

Generalized Program of Geological Field Conference,
Anthracite Region
May 22-24, 1936

Note: Standard time is used throughout anthracite region.

Friday, May 22. Forenoon

Assemble at Chamber of Commerce, Scranton.

Register and receive envelope containing itinerary and descriptive literature.

Lunch at Chamber of Commerce, 12:00 M.

Those who arrive early may enjoy driving through Nay-Aug Park which includes the beautiful gorge of Roaring Brook. The Everhard Museum nearby contains some excellent collections.

Afternoon

Leave Chamber of Commerce at 12:45. Proceed to Marvine Colliery of Hudson Coal Co.

Portion of party go to Grassy Island Coal Mine of Hudson Coal Co. where some remarkable coal fossils in place can be seen. Go to Archbald Pothole.

Other portion go to Archbald Pothole. Go to Grassy Island Coal Mine.

Entire party goes to Baltimore Fire Cut Stripping, near Wilkes-Barre, passing by several coal operations and areas of subsidence. Tree stumps in place in sandstone overlying Mammoth (Baltimore) coal bed.

Proceed to Sterling Hotel, Wilkes-Barre.

Evening

Dinner at Hotel Sterling, 7:00 P.M.

Address by Eli T. Conner on "Anthracite, Past and Present... Future Problematic." Illustrated.

Saturday, May 23.

Leave Sterling Hotel, 8:00 A.M. sharp, each taking box lunch. First visit Red Ash fire south side of Wyoming Valley near Wilkes-Barre.

Return to Wilkes-Barre and follow itinerary along Susquehanna River to Berwick and thence to Hazleton.

Comfort stop at Mount Laurel Park, about 1 mile south of Hazleton.

Proceed to Audenried and thence according to itinerary to Mahanoy City, St. Nicholas Breaker, Shenandoah, Ashland, Frackville to Necho Allen Hotel, Pottsville.

Evening

Dinner, Necho Allen Hotel, 7:00 P.M.

Motion pictures: "Stolen Coal" by courtesy of Stevens Coal Co. "Mining of Anthracite" by courtesy of Philadelphia and Reading Coal and Iron Co.

Sunday, May 24.

Leave Necho Allen Hotel, 8:00 A.M. sharp. Drive to Tamaqua to study excellent contact of Mauch Chunk and Pottsville formations.

Proceed to Coaldale. Here part of party goes underground to see methods of coal mining; others go to Summit Hill strip-pings. Parties reverse. Later assemble in east part of Lansford.

At coaldale Mr. Charles H. Cunningham has promised to have samples of objects carved from anthracite coal.

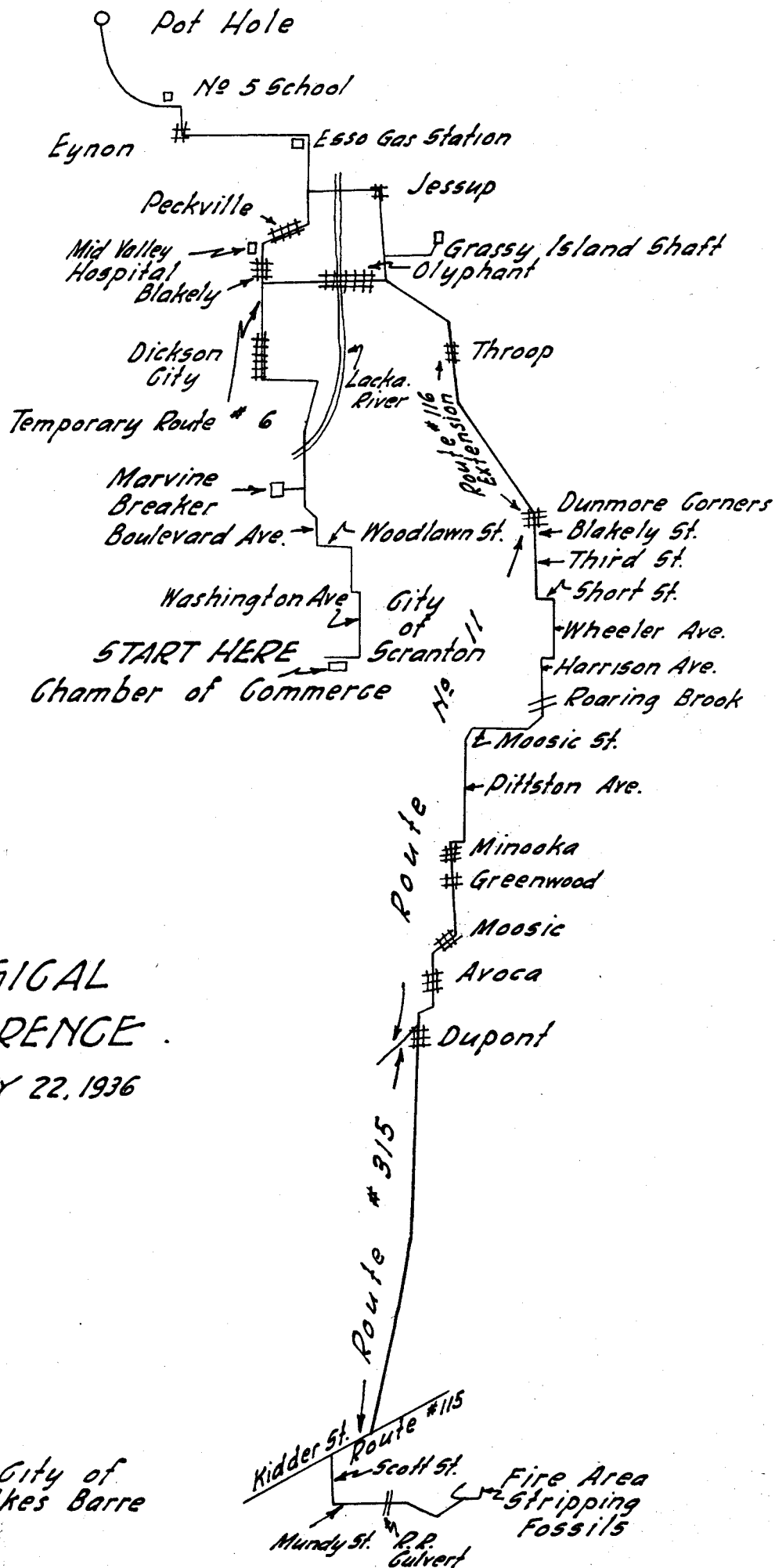
Proceed through Nesquehoning to proximity of Mauch Chunk to see occurrence of carnotite.

Disband. Au revoir.

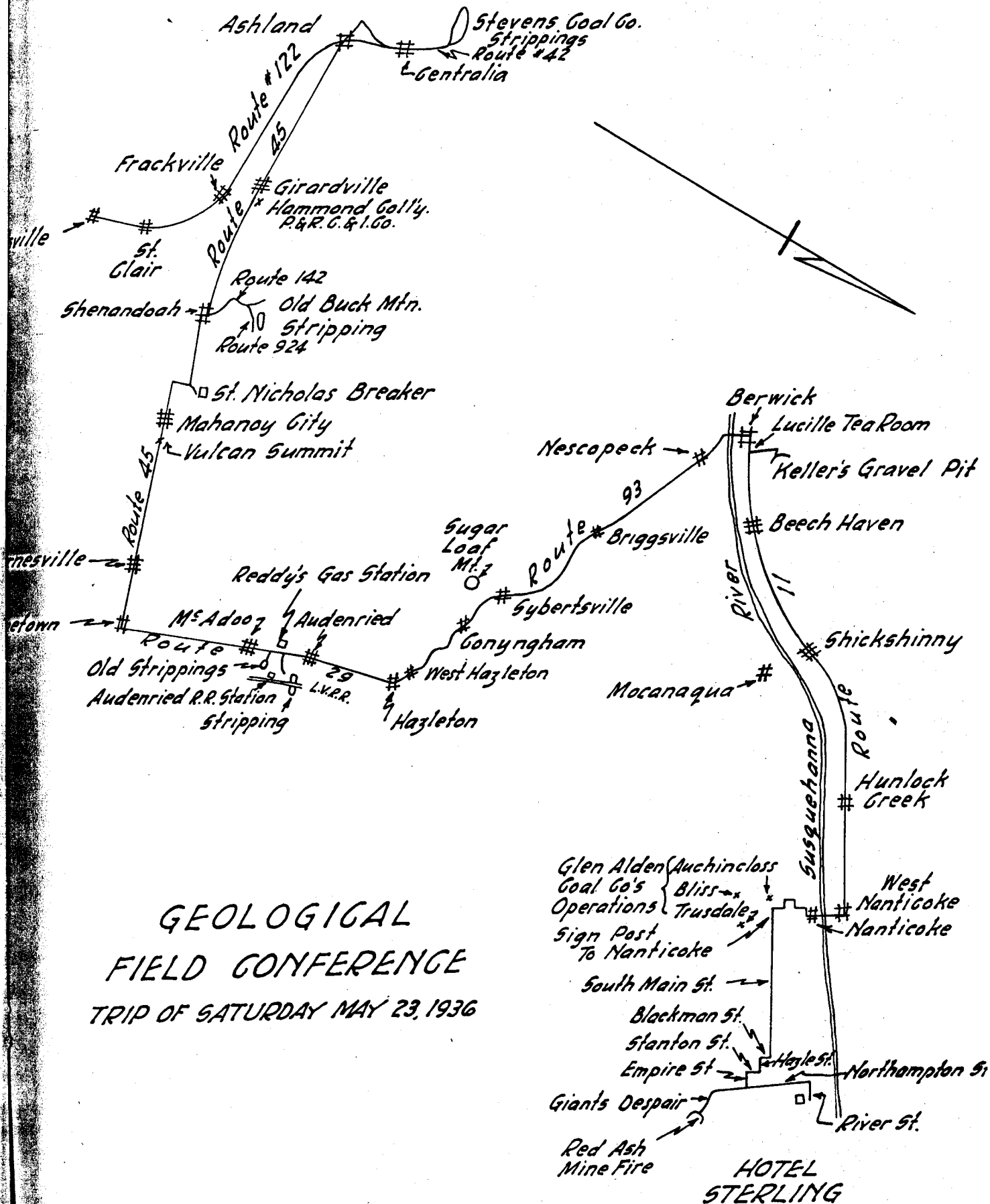
The route of the trip is included in the following topographic quadrangles of the U. S. Geological Survey. Copies can be purchased at 6 Cents each at registration desk.

Scranton quadrangle	
Pittston	"
Wilkes-Barre	"
Shickshinny	"
Hazleton	"
Mahanoy	"
Catawissa	"
Pottsville	"

Several operators have accepted our invitation to meet with us at the Sterling Hotel, Wilkes-Barre and the Necho Allen Hotel, Pottsville to informally discuss problems and answer questions concerning the anthracite regions and the anthracite industry.



GEOLOGICAL FIELD CONFERENCE TRIP OF FRIDAY MAY 22, 1936



**GEOLOGICAL
FIELD CONFERENCE
TRIP OF SATURDAY MAY 23, 1936**

I T I N E R A R Y

GEOLOGICAL INSPECTION OF ANTHRACITE FIELD

MAY 22ND & 23RD, 1936

Inspection of Marvine Breaker and Grassy Island Mine involves the handling of a large party on elevators and shaft cages. The party will be divided into two sections immediately after leaving Marvine Breaker; one section will proceed direct to the Archbald Pot Hole, and the other section direct to Grassy Island Shaft for the underground visit.

After both sections have completed inspection of both points of interest, the party will be united at the D. & H. Station in Olyphant. This station is located near Grassy Island Shaft. Those who visit Grassy Island Shaft first will then go to the Pot Hole, and return to the D. & H. Station to await completion of the underground trip by the other half of the party, before proceeding to Wilkes-Barre.

SCHEDULE

	<u>Approximate Time</u>
Lunch	12:00 M.
Leave Chamber of Commerce	12:45 P.M.
Arrive Marvine	12:55 P.M.
Leave Marvine	2:15 P.M.
Arrive Pot Hole	2:45 P.M.
Leave Pot Hole	3:15 P.M.
Arrive Grassy Island	3:55 P.M.
Leave Grassy Island	4:30 P.M.
Arrive Baltimore "Fire Cut"	5:15 P.M.
Leave Baltimore "Fire Cut"	6:00 P.M.

Miles

- Leave the Chamber of Commerce building on Mulberry Street, with speedometer set at "zero".
- Turn left onto Washington Avenue at traffic light at first corner. Proceed out Washington Avenue.
- 0.1 On right - Elks Club - Masonic Temple and Public Library.
- 0.2 On right - Central High School.
- 0.6 One square to left are the International Correspondence School buildings.
- 0.8 On right - Scranton Electric Company's city plant.
- 1.0 On left - Lackawanna County prison.
- 1.2 Incline to left and go straight ahead on Washington Avenue.
- 1.3 Cross Green-Ridge Street (Lackawanna Trail). Watch "STOP" sign.

Miles	
1.6	Traffic light at Electric Street. Go straight ahead.
1.7	On right - Pennsylvania Oral School for mute children.
1.9	Turn left to Woodlawn Street - grass plot in center.
2.2	Turn right to Boulevard Avenue.
2.4	Turn left and follow Boulevard Avenue along Lackawanna River.
2.7	On left - Richmond Shaft of The Scranton Coal Company. Marvine Colliery straight ahead.
2.9	Turn left into Marvine Breaker. Be careful at railroad crossing ahead. Park automobiles on left and proceed through breaker. After inspecting breaker, return to automobiles and proceed back to main highway. Be careful at railroad crossing.
3.1	Turn left.
3.2	Price-Pancoast Colliery ahead to right. On April 7, 1911, due to a mine fire, 72 men were suffocated in this mine.
3.4	Throop Borough.
3.7	Cross Lackawanna River into Dickson City.
4.0	Turn left at traffic light.
4.2	Cross D. & H. Railroad and under N. Y. O. & W. Railroad tracks.
4.3	Turn right at traffic light. Follow trolley tracks on temporary route #6.
4.7	Dickson City corners.
4.9	Johnson Colliery of The Penn Anthracite Mining Company.
5.3	Ahead to the right are the Olyphant and Eddy Creek Collieries of The Hudson Coal Company.

Note:

- (a) Those autos going to the Pot Hole first, go straight through on temporary Route #6.
- (b) Those autos going to Grassy Island Mine of The Hudson Coal Company first, turn right at traffic light at Blakely Corners 0.6 miles ahead. See page 3.

TO POT HOLE: (Before going to Grassy Island)

5.9	Blakely Corner (Olyphant Borough to right), traffic light. Go straight ahead.
6.4	End of trolley track.
6.9	On left - Mid-Valley Hospital. Keep to right on asphalt pave. Follow temporary Route #6.
7.6	Peckville Borough.
8.5	On right - Scranton Electric Company sub-station.
8.9	Winton Borough.
9.4	Turn left to concrete highway at Esso gas station.
10.6	End of concrete highway - Eynon Borough. Go straight ahead.
10.8	Turn right toward School #5.
10.9	Turn left at school. Keep straight ahead, leaving paved road.
11.0	Follow narrow gauge track, leaving paved road.
11.2	Turn right from narrow gauge track and follow road.
11.7	Park here and walk short distance to Pot Hole on right. Return by same road.

Miles

- 12.6 Turn right at School #5.
12.7 Turn left.
12.8 Go straight ahead on concrete highway.
13.7 Gravity Slope Colliery of The Hudson Coal Company straight ahead in the distance.
14.0 Turn right at Esso gas station. Watch "STOP" sign.
15.2 Turn left (Be careful - railroad crossing) and cross O. & W. Railroad and bridge into Jessup Borough.
15.3 Keep to right on asphalt pave.
15.7 Go under D. & H. railroad.
16.7 Grassy Island Shaft to left.
16.8 Cross D. & H. Railroad tracks.
16.9 Go straight ahead along D. & H. Railroad tracks.
17.2 Turn left and go across D. & H. Railroad tracks.
Go straight ahead over narrow gauge track.
17.3 Turn left.
Drive around scale house on right side.
17.4 Park along road and walk up hill to Grassy Island Shaft.
Here you will descend on mine carriage to view fossils in roof and ribs of mine workings.
After ascending to the surface, return to autos and proceed back on the same road.
17.7 Cross D. & H. Railroad tracks, turn left and wait for the other group of cars to come from the Pot Hole. Then proceed along D. & H. tracks.

Note: From this point on start reading at 17.5 of the itinerary.

TO GRASSY ISLAND To synchronize, turn back your speedometer 0.2 mile.

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TO GRASSY ISLAND (Before going to the Pot Hole)

- 5.9 Turn right at traffic light Blakely Corners.
6.0 Cross O. & W. Railroad tracks and Lackawanna River into Olyphant Borough. Go straight ahead.
6.2 Incline to right.
Ahead turn left around flag pole, and go up along D. & H. Railroad tracks.
6.3 Turn right and cross D. & H. Railroad tracks.
Go straight ahead over narrow gauge track.
6.4 Turn left.
Drive around scale house on right side.
6.5 Park along road and walk up hill to Grassy Island Shaft.
Here you will descend on mine carriage to view fossils in roof and ribs of mine workings.
After ascending to the surface, return to autos and proceed back on the same road.
6.8 Cross D. & H. Railroad tracks, turn right, and proceed along D. & H. tracks.

Note:

On your return from the Pot Hole you will meet the other group of autos near this railroad crossing.

