Appraisal of Mineral Properties

AAP Fall 2024

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Appraisal of Mineral Properties

INSTRUCTOR: Dave Falkenstern

- Resource Technologies Corporation (2000)
- Professional Geologist
- International Institute of Mineral Appraisers

Appraisal of Mineral Properties

Resource Technologies: Jeffery R. Kern

- Pennsylvania General Appraiser
- Pennsylvania Certified Evaluator
- Member
  - International Institute of Mineral Appraisers
  - American Society of Appraisers
  - International Association of Assessing Officers
  - Institute of Business Appraisers
  - Mineral Economics and Management Society

- **Projects in Other States**
  - Delaware
  - Texas
  - Florida
  - Georgia
  - Virginia
  - Mississippi
  - Indiana
  - Ohio
  - Illinois
  - Alaska
  - West Virginia
  - Kentucky
  - Colorado
  - Tennessee
  - Wyoming
  - New Jersey
  - New York
  - North Carolina
  - Arkansas
  - Montana
  - Alabama
  - North Carolina
  - South Carolina

Outline

- Mineral Resources / Market Review
  - Coal
  - Aggregate
- Mineral Valuation
  - Reserves
  - Production
  - Prices / Costs / Royalty
  - Discount Rate
- Natural Gas
- Condemnation Case Study

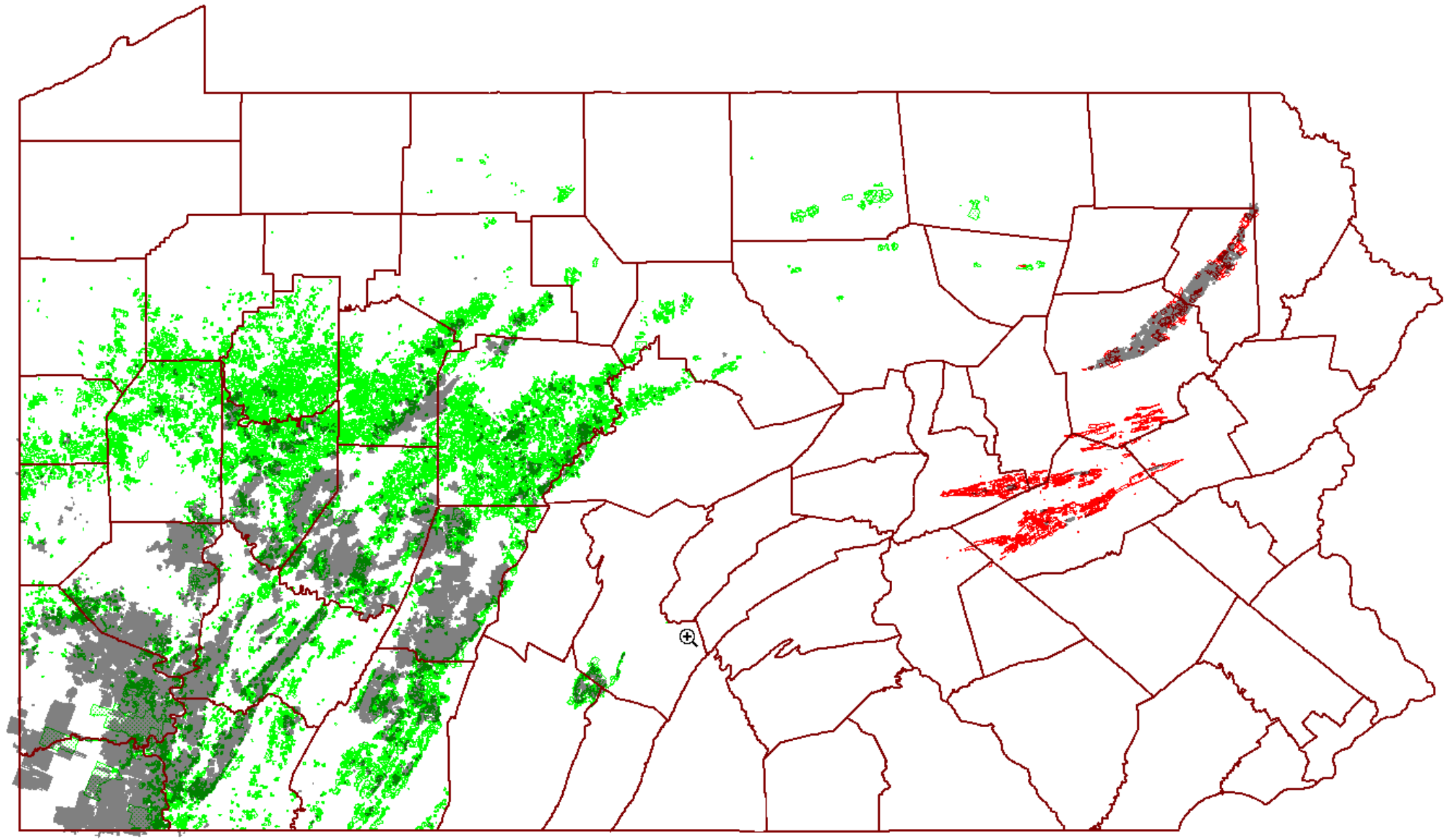
Minerals to be Valued

What is a mineral?

- Coal: Anthracite / Bituminous / Lignite / Coal Refuse
- Aggregates: Sand and Gravel / Crushed Stone
  - Limestone, Granite
- Dimension Stone (Granite, Limestone, Slate)
- Iron Ore
- Industrial / Specialty Minerals
  - Magnesite / Trona / Phosphate / Zircon / Titanium /Gypsum / Talc
- Metals
  - Gold, Silver, Copper, Platinum
- Hydrocarbons: Natural Gas / Oil / NG Liquids

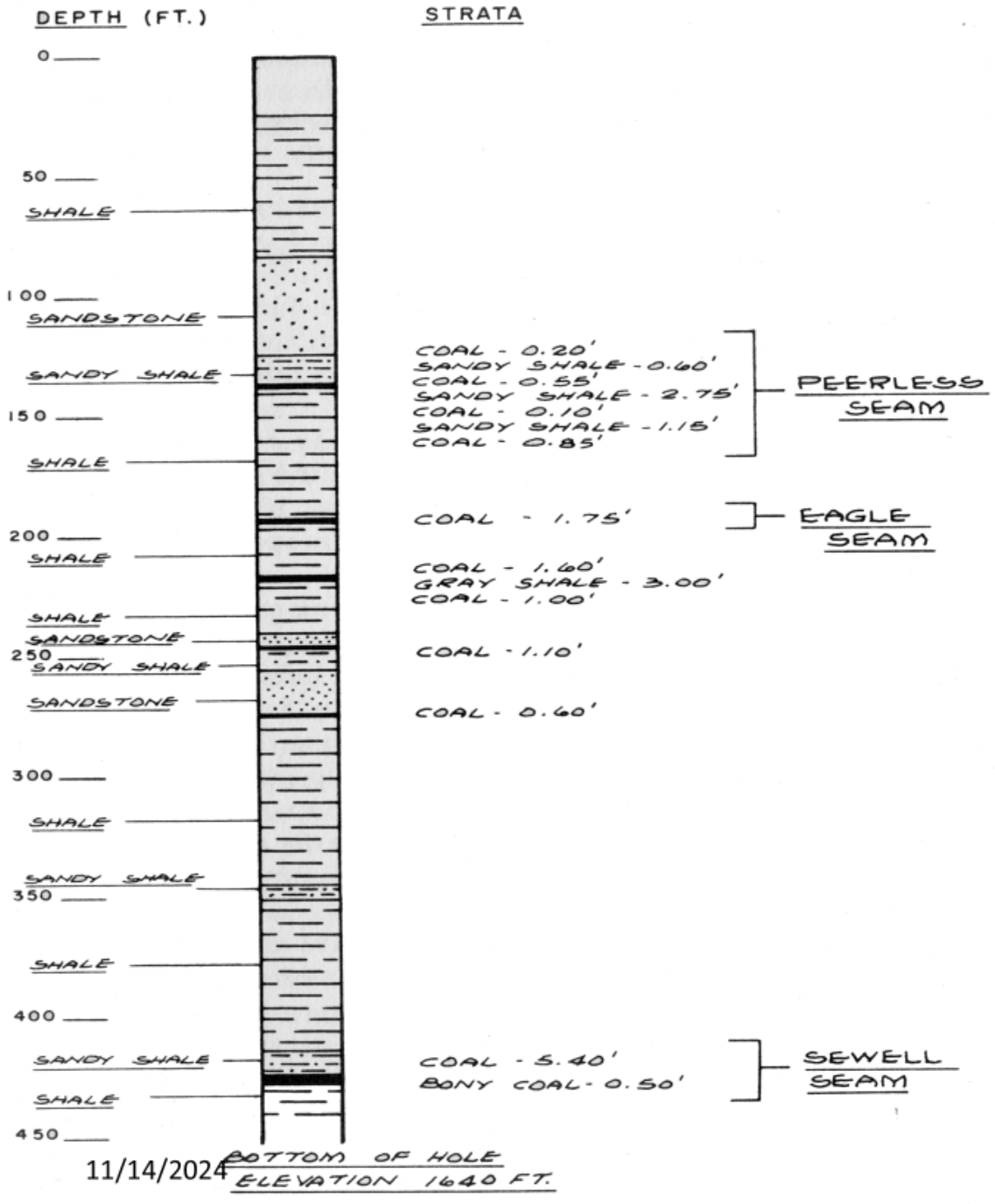
Coal

Coal Mining in Pennsylvania



DRILL HOLE NO. 6

COLLAR ELEVATION 2062'



11/14/2024

Pennsylvania Deep Mine

Battery Powered Mine Car

Belt from Deep Mine

Box Cut / Highwall Miner

Coal Seam

Coal Cleaning Plant

Coal Cleaning Plant and Shop

Coal Loading on Train

Coal Waste

Surface Coal Mining


Fault
5 Vein
5 Vein
5 Vein
Small-
Scale
Anticline

Production – Surface Mines

County	Total
Somerset	823,977
Clearfield	422,569
Centre	136,006
Armstrong	133,753
Cambria	104,346
Huntingdon	80,995
Butler	61,134
Lycoming	46,233
Westmoreland	30,311
Fayette	29,939
Mercer	22,004
Clarion	11,908
Indiana	1,887
Grand Total	1,905,062

County	Total
Luzerne	1,471,361
Schuylkill	1,317,819
Carbon	803,317
Northumberland	312,454
Lackawanna	264,701
Columbia	94,183
Total	4,263,835

Company	Total
Heritage Coal & Natural Resources LLC	368,987
RES Coal LLC	348,082
J & J Svonavec Excav Inc	214,185
Allegheny Mineral Corp	159,362
Wilson Creek Energy LLC	147,964
Coal Loaders Inc	115,174
River Hill Coal Co Inc	104,712
Laurel Sand & Stone Inc	104,346
Junior Coal Contr Inc	66,423
Rosebud Mining Co	47,162
Fisher Mining Company	46,233
Mountaineer Mining Corp	33,671
Stitt Coal Co Inc	30,800
Ben Hal Mining Inc	22,004
T & B Excav Inc	21,915
PBS Coals Inc	19,279
Gary Gioia Coal Co	9,070
Glen Gery Corp	7,480
Corey L Shawver dba Hilltop Coal Co	6,113
Seneca Ldfl Inc	4,725
Fieg Bros	4,249
Valhalla Mining Co LLC	4,097
Charles L Swenglish & Sons Coal Co Inc	3,927
Hardrock Coal Co	3,358
Neiswonger Const Inc	3,102
Swisher Contr Inc	2,599
Beilchick Bros	1,468
King Coal Sales Inc	1,404
IA Const Corp	1,326
Derry Stone & Lime Company Inc	655
Philip Reese Coal Co Inc	500
Alverda Enterprises Inc	419
AW Long Coal Co	271
Grand Total	1,905,062

Production – Deep Mines (2023)

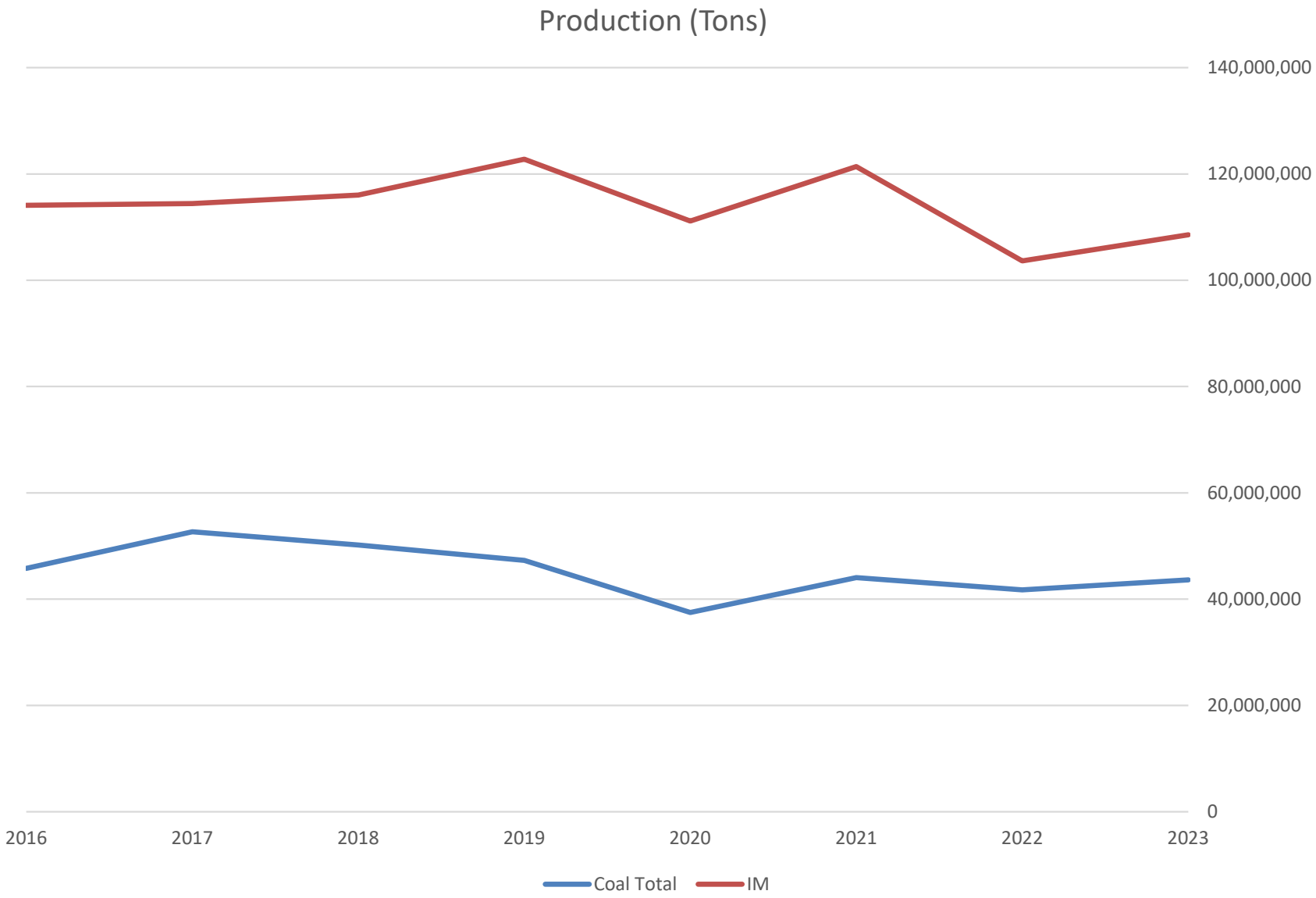
County	Company	Site Name	Production	Seam
Armstrong	Rosebud Mining Co	Parkwood Mine	394,976	Upper Freeport
Cambria	Rosebud Mining Co	Madison Mine	423,047	Upper Freeport
Cambria	Rosebud Mining Co	Cresson Mine	503,157	Upper Freeport
Clearfield	Rosebud Mining Co	Cherry Tree Mine	1,420	Upper Freeport
Clearfield	Rosebud Mining Co	Penfield Mine	155,021	Lower Kittanning
Clearfield	Rosebud Mining Co	Harmony Mine	131,950	Upper Kittanning
Greene	Consol PA Coal Co LLC	Bailey Deep Mine	11,163,524	Pittsburgh
Greene	Consol PA Coal Co LLC	Enlow Fork Mine	8,660,839	Pittsburgh
Greene	Consol PA Coal Co LLC	Harvey Mine	6,237,282	Pittsburgh
Greene	Iron Cumberland LLC	Cumberland Mine	5,934,113	Pittsburgh
Indiana	Rosebud Mining Co	Dutch Run Mine	224,934	Upper Freeport
Indiana	Rosebud Mining Co	Lowry Deep Mine	174,879	Lower Kittanning
Indiana	Rosebud Mining Co	Brush Valley Mine	611,254	Lower Kittanning
Indiana	Rosebud Mining Co	Barrett Deep Mine	416,706	Lower Kittanning
Indiana	Rosebud Mining Co	Knob Creek Mine	126,999	Upper Kittanning
Indiana	Rosebud Mining Co	Heilwood Mine	151,222	Lower Kittanning
Indiana	Rosebud Mining Co	Coral Graceton Mine	1,376	Lower Kittanning
Indiana	Rosebud Mining Co	Crooked Creek Mine	593,366	UFP, UKT
Indiana	Rosebud Mining Co	Fulton Run Mine	0	UFP, UKT
Jefferson	Rosebud Mining Co	Kocjancic Mine	163,034	Lower Kittanning
Somerset	LCT Energy LP	Cass No 1 Mine	0	Lower Freeport
Somerset	LCT Energy LP	Maple Springs Mine	170,378	Lower Kittanning
Somerset	Quecreek Mining Inc	Quecreek No 1	0	Upper Kittanning
Somerset	Rosebud Mining Co	Mine 78	290,538	Upper Kittanning
Somerset	Roxcoal Inc	Horning Deep Mine	128,739	Lower Freeport
Somerset	Wilson Creek Energy LLC	Acosta Deep Mine	284,204	Middle Kittanning
Westmorland	C & D Coal Co LLC	Kingston West Mine	0	Upper Freeport
Westmorland	LCT Energy LP	Rustic Ridge #1 Mine	466,189	Lower Kittanning
Northumberland	Bear Gap Coal	N & L Slope	0	Lykens Valley #4
Schuylkill	B & B Anthracite Coal Co	Rock Ridge Mine	2,684	Buck Mountain
Schuylkill	Kimmels Mining Inc	Williamstown #1 Mine	6,488	Lykens Valley #3
Schuylkill	M & D Anthracite Coal Co	1 Slope Mine	3,124	Buck Mountain
Schuylkill	RS & W Coal Co	Woods Drift Mine	16,782	Rough
Schuylkill	S & J Coal Mine	S & J Coal 2 Mine	22,417	Buck Mtn

