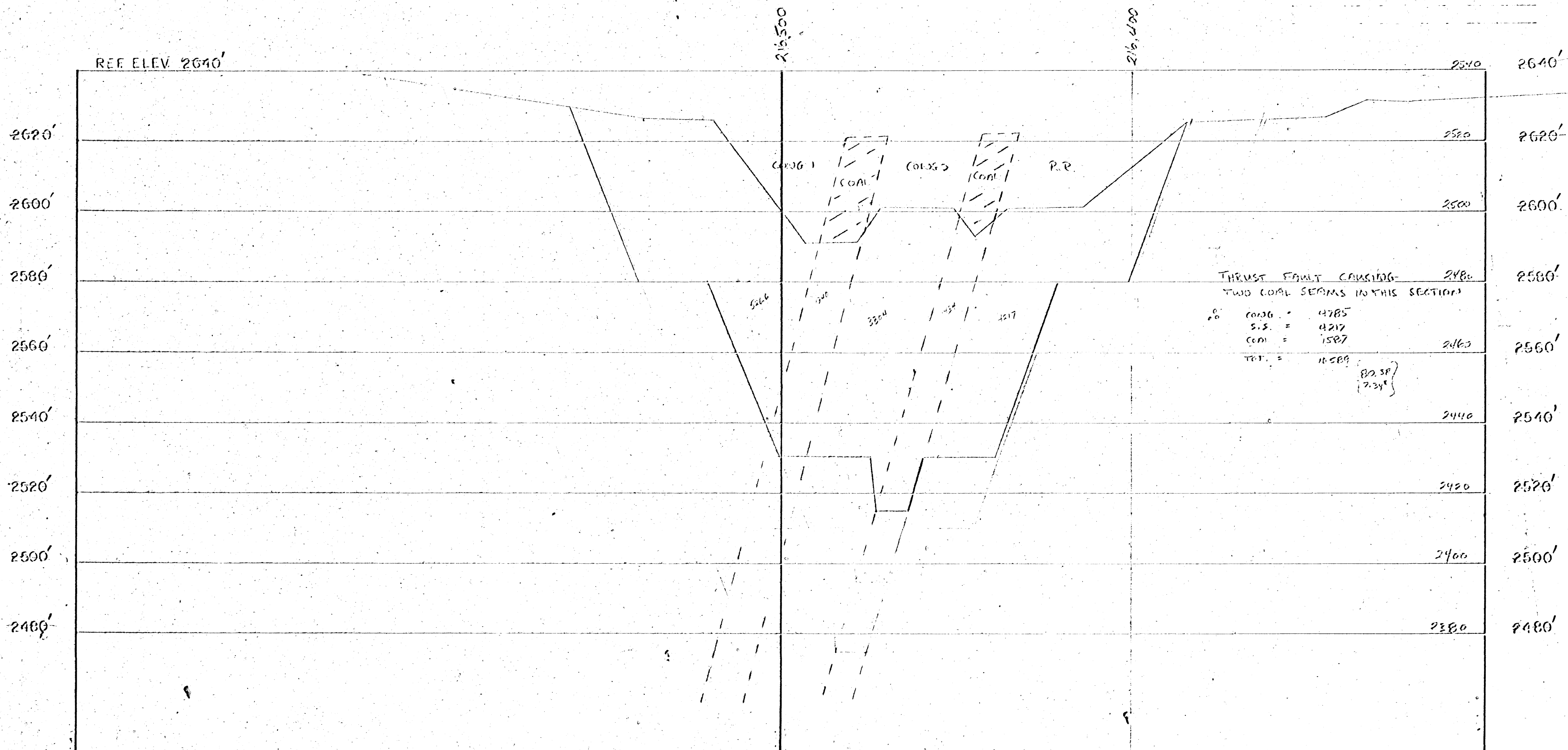
DATE FEB 18/82 DRAWN BY KMS CHECKED BY _____



LEGEND

CARMACKS COAL PROJECT X-SECTION NO 614, 250 N
1981 MINING PLAN scale: 1 inch = 20 feet