- 7.2 Cross D. & H. Railroad tracks.
- 8.3 Go under D. & H. Railroad tracks into Jessup Borough. Go straight ahead.
- 8.4 Keep to the left.
- 8.5 Cross Lackawanna River (Be Careful - railroad crossing) and O. & W. Railroad tracks and turn right on temporary Route #6.
- 8.8 On right - Scranton Electric Company Sub-Station.
- 9.2 Winton Borough.
- 9.7 Turn left to concrete highway at Esso gas station.
- 10.9 End of concrete highway - Eynon Borough.
Go straight ahead.
- 11.1 Turn right toward School #5.
- 11.2 Turn left at school.
- 11.3 Follow narrow gauge track.
- 11.5 Turn right from narrow gauge track and follow road.
- 12.0 Park here and walk short distance to Pot Hole on right.
Return by same road.
- 12.9 Turn right at School #5.
- 13.0 Turn left.
- 13.1 Go straight ahead on concrete highway.
- 14.0 Gravity Slope Colliery of The Hudson Coal Company straight ahead in the distance.
- 14.3 Turn right at Esso gas station. Watch "STOP" sign.
- 15.5 Turn left (Be careful - railroad crossing) and cross O. & W. Railroad and bridge into Jessup Borough.
- 15.6 Keep to right on asphalt pave.
- 16.0 Go under D. & H. Railroad.
- 17.0 Grassy Island Shaft to left.
- 17.1 Cross D. & H. Railroad tracks.
- 17.2 Go straight ahead along D. & H. Railroad tracks.
- 17.5 On left - Olyphant Station.
Meet other group of autos here. Then proceed along D. & H. tracks.

Note:

From this point the itinerary of the group going to the Pot Hole first will be 0.2 mile less.

- 17.6 Keep to the right around flag pole.
- 17.7 Then turn left and cross D. & H. railroad tracks.
Follow trolley track.
- 18.1 On right - Olyphant Shaft of The Hudson Coal Company.
- 18.2 Ahead in the distance is the Underwood Colliery of The Pittston Co.
- 18.4 Throop Borough.
- 19.0 Turn right at school.
- 19.1 Turn left and go straight ahead.
- 20.2 Pass under the transmission line of The Hudson Coal Company.
- 20.3 On left - No. 1 Colliery of The Pittston Company.

Miles

20.7 Dunmore Borough.
21.4 Dunmore Corners. Go straight ahead.
21.9 Turn left at overhead railroad tracks and follow route #11.
22.1 Turn right.
22.2 Cross Erie Railroad tracks.
22.7 Turn right and follow route #11.
22.8 Turn left onto Harrison Avenue and go straight through.
23.5 Cross Harrison Avenue bridge.
(D. L. & W. Railroad and Laurel Line (3rd rail) tracks beneath).
23.6 Turn right at traffic light.
Follow route #11 on Moosic Street.
24.1 Turn left at end of bridge and follow route #11 on Pittston Avenue.
25.0 Right in distance - Baker Colliery of The Glen Alden Coal Company.
25.8 Top of hill.
25.9 Watch houses and streets for mine settlement.
26.1 Turn right and go one block.
26.2 Turn left.
26.25 Scranton City Line - Entering Minooka.
26.5 On right in distance - Concrete Breaker of the Taylor Colliery of the
Glen Alden Coal Company.
27.4 On right in distance - Taylor Borough.
28.6 On right in distance - Old Forge Borough.
29.1 Railroad crossing.
29.3 Railroad crossing at foot of hill - Moosic Borough.
29.9 Duryea Borough.
30.0 Bridge over Erie Railroad tracks.
30.3 Avoca Borough.
31.5 Laurel Line (3rd rail) tracks overhead.
D. & H. and Lehigh Valley Railroad tracks to right.
Keep left on Route #315.
Dupont Borough.
31.8 Turn right on Route #315.
33.1 Note mine settlements.
34.6 Pass over Lehigh Valley Railroad tracks.
36.8 On right - The Hudson Coal Company strippings.
37.2 Ahead to the right - City of Wilkes-Barre.
38.1 Note Pottsville conglomerate on distant mountain.
39.5 Junction of highways.
Turn right. Watch "STOP" sign.
39.7 On left - finished stripping.
40.2 Bridge over railroad siding.
40.3 Turn left at foot of hill and follow trolley track.
40.5 East end of Wilkes-Barre.
40.7 Turn left on Mundy Street.
40.9 Go through culvert under railroad tracks.
41.0 Pass over narrow gauge track and park.
Walk ahead to strippings to view fossils.

After returning to autos, go through culvert again, up Mundy Street,
and turn left onto Scott Street. Follow trolley track into Wilkes-Barre.

SCHEDULE FOR SATURDAY, MAY 23RD

Miles

- Leave Hotel Sterling, Wilkes-Barre, Pa., with speedometer at "zero" and proceed South on River Street, one block.
- 0.2 Turn left into Northampton Street and proceed straight ahead.
- 0.7 Cross Pennsylvania and Central R. R. of N. J. tracks at grade.
- 1.1 Proceed straight ahead.
- 1.3 Note steam on mountain in distance ahead of you. This is the Red Ash Mine Fire which you are to visit.
- 1.4 On right - Empire Shops of the Glen Alden Coal Co.
- 2.2 Cross C. R. R. of N. J. tracks at grade.
- 2.7 Note steam on either side of road. This is the Red Ash Mine Fire. Proceed ahead 0.5 mile.
- 3.2 Turn left through stone pillars and continue ahead on lane. Get out of autos and view Red Ash Mine Fire from top of Pottsville conglomerate rocks. Note the glacial markings on the conglomerate rocks near the stone pillars.

The Red Ash Mine Fire originated in the Red Ash Bed about 2000 feet inside of the main slope, about 150 feet below the surface, and was discovered by a miner reporting for work on Monday morning, December 6, 1915.

The actual cause of the fire is unknown. At its peak the fire spread at the rate of 200 to 300 feet per month, which necessitated the drilling of 257 bore holes in order to establish a silt barrier in the mines and prevent the fire from spreading into adjoining properties. The fire is still slowly spreading in a Southerly and Westerly direction.

- 3.5 Turn autos and return by same road. Note the red shale on the left. Continue down the hill and return via Northampton Street.
- 4.3 Cross C. R. R. of N. J. tracks (same as at 2.2). Follow trolley tracks.
- 5.0 Cross D. L. & W. tracks.
- 5.2 Turn left on Empire Street - asphalt pave. Glen Alden Coal Company's shops on left.
- 5.8 On left Stanton Shaft, Glen Alden Coal Co.
- 6.3 Turn left into Hazle Street - traffic light - Ashley Borough.
- 6.6 Turn right onto brick pave - Blackman Street.
- 7.3 To the right and ahead are the Vulcan Iron Works' buildings.
- 7.35 Turn left into South Main Street. Proceed straight ahead.
- 8.4 Traffic light. On left St. Mary's Cemetery.
- 9.2 On right - Wyoming Valley Country Club.

Miles

- 10.9 Cross trolley track. Continue straight ahead.
This is Hanover Township, reputed to be one of the wealthiest townships in the United States, due to the vast deposits of anthracite coal, which is over 70 ft. thick.
- 11.3 To the left in the distance is Truesdale Colliery of the Glen Alden Coal Co.
Some years ago the company built concrete houses for its employes; the village was known as the Concrete City.
- 11.6 Cross D. L. & W. R. R. branch.
- 12.4 To the left in the distance is Bliss Colliery of the Glen Alden Coal Co.
- 13.2 Turn right to Nanticoke at sign directing to Nanticoke.
- 13.3 On left - Auchincloss Colliery of the Glen Alden Coal Co.
- 13.65 Turn left and follow trolley track.
- 13.7 Turn right onto S. Market Street.
- 14.1 Turn right and go one (1) block.
- 14.15 Turn left.
- 14.4 Traffic light - Go straight ahead.
- 14.6 Turn right.
- 14.65 Turn left.
- 14.9 Cross tracks of Pennsylvania Railroad - Wilkes-Barre to Sunbury Branch.
- 15.2 Enter bridge crossing North Branch of the Susquehanna River.
- 15.4 Turn left at other end of bridge onto Route #11. Watch "STOP" sign.
- 15.5 Short stop for photographing; otherwise do not leave autos.
To the left across the river on the Nanticoke side is the North side of the coal basin. Pottsville conglomerate forms the top of the ridge.
The river and highway continue westward in the valley of Mauch Chunk shales with Pottsville conglomerate capping ridge on opposite side of river. In places, the highway is on Pocono sandstone. Note the well developed high level river terrace. This terrace and others are observed all the way to Berwick, a distance of 20 miles.
- 16.6 On the left are the tracks of the D. L. & W. R. R., Bloomsburg Branch.
The highway here is built on fill in the old Pennsylvania Canal.
- 19.1 Hunlock Creek. Follow Route #11.
- 19.4 On left is generating plant of the Luzerne County Gas & Electric Co.
- 20.2 Across the river is Retreat, Luzerne County home for the aged and feeble minded.
- 21.5 On the left are barns and farm of the Luzerne County home.
- 24.5 Shickshinny.
River and highway turn Southward and cut across strike of strata. Main area of coal measures ends here, although there are a few small synclines containing coal lying at higher levels to the West of the town. These constitute the most westerly coal measures rocks of the Northern Coal Field.
- 25.4 Across the concrete bridge on left is the West End Coal Company at Mocanaqua.
Stop. Do not get out of autos except to take photographs. Look eastward and observe North side and center of Western end of main coal basin.

Miles

- Pottsville strata can be seen dipping Southward with almost horizontal coal measures sandstones in center.
- 26.0 Stop by houses on right side of road. Do not get out of autos except to take photographs. Look across river and observe Northward dipping Pottsville conglomerate forming ridge with valley developed in underlying Mauch Chunk red shales. High ridge farther South is composed of Pocono and older sandstones and shales.
- 28.6 Stop 15 minutes. Road cut about 12 feet deep in stratified terrace gravels showing steeply dipping beds and syncline on left side of road. Terraces continue toward Berwick.
- 30.5 On left across river is Kapwallopen.
- 32.7 Beech Haven. Note small exposure of Hamilton shales.
- 34.7 Entering Berwick. One of the plants of the American Car & Foundry Company is located here. It was also the home of former Secy. of the Treasury, W. H. Woodin.
- 35.2 Turn right at sign (green & white) of Lucille Tea Room. (DO NOT TURN AT LARGE LUCILLE TEA ROOM SIGN LOCATED ALONG HIGHWAY-EAST OF HOUSES -- GO TO SECOND SIGN). Go past two schools.
- 35.45 Turn right and proceed to Keller's gravel pit straight ahead. Stop 20 minutes and return to main highway.
- 36.0 Turn right onto main highway again.
- 36.25 Passing from Luzerne County to Columbia County.
- 36.6 Turn left at first traffic light.
- 36.7 Enter bridge over D. L. & W. R. R. tracks and Susquehanna River.
- 37.0 Nescopeck. Go straight ahead on Route #93.
- 37.9 Cross Pennsylvania R. R. tracks, Wilkes-Barre to Sunbury Branch. From here to Briggsville (43.0) you cross 4 or 5 well-developed terraces, the upper one considerably dissected. The underlying formations form the South side of an anticline and are in succession, Hamilton, Marcellus, Genesee and Catskill, with few or no exposures.
- 43.0 Briggsville. Begin ascent of Nescopeck Mountain composed of Catskill sandstone on North flank with Pocono sandstone at crest and on South slope.
- 45.9 Entering Conyngham Valley cut in Mauch Chunk shales and confined between Nescopeck Mt. (Pocono sandstone) on North and Buck Mt. (Pottsville conglomerate) on South.
- 46.3 Cross Big Nescopeck Creek. Drive slowly and note limonite coating on stones caused by oxidation of ferrous sulphate-bearing mine waters. Water bitter to taste.
- 47.3 Sybertsville. Pass through to entrance to Conyngham (48.0). Stop, but do not leave autos except to take photographs. Observe Sugar Loaf Mountain to right, capped with detached block of Pottsville conglomerate. Thin coal bed in mountain. Leave Shickshinny Quadrangle and enter Mahanoy Quadrangle.
- 49.3 Turn right and start up Buck Mountain which is held up by Pottsville conglomerate.
- 52.1 Enter Black Creek Basin, most northerly coal basin of Eastern Middle Coal Fields.

Miles

- 53.2 Leave Mahanoy Quadrangle and enter Hazleton Quadrangle.
- 53.5 Turn left at the Miners' Bank.
- 54.6 On left Altamont Hotel, Hazleton. Probably stop for a few minutes.
Proceed South on Route #29.
- 55.5 On right, Hazleton Brick Co., which makes high grade building brick from red shale (Coal Measures).
- 57.7 Turn left at Reddy's Tydol service station.
Drive 0.5 mile to L. V. R. R. at old Beaver Brook office. Park autos 20 minutes. See syncline of Mammoth Bed in stripping on either side of Railroad. South limbs pinched to about $2\frac{1}{2}$ feet.
Return by same road to Route #29.
- 58.6 Turn left onto Route #29 and proceed one block.
- 58.7 Turn left at Church and proceed East to Audenried Station of L. V. R.R.
- 58.9 Keep left and pass old steam locomotives.
- 59.1 Park at station and observe small syncline of Mammoth Bed in stripping below station.
Return same road to Route #29.
- 59.5 Turn left onto Route #29.
- 60.1 McAdoo Borough.
- 61.0 Cross bridge over L. V. R. R. - elevation 1836 feet.
- 63.4 Pass under L. V. R. R. tracks.
- 66.9 Hometown. Turn right on Route #45 passing over Mauch Chunk shale.
Leave Hazleton Quadrangle and enter Mahanoy Quadrangle.
- 69.1 Barnesville.
- 70.6 E. Mahanoy Jct. of Phila. & Reading R. R.
- 71.0 Turn left over P. & R. R. R. tracks.
- 73.9 Approaching Vulcan Summit, Broad Mountain.
Leave Mauch Chunk shale and pass on Pottsville conglomerate. Enter Mahanoy coal basin.
- 74.2 Vulcan Summit. Elevation 1600 feet.
- 74.8 Note bootleg operations near highway.
- 75.4 Mahanoy City.
- 75.5 Turn right for one block.
- 75.6 Turn left and follow Route #45.
- 77.1 Pass under Railroad.
- 78.4 Turn right at far end of bridge into Route #45 and stop at St. Nicholas Breaker. One-half hour to pass through breaker.
Return to Route #45, turn right and proceed to Shenandoah.
- 78.8 Enter Shenandoah. Go straight ahead.
- 80.7 Turn right at traffic light onto Route #142.
- 81.1 Turn right onto Route #924.
- 82.4 Turn left off highway. Stop a few minutes to view abandoned strippings of small syncline of Buck Mt. coal bed, lowest workable bed in region, on top of North Mahanoy Mountain.
Return to Shenandoah on routes #924 and #142.
- 84.0 Turn left onto Route #142.
- 85.4 Turn right onto Route #45. Ferguson Hotel on opposite corner.
Leave Mahanoy Quadrangle and enter Catawissa Quadrangle.
- 86.0 Cross bridge over railroad and follow Route #45.
- 86.5 Cross P. & R. R. R. tracks.

Miles

88.3 Turn right and go across small bridge.
89.6 On right - Hammond Colliery of P. & R. C. & I. Co.
90.3 Girardville. Follow Route #45.
92.7 Go under railroad.
93.3 Ashland. If time permits, a visit will be made to the large stripping operation of the Stevens Coal Co., where the Mammoth drag lines of Carey, Baxter & Kennedy are in operation.
If Stevens Coal Company stripping is not visited, turn left into Route #122 as you enter Ashland and go to Necho-Allen Hotel, Pottsville, on Route #122.
This turn is at 99.4 miles.
Proceed through Ashland. Watch for sign to Centralia at narrow street on right side.
94.2 Turn right onto Route #122.
94.7 Pass from Schuylkill County to Columbia County.
95.6 Centralia.
95.9 Proceed ahead on Route #42 and cross railroad.
96.1 Turn left.
96.2 Go straight ahead to stripping and park autos.
This is Stevens Coal Company stripping.
Return on same road.
96.4 Turn right on Route #42.
96.5 Go straight ahead on Route #122.
98.6 Cross bridge over P. & R. R. tracks and turn left into Centre St., Ashland.
99.4 Turn right on Route #122.
99.7 Cross P. & R. R. tracks and follow Route #122.
100.5 On right - Fountain Springs State Hospital.
100.9 Turn left on Route #122.
105.3 On left - Sub-station of Pennsylvania Power & Light Co.
105.8 Frackville.
106.3 Turn right on Route #122. Leave Mahanoy Quadrangle and enter Pottsville Quadrangle.
111.1 St. Clair.
112.2 Turn right on Route #122.
113.6 Pottsville. Keep on Route #122.
114.3 Turn left on Route #122 into Centre St. and proceed South.
114.8 Necho-Allen Hotel on right - Destination.

Itinerary - Sunday, May 24

Leave Necho Allen Hotel, Pottsville, 8:00 A.M.

Go south on Route 120

Turn left at traffic light on Route 209 for Tamaqua.

Enter Tamaqua

Turn right (south), after crossing R.R. on Route 29.

Drive along Schuylkill River crossing outcrops of Pottsville and Mauch Chunk formations.

Turn around at Shellhamer's Swimming Pool.

Retrace route. Stop and observe contact of Pottsville and Mauch Chunk formations exposed along railroad track.

Return to Tamaqua.

Turn right for Coaldale, Route 209.

Proceed to Coaldale under direction of Lehigh Navigation Coal Co. guides.

Party will split at Coaldale, one part going through mine, the other going to Summit Hill Fire Stripping.