Production – Deep Mines (2023)

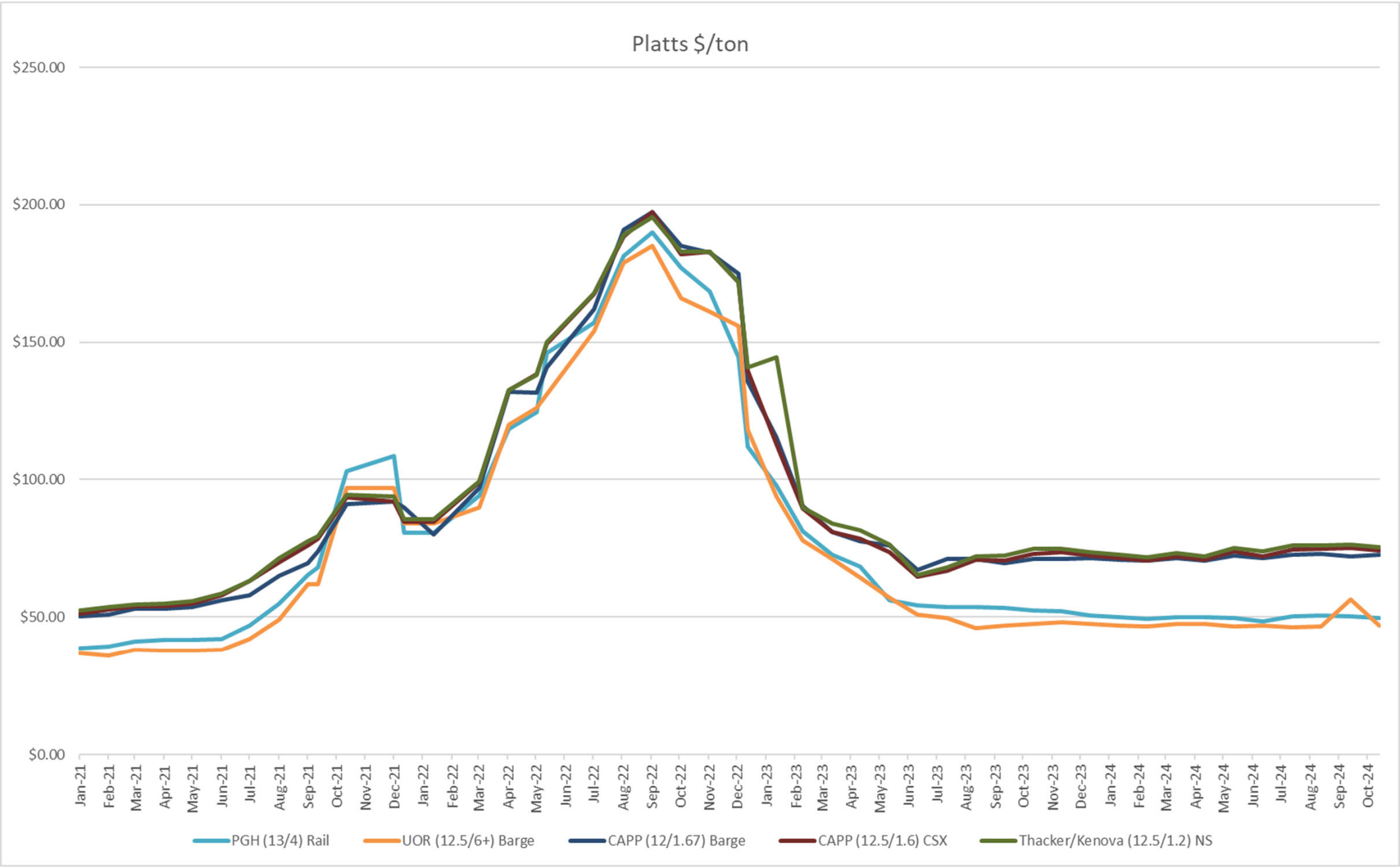
County	Total
Greene	31,995,758
Indiana	2,300,736
Cambria	926,204
Somerset	873,859
Westmorland	466,189
Armstrong	394,976
Clearfield	288,391
Jefferson	163,034
Schuylkill	51,495
Northumberland	0
Grand Total	37,460,642

Company	Total
Consol PA Coal Co LLC	26,061,645
Iron Cumberland LLC	5,934,113
Rosebud Mining Co	4,363,879
LCT Energy LP	636,567
Wilson Creek Energy LLC	284,204
Roxcoal Inc	128,739
S & J Coal Mine	22,417
RS & W Coal Co	16,782
Kimmels Mining Inc	6,488
M & D Anthracite Coal Co	3,124
B & B Anthracite Coal Co	2,684
Bear Gap Coal	0
C & D Coal Co LLC	0
Quecreek Mining Inc	0
Grand Total	37,460,642

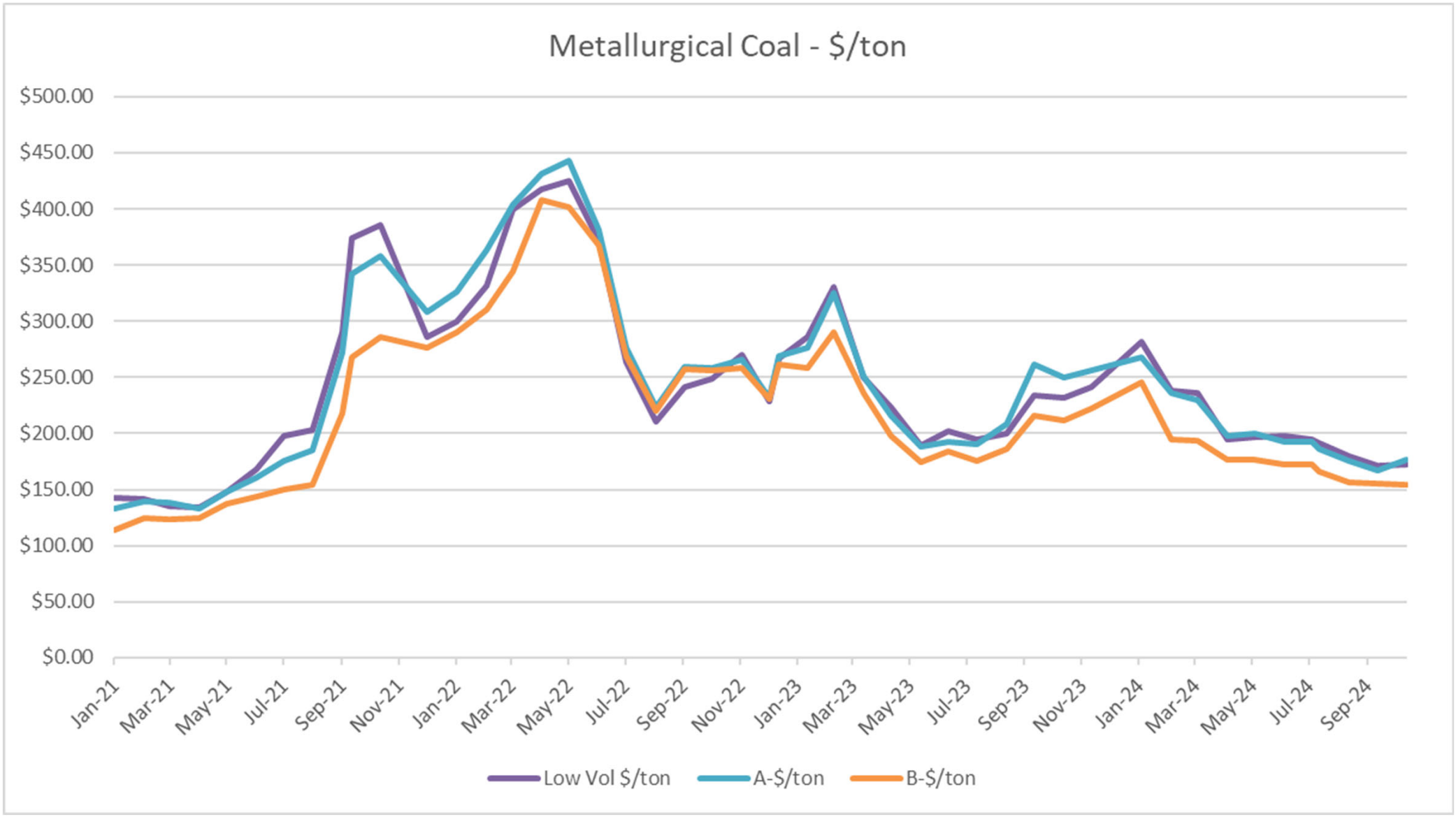
Production (2016-2023)



Prices – Steam Coal



Prices - Met


Metallurgical Coal - $/ton
$500.00
$450.00
$400.00
$350.00
$300.00
$250.00
$200.00
$150.00
$100.00
$50.00
$0.00
Jan-21
Mar-21
May-21
Jul-21
Sep-21
Nov-21
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Mar-23
May-23
Jul-23
Sep-23
Nov-23
Jan-24
Mar-24
May-24
Jul-24
Sep-24
Low Vol $/ton
A-$/ton
B-$/ton


35

Coal Refuse

Refuse Reprocessed

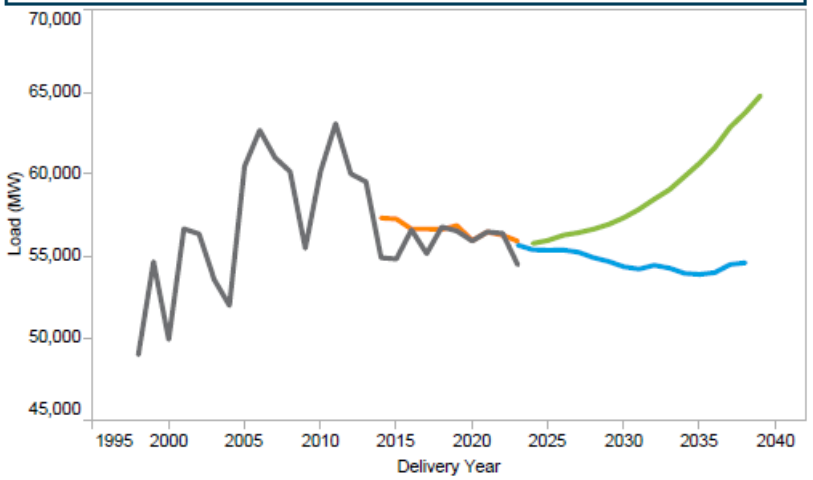
- Bituminous – 2,312,043
- Anthracite – 3,997,063

Power Demand?

PGM

PJM Mid-Atlantic (MAAC)

Summer Peak



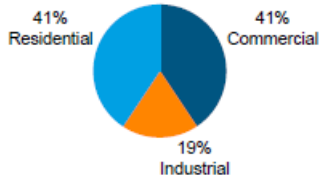
Weather - Annual Average 1994-2022

Avg Summer Daily Temp	74.7
Avg Summer Max Temp	96.3
Avg Winter Daily Temp	34.9
Avg Winter Min Temp	6.5

Zonal 10/15 Year Load Growth

SUMMER	0.7%	1.0%
WINTER	1.7%	1.7%

RCI Makeup



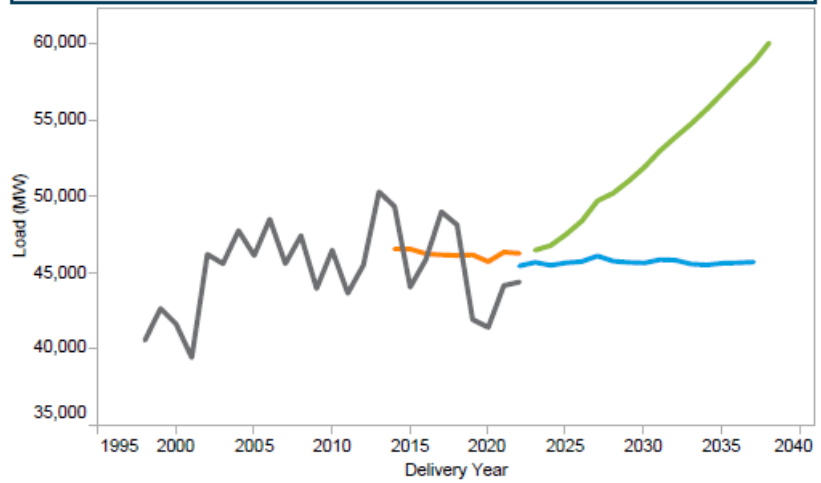
Zones

AE	JCPL	PENLC	PSEG
BGE	METED	PEPCO	RECO
DPL	PECO	PL	UGI

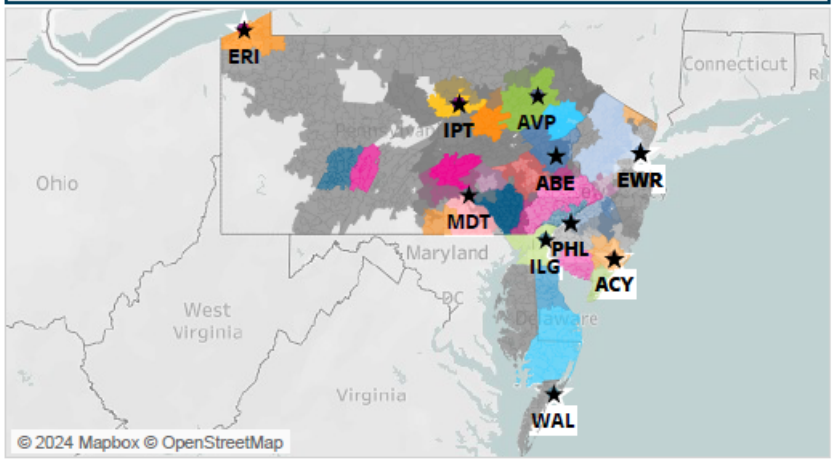
LDAs

E-MAAC C-MAAC
S-MAAC W-MAAC

Winter Peak



Metropolitan Statistical Areas and Weather Stations

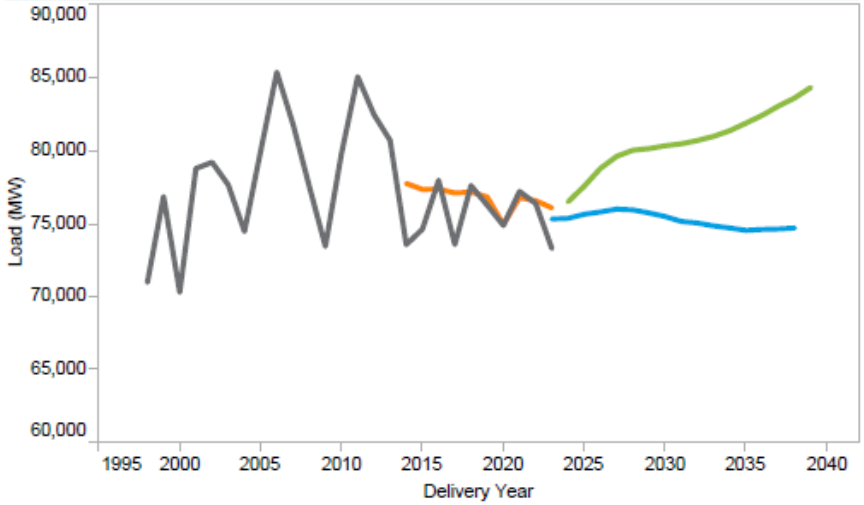


Peak WN peak Forecast 2023 Forecast 2024

PGM

PJM Western

Summer Peak



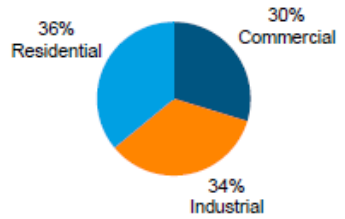
Weather - Annual Average 1994-2022

Avg Summer Daily Temp	73.2
Avg Summer Max Temp	93.2
Avg Winter Daily Temp	32.0
Avg Winter Min Temp	-1.0