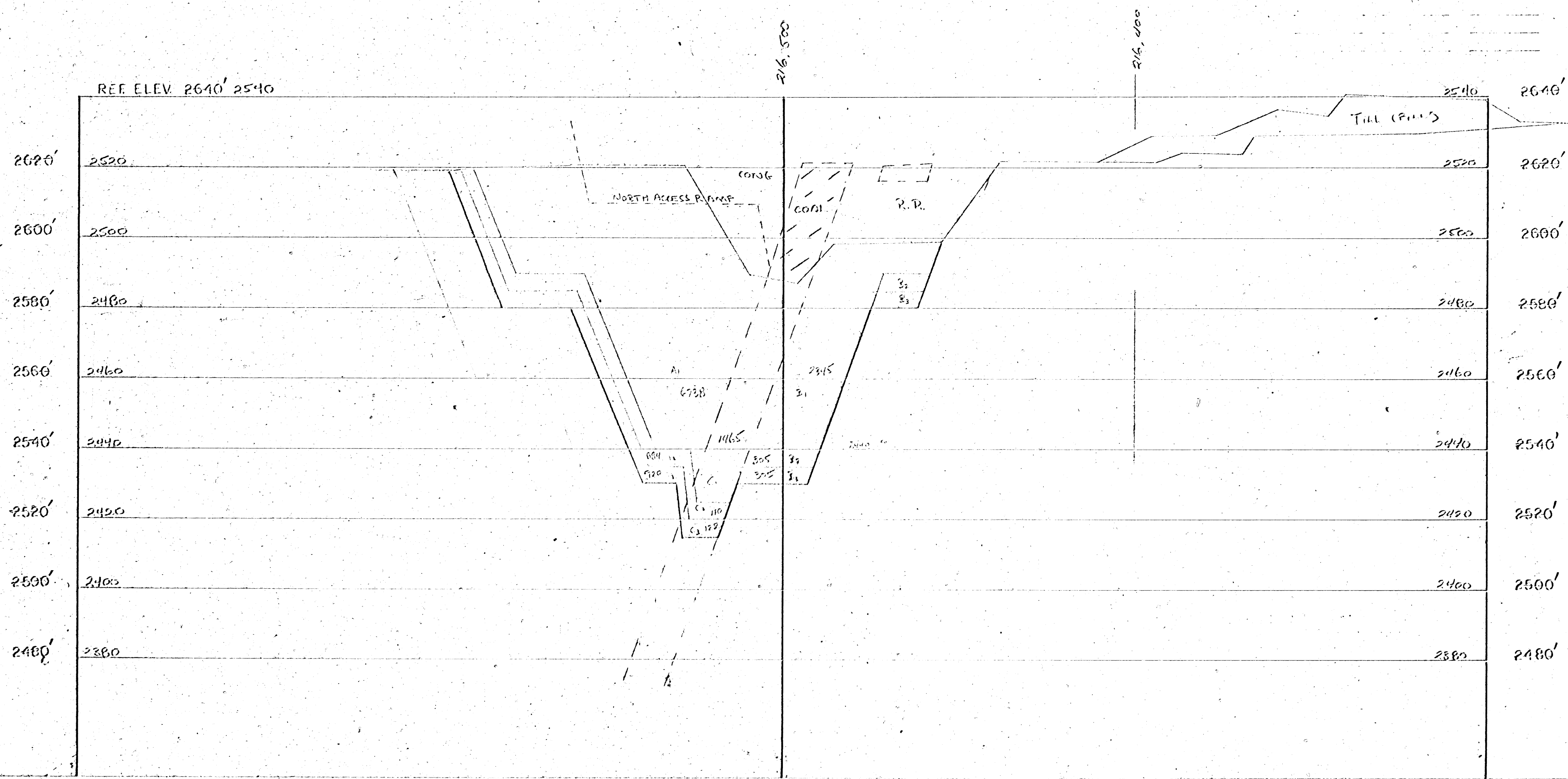
DATE FEB. 18/82 DRAWN BY K. U. CHECKED BY