Parties will then be reversed.

Meet at east end of Lansford.

Proceed by Route 209 through Nesquehoning to outskirts of Mauch Chunk.

Examine Carnotite in Pottsville Conglomerate.

Disband.

GENERAL FACTS CONCERNING THE ANTHRACITE REGIONS AND THE ANTHRACITE INDUSTRY

Most of the material that follows is taken from a report of the Topographic and Geologic Survey of Pennsylvania entitled "Anthracite Losses and Reserves in Pennsylvania" by Dever C. Ashmead (1925).

Geography

"The anthracite fields lie in the northeastern part of Pennsylvania, and were divided by the Pennsylvania Second Geological Survey into four regions, as follows: (1) The Northern Field, consisting of the Wyoming and Lackawanna Valleys in Luzerne and Lackawanna counties; (2) the Eastern Middle Field in the southern part of Luzerne and northern part of Schuylkill and western part of Carbon counties; (3) the Western Middle Field in Schuylkill, Columbia, and Northumberland counties; and (4) the Southern Field in Carbon, Schuylkill, and Dauphin counties.

Geology

"Northern Field. The Northern Field is approximately 55 miles long and is 5 miles wide at its widest point; it contains 176 square miles. The coal beds lie comparatively flat, particularly in the northeastern part of the field. Here also they are near the surface, and pitch steeply only along the outcrops and near local faults. In this northeastern part of the field the average thickness of the beds is 4.88 feet, and the average depth of workings is 268 feet. In the middle section of the Northern Field, in the vicinity of Pittston and Wilkes-Barre, the average thickness increases to 5.9 feet, and the depth to 399 feet; and in the southwestern portion of the field the thickness reaches 6.83 feet and the depth 567 feet.

"Beginning near Pittston, and generally following the bed of Susquehanna River to the city of Nanticoke, and then passing down the middle of the Northern Field to its western end, lies what is known as the "Buried Valley" of the Susquehanna River. Here the river once made a gorge 100 to 300 feet deeper than the present river bed, and during the glacial period this gorge was filled with glacial drift. As this drift is water-bearing, considerable care has to be taken in mining the coal beds beneath it. Enough rock cover must be left so that there will be no danger of the mine workings breaking through into the gravel filling of the Buried Valley or into potholes. If a break-through should occur, there would be great danger of losing all the underground workings by flooding. This means that the recovery of coal is limited by the support necessary to prevent any breakage of the overlying rocks that would permit the inflow of water and quicksand from the Buried Valley.

"Eastern Middle Field. The geologic structure of the Eastern Middle Field is entirely different from that of the Northern Field; it consists of a number of parallel canoe-shaped troughs. As is implied from the term "canoe-shaped", the basins are long and narrow, and the sides pitch steeply. The beds of coal are much thicker, as

is shown by the average of 8.1 feet, but they lie at less depth, the average being only about 347 feet. The Eastern Middle Field contains only about 33 square miles of territory.

"Western Middle Field. A basin about 33 miles long and about 5 miles wide at its widest point extends from a point in the vicinity of Delano to the little town of Trevorton at the extreme western end. This basin, known as the Western Middle Field, contains about 94 square miles. In cross-section it resembles two letters UU joined together at a central point, lower than the two sides. This gives practically all conditions of mining from level at the bottom of the U's to vertical along the sides. The beds of coal in this district average 6.5 feet in thickness, and the average depth of workings is 460 feet.

"Southern Field. The Southern Field extends from the town of Mauch Chunk nearly 70 miles southwest to Lykens and Dauphin at the two ends of the "fish tail". Practically no mining has been undertaken in a great many years in the point of the field extending in the direction of Dauphin. A cross-section of this field shows very steeply pitching sides, and the rocks between the sides badly faulted and displaced. Warping of the earth's crust in this field greatly contorted the rocks in places, and coal was pulverized by the roof and the floor of a bed moving in opposite directions. In other places the movement and pressure were not so great, and the coal merely runs when it is mined; in still other places the coal is solid. However, along what is known as Sharp Mountain, which borders the southern edge of the field, the percentage of prepared sizes is extremely small, owing to the effect of geological movements. Unfortunately, no data are at hand to show the general thickness of the beds and depth of workings; but generally speaking, the beds in this field lie deeper and are thicker than beds in any of the other fields. This field is the largest of the four, and covers 181 square miles."

Stratigraphy and Lithology

The formations represented in and near the anthracite coal basins are the Pocono sandstone and Mauch Chunk shales of the Mississippian and the Pottsville Conglomerate and Coal Measures of the Pennsylvanian.

On the trip little attention will be paid to the Pocono formation. It consists mainly of gray sandstones although shales are common. In places there are thin lenses of coal. It is about 1100 feet in thickness.

The Mauch Chunk shales are seen in many places on the trip. They are prevaillingly red. Sandstone layers are present. The total thickness is about 2000 feet.

The Pottsville Conglomerate appears conspicuously on the borders of the anthracite basins. Milky white quartz pebbles up to an inch in diameter are present in many beds. Shale and some coal also constitute part of the formation. In the Western Middle and Southern fields several coal beds are sufficiently thick to be workable.

The Coal Measures contain most of the coal. Shales comprise the bulk of the series although sandstones and conglomerates are also common. Some of the sandstones are characterized by an abundance of muscovite flakes. The maximum thickness of Coal Measures strata is about 2000 feet.

There is every gradation between shale and coal. If the percentage of fixed carbon is below 40, the material is designated as "slate". A percentage between 40 and 60 is "bone" and more than 60 is "coal." Of course the percentage of carbon of the lower grades of coal is greatly increased in the cleaning process.

Structure

The coal is mainly found in synclinal valleys bounded by outcrops of resistant Pottsville Conglomerate. Within the major synclines there are many minor folds and a great many thrust faults. The south side of the synclines usually have the steepest dips and the thrusts carry strata to the north. These facts furnish evidence of the movement having come from the south. In many mines the folds and faults are extremely complex.

Mining Methods

"The physical condition of the beds, as just outlined, determines to a large extent the method of mining which must be employed for the recovery of coal. Where beds are flat, a room-and-pillar method can be used, similar to that employed in the bituminous coal fields. Where roof conditions permit, long-wall mining can be undertaken. Where the coal does not have much cover it is possible to remove the surface and mine the coal with power shovels. This kind of mining is known as "stripping." Where the beds pitch steeply, the breast system of mining is employed almost exclusively. The present method of breast mining is to drive a gangway in the rock below the coal, drive a rock-chute from the gangway to the bottom of the coal, connect rock-chutes with headings in the coal for the circulation of air, and then, on 50 to 60-foot centers, drive breasts up the pitch, making the breast 18 to 24 feet wide. Timbers are so placed along the sides of the breast as they are driven up that the coal as it is mined falls between the two rows of timbers, and is held from running out the mouth of the breast by a battery. As fast as coal is shot down, coal is drawn from the bottom of the breast through chutes to maintain just enough head-room between the top of the loose coal and the face of the breast to permit the men to work. The spaces between the timbering of the breast and the ribs of the pillars are used for the circulation of air to the face; also as manways for the men to pass to and from their work.

"As the anthracite region contains a large number (12 to 26) of superimposed coal beds, care must be taken so that the mining of a lower bed does not destroy the value of an upper bed. In general, the practice is first to mine both beds, and then postpone the second mining of the lower bed until the upper bed has been mined out. The pillars are columnated as far as possible, so that undue stresses will not be brought upon the lower bed and start squeezes that will cause loss in recovery. However, where the superimposed coal beds are

widely separated, in many places in the anthracite region it has been possible to complete the first and second mining of a lower bed without appreciably affecting the upper bed; but where the beds are close together, it is not possible to do this.

"The character of the roof also determines the method of mining a lower bed. A soft roof, and one that breaks easily, probably means that second mining cannot be done in the underlying part of the lower bed until the upper bed is completely exhausted.

"Character of roof and floor. Naturally, the kind of rock immediately above or below the coal bed has a considerable influence upon the system of mining. A hard sandstone roof permits a much wider chamber or breast than if the rock is a fire clay, soft shale, or slate. The possibility of mining by the longwall system depends also on the character of the roof.

"Faults. In some places the coal has been broken and displaced by faults, crushed by pressure and movement or removed by erosion. Such areas complicate the mining of the coal and increase the cost by necessity of driving through them to reach good coal lying beyond."

"Where the coal lies under a river, enough pillars must be left so that there will be no danger of breaks in the top rock permitting the river to enter the mine. These pillars left to support the river must be considered as an unavoidable loss, for they cannot be recovered."

Water pumped from Pennsylvania anthracite mines in 1921.

Field	Northern	Eastern Middle	Western Middle	Southern
Number of pumps..	460	111	213	108
Capacity, gallons per minute	336,362	113,116	126,258	80,443
Gallons raised...	116,945,000,000	18,524,000,000	34,327,000,000	26,349,000,000
Tons raised.....	435,000,000	67,900,000	127,300,000	90,000,000
Distance raised, feet	395	451	516	650
Foot tons.....	171,825,000,000	30,442,900,000	65,686,800,000	58,500,000,000
Tons of water raised per ton coal	10.8	11.5	12.7	9.2

During the month of March, 1936, due to the accumulation of melting winter snows and warm rains, the pumping of one Anthracite coal company amounted to $4\frac{1}{2}$ billion gallons, or equivalent to 101,000 gallons per minute. This is equivalent to one square mile of water, 22 feet deep.

Some idea of the magnitude of this volume of water might be realized when one might consider the content of the Pymatuning Dam, the largest body of water in the State of Pennsylvania, located at the headwaters of the Allegheny which has a capacity of 72 billion gallons, and could be filled at the above rate in one year and four months.

Coal removed and Coal remaining in the anthracite fields.

Field	Total removed to close of 1921	Total coal remaining	Per cent recover- able	Recoverable coal remain- ing
	Tons	Tons		Tons
Northern.....	2,170,860,000	3,276,763,000	67	2,195,431,000
Eastern Middle	363,820,000	248,628,000	69.4	172,548,000
Western Middle	1,023,770,000	3,573,025,000	58.1	2,075,928,000
Southern.....	857,790,000	9,256,260,000	49	4,535,567,000
Total	4,416,240,000	16,354,676,000		8,979,474,000

Since 1921 there has been approximately 800,000,000 tons removed leaving about 15,500,000,000 tons in the ground. It is estimated that of this 54.9% is recoverable. The amount of coal removed to date is equivalent to 1 square mile of coal 3,126 feet high, or a strip around the world 1 foot thick and 659 feet wide, or 102,136,497 railroad cars (37 feet long), or a train 714,241 miles long, which is equivalent to 28.5 times around the world or 2.88 times to the moon.

The total coal mined to date would be equivalent to a block of coal covering the metropolitan area of the following cities with the thickness shown:

City	Area Sq.Miles	Thickness of Block
Boston	43.9	71 feet
Chicago	201.9	15 "
Detroit	137.9	23 "
Cleveland	70.96	44 "
Cincinnati	71.41	44 "
Philadelphia	128.0	25 "
Greater New York	299.0	11 "
Manhattan Island	21.9	143 "
Scranton	19.54	160 "
Wilkes-Barre	7.27	430 "

At the present rate of consumption of about 50,000,000 tons per year, the anthracite coal supplies will last about 170 years.

The first figures of production are for the year 1807. From that time there was a fairly regular increase, except during the strike years of 1903, 1922 and 1925, to a maximum of 99,611,811 net tons in 1917. Since then there has been a gradual decline. The production in 1935 was 48,663,404 tons. The region is now producing about what it was 40 years ago, less than half the maximum production.

Culm and Silt

Passing through the coal regions one notices enormous heaps of discarded matter.

"The term culm has evolved in its meaning since the beginning of anthracite mining. In the early days of the industry practically all the coal was prepared dry. The fine-sized material, as well as the sizes which were not marketable at that time, were deposited along with the waste material in huge banks on the breaker property. These banks contain from 20 to 80 percent coal, and some of them have large percentages of steam sizes in them. These banks have been practically removed with the exception of those owned by large companies in the Southern Field. These banks are known as culm banks. A culm bank is defined as an accumulation of rock, bone, and coal from an old dry breaker.

"A rock bank is the refuse from a modern wet breaker. These rock banks contain from 1 to 5 percent of marketable coal, and are of no value except for mine filling.

"A silt bank is an accumulation of fine-size coal, bone, and slate which is settled out of breaker water. This material is known also as sludge, fines, slush, and mud."

"Culm and silt stored in banks in the Anthracite Region, in long tons*

Field	Culm	Silt	Mixed	Total
Southern.....	37,970,000	37,415,000	12,700,000	88,085,000
Western Middle	42,585,000	41,935,000	17,175,000	101,695,000
Eastern Middle	2,430,000	6,200,000	1,385,000	10,015,000
Northern.....	7,965,000	8,195,000	1,795,000	17,955,000
Total for all fields	90,950,000	93,745,000	33,055,000	217,750,000

*These tonnages are not recoverable marketable coal. The material composing these banks ranges from 20 to 80 percent combustible material. (Pa.Geol.Surv. 4th Ser. Bull. M-12)

Archbald Pothole

Archbald Pothole was discovered during the first week of February, 1884, at the Ridge mines of the Eaton colliery, on the land of Col. C. B. Hackley; the colliery being operated by Messrs. Jones, Simpson & Co.

The hole is 38 feet deep and about 40 feet in diameter at the surface. It is cut almost exclusively out of slate and sandy shale, principally the former, and the faces of the hole are extremely smooth. The pebbles taken out of the hole were from sedimentary strata, and, as far as could be determined, from strata geologically above the Pocono sandstone, which forms the highest summits north and northeast of the hole. A number of these pebbles were evidently formed from the rock which was cut out of the hole, and among them there were several pebbles cut from the coal-bed itself.

Ashburner writes:

"That the cause of the pothole must be sought for during the glacial period there can be no question, because only during that period can we conceive of sufficient water resulting from the melting of the existing ice sheet, to produce such a phenomenon."

He concludes:

"In only two ways is it possible for me to conceive of this hole being formed:

"First. By the water which always flows underneath a glacier, particularly near its terminus.

"Second. By water flowing over the edge of the retreating ice, at the terminus of a glacier.

"In either case we would have sufficient water to form the hole, and the inclined directions of the water as it fell upon the rocks would produce a hole having an inclined axis..... cut out of horizontal strata." (Ashburner, C. A.: Annual Report of 1885, Second Geological Survey, Pennsylvania, pp. 615-625, 1886)

Mine Fires

In the last sixty years many millions of Dollars has been spent in fighting mine fires, over \$12,000,000 having been spent in the Wyoming Valley alone. Additional millions have been lost due to the inaccessibility of the coal, lost wages, and loss of production. The men fighting the fires have worked in areas where the temperature has averaged 220 degrees Fahrenheit, and where the danger of gas has been extreme. Flooding, slushing, building fire walls, and other methods have been used to try to confine and control the fires. The best results seem to have been obtained by stripping.

One of the peculiar facts is that most of the coal itself is not destroyed, but the carbonaceous material and gas in the overlying rock (bone) burns, leaving good coal beneath, unless it is broken or partially mined, thus permitting an abundant supply of air, in which case the coal is consumed.

Baltimore Fire. In January 1874, fire started in the Baltimore Colliery of the Hudson Coal Company. The original area affected was 10 acres but eventually $16\frac{1}{2}$ acres became involved. After all sub-surface methods of fighting the fire had failed it was decided to isolate the fire by stripping. In 1931 the A. E. Dick Contracting Company received a contract calling for the removal of over one and a half million cubic yards of overburden and coal. A cut ranging up to 90 feet in depth was made between the fire and the unaffected area, thus isolating it and bringing it under control.

Red Ash Fire. The Red Ash fire started in 1915. When the last shift left the mine on Saturday everything was normal; on Monday morning it was found to be a roaring furnace. Mine lamps with exposed flames are thought to have started the fire in old timbers. In 1922 an unsuccessful attempt was made to put out the fire. At present attempts are being made to keep the fire from spreading to adjacent coal land by means of slush barriers. It is estimated that over three million tons of coal will be lost due to this single fire.

Summit Hill Fire. See separate sheet supplied by the Lehigh Navigation Coal Co. ("History of Wyoming Valley Mine Fires both Fascinating and Terrible." Sunday Independent, Wilkes-Barre, Pa. Sept. 23, 1934)

Carnotite

A uranium mineral was noted as early as 1874 at the eastern end of Mount Pisgah, about three-quarters of a mile north of Mauch Chunk.

This mineral identified by Wherry in 1908 as carnotite occurs in a road cut in a 40-foot layer of coarse-grained conglomerate near the base of the Pottsville formation.

An analysis of the material is as follows: V_2O_5 -21.73, UO_3 -68.99, K_2O -7.86, CaO -1.42.

It appears as a canary-yellow earthy coating on fracture surfaces and surrounding pebbles and as disseminated particles through the rock. It is not sufficiently abundant at this locality to be of economic importance. Wherry considered the deposit due to the precipitation chiefly along fractures from ground water. The source of the uranium and vanadium in the ground water was thought to be from heavy sand concentrates in sediments laid down under arid or semi-arid conditions. (Wherry, E. T.: Am. Jour. Sci., 4th ser., vol. 33, pp. 574-580, 1912. U.S.G.S. Bull. 580-H pp. 147-151, 1914)

Notes on Pleistocene Geology between Wilkes-Barre
and Hazleton

By George H. Ashley

At the mouths of Harvey and Humlock creeks and south of Shick-shinny, are terraces with gravels in which delta foreset beds predominate, overlain by horizontal coarser beds. The exact history of these deposits is not known. They suggest deltas built in waters temporarily dammed, waters which later become filled with sand and gravel so as to carry the drainage at terrace level, the coarse gravel at the top representing an abandoned stream bottom at that level.