Zonal 10/15 Year Load Growth

SUMMER	0.6%	0.7%
WINTER	0.9%	0.8%

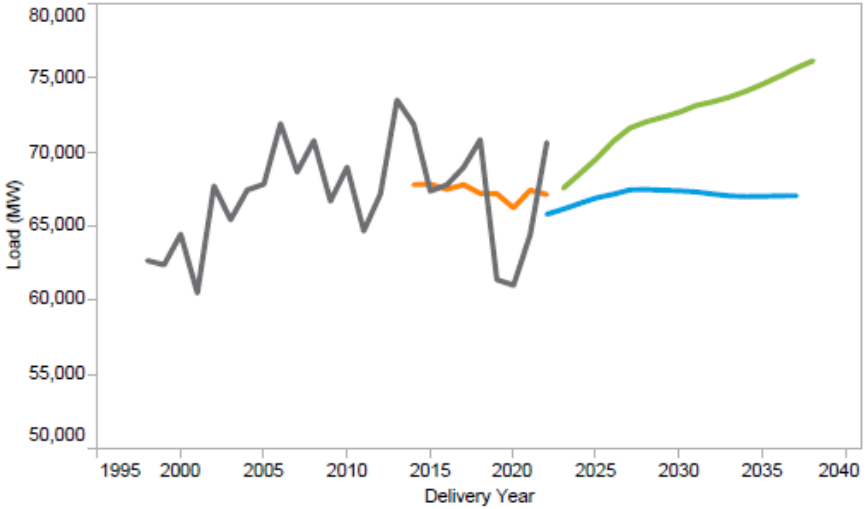
RCI Makeup



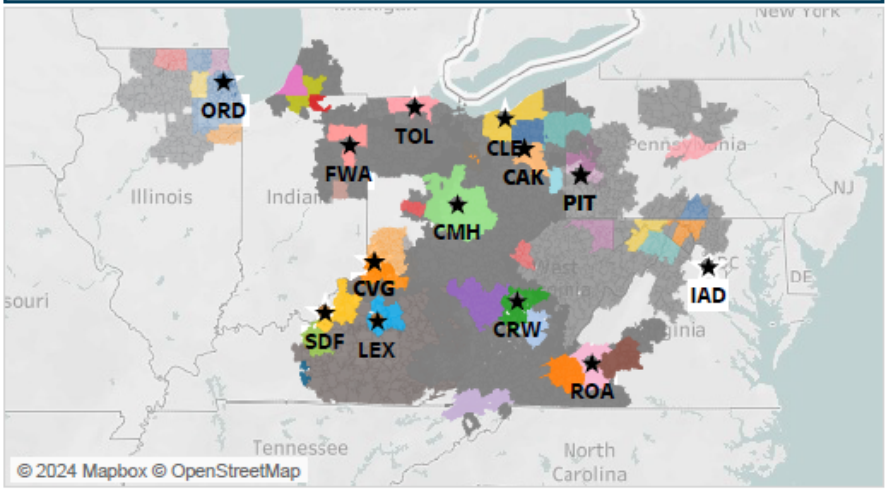
Zones

AEP	COMED	DLCO
APS	DAYTON	EKPC
ATSI	DEOK	OVEC

Winter Peak



Metropolitan Statistical Areas and Weather Stations



Peak WN peak Forecast 2023 Forecast 2024

Data Centers

Load Forecasts May Be Understating Data Center Load Growth

According to the Boston Consulting Group (BCG), data centers currently represent 2.5% of U.S. electricity consumption. By 2030, BCG expects energy use to grow from 126 TWh to 335 TWh, or demand of 17 GW to 45 GW.

According to JLL, siting for "power hungry" data centers depends on land *and* power availability. Data center growth is forecast to exceed $150 billion through 2028.

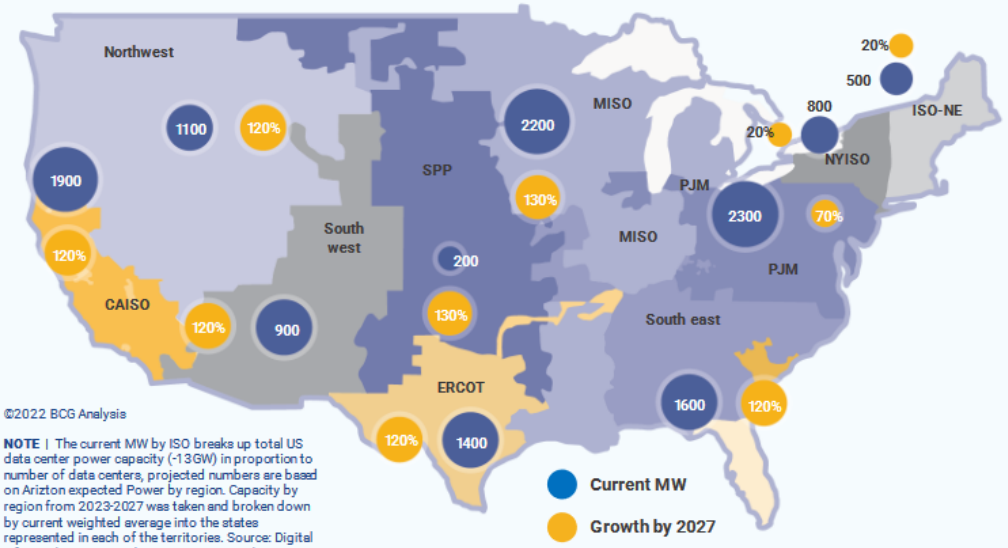
New generative artificial intelligence (GenAI) is a significant driver of BCG's estimate, with 2 GW of GenAI-related load in the base case and possibly an *additional* 7 GW of GenAI load online by 2030. At this higher end, BCG estimates that data centers could consume 7.5% of all electricity in the U.S.

Seven case studies in this report identify data centers as one driver of near-term load growth. Forecasts of 5-year growth vary: BCG projects 13 GW, while Schneider Electric's 9 GW forecast anticipates further efficiency gains.

However, neither MISO nor CAISO appear to have included substantial data center growth in their 2023 forecasts. Based on BCG's forecast, this could mean 3-5 GW of load growth is missing from the national load growth forecast.

By 2030, BCG expects energy use to grow from 126 TWh to 335 TWh, or demand of 17 GW to 45 GW.

>60% of Data Centers Expected in MISO, CAISO, PJM, and Southeast by 2027



©2022 BCG Analysis

NOTE | The current MW by ISO breaks up total US data center power capacity (~13GW) in proportion to number of data centers, projected numbers are based on Arizton expected Power by region. Capacity by region from 2023-2027 was taken and broken down by current weighted average into the states represented in each of the territories. Source: Digital Infra Real Estate, Omdia, Arizton, BCG Analysis

SOURCES | Arizton, *US Data Center Construction Market – Industry Outlook and Forecast 2023-2028* (February 2023).
Avelar, Victor et. al., *The AI Disruption: Challenges and Guidance for Data Center Design* (September 2023).
Boston Consulting Group, *The Impact of GenAI on Electricity* (September 2022).
JLL, *North America Data Center Report* (H1 2023).
Mordor Intelligence, *U.S. Data Center Construction Market Size* (2023).

Aggregates

Sand and Gravel Deposit

Sand and Gravel Dredge

Annville - Limestone

Drill Rig

Loading Hopper to Crush Rock

Granite Quarry

Crushed Rock for Cement

Crushed Rock for Cement

Sand and Gravel Stockpile

Production - County

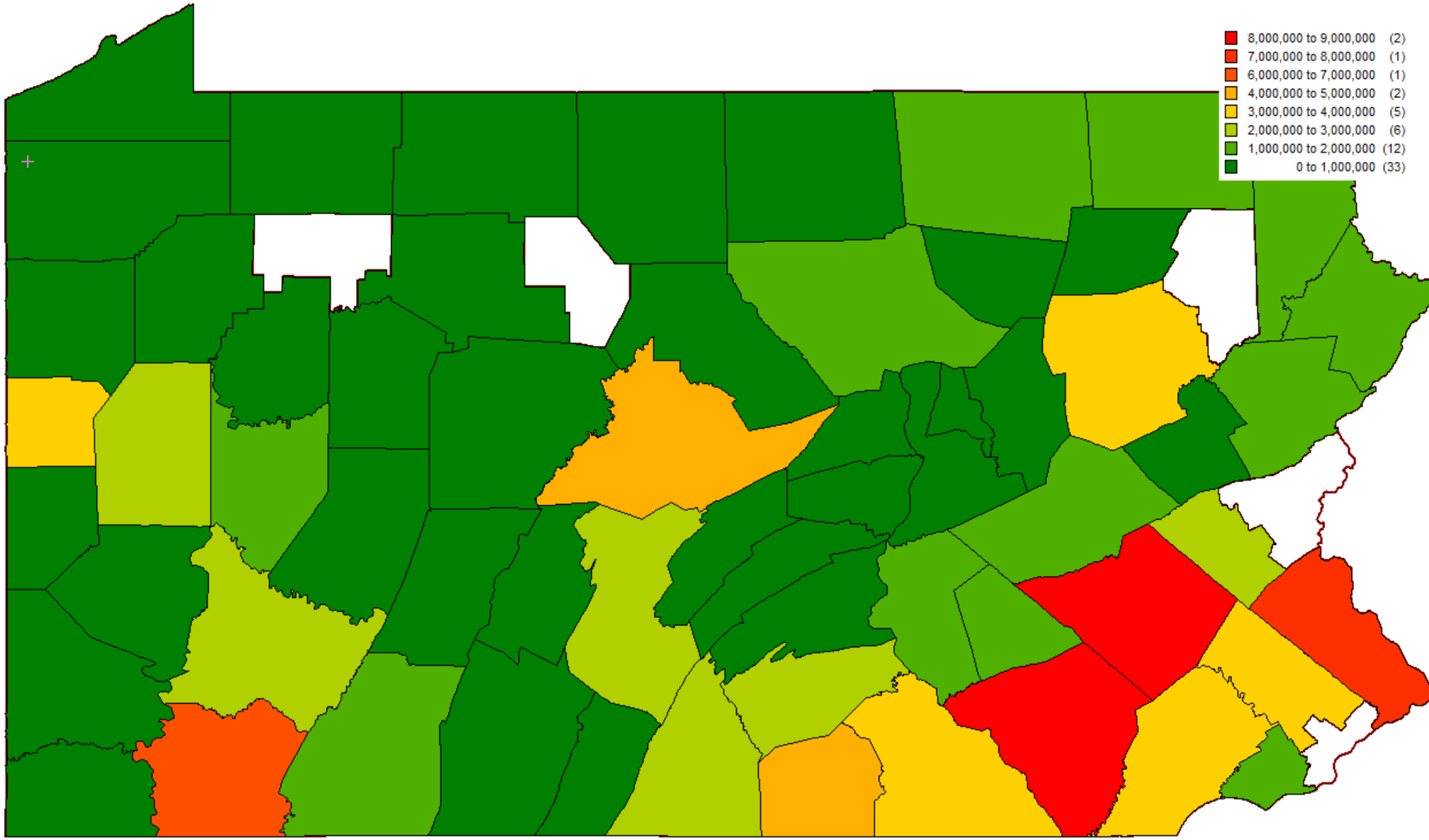
County	Total		County	Total
Grand Total	108,559,817		Monroe	1,795,691
Lancaster	8,942,952		Dauphin	1,614,514
Berks	8,871,051		Somerset	1,449,213
Bucks	7,238,205		Schuylkill	1,368,435
Fayette	6,981,925		Bradford	1,364,919
Northampton	6,757,724		Susquehanna	1,258,171
Adams	4,752,972		Lycoming	1,254,809
Centre	4,568,725		Wayne	1,160,749
Luzerne	3,884,020		Armstrong	1,154,755
York	3,862,914		Pike	1,089,070
Lawrence	3,635,327		Delaware	1,048,190
Montgomery	3,214,695		Blair	967,372
Chester	3,211,670		Montour	894,554
Franklin	2,774,555		Northumberland	844,198
Butler	2,622,591		Bedford	762,532
Cumberland	2,602,205		Tioga	736,954
Westmoreland	2,569,528		Union	695,109
Huntingdon	2,200,302		Mercer	682,114
Lehigh	2,021,154		Mifflin	545,435
Lebanon	1,830,478		Clinton	487,414

Production - Company

Company	Total	Company	Total
New Enterprise Stone & Lime	16,234,032	St Thomas Dev Inc	971,324
Heidelberg Materials NE LLC	11,219,163	Kinsley Const Inc	953,202
H & K Group Inc	7,028,177	Allan Myers Materials PA Inc	936,829
Pennsy Supply Inc	5,849,833	Coolspring Mining Inc	798,631
Eureka Stone Quarry Inc	3,917,276	Derry Stone & Lime Co.	728,073
Allegheny Mineral Corp	3,469,821	Pottsville Materials LLC	674,180
Graymont PA Inc	2,925,428	Wilkes Barre Materials Inc	585,974
Heidelberg Material US Cement	2,859,254	US Silica Co	554,895
Naceville Materials	2,750,315	Meckleys Limestone Prod Inc	548,227
Vulcan Const Materials LP	2,401,129	Cnty Line Quarry Inc	547,735
Glenn O Hawbaker Inc	2,141,892	Union Quarries Inc	538,000
Dyer Quarry Inc	2,085,171	H & H Materials Inc	526,311
Martin Stone Quarries Inc	2,070,250	Glacial Sand & Gravel Co	477,198
Laurel Aggregates of Delaware LLC	2,011,715	Neiswonger Const Inc	474,253
Amerikohl Aggregates Inc	1,910,744	Allan Myers LP DBA Allan Myers Materials	451,134
Specialty Granules Inc	1,852,876	Pierson Rheems LLC	441,439
Highway Materials Inc	1,842,179	Decristo Inc	427,096
Glasgow Inc	1,822,000	Rocky Licensing Corp	406,784
York Bldg Prod Co Inc	1,710,200	Dalrymple Gravel & Contr Co Inc	381,240
Bullskin Stone & Lime LLC	1,624,595	Keystone Lime Co	378,779
Compass Quarries Inc	1,601,668	Bluegrass Materials Co LLC	378,643
Keystone Cement Co	1,294,584	Hazleton Materials LLC	374,337
Three Rivers Aggregates LLC	1,117,764	Holcim (US) Inc	361,424
Rohrer's Quarry Inc	1,083,338	Con Stone Inc	353,990
Hercules Cement Co LP	979,817	Delaware Quarries Inc	343,207

Production – Lithology

Mineral	Total
Limestone	64,251,770
Sandstone	12,320,417
Sand & Gravel	8,565,998
Argillite	7,525,703
Diabase	4,542,138
Other Metamorphic	3,141,564
Shale	2,710,532
Clay	1,228,165
Bluestone	1,122,532
Granite	778,075
Quartzite	711,944
Hornfels	497,448
Gneiss	451,134
Topsoil	274,087
Slate	174,848
Slag	119,470
Sand & Gravel	66,100
Limestone	51,700
Other Sedimentary	16,200
Red-Dog (Cinders)	8,480
Dolomite	512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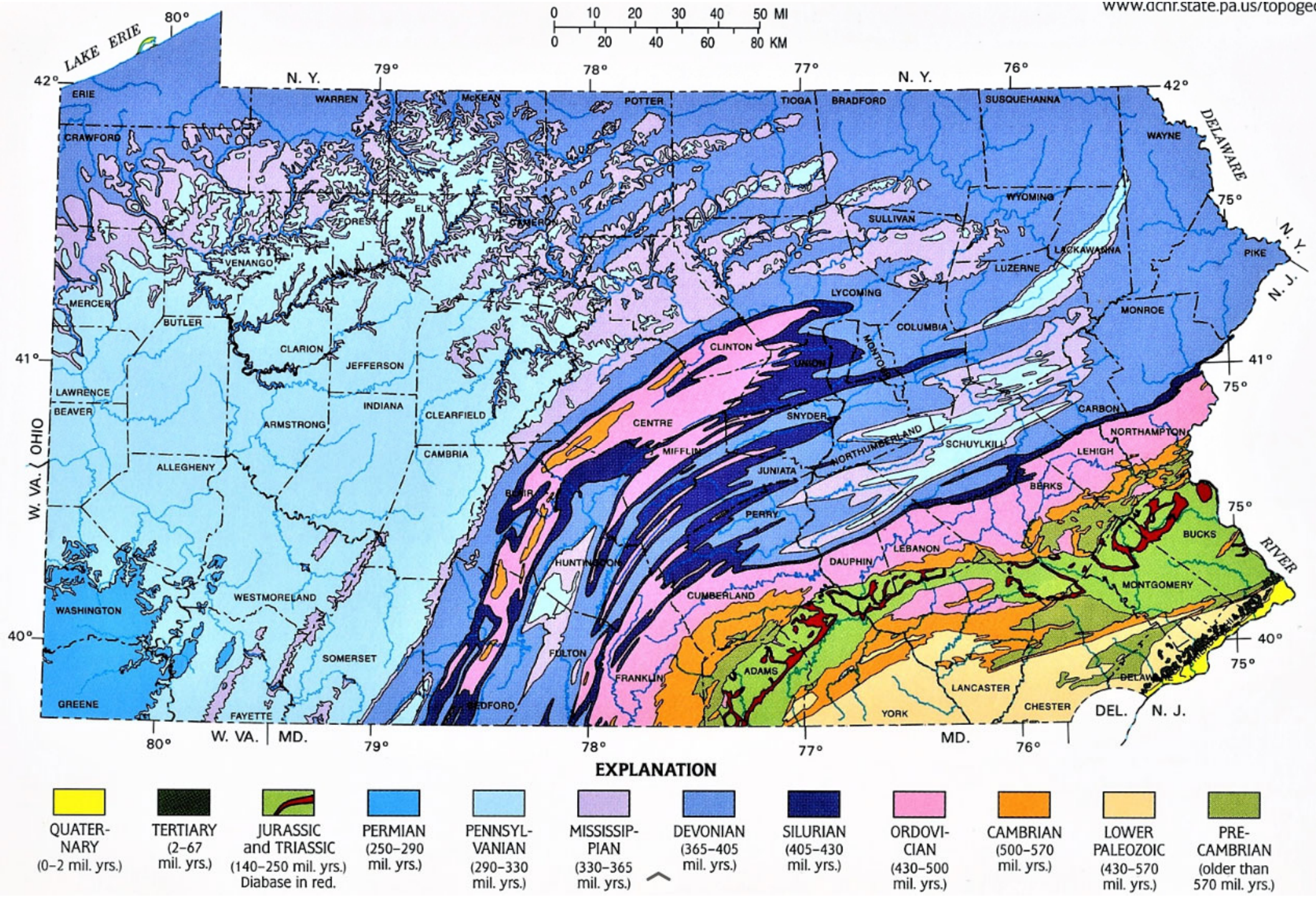
7,000,000 to 8,000,000 (1)
6,000,000 to 7,000,000 (1)
4,000,000 to 5,000,000 (2)
3,000,000 to 4,000,000 (5)
2,000,000 to 3,000,000 (6)
1,000,000 to 2,000,000 (12)
0 to 1,000,000 (33)