LEGEND

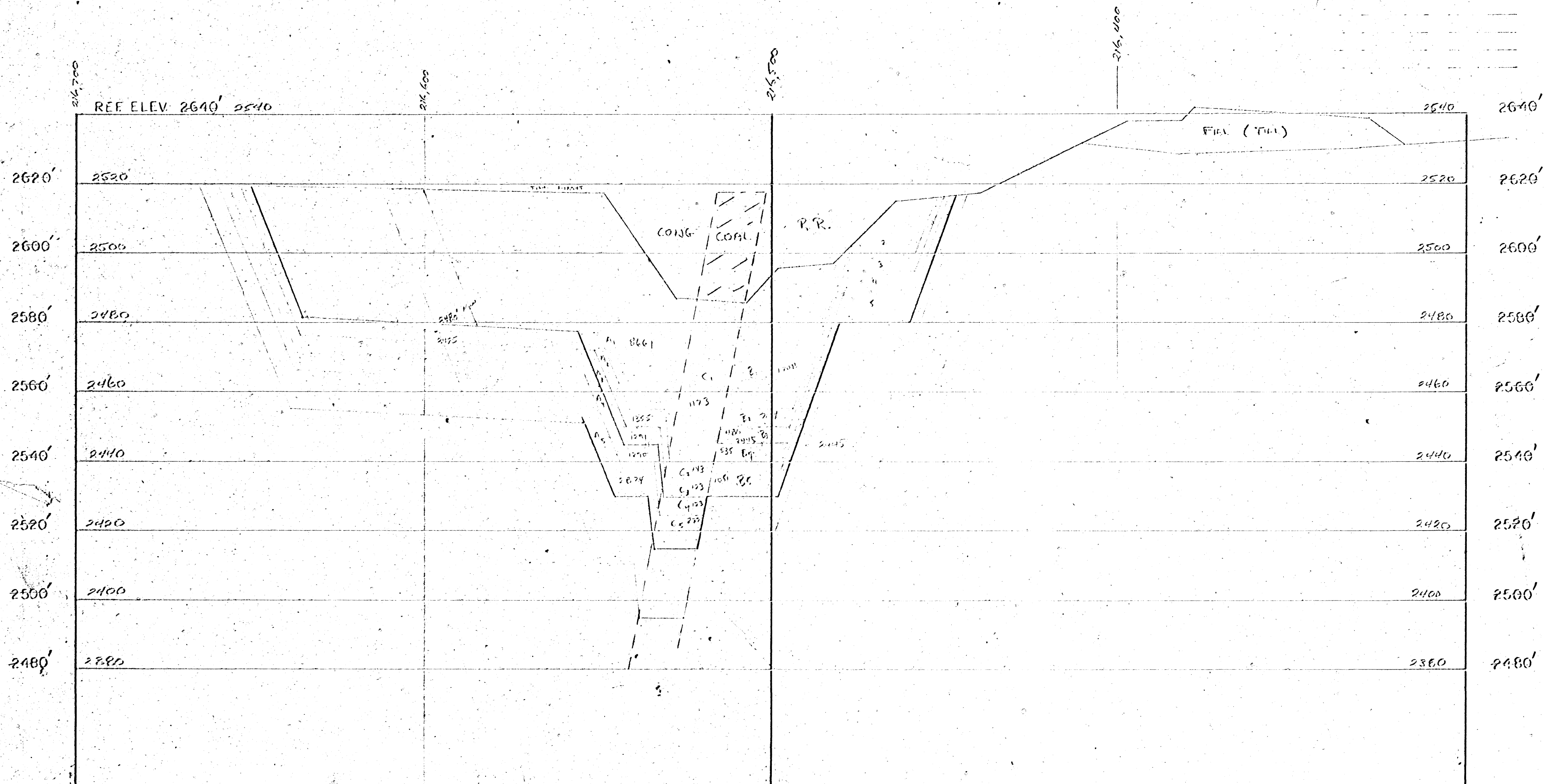
CARMACKS COAL PROJECT X-SECTION NO 614, 300
 1981 MINING PLAN scale: 1 inch = 20 feet