The Wisconsin terminal moraine is crossed at Beach Haven capping the terrace either side of the river. Berwick is built on an out-wash-gravel terrace, the gravel having a reported depth of 100 feet or practically to river level.

Crossing the river at Nescopeck, three terraces, separated by sharp escarpments, are seen, probably representing stages in down cutting of the out-wash gravel. These are at 500 to 520 feet and at 580 feet; and the uppermost, two miles east of Nescopeck, at 620 feet, is coincident with the edge of the Wisconsin Moraine. The road is partly within and partly outside of the Moraine to Briggsville where we leave the Wisconsin. Climbing the mountain, we cross the "Probable limit of Illinoian ice, North Branch lobe", of Leverett at about 1200 feet A.T.

From Nescopeck to the mountain, we have been crossing Middle and Upper Devonian. The Pocono forming the mountain is part of the south limb of an anticline centering just north of the river at Berwick. The valley of Nescopeck Creek is cut in Mauch Chunk shale and sandstone. The valley is believed to have been occupied by the Nescopeck ice lobe which extended down the valley from the edge of the Wisconsin ice, near Drums, almost to where the creek turns north through the mountain. The south side of this lobe is crossed at Conyngham.

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and Anthracite Industry of Pennsylvania.

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Acknowledgments

The Committee cannot over-emphasize the value of the assistance that has been rendered by the Anthracite Industry in preparations for this trip. Without the whole-hearted cooperation that has been shown it would have been impossible to present such a cross section of the Anthracite region and its problems. It would be difficult to mention all of the many helpful suggestions.

Special mention must be made of the Anthracite Institute which, through its Executive Director, Louis C. Maderia III, has provided considerable literature, and has acted as an agent for the industry as a whole. The Hudson Coal Company, represented by Cadwallader Evans and H. H. Otto, by its activity has rendered outstanding service to the Committee and the Conference. Not only did they plan the main part of the trip in the Northern field, but they also prepared the road log from Scranton to Pottsville.

Other people to whom the committee is deeply indebted are, J. H. Pierce and H. D. Kynor of the Jas. H. Pierce Co., H. R. Randall of the Rhoades Contracting Co., Donald B. Dick of the A. E. Dick Contracting Co., H. M. Smyth of the St. Clair Coal Co., T. D. Lewis of the Lehigh Navigation Coal Co., D. E. Nicholson of the International Correspondence Schools, F. E. Learned, G. A. Roos and C. P. Swartz of the Philadelphia and Reading Coal and Iron Co.

Committee on Arrangements,

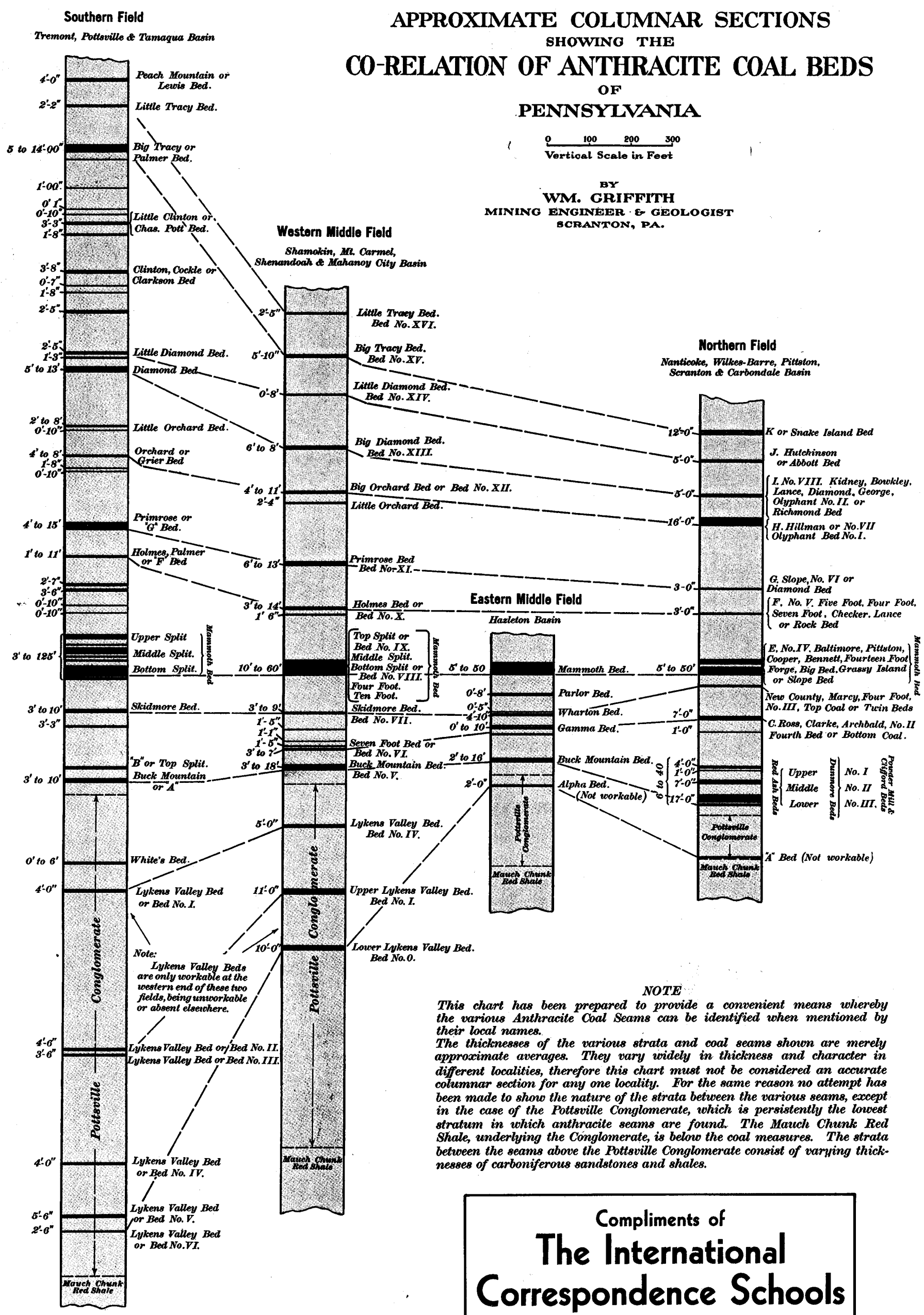
For New York: H. Ries; J. D. Burfoot

For Pennsylvania: George H. Ashley; Benj. L. Miller, Chairman;
D. M. Fraser; Lawrence Whitcomb, Secretary.

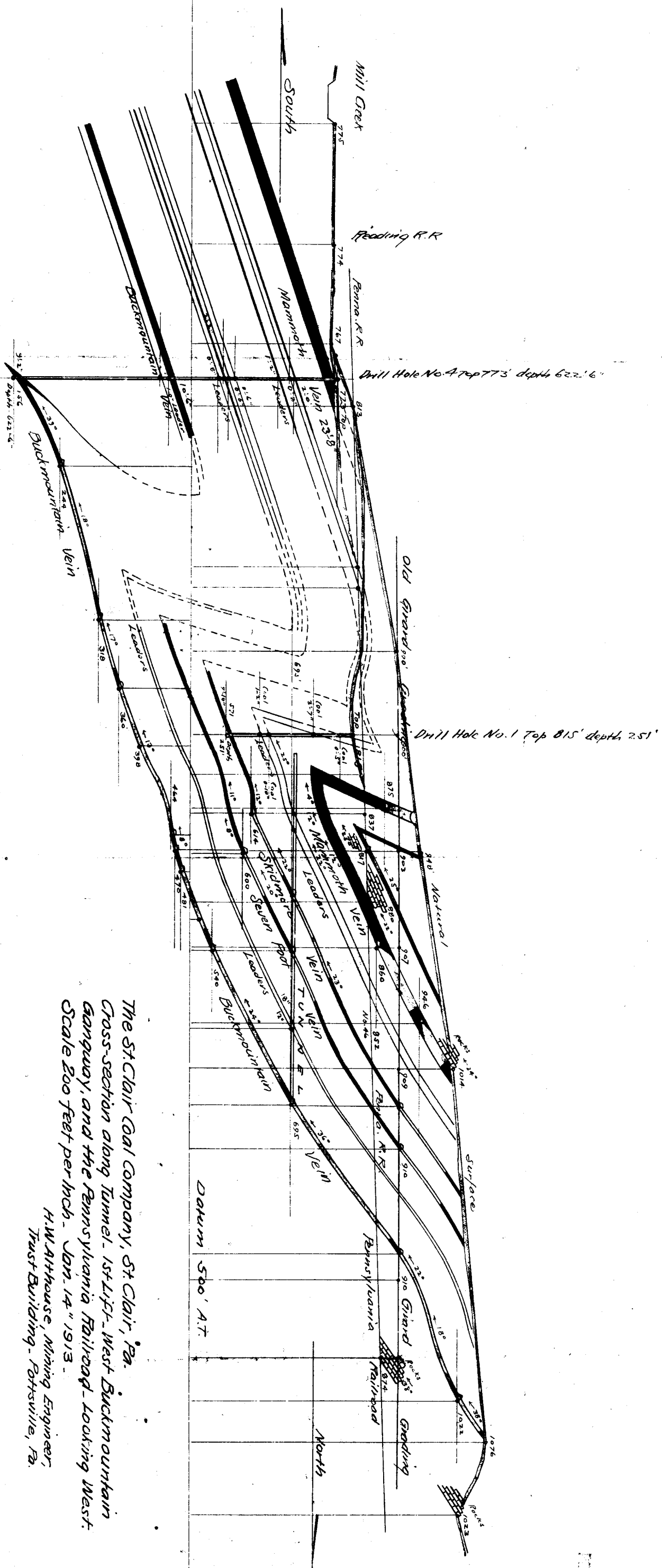
APPROXIMATE COLUMNAR SECTIONS SHOWING THE CO-RELATION OF ANTHRACITE COAL BEDS OF PENNSYLVANIA

0 100 200 300
Vertical Scale in Feet

BY
WM. GRIFFITH
MINING ENGINEER & GEOLOGIST
SCRANTON, PA.



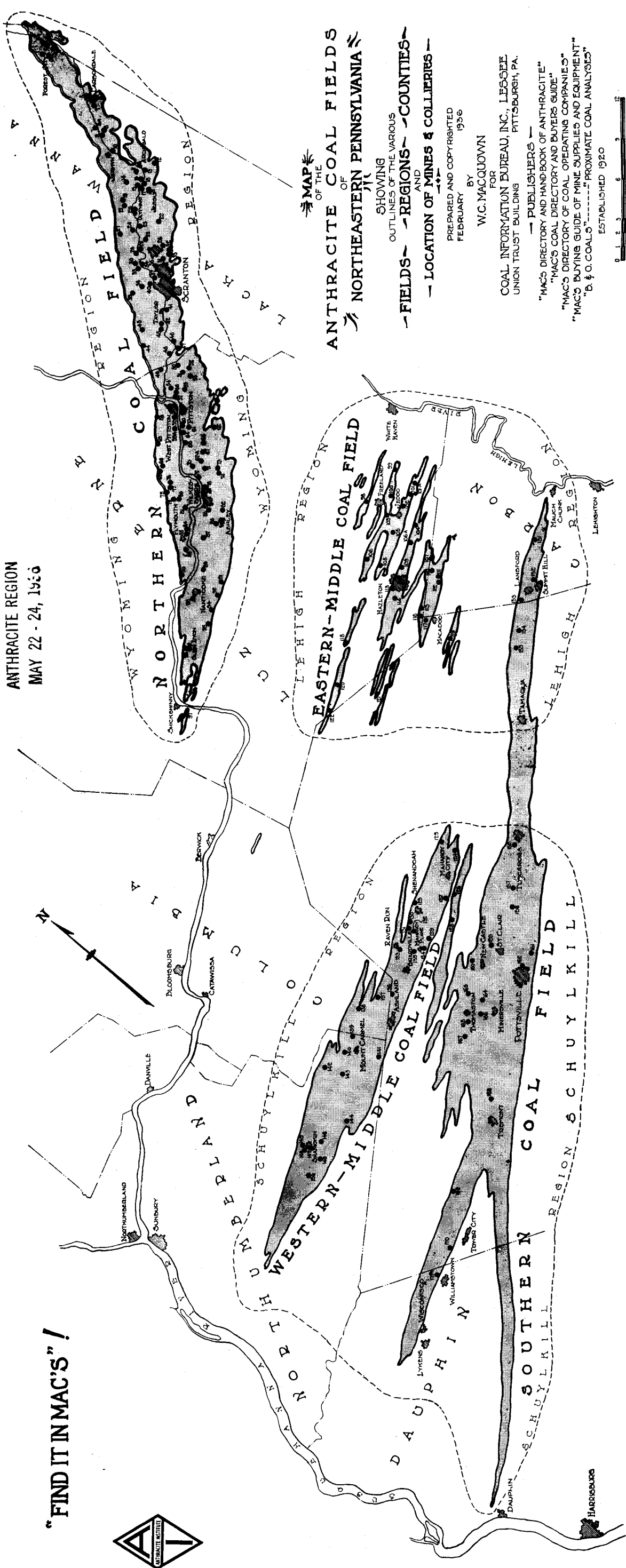
Compliments of
**The International
Correspondence Schools**
Scranton, Pa.



The St. Clair Coal Company, St. Clair, Pa.
 Cross-section along Tunnel-1st Lift-West Buck Mountain
 Gangway, and the Pennsylvania Railroad-Looking West.
 Scale 200 feet per inch. Jan. 14" 1913.
 H.W. Atthouse, Mining Engineer,
 Trust Building-Pittsville, Pa.

FIELD CONFERENCE
PENNA. - N.Y. GEOLOGISTS
ANTHRACITE REGION
MAY 22 - 24, 1936

"FIND IT IN MAC'S"!



MAP OF THE
ANTHRACITE COAL FIELDS
OF
NORTHEASTERN PENNSYLVANIA
SHOWING
OUTLINES OF THE VARIOUS
FIELDS - REGIONS - COUNTIES -
AND
LOCATION OF MINES & COLLIERIES -
PREPARED AND COPYRIGHTED
FEBRUARY 1936
BY
W.C. MACQUOWN
FOR
COAL INFORMATION BUREAU, INC., LESSEE
UNION TRUST BUILDING
PITTSBURGH, PA.
"MAC'S DIRECTORY AND HANDBOOK OF ANTHRACITE"
"MAC'S COAL DIRECTORY AND BUYERS GUIDE"
"MAC'S DIRECTORY OF COAL OPERATING COMPANIES"
"MAC'S BUYING GUIDE OF MINE SUPPLIES AND EQUIPMENT"
"D. & O. COALS" - "PROXIMATE COAL ANALYSES"
ESTABLISHED 1920

Numerical List—Anthracite Producing Companies

No.	Mine	Operator
1	Richmond	Penn. Anth. Collieries Co.
2	Forest City	The Pittston Co.
3	Sillwater	Shenandoah Coal Co.
4	Clinton	Penn. Anth. Collieries Co.
5	Coal Brook	Penn. Anth. Collieries Co.
6	Boland	Green Ridge Coal Co.
7	Racket Brook	Scranton Coal Co.
8	Powderly	Suffolk Coal Co.
9	Jermy	Penn. Anth. Collieries Co.
10	Gravitt	The Pittston Co.
11	Light Stripping	The Pittston Co.
12	Layman	H. A. Light Coal Co.
13	Pine	Penn. Anth. Collieries Co.
14	Parade	Penn. Anth. Collieries Co.
15	Parade	Penn. Anth. Collieries Co.
16	Parade	Penn. Anth. Collieries Co.
17	Parade	Penn. Anth. Collieries Co.
18	Parade	Penn. Anth. Collieries Co.
19	Parade	Penn. Anth. Collieries Co.
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21	Parade	Penn. Anth. Collieries Co.
22	Parade	Penn. Anth. Collieries Co.
23	Parade	Penn. Anth. Collieries Co.
24	Parade	Penn. Anth. Collieries Co.
25	Parade	Penn. Anth. Collieries Co.
26	Parade	Penn. Anth. Collieries Co.
27	Parade	Penn. Anth. Collieries Co.
28	Parade	Penn. Anth. Collieries Co.
29	Parade	Penn. Anth. Collieries Co.