Geology and Location

- Area Population Market
- Rock Quality
  - PennDOT Specifications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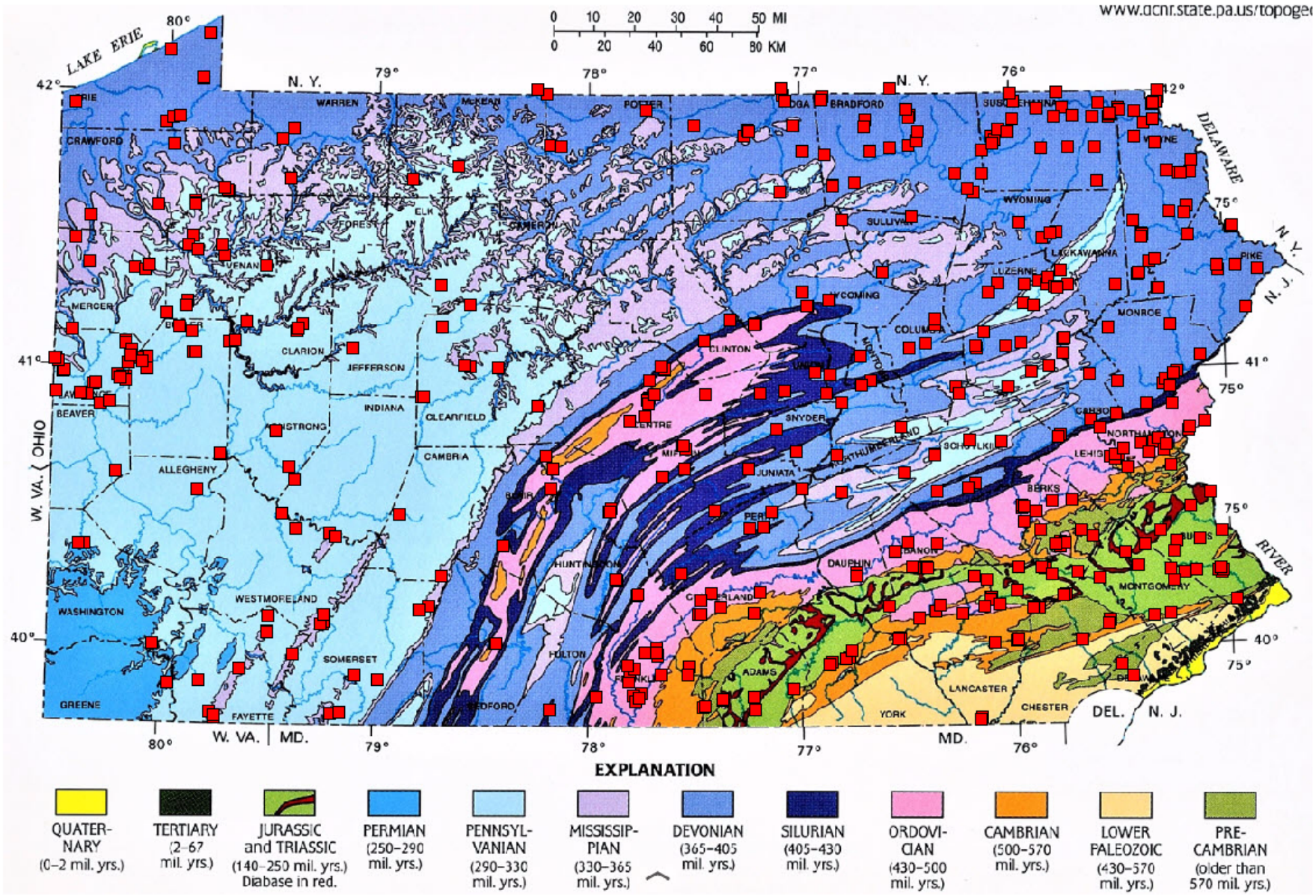
McKEAN
POTTER
TIOGA
BRADFORD
SUSQUEHANNA
WAYNE
PIKE
CRAWFORD
MERCER
VENANGO
FOREST
ELK
CAMERON
SULLIVAN
WYOMING
LACKAWANNA
LUZERNE
LYCOMING
MONROE
BUTLER
CLARION
JEFFERSON
CLINTON
COLUMBIA
MONTOUR
UNION
LAWRENCE
BEAVER
ARMSTRONG
INDIANA
CLEARFIELD
CENTRE
SNYDER
CARBON
NORTHUMBERLAND
SCHUYLKILL
NORTHAMPTON
ALLEGHENY
CAMBRIA
MIFFLIN
LEHIGH
JUNIATA
BERKS
BLAIR
PERRY
BUCKS
LEBANON
DAUPHIN
HUNTINGDON
MONTGOMERY
WESTMORELAND
CUMBERLAND
WASHINGTON
SOMERSET
FULTON
ADAMS
FRANKLIN
LANCASTER
GREENE
FAYETTE
BEDFORD
YORK
CHESTER
41°
40°
80°
79°
78°
77°
76°
75°
42°
EXPLANATION
QUATER-NARY (0–2 mil. yrs.)
TERTIARY (2–67 mil. yrs.)
JURASSIC and TRIASSIC (140–250 mil. yrs.) Diabase in red.
PERMIAN (250–290 mil. yrs.)
PENNSYL-VANIAN (290–330 mil. yrs.)
MISSISSIP-PIAN (330–365 mil. yrs.)
DEVONIAN (365–405 mil. yrs.)
SILURIAN (405–430 mil. yrs.)
ORDOVI-CIAN (430–500 mil. yrs.)
CAMBRIAN (500–570 mil. yrs.)
LOWER PALEOZOIC (430–570 mil. yrs.)
PRE-CAMBRIAN (older than 570 mil. yrs.)

> 0 tons (510)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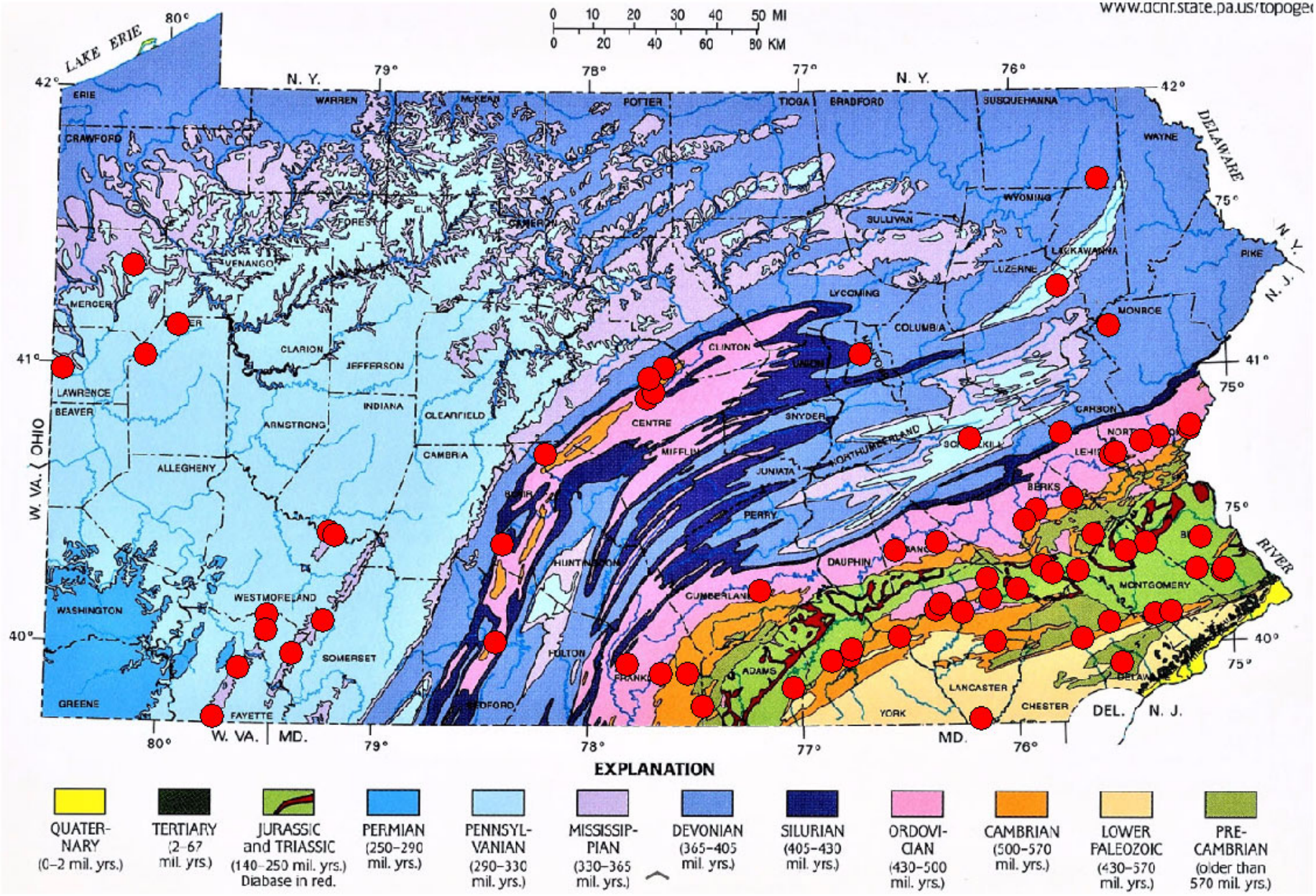
N. J.
DELAWARE RIVER
EXPLANATION
QUATER-NARY (0–2 mil. yrs.)
TERTIARY (2–67 mil. yrs.)
JURASSIC and TRIASSIC (140–250 mil. yrs.) Diabase in red.
PERMIAN (250–290 mil. yrs.)
PENNSYL-VANIAN (290–330 mil. yrs.)
MISSISSIP-PIAN (330–365 mil. yrs.)
DEVONIAN (365–405 mil. yrs.)
SILURIAN (405–430 mil. yrs.)
ORDOVI-CIAN (430–500 mil. yrs.)
CAMBRIAN (500–570 mil. yrs.)
LOWER PALEOZOIC (430–570 mil. yrs.)
PRE-CAMBRIAN (older than 570 mil. yrs.)

> 500,000 tons (75)



Prices

State	2015	2016	2017	2018	2019	2020	2021	2022	2023
Hawaii	$17.79	$19.19	$19.86	$20.45	$21.24	$21.98	$23.52	$23.29	$25.57
North Carolina	$14.27	$15.15	$15.59	$15.90	$16.86	$17.39	$17.26	$19.93	$21.94
Georgia	$12.10	$13.16	$13.53	$14.53	$15.48	$15.83	$16.58	$19.75	$21.68
Virginia	$14.17	$14.47	$14.92	$15.83	$15.12	$15.59	$17.52	$18.39	$20.36
South Carolina	$10.44	$10.97	$11.28	$11.78	$12.44	$12.77	$13.37	$17.28	$19.00
Tennessee	$10.94	$11.50	$11.84	$12.06	$12.52	$12.91	$13.00	$16.32	$17.81
New Jersey	$8.21	$7.43	$7.66	$10.44	$10.10	$10.41	$10.14	$15.54	$17.00
Florida	$10.79	$11.54	$11.88	$11.92	$12.01	$12.42	$14.43	$15.24	$16.76
Pennsylvania	**$11.40**	**$12.05**	**$12.41**	**$12.52**	**$12.71**	**$13.07**	**$12.44**	**$15.06**	**$16.57**
Massachusetts	$11.92	$12.02	$12.40	$13.03	$12.84	$13.20	$11.44	$14.80	$16.19
Alabama	$9.44	$10.09	$10.41	$10.35	$10.35	$10.64	$12.05	$14.25	$15.68
Nebraska	$11.26	$11.63	$12.00	$11.79	$12.70	$13.06	$14.23	$13.36	$14.69
Texas	$9.07	$9.40	$9.68	$10.32	$10.96	$11.29	$11.28	$13.18	$14.47
New Hampshire	$8.42	$8.86	$9.13	$9.35	$9.47	$9.75	$7.81	$13.06	$14.36
Connecticut	$13.76	$14.20	$14.56	$14.58	$14.45	$14.90	$13.84	$12.73	$14.03
Maryland	$9.83	$10.59	$10.89	$11.30	$11.40	$11.74	$12.81	$12.53	$13.80
New York	$10.77	$11.12	$11.44	$11.70	$12.07	$12.45	$12.32	$12.14	$13.31
California	$7.95	$8.07	$8.32	$8.89	$8.93	$9.18	$11.44	$11.92	$13.12
West Virginia	$10.04	$10.15	$10.42	$10.52	$10.82	$11.14	$11.14	$11.60	$12.74
Washington	$13.36	$13.44	$13.81	$13.17	$13.38	$13.84	$13.75	$11.58	$12.73
Illinois	$9.49	$9.73	$10.03	$10.15	$9.75	$10.04	$9.85	$11.56	$12.71
Vermont	$9.22	$9.36	$9.65	$9.36	$9.93	$10.21	$10.04	$11.35	$12.47
Rhode Island	$9.73	$9.75	$10.05	$10.06	$10.09	$10.38	$8.29	$11.33	$12.45
New Mexico	$8.10	$8.35	$8.62	$8.46	$8.83	$9.11	$11.24	$11.25	$12.37
Oregon	$6.54	$6.62	$6.82	$7.23	$7.95	$8.21	$8.42	$11.13	$12.24
Minnesota	$11.40	$11.41	$11.76	$12.62	$12.60	$12.94	$13.28	$11.00	$12.16
Nevada	$8.45	$7.72	$7.90	$7.88	$8.34	$8.56	$8.32	$10.86	$11.93
Kentucky	$8.45	$8.61	$8.86	$8.77	$8.85	$9.11	$9.16	$10.84	$11.91
Arizona	$8.39	$8.81	$9.07	$8.76	$8.28	$8.51	$10.64	$10.61	$11.69
Ohio	$8.12	$8.90	$9.19	$10.40	$10.44	$10.77	$11.45	$10.43	$11.49

Mineral Valuation

Why Appraise Mineral Properties?

- Investment and Operating Decisions
- Financing
- Tax planning
- Sale or Acquisition of Operating Companies or Reserves
- Reports to Federal Agencies (Securities Exchange Commission)
- Condemnation
- Income, Severance, and Ad-valorem taxation

Mineral Value

What is Mineral Value?

- After processing unit value of a commodity:
  - Price per processed and delivered ton of coal
  - Price of delivered gasoline
  - Price of a diamond ring
- FOB Price at the mine site
- In-place value in the ground
- Speculative value for future development
  - Permitted or not?

A Mineral Property only has value as it relates to its ability to produce future income

Categories of Mineral Property Value

- Active Extractive Operations
  - Mines
  - Quarries
  - Wells
- Reserve
  - Properties included in active operational control
  - Properties which are situated for future extraction
- Resources
  - Properties which may contain future reserves

Minerals are Just Like....

Active Mine ➡ Commercial real estate
➡ Industrial property
➡ New home construction in subdivision

Permitting Process ➡ Undeveloped parcel in a growing industrial or commercial area
➡ Approved subdivision

Reserve ➡ Undeveloped parcel which may have future developmental possibilities; planned subdivision

Highest and Best Use

Just like any other property

- **Possible:**
  - Does the asset exist, is there a sufficient quantity of the appropriate quality of resource, and is it technically possible to use it?
- **Legal:**
  - Is it legal or permissible to exploit the asset?
- **Feasible:**
  - Can the asset be utilized or exploited in a realistic manner? Is there appropriate access (in mineral properties, this may include rights to mine, rights of ingress and egress, wheelage rights, air shaft, and water control rights)?
- **Economic:**
  - Can the resource be exploited in such a way as to return a positive economic return on the investment necessary to exploit the resource? Is there a potential profit in the present or foreseeable market place?