DATE FEB 18/82 DRAWN BY K.G. CHECKED BY



LEGEND

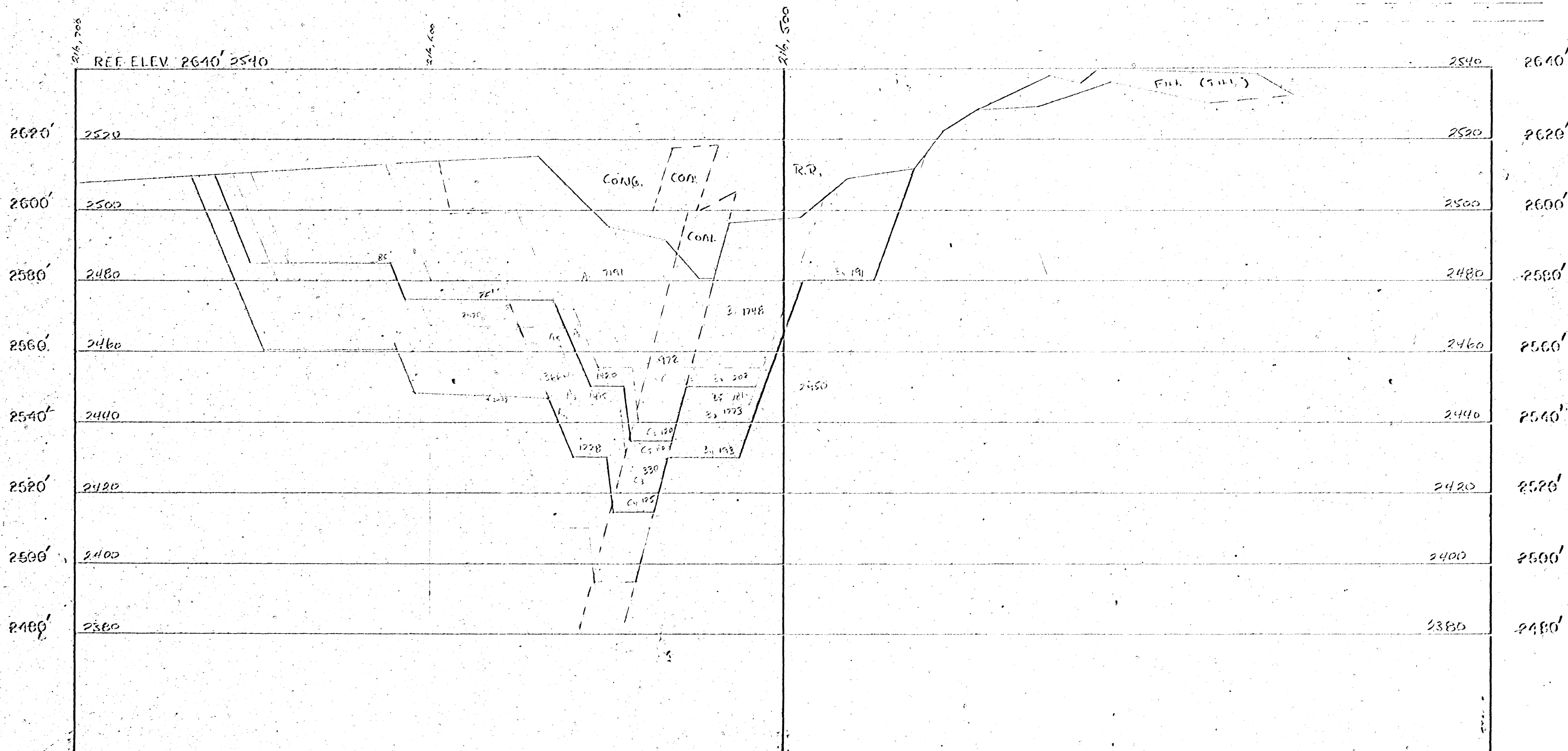
CHECKED BY _____



LEGEND

CARMACKS COAL PROJECT X-SECTION NO 614, 400
1981 MINING PLAN scale: 1 inch = 20 feet