Northern Field No's 1 to 97---Eastern Middle Field No's 98 to 122 Western Middle Field No's 123 to 150---Southern Field No's 151 to 171

No.	Mine	Operator
88	Nottingham No. 5	Glen Alden Coal Co.
89	Loomis	Glen Alden Coal Co.
90	Chauncey	Glen Alden Coal Co.
91	Truesdale	Glen Alden Coal Co.
92	Ellis	Glen Alden Coal Co.
93	Susquehanna No. 7	Susquehanna Coll. Co.
94	Alden	Alden Coal Co.
95	Varanite No. 18	Susquehanna Coll. Co.
96	Susquehanna No. 6	Susquehanna Coll. Co.
97	West End	West End Coal Co.
98	New Upper Lehigh	New Upper Lehigh Coal Co.
99	Sandy Run	Sandy Run Miners & Prod. Co.
100	Highland Nos. 1, 2 & 6	Jeddo-Highland Coal Co.
101	Eckley	Jeddo-Highland Coal Co.
102	Stockton	Jeddo-Highland Coal Co.
103	Drifton	Jeddo-Highland Coal Co.
104	Highland No. 5	Jeddo-Highland Coal Co.
105	Hazle Brook	Hazle Brook Coal Co.
106	Lehigh	Lehigh Valley Coal Co.
107	Beaver Meadow	Lehigh Valley Coal Co.
108	Jeddo No. 7	Jeddo-Highland Coal Co.
109	Hazleton Shaft	Lehigh Valley Coal Co.
110	Evans	Evans Colliery Co.
111	Coleraine	Penn. Anth. Collieries Co.
112	Palmer	Wolf Coll. Co., Inc.
113	Hazleton No. 1	Lehigh Valley Coal Co.
114	Granberry	Lehigh Valley Coal Co.
115	Spring Mountain	Lehigh Valley Coal Co.
116	Beaver Brook	Lehigh Valley Coal Co.
117	Audenreid No. 4	Lehigh Valley Coal Co.
118	Tomblick	Lehigh Valley Coal Co.
119	Candlers	Lehigh Valley Coal Co.
120	Derrigo	Lehigh Valley Coal Co.
121	Lehigh	Lehigh Valley Coal Co.
122	Parade	Lehigh Valley Coal Co.
123	Parade	Lehigh Valley Coal Co.
124	Parade	Lehigh Valley Coal Co.
125	Parade	Lehigh Valley Coal Co.
126	Parade	Lehigh Valley Coal Co.
127	Parade	Lehigh Valley Coal Co.
128	Parade	Lehigh Valley Coal Co.
129	Parade	Lehigh Valley Coal Co.
130	Parade	Lehigh Valley Coal Co.
131	Parade	Lehigh Valley Coal Co.
132	Parade	Lehigh Valley Coal Co.
133	Parade	Lehigh Valley Coal Co.
134	Parade	Lehigh Valley Coal Co.
135	Parade	Lehigh Valley Coal Co.
136	Parade	Lehigh Valley Coal Co.
137	Parade	Lehigh Valley Coal Co.
138	Parade	Lehigh Valley Coal Co.
139	Parade	Lehigh Valley Coal Co.
140	Parade	Lehigh Valley Coal Co.
141	Parade	Lehigh Valley Coal Co.
142	Parade	Lehigh Valley Coal Co.
143	Parade	Lehigh Valley Coal Co.
144	Parade	Lehigh Valley Coal Co.
145	Parade	Lehigh Valley Coal Co.
146	Parade	Lehigh Valley Coal Co.
147	Parade	Lehigh Valley Coal Co.
148	Parade	Lehigh Valley Coal Co.
149	Parade	Lehigh Valley Coal Co.
150	Parade	Lehigh Valley Coal Co.
151	Parade	Lehigh Valley Coal Co.
152	Parade	Lehigh Valley Coal Co.
153	Parade	Lehigh Valley Coal Co.
154	Parade	Lehigh Valley Coal Co.
155	Parade	Lehigh Valley Coal Co.
156	Parade	Lehigh Valley Coal Co.
157	Parade	Lehigh Valley Coal Co.
158	Parade	Lehigh Valley Coal Co.
159	Parade	Lehigh Valley Coal Co.
160	Parade	Lehigh Valley Coal Co.
161	Parade	Lehigh Valley Coal Co.
162	Parade	Lehigh Valley Coal Co.
163	Parade	Lehigh Valley Coal Co.
164	Parade	Lehigh Valley Coal Co.
165	Parade	Lehigh Valley Coal Co.
166	Parade	Lehigh Valley Coal Co.
167	Parade	Lehigh Valley Coal Co.
168	Parade	Lehigh Valley Coal Co.
169	Parade	Lehigh Valley Coal Co.
170	Parade	Lehigh Valley Coal Co.
171	Parade	Lehigh Valley Coal Co.

SUMMIT HILL MINE FIRE

PENNA. GEOLOGICAL SURVEY

ANTHRACITE DIVISION

MAY 12, 1936

Fire was discovered in February, 1859, in an old abandoned gangway at the foot of No. 1 Slope which was driven in the South Dip of the Mammoth Vein near the spoon end of the Summit Hill Basin.

Numerous stories relating to the origin of the fire have been circulated. The most plausible one is that a wooden mine car into which newly raked ashes from a stove at the foot of the Slope had been shoveled, was shifted into the old disused gangway and that the ashes were hot enough to ignite the car and eventually the timbers and coal in the gangway.

The No. 1 Slope workings were abandoned and sealed with the view of having them fill with water and the fire smother itself through lack of air and by the fumes which the fire produced. Mining of the vein was continued farther west from the No. 2 Slope and an open cut was made west of the fire area to prevent it from extending into the No. 2 Slope workings and those off the Davies Slope east of the No. 2 Slope. Apparently the fire had made no progress westward and seemed to be dying out.

In 1895 an East Gangway from Davies Slope broke into a fire that had been smoldering for years. This gangway gave vent to the fire and it commenced to spread rapidly. Again the openings were sealed off and pumping machinery placed at Coaldale Colliery to pump breaker slush to the crop above the new fire area and into a series of 6" bore holes placed on 25' centers over an area 250' wide, extending from the crop to the water level to form a barrier and also prevent air from reaching the fire.

This barrier was found ineffective and another similar barrier was formed west of No. 2 Slope, which also failed to retard the progress of the fire.

In 1908, when the fire showed evidence of continuing westwardly and extending around the nose of the anticline into the Main Basin of the Panther Creek Valley, the Fire Barrier Wall was started. This wall, 12' wide and 800' long, was constructed by making an open cut at the outcrop of the Mammoth Vein anticline, sinking six shafts, removing the 55' Mammoth Vein between the south shaft and the outcrop, the top rock between the fourth shaft and the outcrop, and back-filling this opening with clay and sand. To support the side walls of the excavation and confine the clay and sand, 47 lateral concrete walls 18" and 24" thick were placed and supporting timbers used in sinking the openings removed to eliminate all possible chance of the fire eating through the barrier. These walls were placed in sections starting at the bottom and brought up a little in advance of the clay and sand back fill. The first four shafts were 12' x 50' and the last two 12' x 20' in section, varying in depth to the bottom rock from 135' to 215'. The work of constructing the barrier was very difficult due to excessive heat and noxious gases entering its openings from the nearby fire.

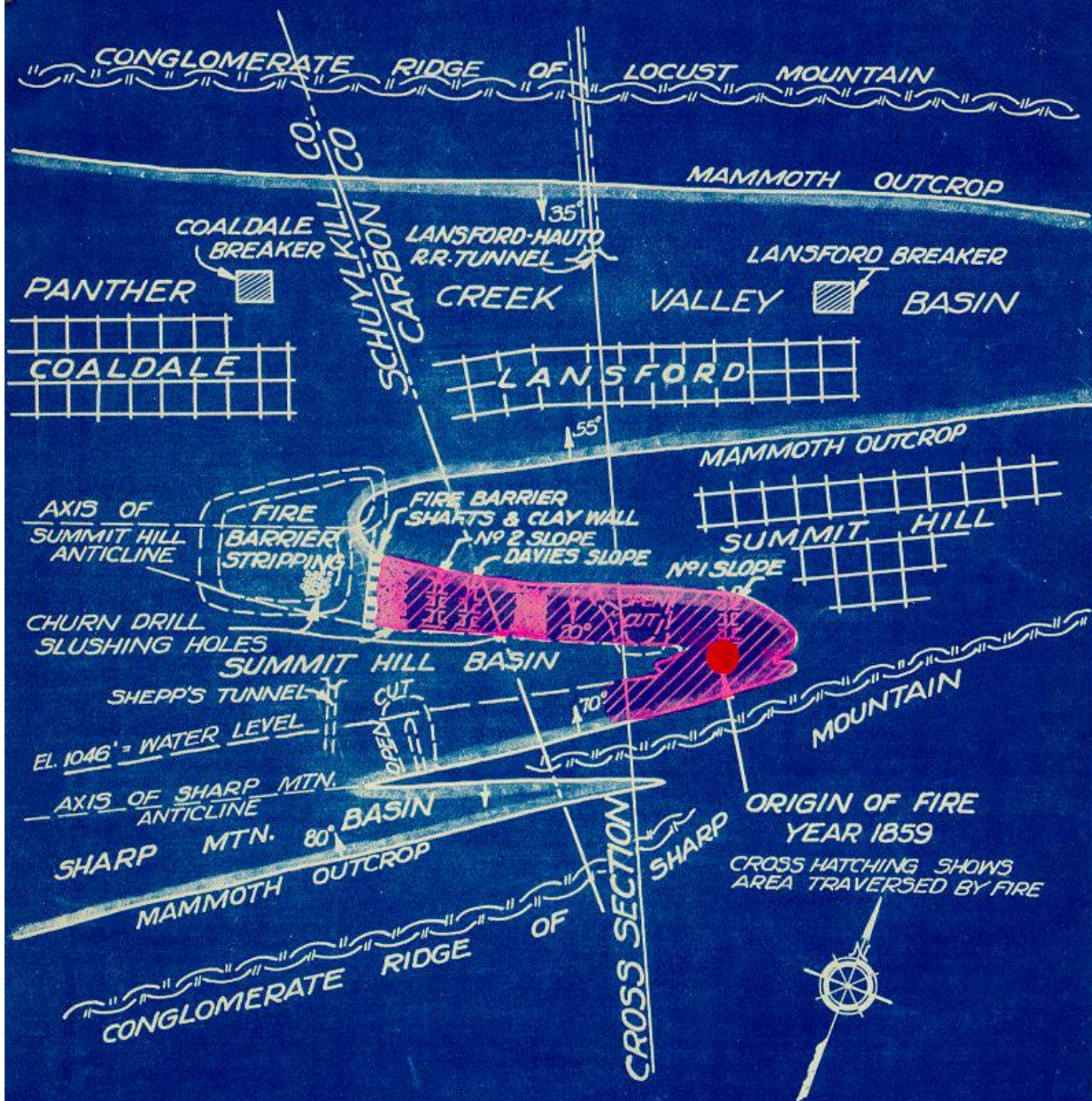
In 1911, to further insure confining the fire to the Summit Hill Basin, a stripping was started along the anticline on the west side of the Fire Barrier Wall. This stripping, its East Extension and the one at the West now underway, will remove all of the coal over the anticline and expose it to a point below the No. 9 Water Level.

In 1915, the fire crossed the Fire Barrier Wall and appeared in the stripping area. Again churn drilling and slushing was resorted to and stripping operations speeded up, finally cutting off the fire before it could spread to any large extent in the vein. Later, stripping excavation showed that hot gases from the fire area worked over the barrier between the Fourth and Fifth Shafts and burned in the rock over the vein, starting a small fire in the vein, as was evidenced by the coal ashes excavated in the Southeast corner of the stripping.

In addition to the work done on the South Dip, an open cut was made in 1912, on the North Dip of the Summit Hill Basin opposite the Fire Barrier, in which all of the coal lying between the outcrop and the Springdale Water Level was removed.

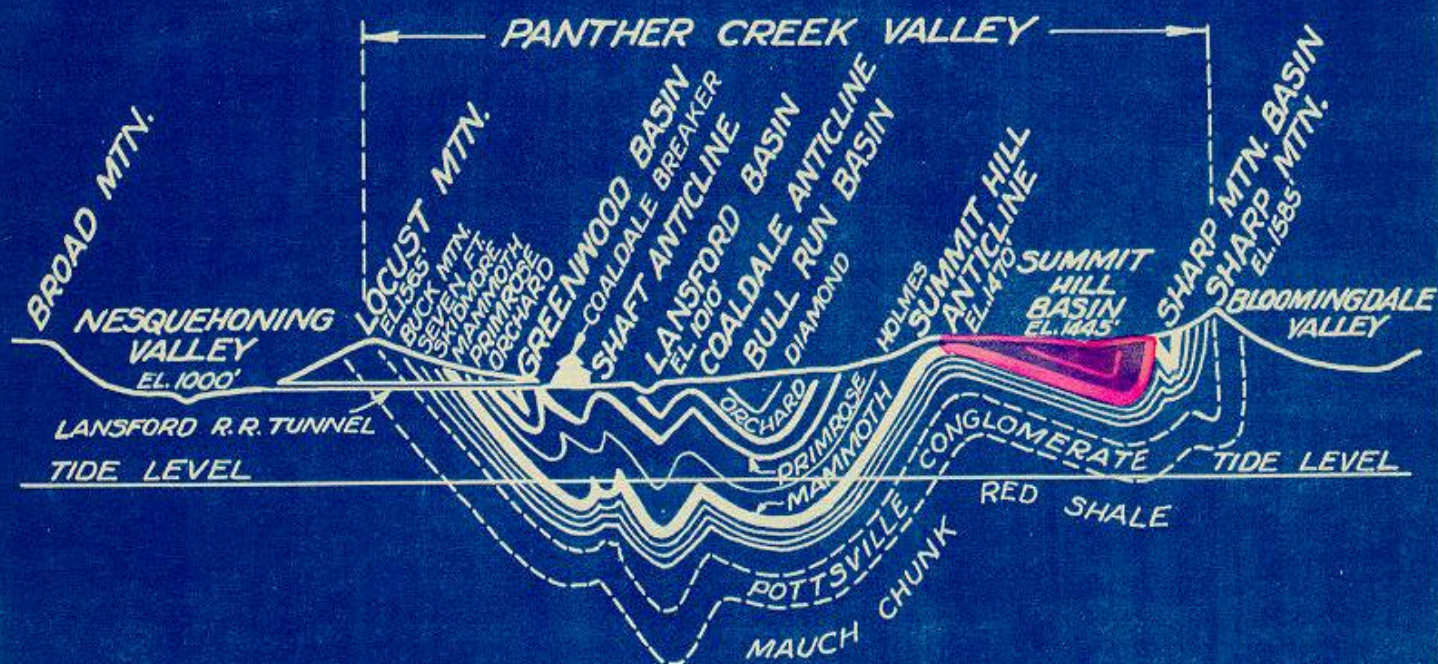
At present the fire is effectually confined to the Summit Hill Basin and is in a dormant state.

Lansford, Pa., May, 1936



SKETCH SHOWING LOCATION OF SUMMIT HILL MINE FIRE

— NORTH —



CROSS SECTION OF PANTHER CREEK VALLEY ON LINE OF LANSFORD RAILROAD TUNNEL
LOOKING EAST

Scale 0 500' 1000' 1500' 2000' 2500' 3000'

FIELD DIVISION OF
PENNA. - N.Y. GEOLOGISTS
ANTHRACITE REGION
MAY 22 - 24, 1936

ST. NICHOLAS CENTRAL BREAKER

The Philadelphia and Reading Coal and Iron Company's Central Breaker at St. Nicholas, Pa., is the second huge automatic plant built to meet the demand for perfectly prepared Reading Anthracite by millions of consumers throughout the United States and Canada. The first of these plants was built at Locust Summit, Pa., fourteen miles west of St. Nicholas. Both have set new records in the magnitude and efficiency of hard coal preparation.

St. Nicholas Central Breaker cleans and prepares for market the Reading Anthracite mined in the Company's Mahanoy District, east of the Locust Summit District. The mining area which supplies St. Nicholas covers ten square miles and comprises such large communities in Schuylkill County as Shenandoah, Mahanoy City, Gilberton and Girardville.

The rated capacity of the St. Nicholas Breaker is more than 12,500 tons a day. The Breaker was designed to be a model of operating efficiency so that the coal produced is thoroughly free from slate, bone, and other impurities, properly sized and subjected to rigid tests to assure to the public a product of highest purity and quality. Coal from the mines enters St. Nicholas on a conveyor belt moving at a speed of 600 feet a minute. Twelve minutes later it has passed through the many processes of the preparation plant and is being loaded into freight cars for transportation to consumers.

Large laboratories have been installed in the Breaker and are completely equipped to test the product before it is released for market. Inspectors take nine samples of coal from each railroad car loaded at the Breaker and these samples are subjected to the exacting tests designed to assure the highest standards of quality and sizing. If any car of coal fails to meet all of the tests, it is returned to the Breaker for reparation.

COVERS 500 ACRES

The St. Nicholas plant with its auxiliary facilities covers an area of more than 500 acres at a point approximately midway between Mahanoy City and Shenandoah, on Pennsylvania Highway Route 45.

The Breaker and its auxiliary buildings are constructed of steel, concrete, and other permanent materials. Automatic machinery of the most modern type is operated by motors perfectly synchronized by electrical controls. The vibration and dirt found in old fashioned coal breakers has been practically eliminated.

Electric power used at St. Nicholas is generated at nearby plants which use anthracite with a degree of efficiency that has challenged the finest records of hydro-electric or other power production.

One of the most impressive of the auxiliary structures at St. Nicholas is the new high pressure steam plant using mechanical stoking equipment. Fine sizes of coal, formerly sent to the refuse banks, are salvaged and cleaned at St. Nicholas, mixed with water and then pumped through a pipe line 1500 feet long to the steam plant. Here, the coal is de-watered and fed into the boilers by mechanical stokers. The water removed from the coal is again put to use and carries off the ashes. This plant supplies the steam at a number of collieries adjacent to St. Nicholas, replacing the old fashioned and wasteful boiler houses which were maintained at each of the collieries. The steam is transmitted at high pressure through insulated pipe lines for considerable distances.

STRUCTURAL FACTS

An idea of the immensity of the St. Nicholas preparation plant may be had from a few statistics concerning its construction and operation:-

Approximately 2,500 employees were engaged by contractors who built it.