Market

- Reliability of Supplier (Supply)
- Reliability Demand by Purchaser
- Quantity of Reserve
- Quality of Reserve
- Production Cost vs. Market Price
- Transport Cost
- Delivered Price

Market Prices

- Contract
  - Specific needs of supplier and purchaser
  - May include other factors
- Spot
  - Open market bidding
- Sources of Information
  - Industry Publications
  - Coal Outlook
  - Public Utility Commissions
  - Energy Information Agency (US DOE)
  - UGSS
  - Commodity Surveys
  - SEC Documents

Ownership

Ownership Defines Use and Availability

- Fee Ownership - **complete mineral and surface rights**
- Surface Lease - **control by lease of surface rights**
- Mineral Lease - **control by lease of mineral rights**
- Surface Only - **ownership of surface rights**
- Mineral Only - **ownership of mineral rights**
- Adverse - **properties not owned or leased**

Specific Legal Valuation Requirements

In addition to the prices paid in sales of similar lands, due regard must be given to the physical features of the property to be valued. The formation of the coal strata should be taken into account as well as:

- number of veins
- depth
- thickness
- pitch
- basins
- proximity to outcrop
- character of the separating rock formation
- quality of the coal
- gaseous or nongaseous nature
- kind of overlying surface
- availability of the coal
- difficulty in mining it
- probable quantity of the merchantable coal in the ground with allowance for loss in mining
- demand for the product
- all elements which a prudent purchaser would take into consideration

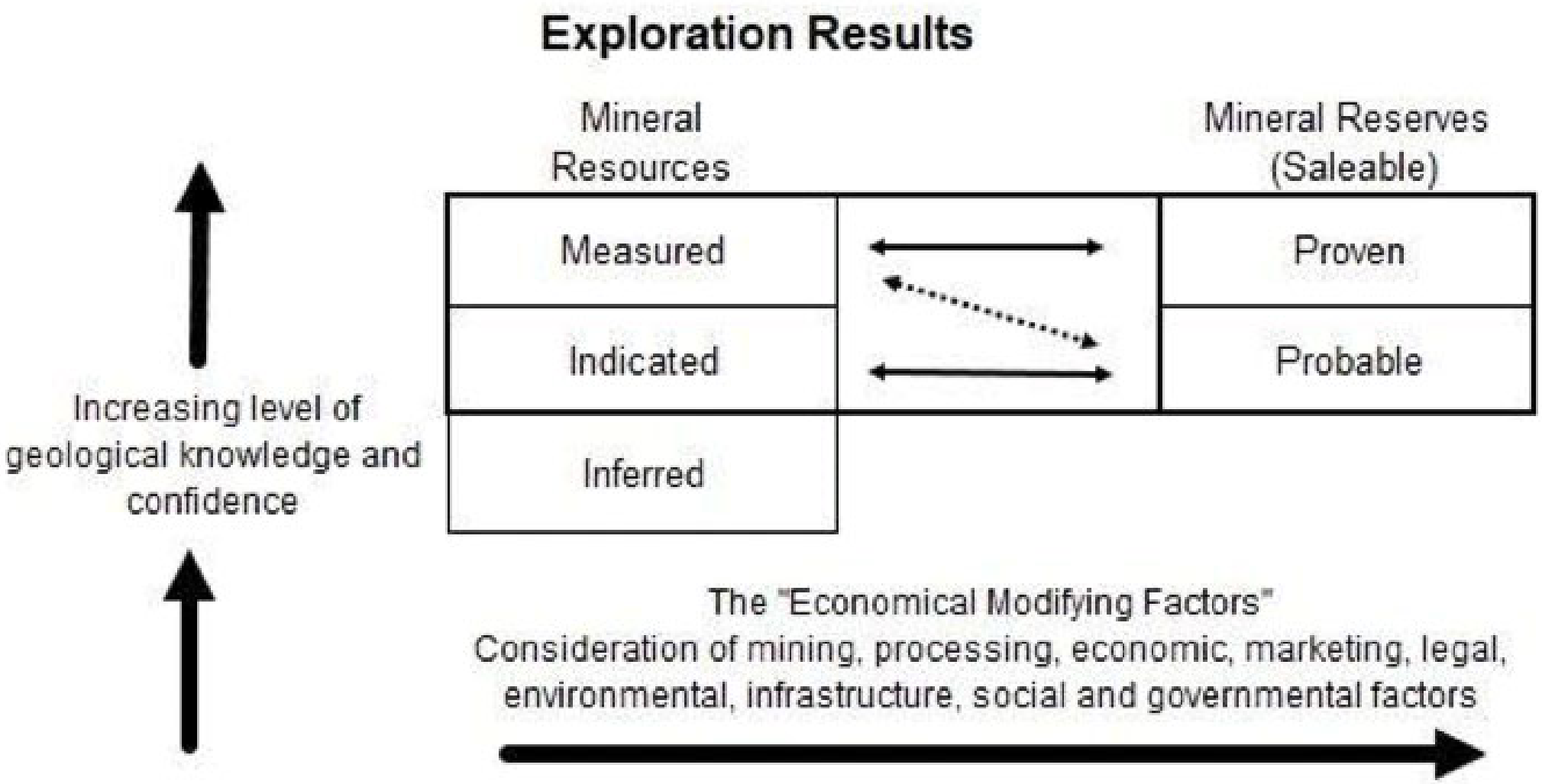
Factors to be Investigated

- Resource / Reserves
- Quality and Processing
- Environmental Considerations
- Current Operations
- Mining Plans
- Production Costs
- Markets and Transportation
- Valuation Techniques

Resources / Reserves

- Resources
  - Naturally occurring concentration or deposit
  - Economic extraction is potentially feasible
- Reserves
  - Only potentially recoverable mineral
  - Economic exploitation probable
  - Classified as:
    - **Inferred**
    - **Indicated**
    - **Measured**
- Active
  - Current extraction occurring in definable deposit

Reserves


Exploration Results
Mineral Resources
Mineral Reserves (Saleable)
Measured
Indicated
Inferred
Proven
Probable
Increasing level of geological knowledge and confidence
The "Economical Modifying Factors"
Consideration of mining, processing, economic, marketing, legal, environmental, infrastructure, social and governmental factors

Reserve Classifications

- IRS
  - Proven Reserves
  - Probable Reserves
  - Possible Reserves
  - Property
    - **Recoverable Reserves**
- Geophysical
  - Proven Reserves
  - Probable Reserves
  - Possible Reserves
  - Speculative Reserves

Reserve Classification (SEC)
Proven Reserves (Hydrocarbons)

- "Reasonably Certain" to be producible:
  - Current technology
  - Current prices
  - Current commercial terms
  - Current government consent

    - **P90, having a 90% certainty of being produced.**
    - **Proven reserves are usually applied to:**
      - producing wells
      - single offset wells from the actively producing well

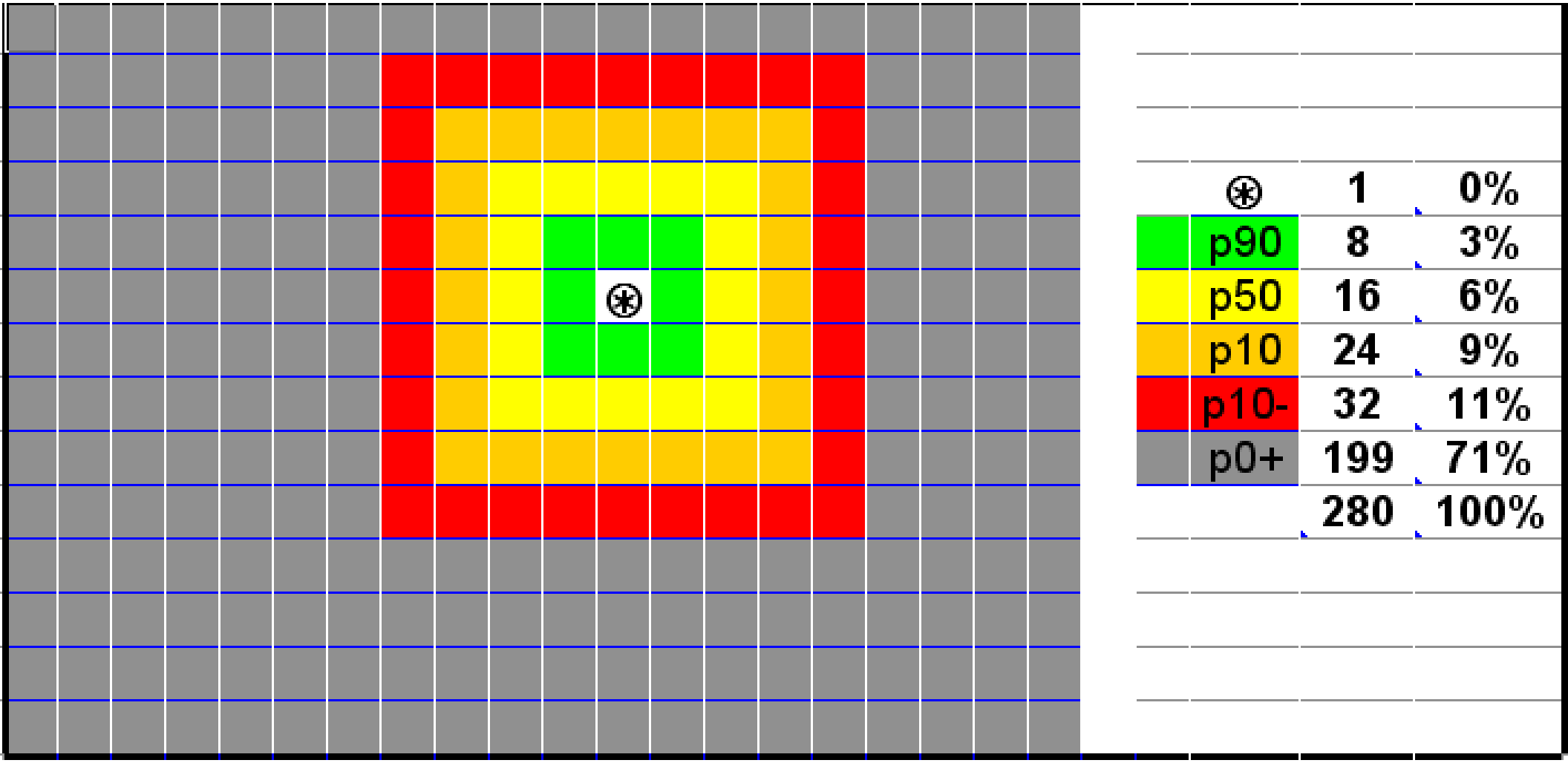
Reserve Classification (SEC) Probable Reserves

- "Reasonably Probable" of being produced:
  - current or likely technology
  - current prices
  - current commercial terms
  - government consent:
    - P50., having a 50% certainty of being produced.

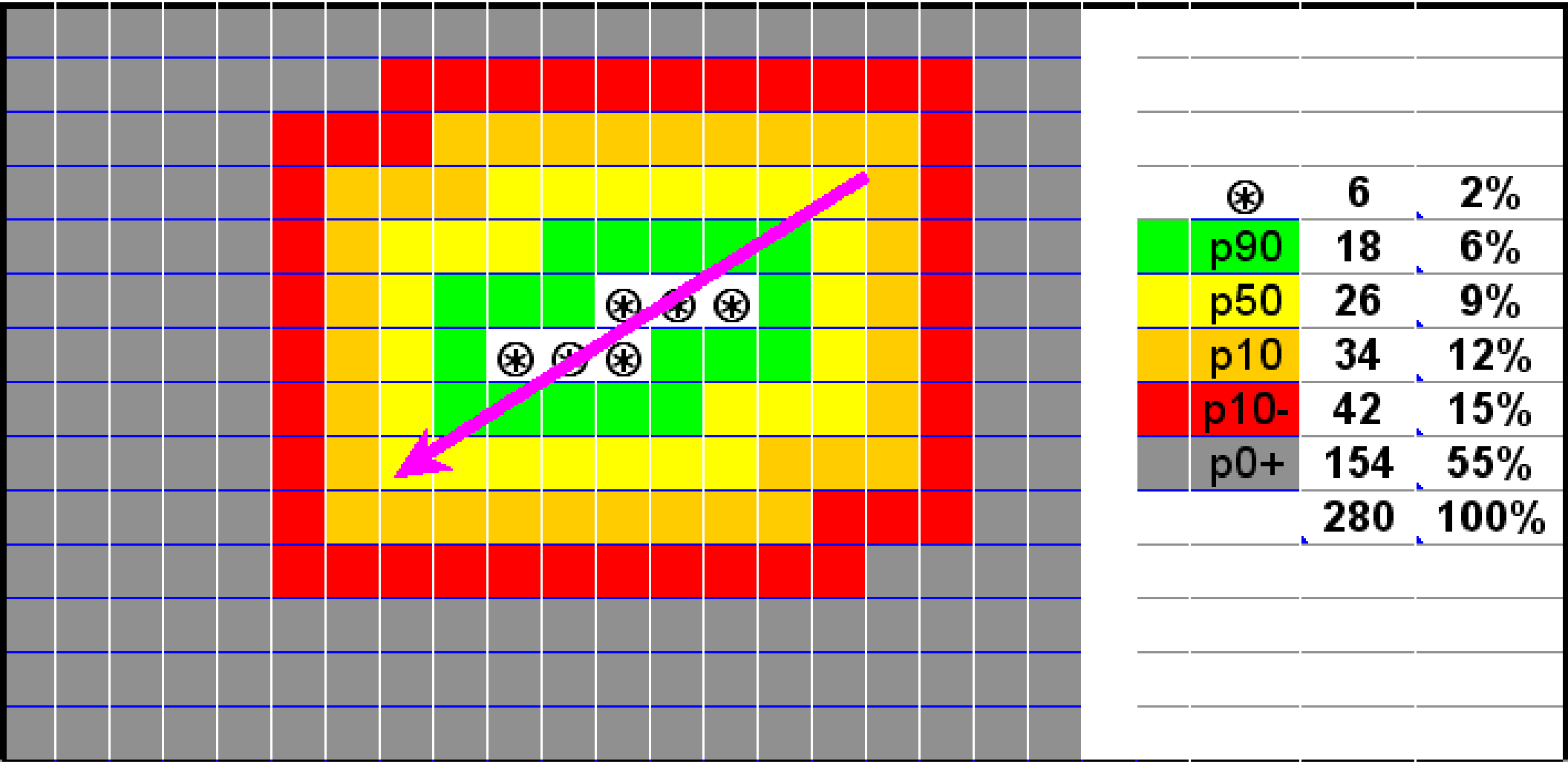
Reserve Classification (SEC)

- Possible Reserves:
  - "having a chance of being developed"
  - under favorable circumstances (3P):
    - P10., having a 10% certainty of being produced.
    - Possible Reserves are generally applied to single well offsets from Probable Reserves as long as the offset follow known production trends.
- Speculative (Prospective) Reserves
  - less than a 10% probability that reserves will be discovered and developed.

Well Spacing

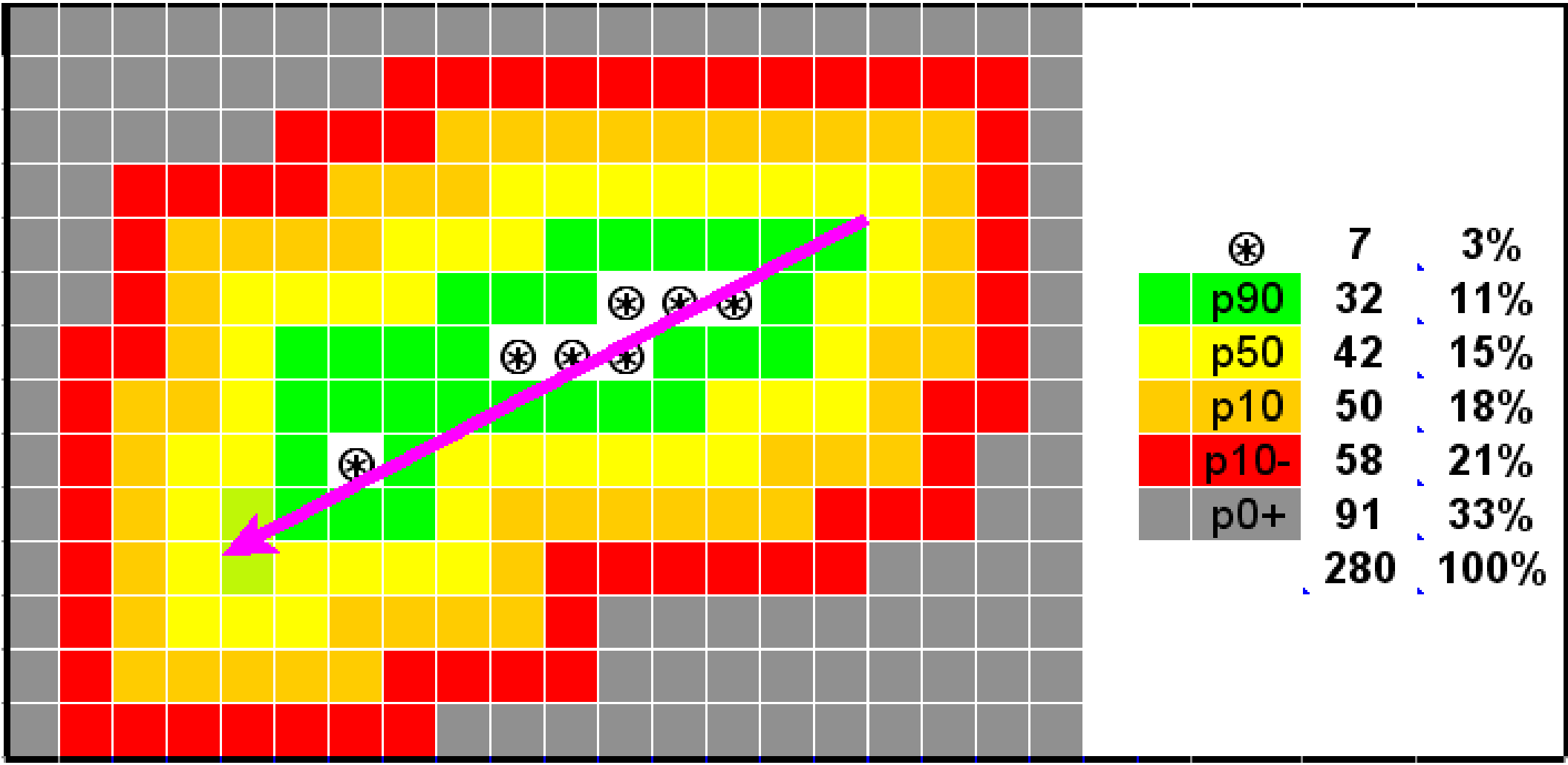


Well Spacing / Offset Interpretation:



	⊛	6	2%
	p90	18	6%
	p50	26	9%
	p10	34	12%
	p10-	42	15%
	p0+	154	55%
		280	100%

Well Spacing / Offset Interpolation



Reserves

The ore body defines the future use of the deposit

- Geology
  - Thickness and consistency of deposit
  - Overlying strata (roof or overburden)
  - Geologic disturbances or anomalies
- Topography
- Surface features
  - Flood plains
  - Drainage areas
  - Aquifers

Surface Mine Reserves

- Overburden ratio (stripping ratio)
  - Volume of overlying material which must be removed to extract a ton of coal (cu ft / ton
- Difficulty in removing overburden
  - Hard rock
  - Difficult access
  - Water
  - Disposal problems
  - Dilution Contamination of ore with overburden during the mining process
- Multiple Seam Mining (e.g. Mountain Top Removal)
  - Improving ratio
  - Able to retrieve otherwise “non-economic” seams

Deep Mine Reserves

- Roof Rock
  - Types of control measures required
  - Control not possible
- Floor Rock
  - Mining equipment moves freely
  - Condition pose problems to movement
- Water
  - Seam above drainage can be mined with water controls
  - Seam below drainage requiring significant water control and treatment
  - Seam can not be mined without significant water drainage problems

Reserves: Data Sources

- Geologic maps and Data
  - USGS
  - State Geologic Survey
- Topographic Maps
- Permit Data
  - DEP/DNR Offices
  - Courthouse records
- Public Reports
- Confidential Mining Company Maps and Reports

Ownership Data Sources

- Deeds – may or may not show considerations
- Leases – may or may not show royalty amounts
- Memoranda – never shows any $$$
- Permit files – will provide details
- SEC files – will provide details
- Assessment files – ???