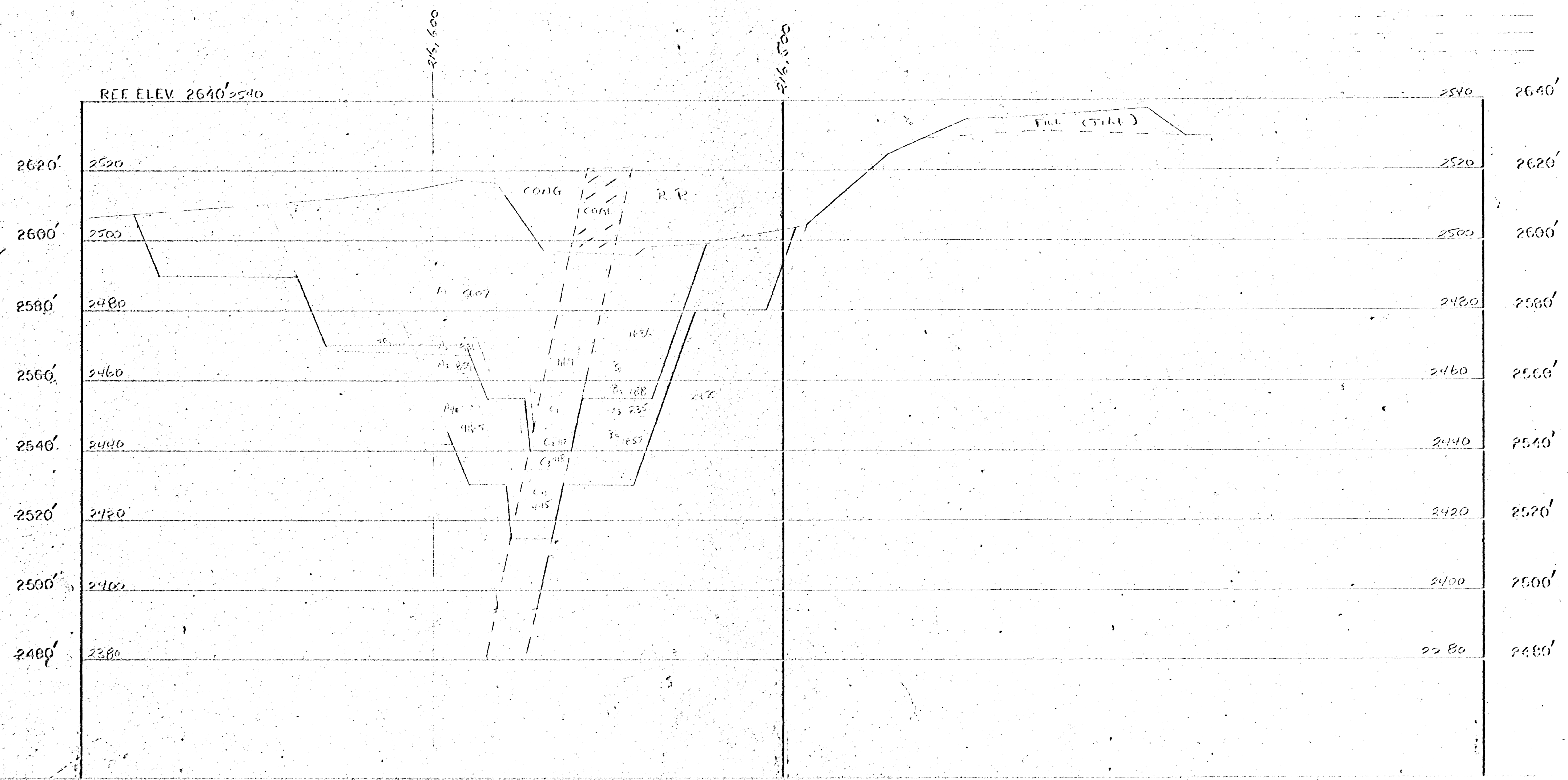
DATE FEB 18 82 DRAWN BY K.O. CHECKED BY



CARMACKS COAL PROJECT X-SECTION NO 614, 450 N
1981 MINING PLAN scale: 1 inch = 20 feet