More than 150,000 man days of direct employment at the site were provided by this construction enterprise during what was probably the most serious period of industrial depression in the history of the United States. Hundreds of thousands of additional man days of employment were provided by the orders for machinery and construction materials.

Construction was begun in May, 1931.

Approximately half a million cubic yards of grading was required to prepare the site for the builders.

Two streams were diverted into new channels.

Approximately 20 miles of railway tracks were laid.

Approximately 3,800 tons of structural steel were used, more than 10,000 cubic yards of reinforced concrete, a mile and a half of conveyor lines, 25 miles of conduit, 26,241 square feet of rubber belting, 118 miles of wire and cable, and 20 miles of pipe have been installed.

The pumps in the Breaker have a circulating capacity totaling approximately 150,000 gallons per minute. This is the equivalent of nearly 300,000 tons of water per 8-hour day.

There are several hundred motors of various types and sizes with a total capacity of 8,000 horse power for the operation of the Breaker equipment and its auxiliaries.

Half a dozen large steel and concrete water reservoirs have been built, there are sheds where 18 carloads of coal are thawed at once in winter time, and a huge rotary car dump which overturns freight cars and empties them with amazing speed and ease.

The Breaker is constructed in two halves. Each half can be operated independently of the other, an arrangement which provides maximum flexibility in production and operation.

SEEING ST. NICHOLAS

1. ROTARY CAR DUMP Here, cars containing newly mined anthracite are carefully overturned and emptied into a hopper from which the coal is automatically fed onto a belt conveyor 920 feet long which raises it to the top of the breaker 120 feet above the surface. An auxiliary conveyor, coming down the valley from the North, feeds the product from two nearby collieries onto the main belt. The nearby THAW SHED is used in wintertime to free coal in the railway cars from ice and snow. Cars roll by gravity into the drum of the Rotary Dump, are clamped tight, and the drum is revolved by cables operated by an electric motor. The dump operator sits in a small overhead compartment and controls all of the mechanisms by means of push buttons.

2. THE THICKENER. This is a huge sedimentation tank for clearing water, used in the breaker, from the solids washed out in the cleaning process. The water is then recirculated. More than 40 thousand gallons of water per minute are circulated in the breaker and the Thickener reduces the "make-up" of fresh water used to 3,000 gallons per minute. The lost water is used in pumping the sediment up the mountainside across the road to a basin in which it is deposited to drain and harden. The daily water circulation in the breaker equals that used by a city the size of Baltimore.

3. THE FLOW. At this point, the conveyor belt empties the coal into a distributing shaker which serves it to the two complete operating units into which the plant is divided. Apparatus is available to divert the coal from either side of the plant if desired. A deluge of water "launders" the coal at this point, thoroughly cleaning it of silt and mud before it enters the lines of preparation machinery. Note huge electro magnet overhanging the top of conveyor belt. This seizes "tramp" iron and removes it from the feed.

4. PRIMARY CONES. These huge tanks contain and exactly maintain a mixture of sand and water, constantly agitated by revolving metal arms. The mixture of sand and water is heavier than pure coal which floats at the top of it like wood and flows over the lip to the sizing screens. Impurities, such as slate and bone, automatically sink to the bottom and are drained off at intervals through automatically operated traps at the bottom. There are twelve cones and Hydrotators in the Breaker to perform this function. Just before reaching the primary cone, small sizes are screened out and bypassed to feeder lines for separate preparation.

5. CRUSHER ROLLS After its first cone cleaning, the coal is crushed into domestic sizes in these rapidly revolving steel toothed rolls. Note absence of dust throughout plant.

6. CONTROL ROOMS. Here a marvelous system of electrical controls exactly synchronizes operation of cones, rolls, shaking screens, and other equipment. In case of a breakdown at any point, automatic relays shut down apparatus back to the beginning of production line.

7. RETURN CONVEYOR. Spillage from the breaker and the loading yard is returned to the top of breaker where it is fed back into production line.

8. SECONDARY CONES. Final elimination of rock and bone adhering to coal and freed from it in the crusher rolls takes place in these cones, which operate on the same principle described under No. 4.

9. FINAL SIZING SCREENS. Under constant sprays of water the purified coal is divided into the various classifications required by the consumer.

10. SAND SUMP. More than 1,000 tons of sand is used in the circulating system of the cones. Nearly all of it is recovered and cleaned in a sand cone for return to the system.

11. MAIN CONTROL ROOM. This is the heart of the Breaker. Electricity, manufactured by steam power plants using anthracite energy in the district is distributed to several hundred motors from this point and is automatically regulated.

12. LOADING BOOMS. At this point, the finished product is gently lowered into railroad cars on rubber belts, avoiding breakage. Box cars are clamped in a "cradle" seen at the right. They are then tilted forward and backward as they are being loaded. All of this apparatus is automatically controlled by push buttons operated by the man at the "organ".

13. REFUSE BELT. All refuse eliminated by the cones is carried by this enclosed conveyor to a hopper on the hill at the right. From the hopper, it is loaded onto dump cars which deposit it on the rock bank.

14. INSPECTION LABORATORY. Inspectors watch the loading of each car of coal. They take representative samples from nine points on each car. These are numbered and hooked on the carrier line which brings them to the laboratory for inspection. The coal is put through a sizing machine to determine whether it meets the Company's rigid standards. The samples are then "floated" in tanks containing a solution of water and zinc chloride which is of the same gravity as the agitated sand and water mixture in the secondary cones. Any pieces suspected of containing partial impurities are cracked and examined by the inspectors. On the evidence of these tests the car is either released or condemned. Even though it should pass these tests, it may be condemned for appearance. If approved, the car is dropped to an automatic weigh scale and is ready for shipment.

15. TESTING LABORATORY. Here the coal is also subjected to sizing tests and typical samples are burned in electric ovens to determine the ash content. Should the ash content be found too high, the entire car is condemned and the coal is returned to the breaker for re-preparation.

16. AIR COMPRESSORS. These furnish power for the automatic valves which trap out the impurities when they sink to the bottom of the cones.

17. WATER PUMPS. The circulating capacity of these huge pumps totals 150 thousand gallons per minute.

18. MOTOR GENERATOR SETS. These convert electric power supply as required for the rotary car dump and other heavy equipment.

THE PRODUCT

Millions of satisfied consumers in 40 states and 8 Canadian provinces use Famous Reading Anthracite for health, comfort and convenience in their homes. The efficiency and exact care with which it is prepared in the world's largest and finest breakers is an assurance of superlative quality and real economy, for the product is all coal.

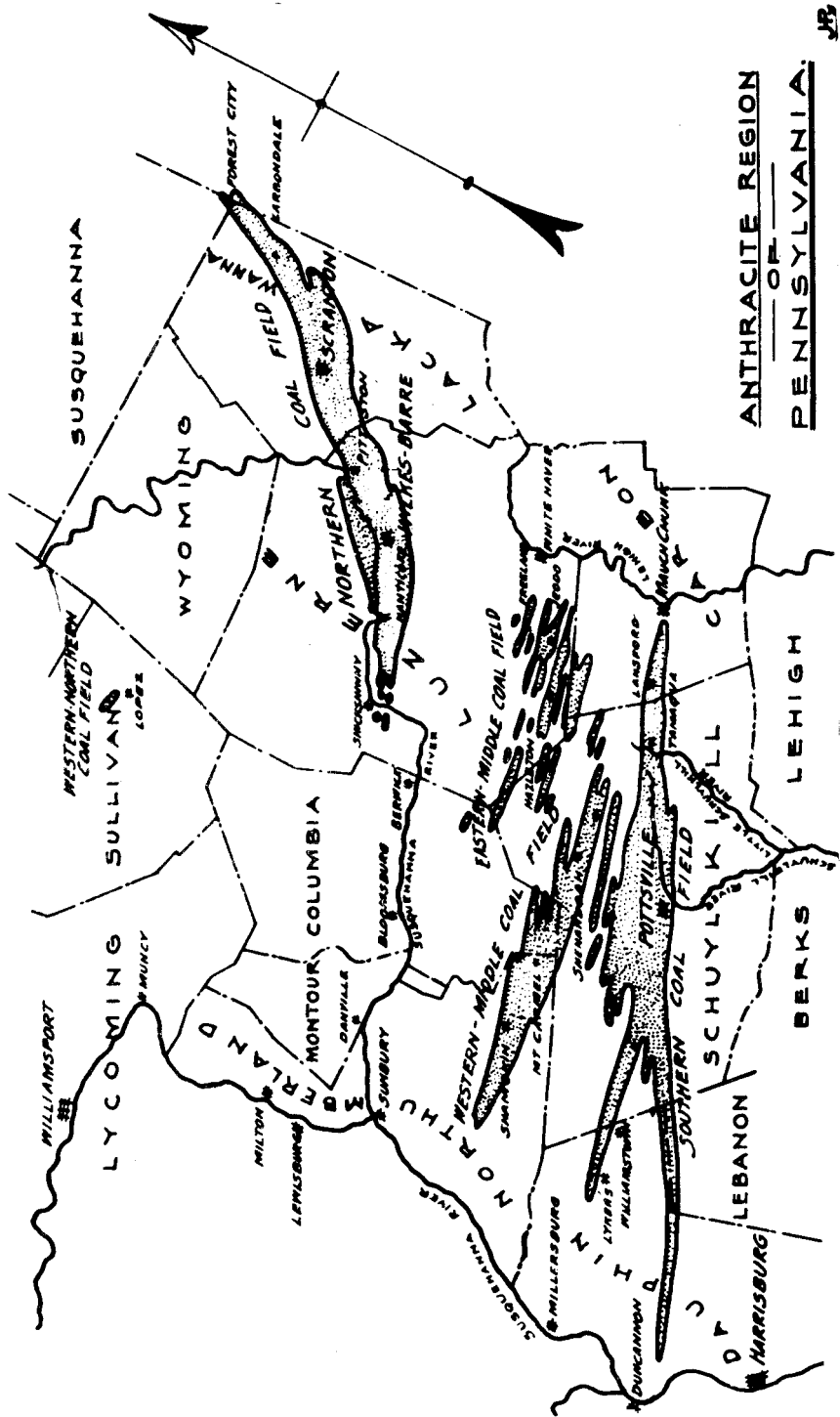
"NATURE NEVER MADE NOR HAS MAN DISCOVERED A FINER FUEL THAN FAMOUS READING ANTHRACITE."