Market / Quality

- **Market Identification**
  - What market will the commodity serve?
- **Price Estimation**
  - What price will the commodity fetch?
- **Absorption**
  - How much can be sold annually?
- **Production Costs**
  - What is the cost to produce (process)?

Quality and Processing Coal

- Ash %
- Moisture %
- Heating Value – Btu per pound
- Sulfur %
- Volatile Matter
- Friability
- Grindability
- Fixed Carbon

Quality and Processing

Aggregate: Crushed Stone, Sand Gravel

- Absorption
- Hardness/Integrity
- Color
- PH
- Fracture
- Skid resistance

Environmental Considerations

- Air Pollution
- Water Pollution
- Noise and Vibration
- Waste Disposal
- Physical Appearance
- Subsidence
- Reclamation

Environmental Controls

Permits required

- Mine Drainage
- Mining
  - Surface Mine
  - Underground Mine
  - Auger Mine
- Pollution
  - NPDES
- Safety
  - MSHA
- Specific Mining Modules
  - Subsidence
  - Coal Waste Disposal
  - Blasting
  - Sedimentation and Erosion

Current Operations

A key to assessing the future

- Identify likely market
- Furnish insight into operational characteristics
- Provide information concerning resources
- Contribute information concerning location and transportation
- Provide comparative basis for estimating:
  - Absorption / production rates
  - Royalty and discount rates
  - Valuation
    - per acre
    - per unit
    - per operation

Current Operations

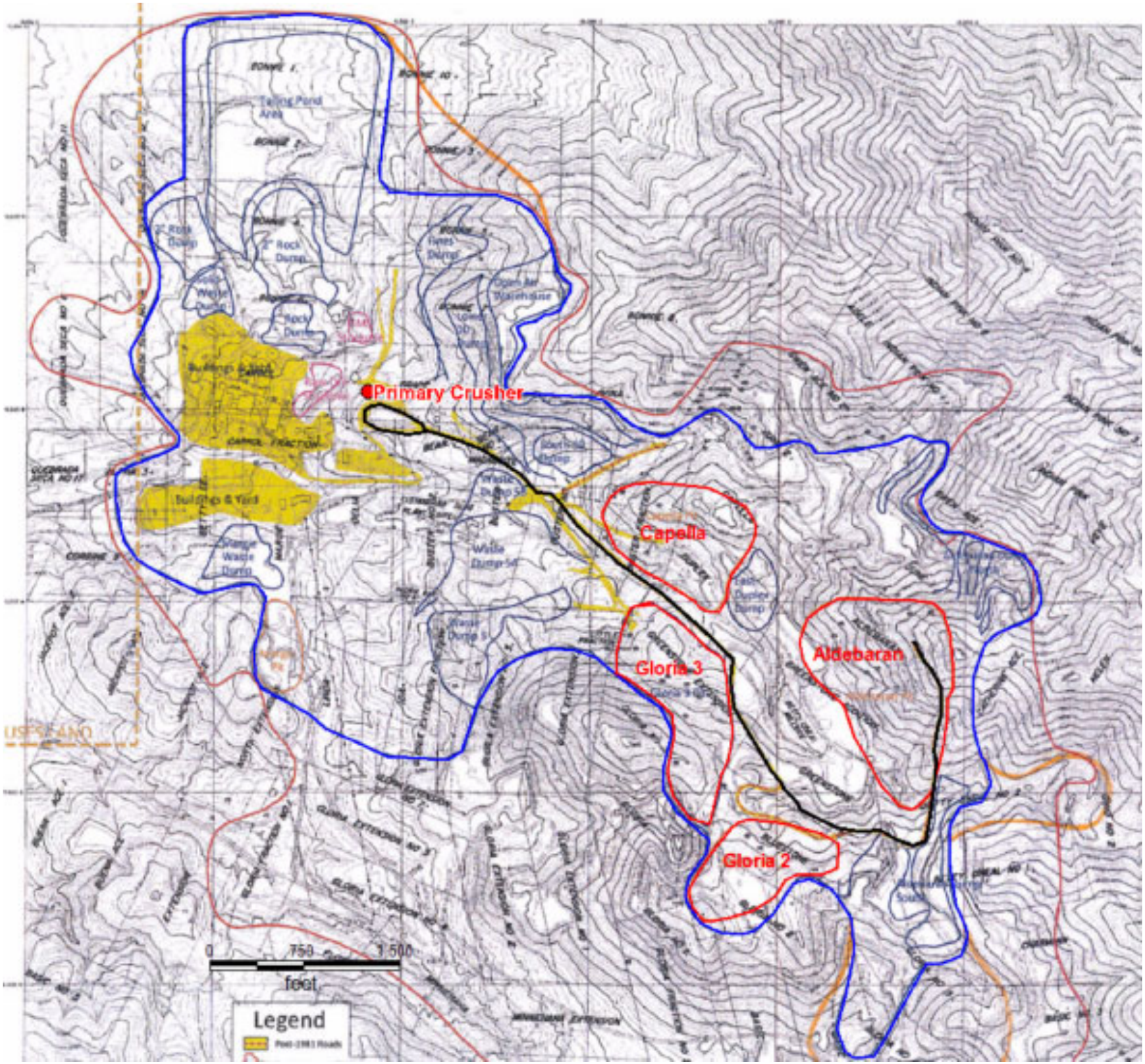
Information Sources

- DEP records:
  - Regulatory Files:
  - Inspection reports
  - Permit Files
  - Annual Production reports
  - Environmental Information:
  - Geologic Studies
  - Annual reports
- Industry sources:
- Platts Coal Outlook
- Aggregates Manager
- Operator Records

Mining Plans

- Pre Mine Development
- Mine Life
- Annual Production
- Equipment
- Capital Costs
- Production Costs
- Reclamation Procedures

Filed with the state prior to start-up, and periodically during operation


Primary Crusher
Capella
Gloria 3
Aldebaran
Gloria 2
0
750
1 500
feet
Legend

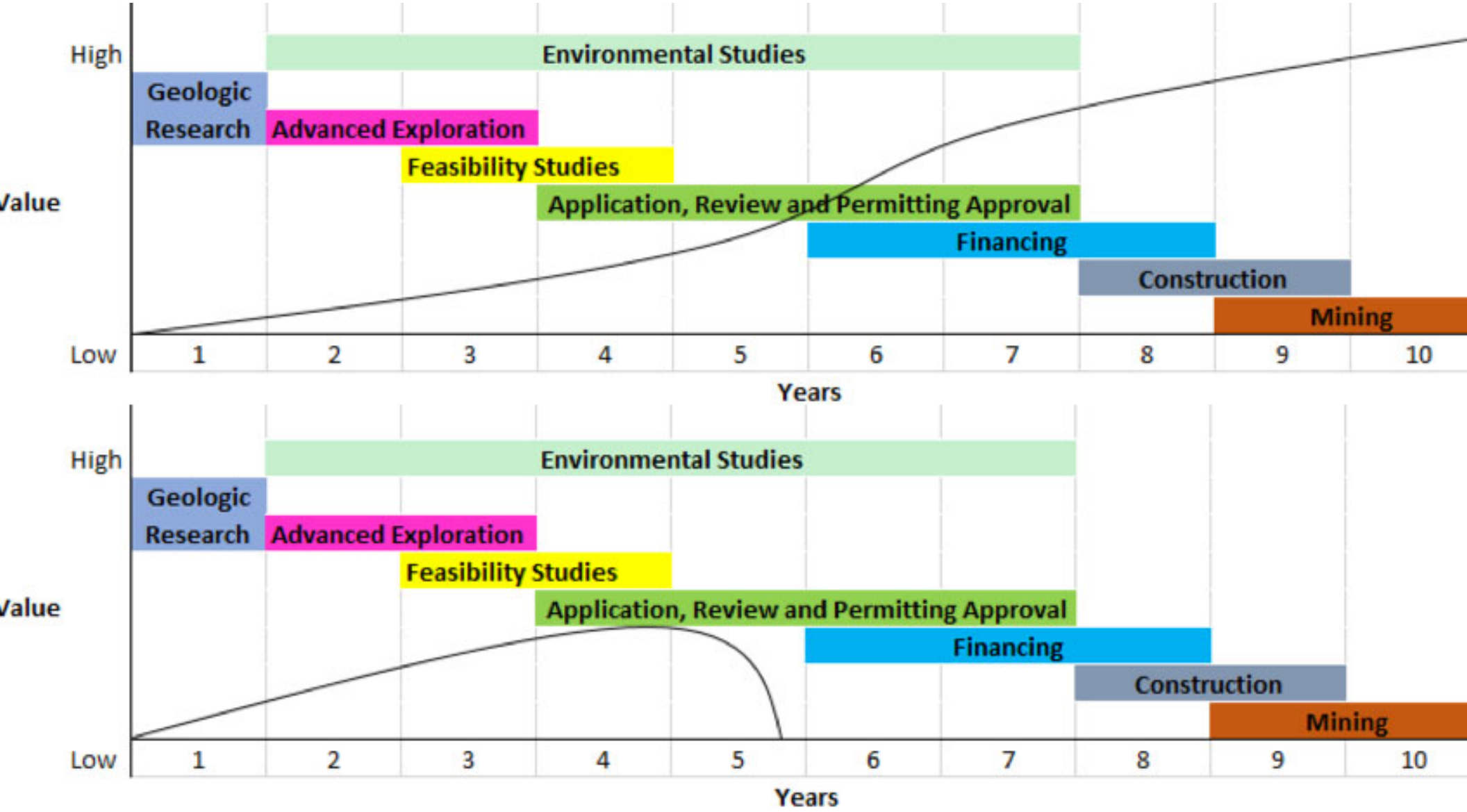
Production Costs

- Labor Costs
- Supplies and Materials
- SG&A
- Power
- Royalties
- EBITDA
- Property Taxes
- Income Taxes
- Depreciation
- Penalties and Fines

Transportation

- Transport is a significant cost
- Transport costs can preclude economic viability of a deposit
- The higher the unit value the longer the transport distance:
  - Gold and Oil is transported world wide
  - Crushed stone is transported 30 ± miles
- Transport cost relate to methods
  - Conveyor – $0.07 to 0.13 ± per ton mile
  - Barge – $0.09 to 0.20 ± per ton mile
  - Rail – $0.12 to 0.25 ± per ton mile
  - Truck – $0.17 to 0.30 ± per ton mile

Mineral Property Development



Valuation Methods

Valuing the Property, not the Business

- Comparative Sales
- Royalty Analysis
- Operational Analysis (Residual)
- Mass Appraisal

Comparative Sales

Pros and cons

- **Advantages**
  - Government agencies generally prefer
  - Direct comparison easiest to present
- **Disadvantages**
  - Almost never any real comparable properties – particularly active mines or active reserves
  - Sufficient data may not be available
  - While some properties resemble others in some aspects, they may be extremely dissimilar in other aspects

Operational Analysis

- Develop Discounted Cash Flow for the Operation
  - Mine Life
  - Annual Production
  - Cash Flow
  - Depreciation
  - Gross Profit before Income tax
  - Federal Taxes
  - Net Income after Tax
  - Capital Expenditures
  - Sales per Year
  - Sales Revenue

Operational Analysis

Pros and Cons

- Advantages
  - Method used by most companies
  - Generally considered the preferred method of valuation
- Disadvantages
  - Requires significant information
    - Confidential company data
    - Many business assumptions
  - Time Consuming
  - Subject to considerable interpretation

Royalty Analysis

Modified Operational Analysis

- Develop Discounted Cash Flow to Royalty Interest
  - OR Proxy for Separate Mineral Ownership
- Seams (deposit)
- Lease Terms
- Selling Prices
- Royalty Payments
  - Advance Minimum Royalty
  - Production Royalty
- Monthly Production Reports/Estimates
- AS OF THE DATE OF VALUATION

Royalty Analysis

Advantages and Disadvantages

- Advantages
  - Approximates the in-place value of the resource (represents what a willing buyer pays a willing seller)
  - Market driven
  - Comparisons easier
  - Relatively easy to compute
  - Based on common economic and appraisal principles
  - Focuses on resource in-place, not the business
- Disadvantages
  - Not as property specific as operational analysis
  - Requires access to lease royalty comparisons

Basic Valuation Principles

- Dollar today is worth more than a dollar tomorrow
- Principle of substitution appropriate (willing seller / willing buyer)
- Production will approximate optimal market absorption rate

Discount Rate Procedures (Build-Up)

- In order to dampen the effects of market spikes, all measures are based on 3-year forward weighted averaging.
- Ratio of equity to finance is based on industry surveys.
- The safe rate is based on the 20 year T-bill
- Equity risk is based on the Ibbotson survey for each year.
- The size premia is based on averaging the micro and sub-micro cap.
- The industry adjustment is based on the Ibbotson calculation based on an examination of industry-specific betas.
- The tax rate is based on the Ibbotson data set for actual taxes paid over a 5-year period.
- The finance rate is based on the information contained in the ACLI quarterly publication concerning relatively high risk industrial loans with long terms: 10-20 years.

OIL AND GAS CAPITALIZATION RATE

The Tax Year 2025 cost of capital analysis for West Virginia Oil and Gas was completed on 06/14/2024 using the Q4 2023 Cost of Capital Professional study and the Kroll Cost of Capital Navigator. Returns were selected and calculated for the time period ranging from 1928 to 2023 using a geometric mean. The Capitalization Rate is based on the weighted cost of capital where the equity proportion is set at 80% and the debt portion is set at 20%.

5.4.2.a: Equity Portion:
The Build-Up Model was selected for the computation of the cost of equity capital. Given the components selected the formula used is as follows:

CoE = RFR + ERP + IRP + SP + RSRP
13.82% = 4.56% + 5.19% + 0.78% + 0.99% + 2.30%

5.4.2.a.1 A **4.56%** Risk Free Rate (RFR) was selected, representing the 20-Year Treasury Constant Maturity Rate available on 6/14/2024 at the Federal Reserve Bank.

5.4.2.a.2 A **5.19%** Equity Risk Premium (ERP) was selected, representing the Historical ERP calculated using the S&P 500 average annual return of 10.03% derived from Center for Research in Security Prices (CRSP) data for the 1928 - 2023 period and a 4.84% 20-year T-Bond average annual return (Reconstructed) for the same timeframe.

5.4.2.a.3 An implied **0.78%** Industry Risk Premium (IRP) was calculated using an industry beta of 1.15 selected based on average Beta of West Virginia Exploration & Production firms: Antero Resources, Cabot Corp, Chesapeake Energy, Dominion Resources, EOG Resources, Range Resources, and Southwestern Energy. The Implied Industry Risk Premium is calculated as: (Industry Beta * ERP) - ERP = (1.15 * 5.19%) - 5.19%.

5.4.2.a.4 A **0.99%** Size Premium (SP) was selected. The Size Premium was based on CRSP decile 3 which included 210 firms with an equity market capitalization size ranging from $7,493,607,000 to $14,820,048,000 in Q4 2023. The CRSP decile 3 mean annual return reached 11.02% between 1928 and 2023. The mean annual return for the S&P 500 for the same period was 10.03%.

5.4.2.a.5 A **2.3%** Regional Specific Risk Premium (RSRP) was selected due to the analysis being focused on a single state only market segment.

5.4.2.b Debt Portion:

5.4.2.b.1 A borrowing rate (pre-tax cost of debt) of **7.93%** was selected. Based on average of Prime Lending Rate +2% (8.1%+2%) and BAA Corp Bond Rate 5.75%. (June 14, 2024)

5.4.2.b.2 A tax rate of **5.61%** was selected. Stern, NYU, Damodaran

Equity percentage of 80% was selected. Average of West Virginia Exploration & Production firms: Antero Resources, Cabot Corp, Chesapeake Energy, Dominion Resources, EOG Resources, Range Resources, & Southwestern Energy.

Debt Percentage of 20% was selected.