LEGEND

DATE	DRAWN BY	CHECKED BY
FEB 18 82	FUS	

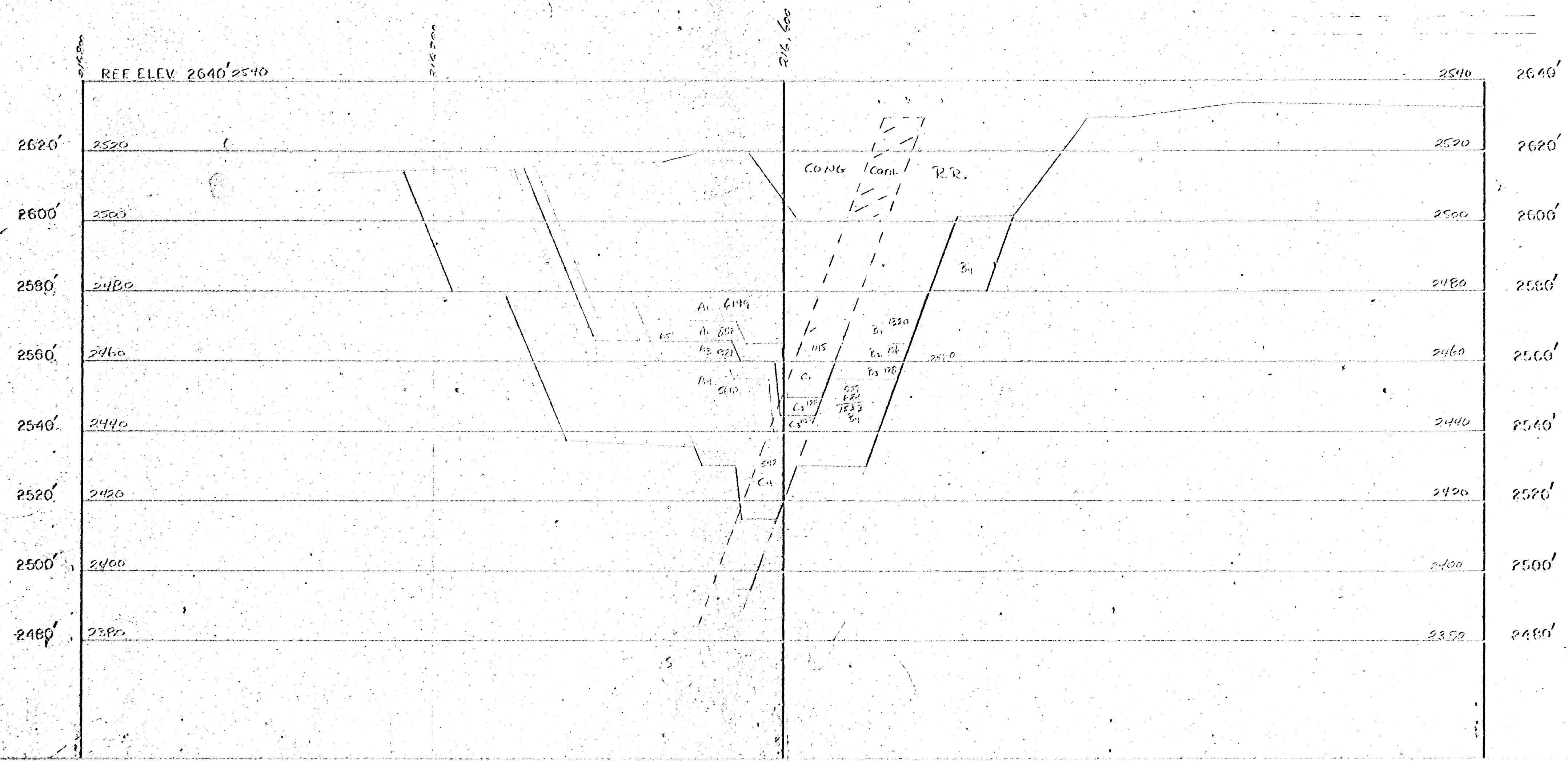


last section to recover coal

CARMACKS COAL PROJECT X-SECTION NO 614, 500 N
1981 MINING PLAN scale: 1 inch = 20 feet