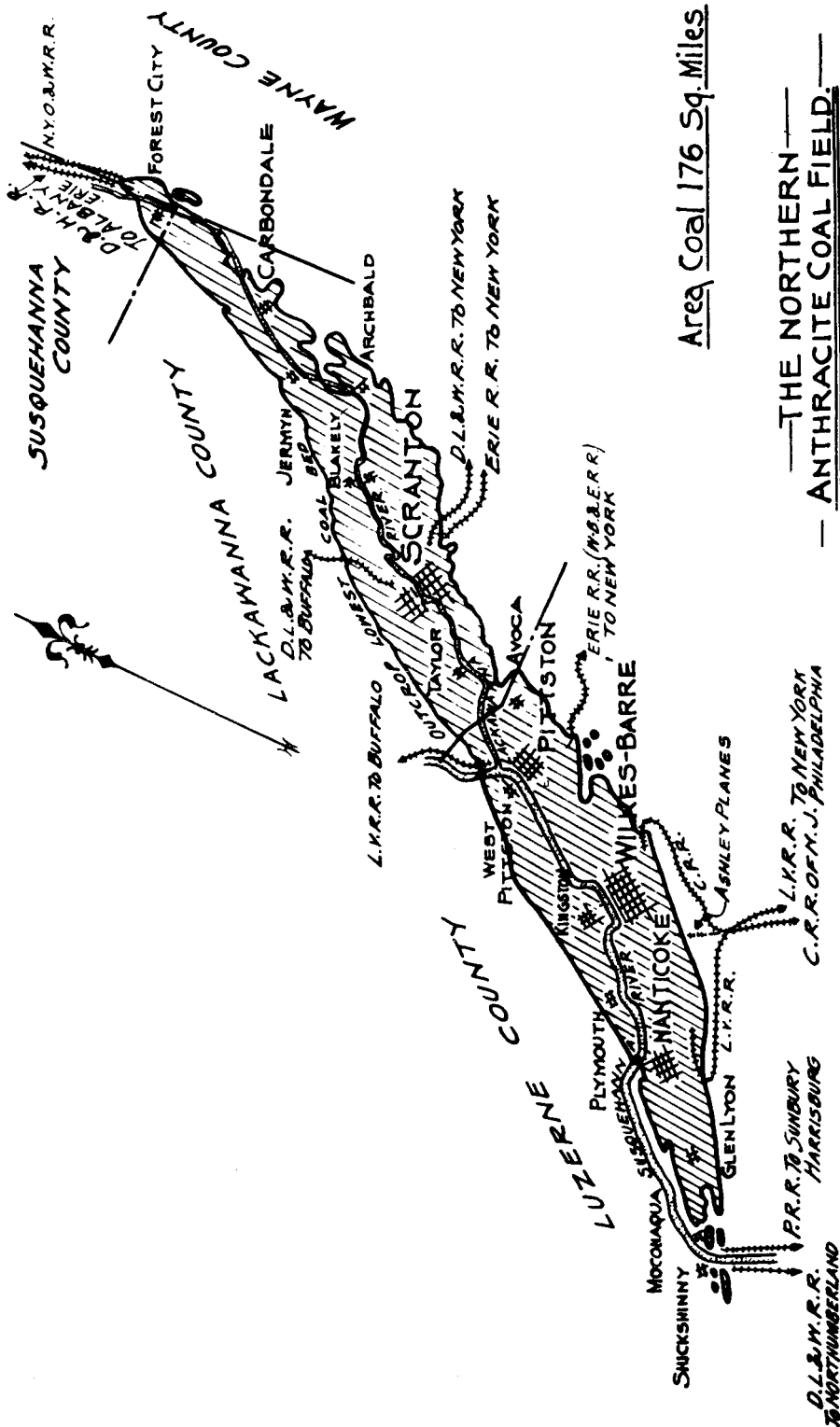
THE _____
ANTHRACITE
REGION
OF _____
PENNSYLVANIA

FIELD CONFERENCE
PENNA. - N.Y. GEOLOGISTS
ANTHRACITE REGION
MAY 22 - 24, 1936

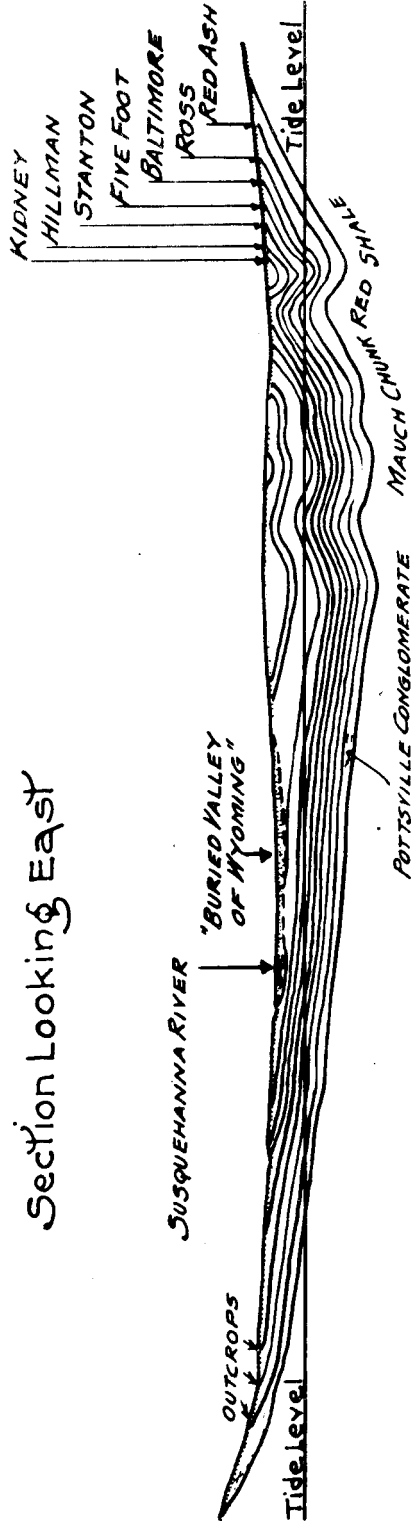




**ANTHRACITE REGION
OF
PENNSYLVANIA.**

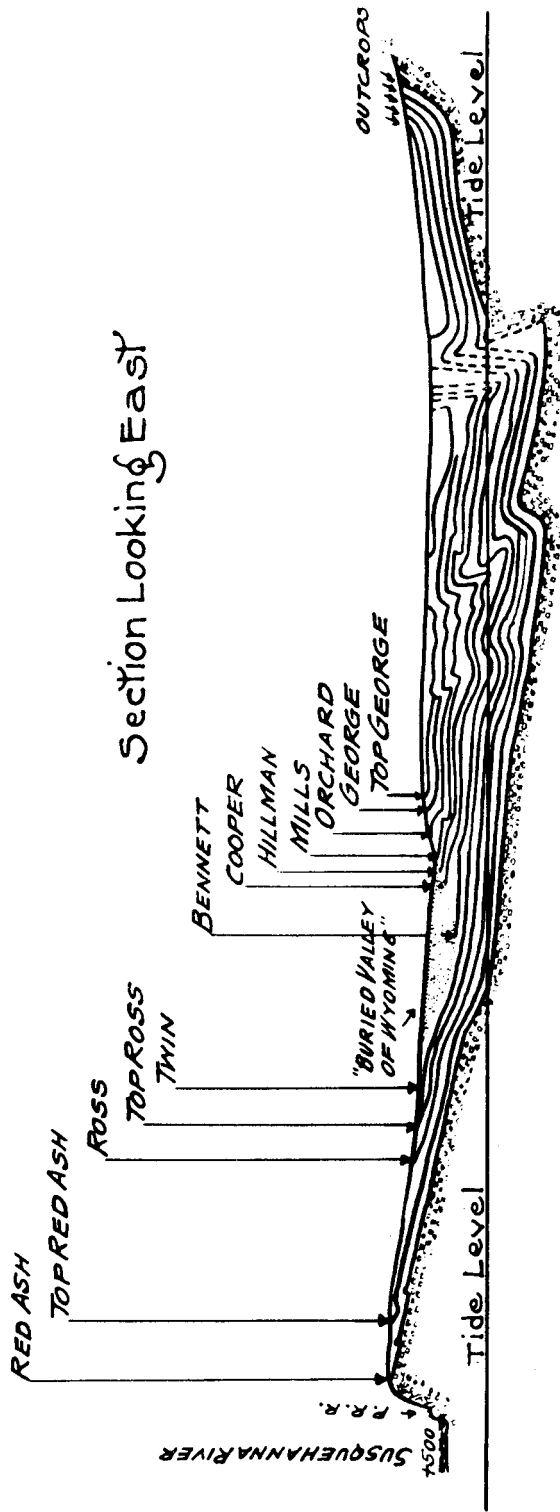


Section Looking East

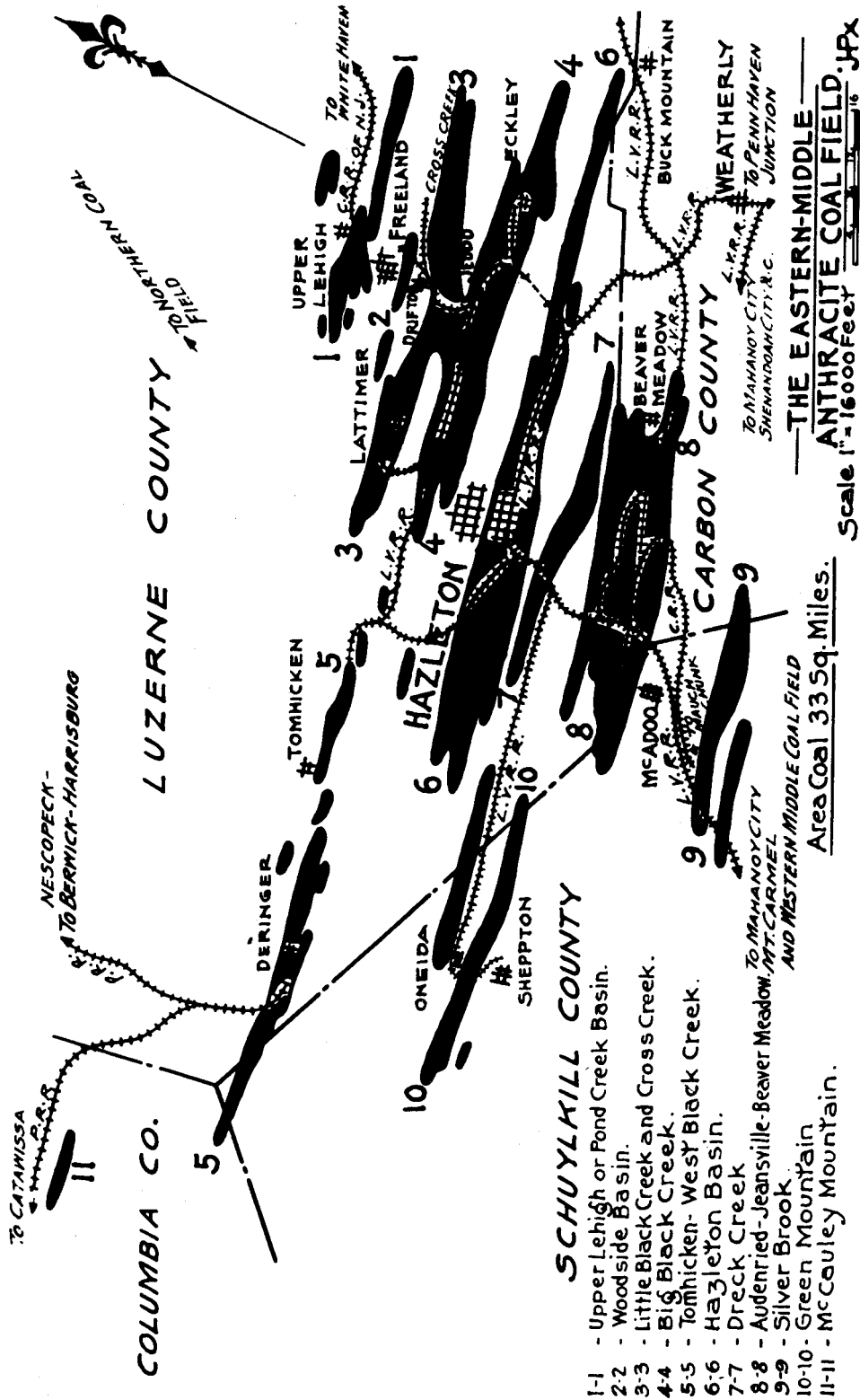


THE NORTHERN COAL FIELD
(CROSS-SECTION IN THE VICINITY OF
WILKES-BARRE.)

Scale
 800' 2400' 1600' 3200'



THE NORTHERN COAL FIELD
CROSS-SECTION IN THE VICINITY OF
NANTICOKE,
 Scale 500' 1000' 1500'



Area Coal 33 Sq. Miles.

AND WESTERN MIDDLE COAL FIELD

AND WESTERN

TO MAHANOY CITY

MT. CARMEL

ook

Mountain

11-11 - McCauley Mountain.

AND WESTERN MIDDLE COAL FIELD

AND WESTERN

TO MAHANOY CITY

MT. CARMEL

ook

Mountain

11-11 - McCauley Mountain.

AND WESTERN MIDDLE COAL FIELD

AND WESTERN

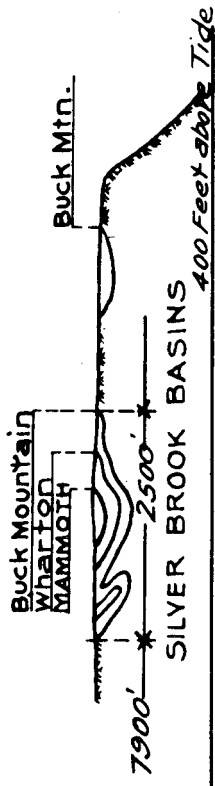
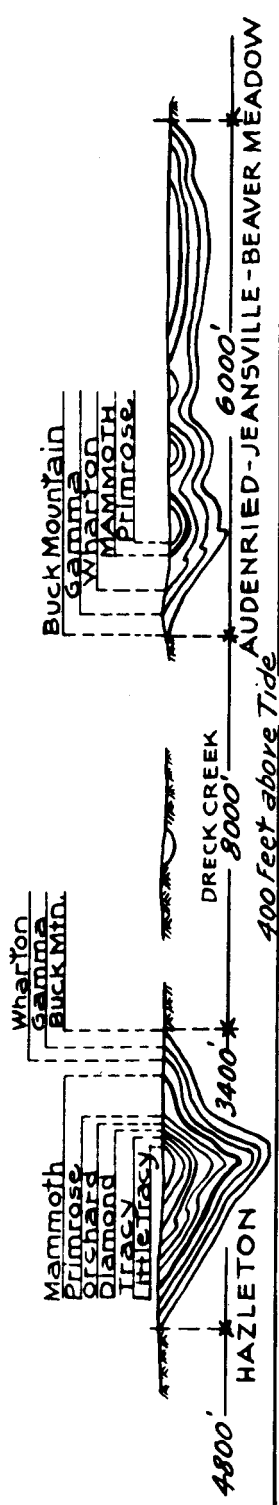
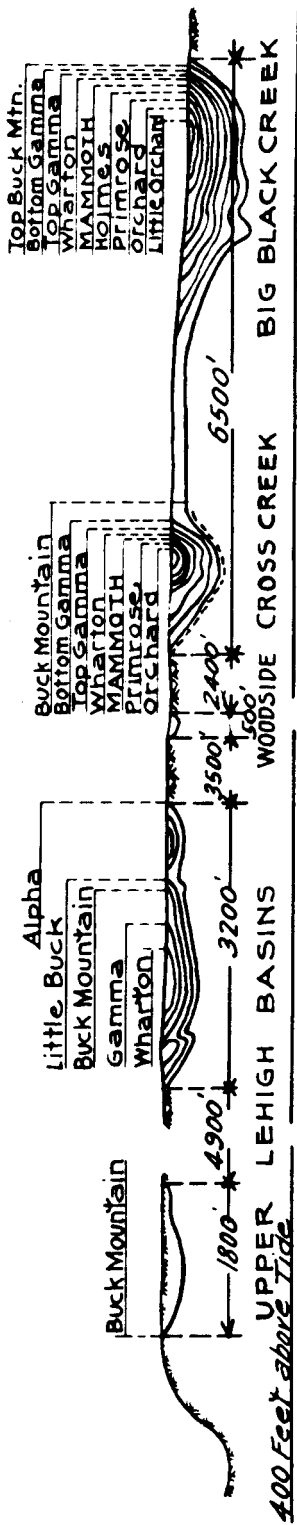
TO MAHANOY CITY

MT. CARMEL

ook

Mountain

11-11 - McCauley Mountain.



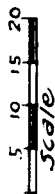
SECTIONS LOOKING EAST

A PORTION OF THE COAL BASINS

— COMPRISING THE —

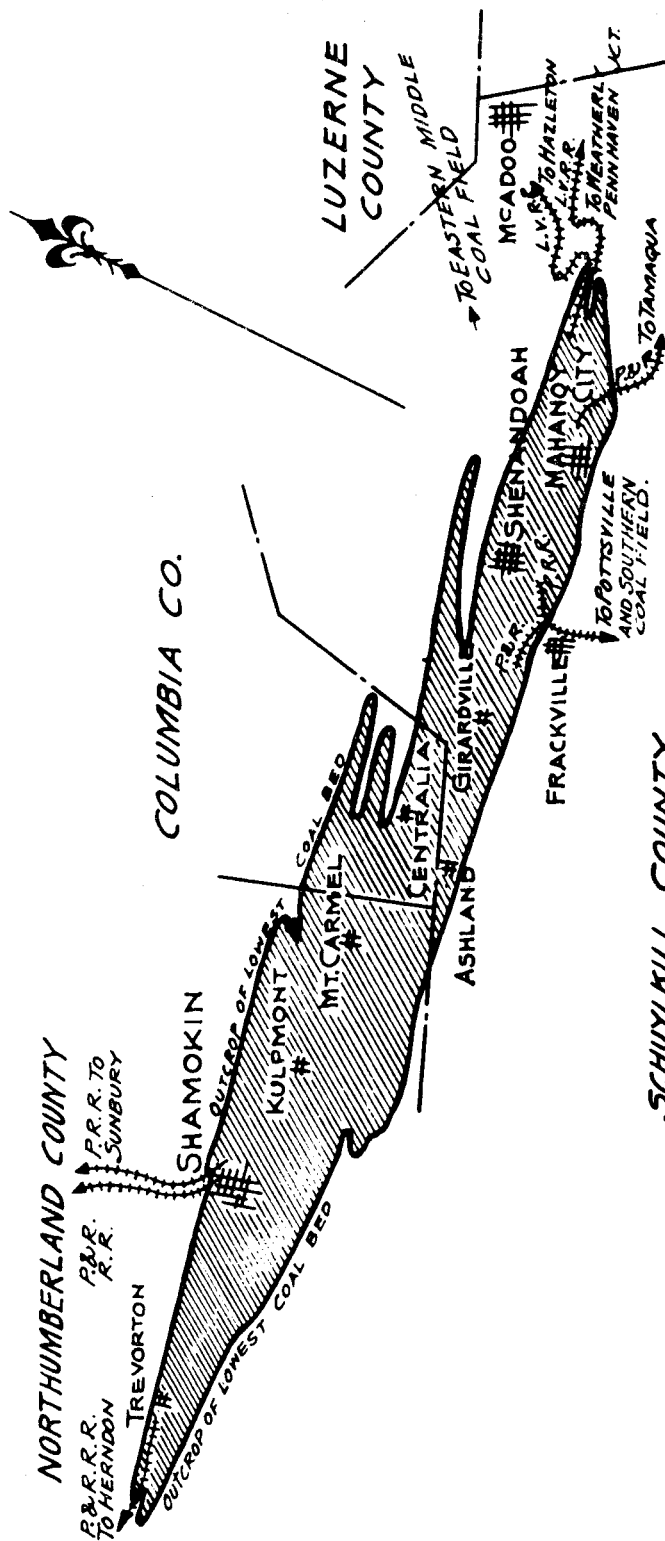
EASTERN-MIDDLE COAL FIELD.

SCALE 1" = 2000 FEET



Scale

JPK



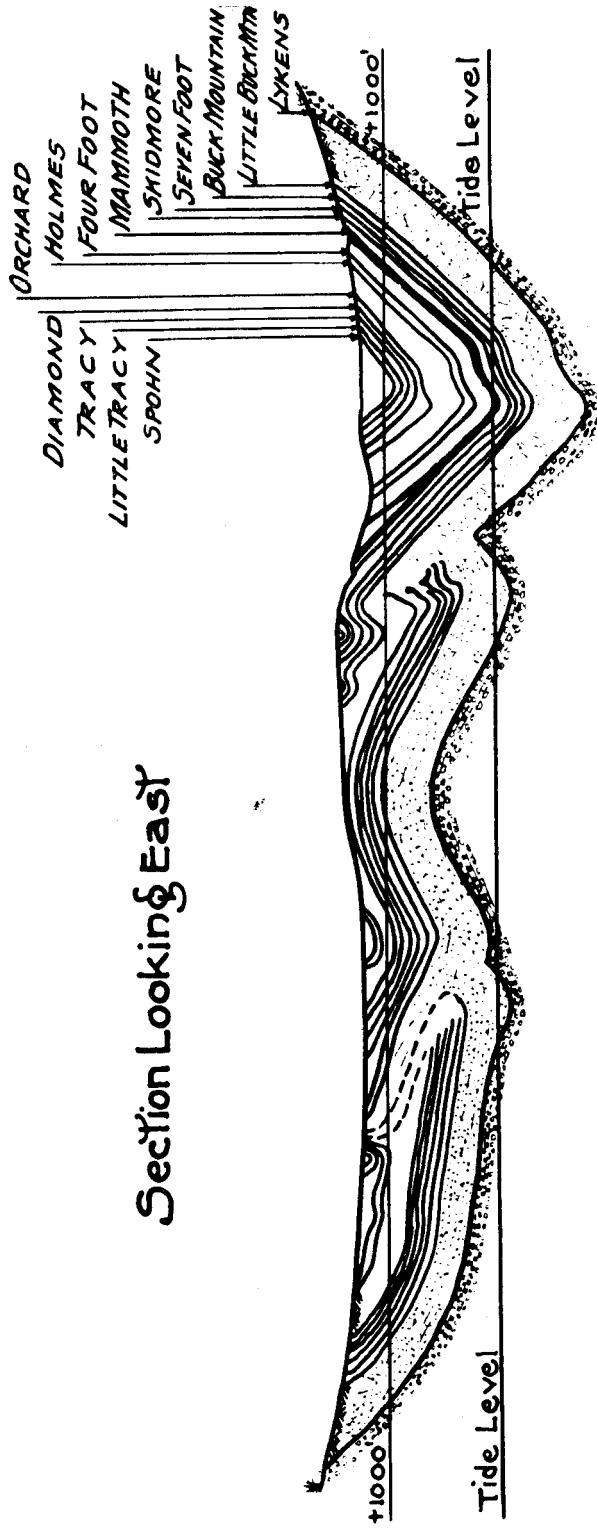
—THE WESTERN-MIDDLE—
ANTHRACITE COAL FIELD.