The Weighted Average Cost of Capital (WACC) computed for WV Oil and Gas TY 2025. Given the components selected the formula used is as follows:

$$WACC = (CoE * We) + (KdPreTax * (1 - t) * Wd)$$

$$12.55\% = (13.82\% * 80.00\%) + (7.93\% * (1 - 5.61\%) * 20.00\%)$$

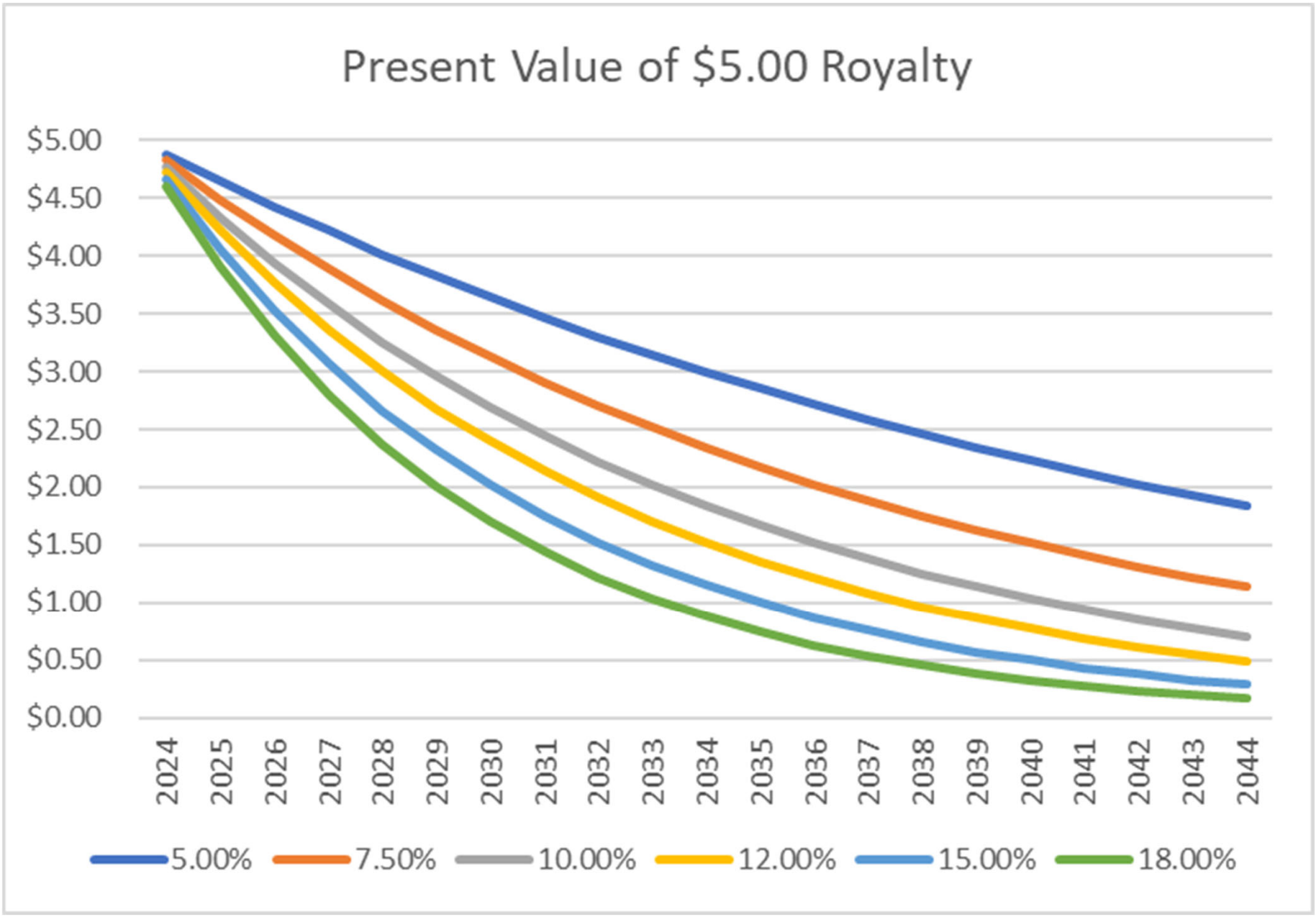
The West Virginia Weighted Average Cost of Capital for oil and gas is calculated as 12.55% WACC.

Discount Rate by Industry

- Business Valuation Resources
  - https://www.bvresources.com/
  - Subscription Service
- Aswath Damodaran
  - https://pages.stern.nyu.edu/~adamodar/
  - Public - Excel

	Industry Name	Count	Beta	Cost of Equity	E/(D+E)	Std Dev in Stock	Cost of Del	Tax Rate	Cost of Capital	C
37	Chemical (Specialty)	68	1.09	8.88%	78.85%	36.60%	5.09%	10.40%	7.81%	
38	**Coal & Related Energy**	**18**	**1.27**	**9.73%**	**81.60%**	**55.69%**	**5.35%**	**2.62%**	**8.67%**	
53	Financial Svcs. (Non-bank &	172	1.14	9.14%	22.02%	38.66%	5.09%	11.07%	4.99%	
54	Food Processing	82	0.61	6.67%	74.79%	36.51%	5.09%	8.29%	5.95%	
55	Food Wholesalers	14	0.97	8.32%	69.14%	27.30%	5.09%	15.90%	6.93%	
56	Furn/Home Furnishings	31	1.11	8.97%	67.77%	46.65%	5.09%	13.94%	7.31%	
57	Green & Renewable Energy	17	1.11	8.97%	41.42%	57.34%	5.35%	4.39%	6.07%	
58	Healthcare Products	230	1.06	8.77%	88.76%	52.21%	5.35%	4.81%	8.23%	
59	Healthcare Support Services	119	1.03	8.63%	78.82%	49.53%	5.09%	8.08%	7.61%	
60	Heathcare Information and	128	1.27	9.74%	86.15%	54.15%	5.35%	3.11%	8.95%	
61	Homebuilding	32	1.37	10.18%	85.90%	32.31%	5.09%	17.22%	9.28%	
62	Hospitals/Healthcare Faciliti	32	0.88	7.93%	55.63%	46.33%	5.09%	6.86%	6.10%	
63	Hotel/Gaming	68	1.34	10.06%	67.26%	40.80%	5.09%	8.63%	8.02%	
64	Household Products	93	0.84	7.76%	85.80%	51.12%	5.35%	8.21%	7.23%	
65	Information Services	18	0.93	8.16%	73.71%	33.83%	5.09%	15.79%	7.02%	
66	Insurance (General)	21	1.03	8.63%	79.41%	40.38%	5.09%	13.69%	7.64%	
67	Insurance (Life)	23	0.77	7.40%	52.02%	30.85%	5.09%	10.18%	5.68%	
68	Insurance (Prop/Cas.)	50	0.74	7.28%	83.76%	27.40%	5.09%	12.42%	6.72%	
69	Investments & Asset Manag	334	0.46	5.98%	71.26%	15.15%	4.50%	11.33%	5.23%	
70	Machinery	103	1.03	8.60%	85.57%	33.44%	5.09%	11.73%	7.91%	
71	Metals & Mining	68	0.96	8.31%	86.34%	60.56%	5.35%	2.00%	7.72%	
72	Office Equipment & Service	17	1.14	9.12%	65.54%	30.28%	5.09%	17.12%	7.29%	
73	Oil/Gas (Integrated)	4	0.67	6.96%	88.89%	26.44%	5.09%	21.18%	6.61%	
74	Oil/Gas (Production and Exp	166	0.93	8.16%	81.12%	46.31%	5.09%	5.61%	7.34%	
75	Oil/Gas Distribution	24	0.79	7.52%	58.75%	32.55%	5.09%	9.25%	5.99%	
76	Oilfield Svcs/Equip.	100	0.98	8.39%	75.68%	43.73%	5.09%	10.88%	7.27%	
77	Packaging & Container	22	1.13	9.09%	62.01%	26.24%	5.09%	18.12%	7.09%	
78	Paper/Forest Products	7	1.94	12.80%	72.80%	43.04%	5.09%	12.91%	10.35%	
79	Power	50	0.65	6.87%	51.83%	20.39%	4.50%	13.69%	5.19%	
80	Precious Metals	61	0.87	7.88%	86.80%	63.61%	5.35%	1.98%	7.37%	
81	Publishing & Newspapers	21	0.96	8.30%	75.49%	38.20%	5.09%	10.01%	7.20%	
82	R.E.I.T.	193	1.03	8.63%	55.85%	23.72%	4.50%	1.95%	6.31%	
83	Real Estate (Development)	17	0.67	6.96%	51.52%	34.24%	5.09%	1.45%	5.43%	
84	Real Estate (General/Diversi	11	0.56	6.47%	75.83%	35.91%	5.09%	13.21%	5.83%	

Discounted Royalty Payments



Basic Valuation Parameters

Acres	1,500
Thickness (ft)	6
Tons per Acre Foot	1,800
Total Tons	16,200,000
Overall Recovery	70%
Recoverable Tons	11,340,000
Production	1,000,000
Mine Life	11.34
Coal Price	$50.00
Royalty Rate	5.00%
Royalty $/ton	$2.50
Admin	$2.50
Selling Expenses	$5.00
Operating Costs	$30.00
Total Costs ($/ton)	40.00
Startup	$125,000,000
Closure	$70,000,000
Discount Rate Op	12.00%
Discount Rate Roy	6.00%

Operating Proforma

Year	Op Ex	Production	Gross	Costs	Net	PV OP	Royalty	PV Royalty
1	$12,500,000	1,000,000	$50,000,000	$40,000,000	-$2,500,000	-$2,362,280	$2,500,000	$2,428,210
2		1,000,000	$50,000,000	$40,000,000	$10,000,000	$8,436,710	$2,500,000	$2,290,770
3	$2,000,000	1,000,000	$50,000,000	$40,000,000	$8,000,000	$6,026,220	$2,500,000	$2,161,100
4		1,000,000	$50,000,000	$40,000,000	$10,000,000	$6,725,690	$2,500,000	$2,038,780
5		1,000,000	$50,000,000	$40,000,000	$10,000,000	$6,005,080	$2,500,000	$1,923,370
6		1,000,000	$50,000,000	$40,000,000	$10,000,000	$5,361,680	$2,500,000	$1,814,500
7		1,000,000	$50,000,000	$40,000,000	$10,000,000	$4,787,210	$2,500,000	$1,711,800
8	$5,000,000	1,000,000	$50,000,000	$40,000,000	$5,000,000	$2,137,150	$2,500,000	$1,614,900
9		1,000,000	$50,000,000	$40,000,000	$10,000,000	$3,816,340	$2,500,000	$1,523,490
10		1,000,000	$50,000,000	$40,000,000	$10,000,000	$3,407,440	$2,500,000	$1,437,260
11		1,000,000	$50,000,000	$40,000,000	$10,000,000	$3,042,360	$2,500,000	$1,355,900
12	$7,000,000	340,000	$17,000,000	$13,600,000	-$3,600,000	-$977,900	$850,000	$434,910
Total	$26,500,000	11,340,000	$567,000,000	$453,600,000	$86,900,000	$46,405,700	$28,350,000	$20,734,990
Per Acre						$30,937		$13,823

In-Place Mineral Value

Year	Present Value Royalty
1	$2,428,210
2	$2,290,770
3	$2,161,100
4	$2,038,780
5	$1,923,370
6	$1,814,500
7	$1,711,800
8	$1,614,900
9	$1,523,490
10	$1,437,260
11	$1,355,900
12	$434,910
Total	$20,734,990

Declining Value into Future

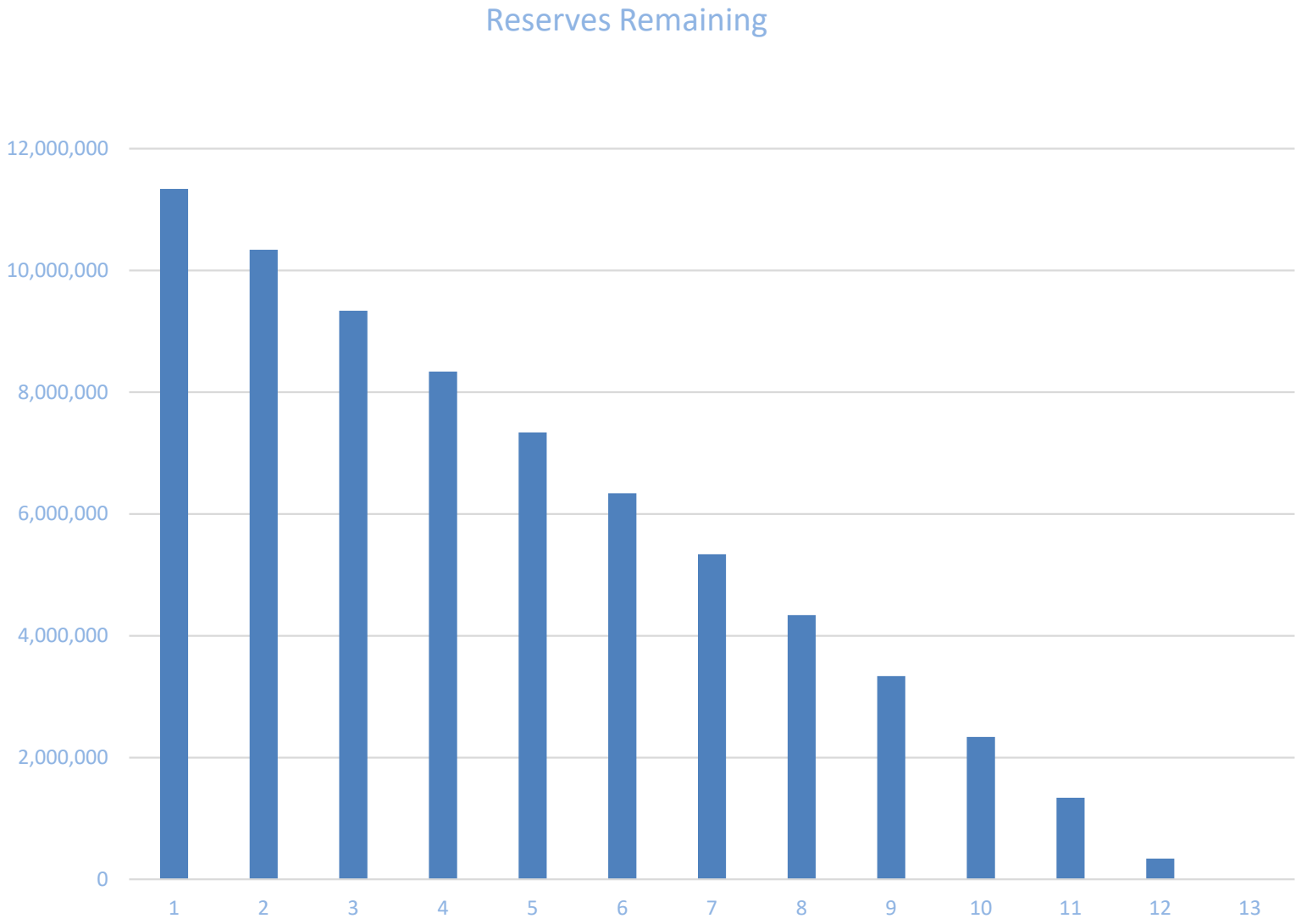
Year		2024	2025	2026	2027	2028	2029	2030	2031
	1	$2,428,210	$2,428,210	$2,428,210	$2,428,210	$2,428,210	$2,428,210	$2,428,210	$2,428,210
	2	$2,290,770	$2,290,770	$2,290,770	$2,290,770	$2,290,770	$2,290,770	$2,290,770	$2,290,770
	3	$2,161,100	$2,161,100	$2,161,100	$2,161,100	$2,161,100	$2,161,100	$2,161,100	$2,161,100
	4	$2,038,780	$2,038,780	$2,038,780	$2,038,780	$2,038,780	$2,038,780	$2,038,780	$2,038,780
	5	$1,923,370	$1,923,370	$1,923,370	$1,923,370	$1,923,370	$1,923,370	$1,923,370	$1,923,370
	6	$1,814,500	$1,814,500	$1,814,500	$1,814,500	$1,814,500	$1,814,500	$1,814,500	$0
	7	$1,711,800	$1,711,800	$1,711,800	$1,711,800	$1,711,800	$1,711,800	$0	$0
	8	$1,614,900	$1,614,900	$1,614,900	$1,614,900	$1,614,900	$0	$0	$0
	9	$1,523,490	$1,523,490	$1,523,490	$1,523,490	$0	$0	$0	$0
	10	$1,437,260	$1,437,260	$1,437,260	$0	$0	$0	$0	$0
	11	$1,355,900	$1,355,900	$0	$0	$0	$0	$0	$0
	12	$434,910	$0	$0	$0	$0	$0	$0	$0
Total		$20,734,990	$20,300,080	$18,944,180	$17,506,920	$15,983,430	$14,368,530	$12,656,730	$10,842,230
Per Acre		$13,823	$13,533	$12,629	$11,671	$10,656	$9,579	$8,438	$7,228