LEGEND

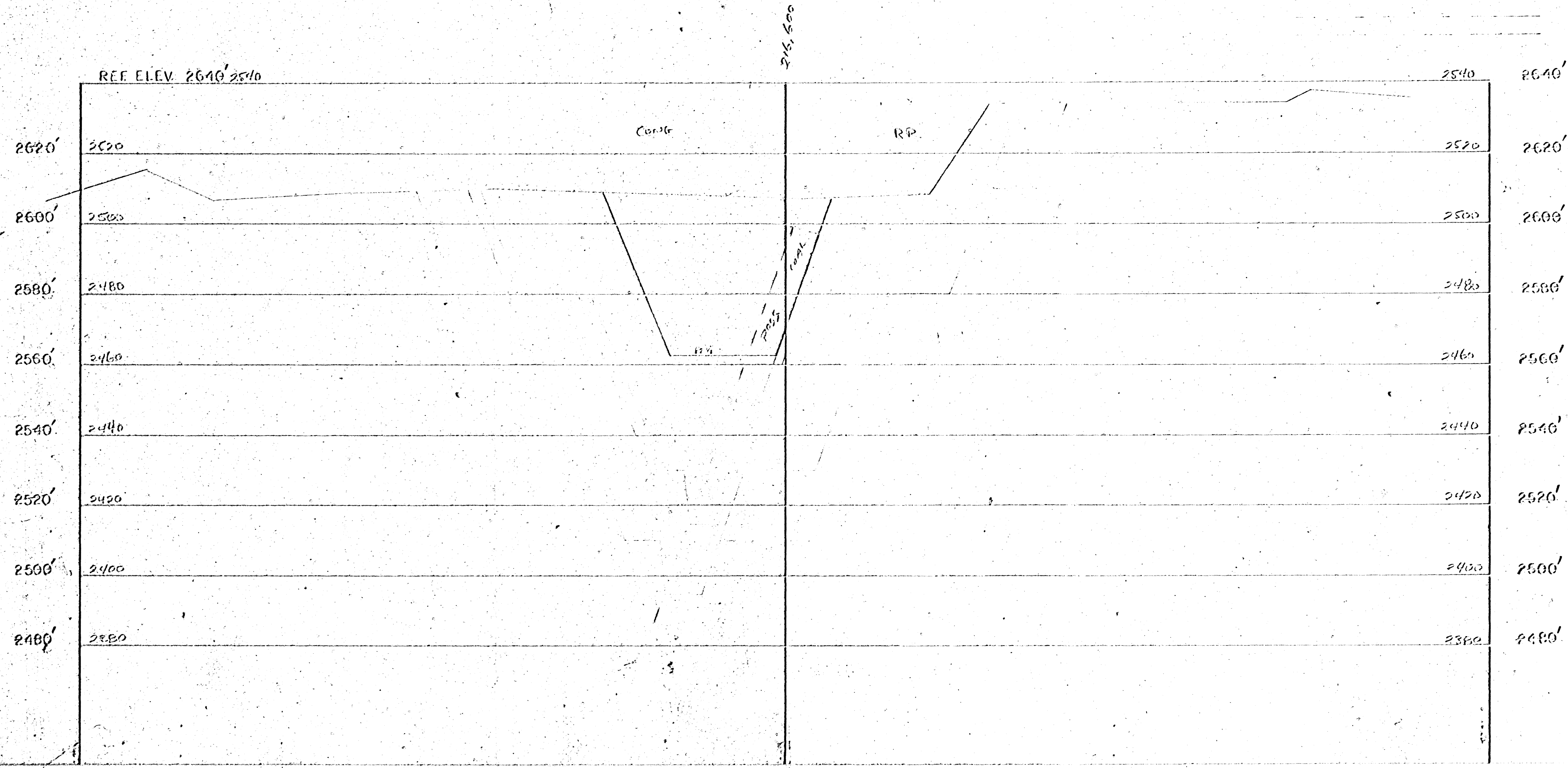
DATE	DRAWN BY	CHECKED BY
FEB 18 82	KW	



LEGEND

CARMACKS COAL PROJECT X-SECTION NO 614,530 N
1981 MINING PLAN scale: 1 inch = 20 feet