Area Coal 94 Sq. Miles

Scale 10000' 20000' 30000'

JR

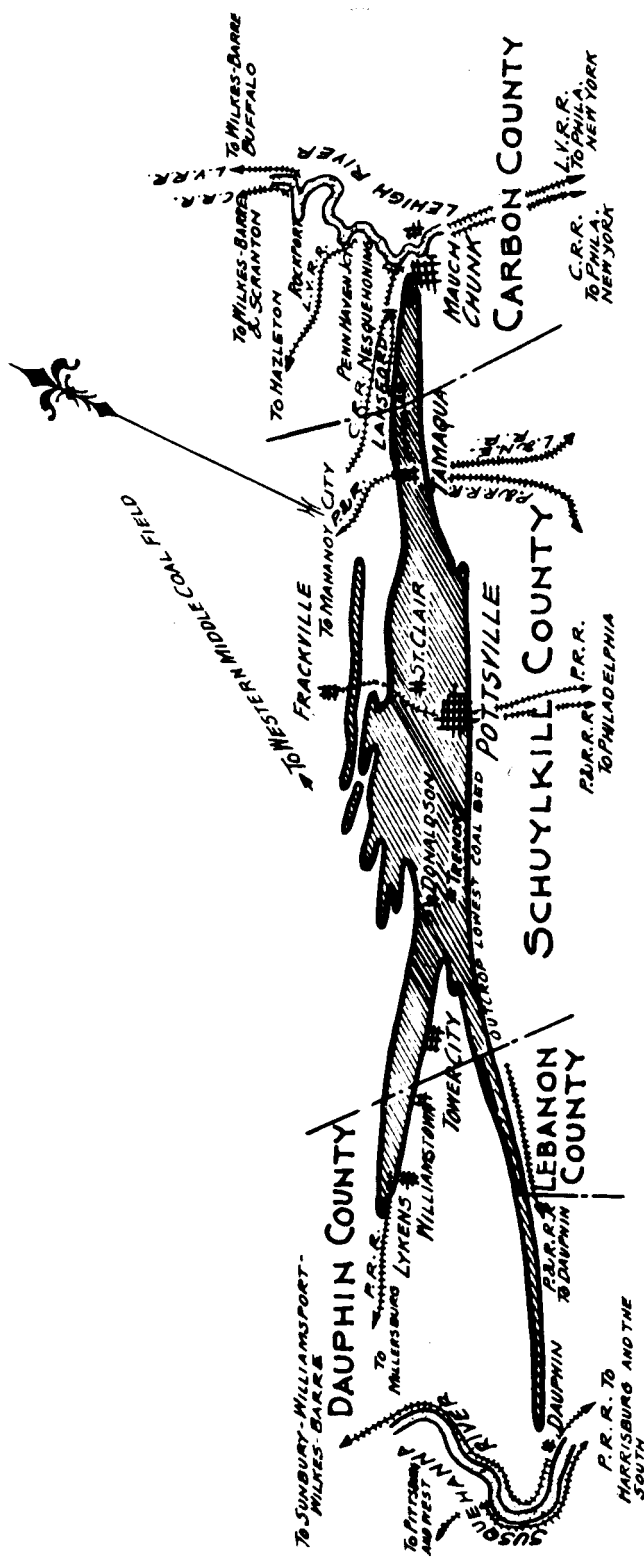
Section Looking East



THE WESTERN-MIDDLE COAL FIELD
CROSS-SECTION IN THE VICINITY OF
SHENANDOAH.

Scale - 800' 1600' 2400'

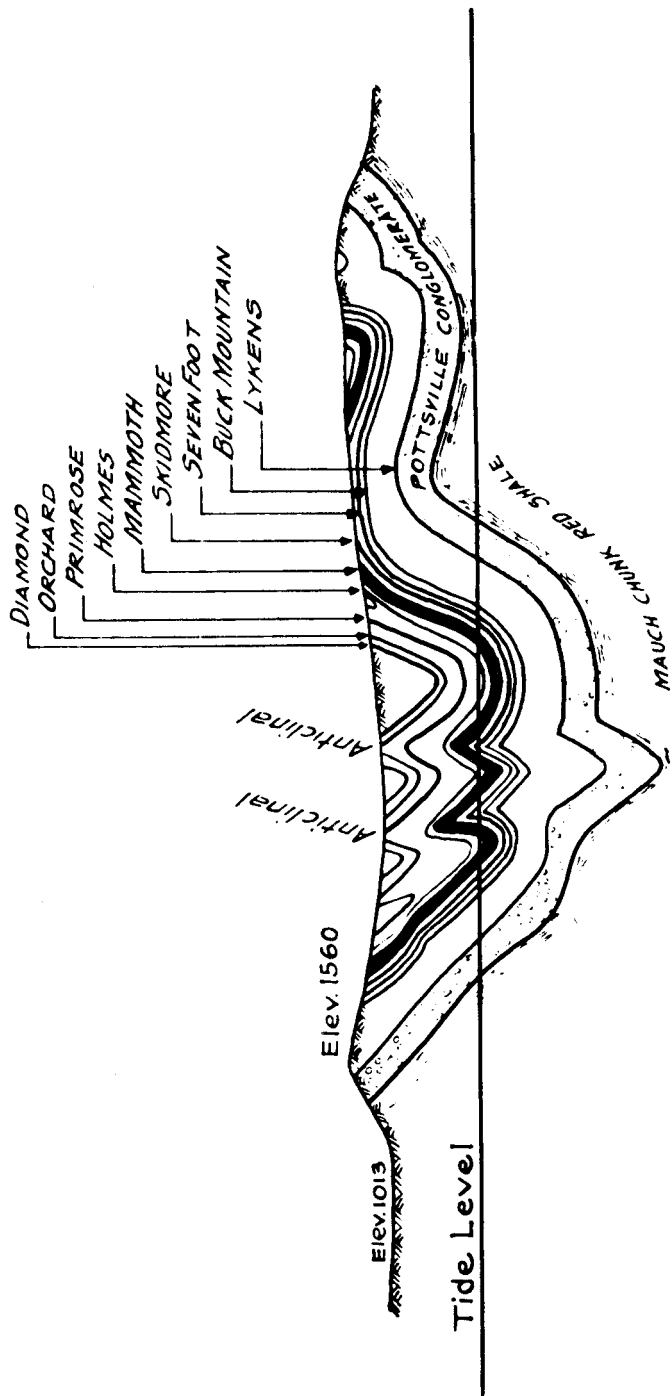
JRx



Area Coal 181 Sq. Miles.

THE SOUTHERN ANTHRACITE COAL FIELD.





THE SOUTHERN COAL FIELD. - CROSS-SECTION EAST OF TAMAQUA.

Scale = 500 1500' 2500'

ST. NICHOLAS CENTRAL BREAKER

FIELD CONFERENCE
PENNA. - N.Y. GEOLOGISTS
ANTHRACITE REGION
MAY 22 - 24, 1936

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The rated capacity of the St. Nicholas Breaker is more than 12,500 tons a day. The Breaker was designed to be a model of operating efficiency so that the coal produced is thoroughly free from slate, bone, and other impurities, properly sized and subjected to rigid tests to assure to the public a product of highest purity and quality. Coal from the mines enters St. Nicholas on a conveyor belt moving at a speed of 600 feet a minute. Twelve minutes later it has passed through the many processes of the preparation plant and is being loaded into freight cars for transportation to consumers.

Large laboratories have been installed in the Breaker and are thoroughly equipped to test the product before it is released for market. Inspectors take nine samples of coal from each railroad car loaded at the Breaker and these samples are subjected to the exacting tests designed to assure the highest standards of quality and sizing. If any car of coal fails to meet all of the tests, it is returned to the Breaker for reparation.

COVERS 500 ACRES

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The Breaker and its auxiliary buildings are constructed of steel, concrete, and other permanent materials. Automatic machinery of the most modern type is operated by motors perfectly synchronized by electrical controls. The vibration and dirt found in old fashioned coal breakers has been practically eliminated.

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STRUCTURAL FACTS

An idea of the immensity of the St. Nicholas preparation plant may be had from a few statistics concerning its construction and operation:-

Approximately 2,500 employees were engaged by contractors who built it.

More than 150,000 man days of direct employment at the site were provided by this construction enterprise during what was probably the most serious period of industrial depression in the history of the United States. Hundreds of thousands of additional man days of employment were provided by the orders for machinery and construction materials.

Construction was begun in May, 1931.

Approximately half a million cubic yards of grading was required to prepare the site for the builders.

Two streams were diverted into new channels.

Approximately 20 miles of railway tracks were laid.

Approximately 3,800 tons of structural steel were used, more than 10,000 cubic yards of reinforced concrete, a mile and a half of conveyor lines, 25 miles of conduit, 26,241 square feet of rubber belting, 118 miles of wire and cable, and 20 miles of pipe have been installed.

The pumps in the Breaker have a circulating capacity totaling approximately 150,000 gallons per minute. This is the equivalent of nearly 300,000 tons of water per 8-hour day.

There are several hundred motors of various types and sizes with a total capacity of 8,000 horse power for the operation of the Breaker equipment and its auxiliaries.

Half a dozen large steel and concrete water reservoirs have been built, there are sheds where 18 carloads of coal are thawed at once in Winter time, and a huge rotary car dump which overturns freight cars and empties them with amazing speed and ease.

The Breaker is constructed in two halves. Each half can be operated independently of the other, an arrangement which provides maximum flexibility in production and operation.

PRELIMINARY CLEANING

The St. Nicholas Plant receives coal of the same general classification of quality, specific gravity, and other characteristics loaded at mine mouths in the adjacent territory. As the coal comes up the mine shafts, it is fed into preliminary cleaner plants where large rocks and other impurities are removed and sent to refuse banks. The remaining large "feed", as the raw coal is called, is passed through rolls which reduce it to sizes that can be handled most efficiently by the Central Breaker. The feed is then loaded by conveyor belts into railroad cars and sent to the Receiving Yard at St. Nicholas. In the case of two collieries adjacent

to St. Nicholas, the feed is carried directly to the Breaker by a long covered belt conveyor which winds through the valley like a gigantic snake. Arrived at St. Nicholas, this conveyor lifts the coal at an angle of 11 degrees to the top of the Breaker where the process of complete preparation begins. Railroad cars loaded with raw coal from other mines in the Mahanoy District enter the Receiving Yard north of the Breaker, are overturned and emptied in a moment by the rotary dumper, and their content is fed onto the main conveyor and into the Breaker.

PERFECT PREPARATION

The feeding point at St. Nicholas is 120 feet above the ground level. At this point the conveyor belt empties the feed into a distributing shaker which apportions the coal between the two complete operating units into which the plant is divided. A deluge of water "launders" the coal at this point, thoroughly cleaning it of silt and mud before it enters the line of preparation machinery. After the feed has passed through the "laundry", it is then spilled onto scalping screens which divide the flow into sizes to be fed into various lines of preparation. The larger sizes are fed directly from this point into primary and secondary cones. The pea and buckwheat sizes and the rice and barley sizes are fed to smaller cones and the smallest size, known as No. 4 buckwheat, goes to hydrotators.

The cones are huge cone-shaped metal tanks in which pure coal is automatically separated from slate, bone or other incombustible material. The cones contain mixtures of sand and water, agitated by water jets and revolving arms. The sand and water mixture is constantly maintained at a point of gravity heavier than pure coal and lighter than any of the impurities which accompany the coal when it is removed from the depths of the earth. Since the sand and water mixture is heavier than coal, the coal floats as if it were wood,

and a stream of water carries it over the lip of the cone to the desanding shakers and the screens which separate it into commercial sizes. The impurities, being heavier than the sand and water mixture, automatically sink to the bottom, are drawn off through a series of traps or gates, and are then deposited on conveyors which remove this incombustible material for deposit on the nearby refuse banks.

CONE CLEANED

A well known natural law governs this process but the mechanisms for applying it with maximum efficiency are inventions perfected within the past decade. The law of gravity which controls the process may be illustrated as follows:

One cubic foot of water weighs 62 1/2 pounds. If enough sand is added to the water to cause one half of the water in the container to overflow, the container will then have half a cubic foot of water and half a cubic foot of sand. If the sand is ordinary quartz sand like that found along the seashore, it weighs approximately 81 pounds per half cubic foot, in the solid. A half cubic foot of water weighs 31-1/4 pounds. The mixture, therefore, weighs 112-1/4 pounds or approximately 1.80 times the weight of a cubic foot of water. Hence the specific gravity of the mixture is 1.80. If this mixture is agitated to prevent the sand from settling, the fluid mass or mixture will float any material having a specific gravity which is less than 1.80 and any material having a specific gravity greater than 1.80 will sink. This is true whether the materials to be purified are coarse or fine, provided they are coarser than the grains of sand.

At St. Nicholas, the mixture of sand and water in the cones is constantly regulated by automatic devices adjusted with the utmost care to maintain a constant perfection of separation of the coal from its impurities. The smallest size of coal prepared at St. Nicholas, known to the trade as No. 4 Buckwheat, goes through large hydrotators which classify the inflowing feed into two levels of withdrawal, the coal following the higher level and the impurities following the lower level.

EXACT SIZING

After the various sizes of coal have passed the cones, they move through water jets which clean them thoroughly and over long rows of sizing screens which effect an exact grading for commercial classification.

The St. Nicholas Breaker contains 20,000 square feet of screens, the size of apertures ranging from 4-1/2 inches to 1/50th of an inch. These screens are specially designed and constructed of highly durable materials. Many of them are 8 feet wide to accommodate the immense coal flow when the plant is operating at full capacity.

Every piece of machinery in St. Nicholas Breaker is specially planned and adjusted for the gentle handling of the coal which is literally "carried on rubber" so as to prevent unnecessary breakage and permit marketing a maximum of prepared sizes. This care is extended even to the loading of the coal into cars which will carry it to market. Famous Reading Anthracite is deposited in the cars by rubber conveyor belts which are lowered into the interiors and load the finished product with a drop of less than a foot, an arrangement which eliminates to the greatest possible degree the degradation of coal after it has left the preparation plant. Special loading facilities are provided for box cars which are clamped in a "cradle" which tilts them gently first to one side and then the other as they are loaded, so that the coal is placed and levelled without breakage.

OPERATING EFFICIENCY

Efficiency of operating equipment is to be found everywhere in the St. Nicholas plant. The water used in the plant is taken from the mine depths, treated in neutralization tanks, and thence pumped into the Breaker.

The pumps circulate a water supply sufficient for a city of considerable size, but wastage is avoided by a recovery

process which passes approximately 100 million gallons of water used in cleaning the coal during eight hours of operation into "thickeners" or sedimentation tanks. These sink the solids and return the purified water to the Breaker's circulating system.

Water is circulated through the Breaker at a rate of about 40,000 gallons per minute. Recirculation of this water permits a high rate of conservation. A new supply of water is introduced into the system at the rate of 3,000 gallons per minute, this being necessary for the make up supply to take care of the losses and the necessary water for pumping off silt and sludge. The sediment or sludge is trapped out of the bottom of the supply tanks and is conveyed by pipe lines to a large settling basin west of the Breaker where it drains and solidifies.

More than a thousand tons (2 million pounds) of sand are used in the circulating system of the Breaker. Sand washed out of the system in the preparation process is largely recovered, cleaned, reclassified, and returned to circulation by sand pumps.

CAREFUL DESIGN

Mechanical equipment throughout the Breaker is of the highest quality obtainable and most modern type. The belt conveyers throughout the plant have incorporated in their design the most modern features developed in this type of transportation, both overground and underground. All shafts used are alloy steel. All bearings are anti-friction, either of the roller or ball type. All gears are enclosed and running in oil - most of them of the herringbone type. Extreme care was exercised in laying out chutes in the plant so as to give the most delicate handling of the material throughout the process.

The care given to every pound of coal which passes through the Breaker is graphically illustrated by the use of a powerful electro magnet which hovers over the incoming flow as it arrives from the mines. Any "tramp" iron which may have gotten accidentally into the coal in the course of its transportation to St. Nicholas is seized by the magnet's invisible force and lifted out of the feeder line to be deposited later in a pile of scrap metal. Nails, bolts, and even pieces of metal rail are automatically removed by this method - for the magnet never misses.

Another marvel of care and exactitude is found in the weighing facilities at the Breaker. There is no guess work about the tare weight of railroad cars or the weight of the coal placed in them for market. When trains of run of mine coal arrive in the Receiving Yard at the Breaker, the cars pass over a weigh scale. After the cars are emptied of their content at the rotary dump, they are sent to wash racks where a corps of workers thoroughly clean their interiors with jets of water. The empty cars then pass over another scale and their weight is automatically registered upon a weight ticket. This ticket is then placed in a container and sent through a pneumatic tube to a scale house beyond the Breaker's loading bay. When a car has been loaded, it passes over the second scale, the weight ticket for this car on which the empty weight has been marked is again inserted beneath a stamping device and the loaded weight of the car is automatically printed on the ticket in a space below the tare weight.

RIGID INSPECTION

Inspection of every carload of Reading Anthracite has been designed to assure super quality for the customer. The Inspection Division and its laboratories comprise an organization distinct from the Breaker Management and the Company's Production Department. The Inspection Division is under the

control of the Sales Department, the idea being that the organization which produces and prepares Famous Reading Anthracite shall not be the judge of its own merit but shall be checked independently.

The coal inspectors watch every carload as it is being loaded and they may stop the loading at any time if the product does not meet their requirements. If their visual examination is favorable, they collect samples from nine points on the car in accordance with the highest standards of testing in the anthracite trade. These samples are placed in metal buckets which are marked with the number of the car and they are then attached to chain conveyors which carry them into the laboratory. Here the samples of Fyrewell (pea size) and under are placed in an electric dryer and are then screened to determine the percentage of over and under size. They are then divided and reduced by the "cone and quartering" formula to representative samples which are carefully weighed, placed in porcelain containers, and burned in electric furnaces to what is known by chemists as "constant weight", the final ash content. This ash weight is compared with the original weight to establish a percentage standard and if it is too high, the whole car of coal is condemned.

The large, or prepared sizes, are subjected to a different series of tests in a branch of the laboratory located in the building directly over the loading tracks. When the car has been filled to the satisfaction of the inspector, he takes 100 pounds of samples from the nine points fixed by standard requirements, places them in two buckets which are marked for identification and attaches them to the conveyor which carries them into the laboratory. The samples are weighed and are then passed through a series of electrically operated sizing screens and the sorted piles of coal are weighed again to determine the percentage of deviation from exact standard. The samples are next placed in a zinc chloride bath which floats the pure coal and sinks the impurities. If any impurities are revealed, they are washed, dried and weighed carefully to establish once more a per-

centage of purity.

When they have passed inspection, the carloads of Famous Reading Anthracite pass over the weigh scales and are then moved into the Classification Yard below the Breaker. Hundreds of carloads are made up daily into long trains which leave St. Nicholas for delivery in 40 States and 8 Canadian Provinces where millions of consumers use Famous Reading Anthracite for health, comfort and convenience in their homes.