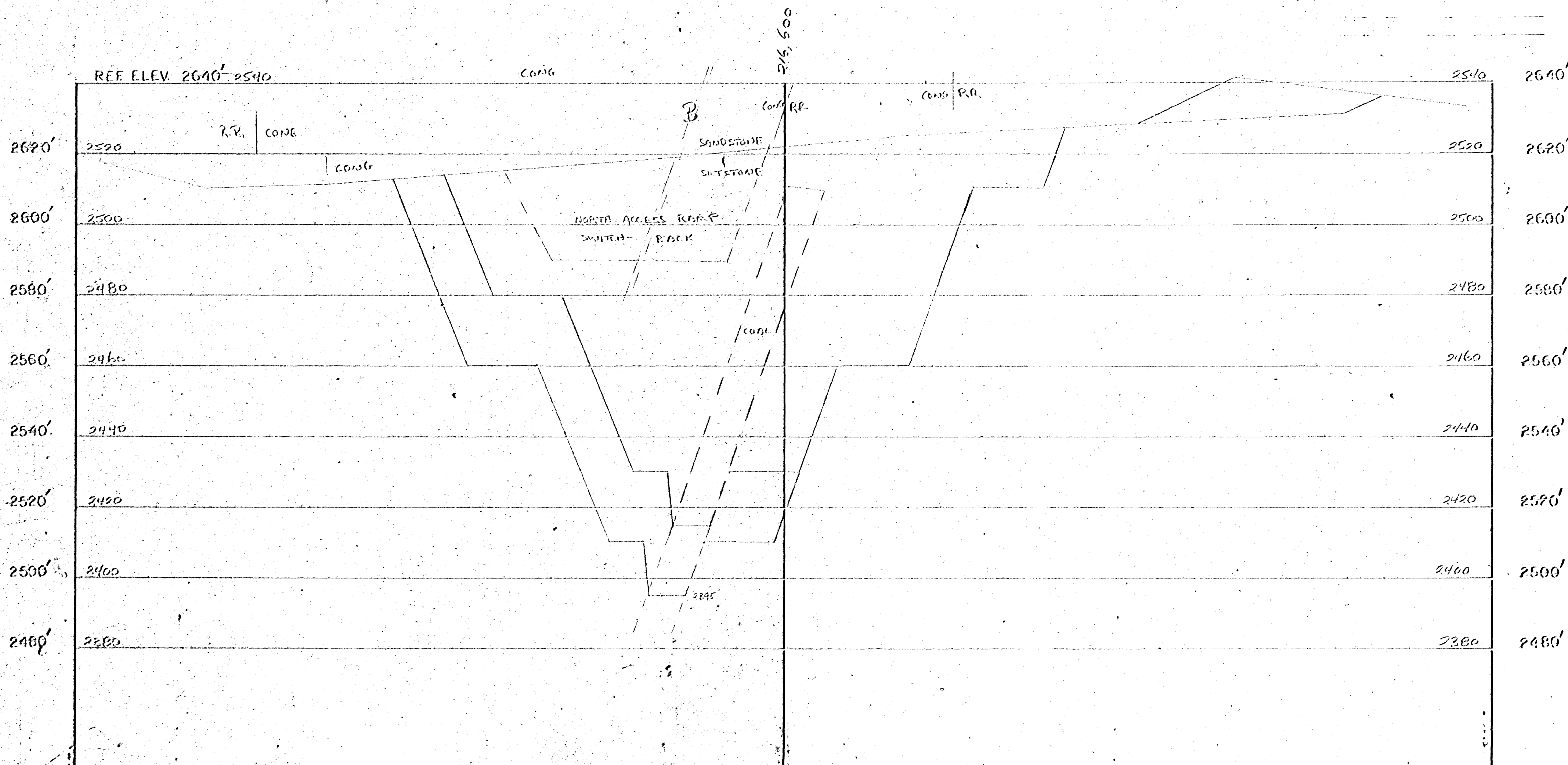
DATE: FEB. 12 '82
DRAWN BY: J. J. J.
CHECKED BY:



LEGEND

CARMACKS COAL PROJECT X-SECTION NO 614,600 N
1981 MINING PLAN scale: 1 inch = 20 feet

DATE FEB 18/82 DRAWN BY K.W. CHECKED BY



CARMACKS COAL PROJECT X-SECTION NO 614,650
1981 MINING PLAN scale: 1 inch = 20 feet

LEGEND

DATE	DRAWN BY	CHECKED BY
FEB. 12 / 87	Yos.	