Components of Value

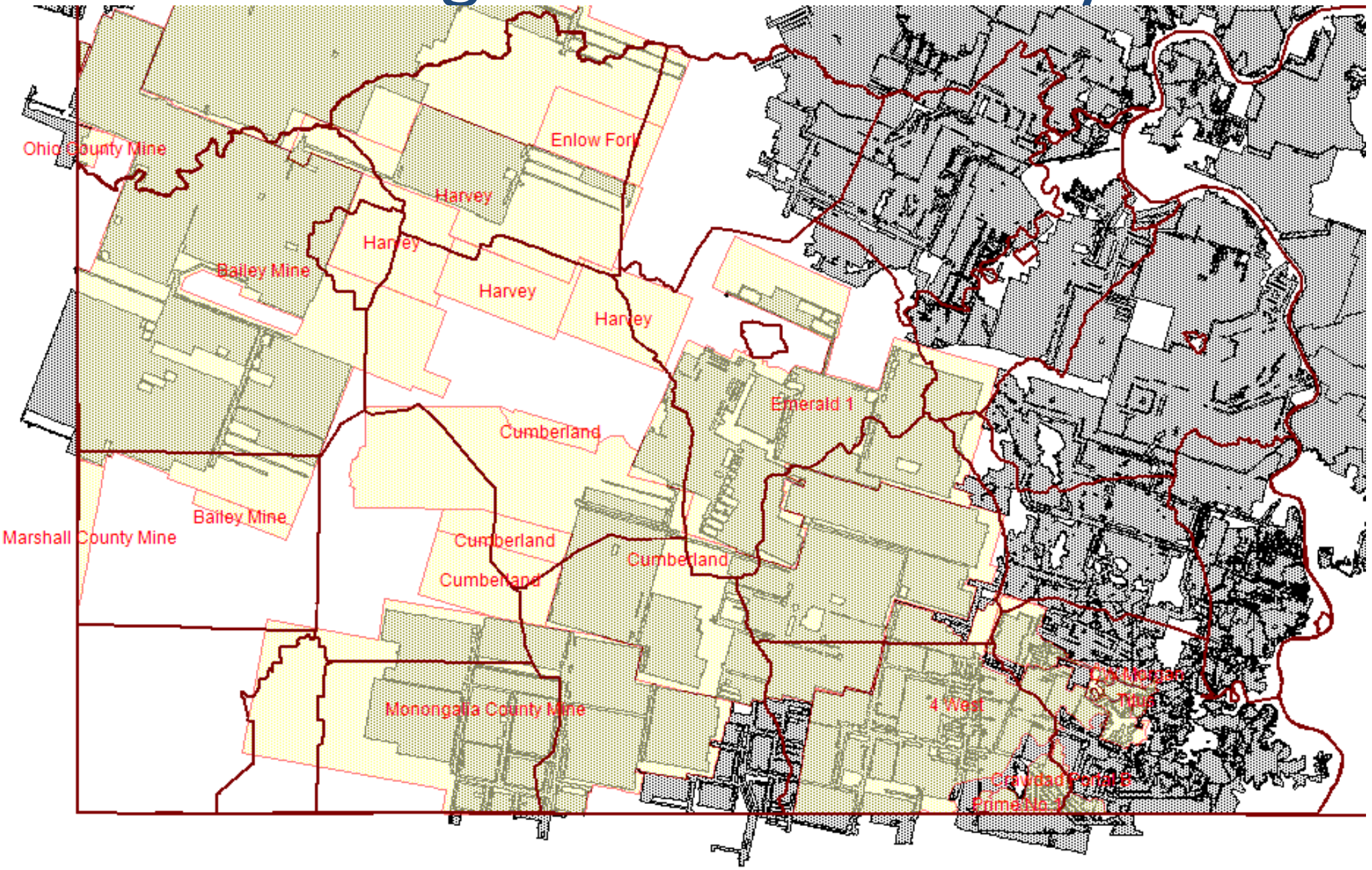
- Enterprise Value
  - In-Place Mineral Value
    - Royalty Payments
  - Land Improvements
    - In-Place Permits
    - Engineering Plans
    - Underground Portals
  - Rolling Stock and Other Equipment

Declining Value into Future

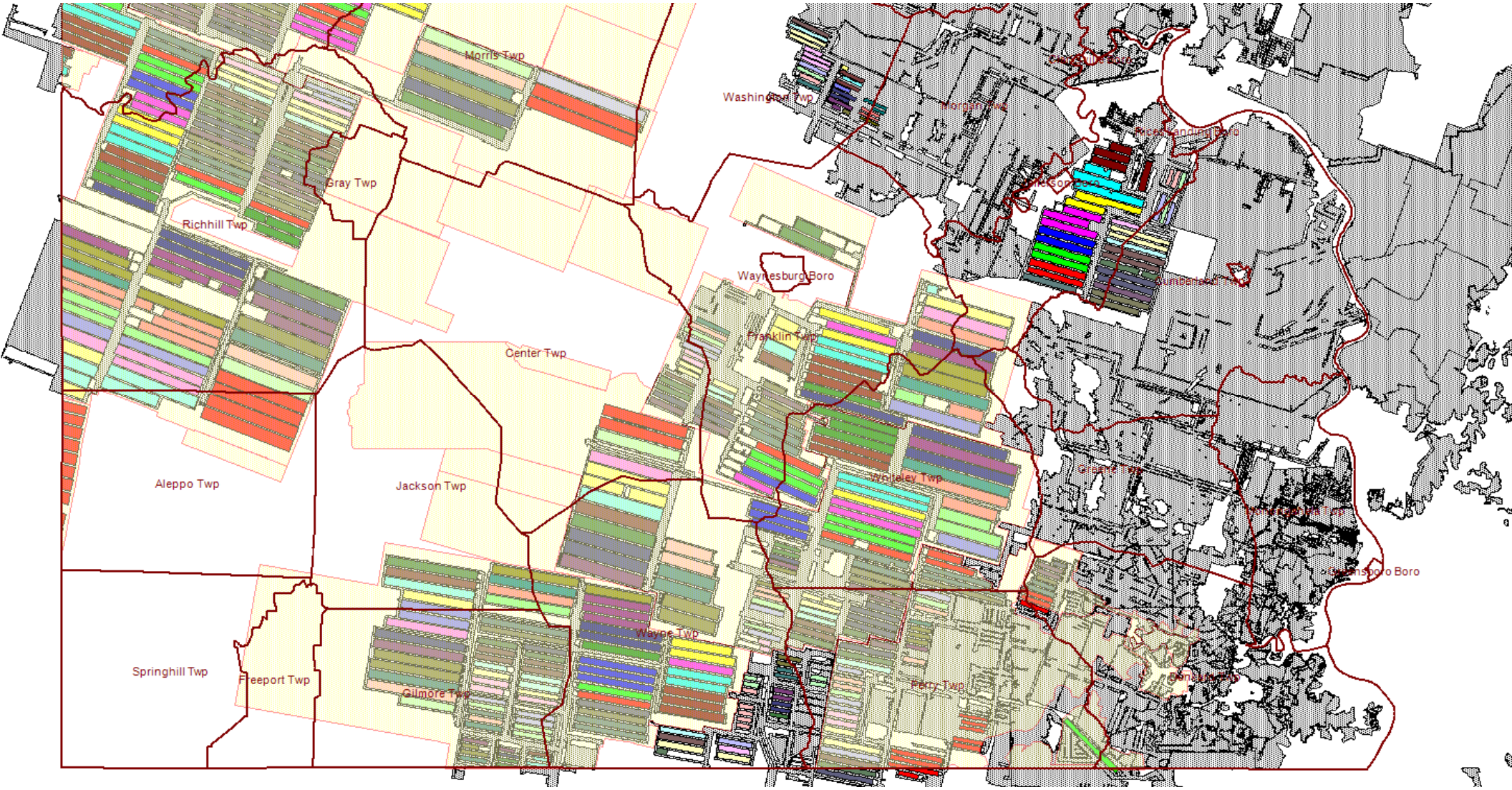
Declining Value into Future



Mining in Greene County



Mining in Greene County



Panel Size

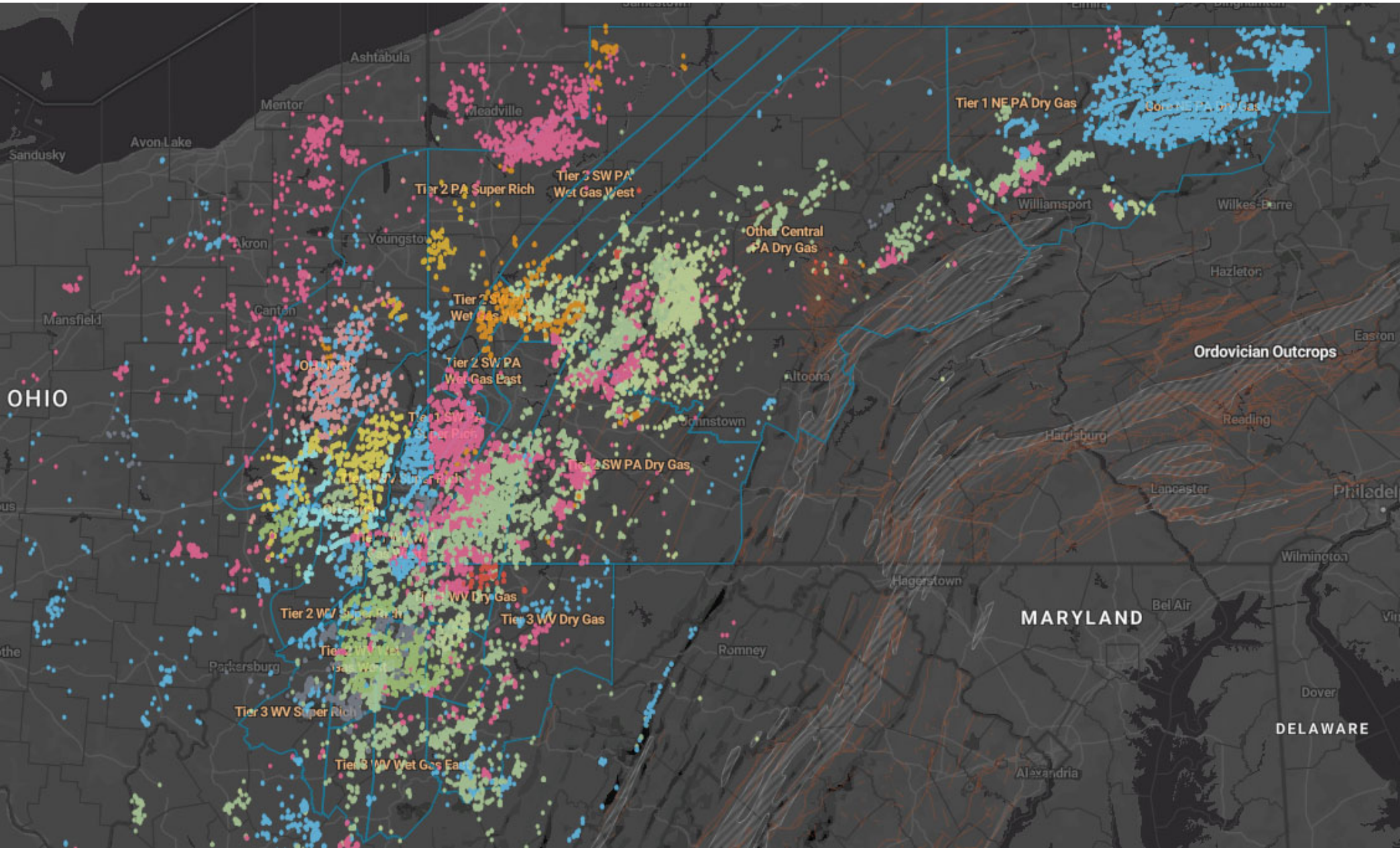
- 1,500 ft x 12,200 ft
- 420 acres
- 420 * 7 * 1800 = 5,300,000

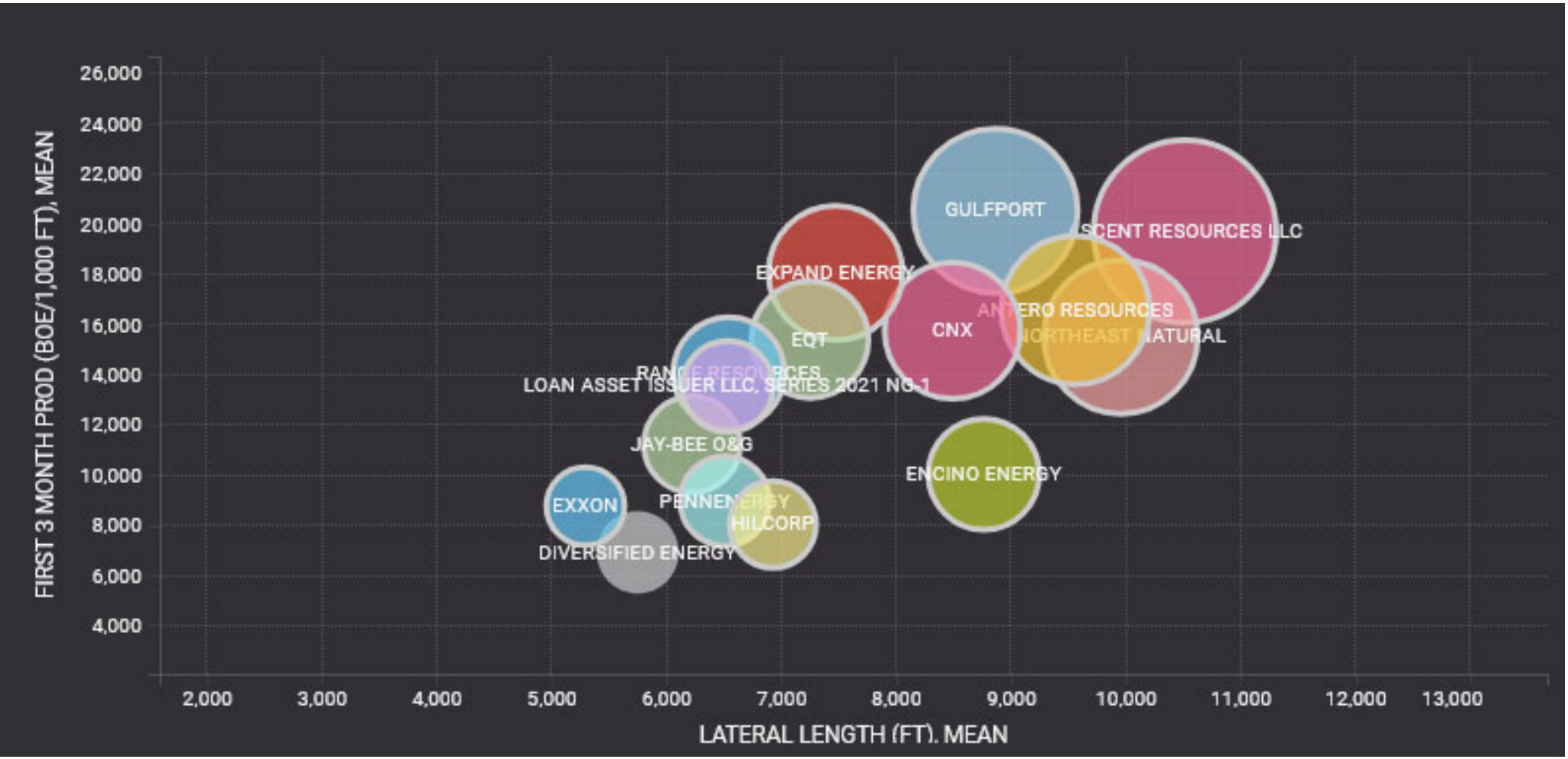
Greene	Consol PA Coal Co LLC	Bailey Deep Mine	11,163,524
Greene	Consol PA Coal Co LLC	Enlow Fork Mine	8,660,839
Greene	Consol PA Coal Co LLC	Harvey Mine	6,237,282
Greene	Iron Cumberland LLC	Cumberland Mine	5,934,113

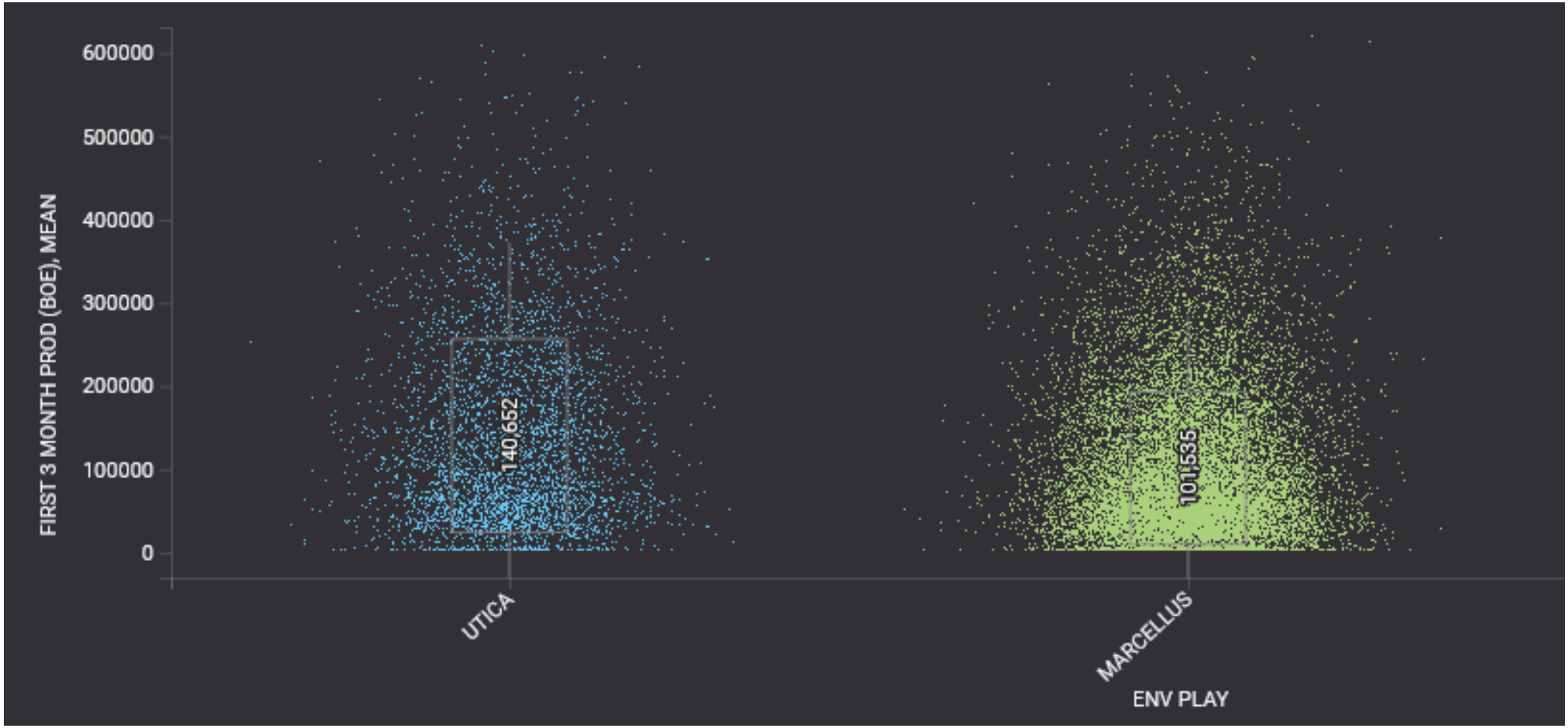
Other Considerations for Tax Assessment

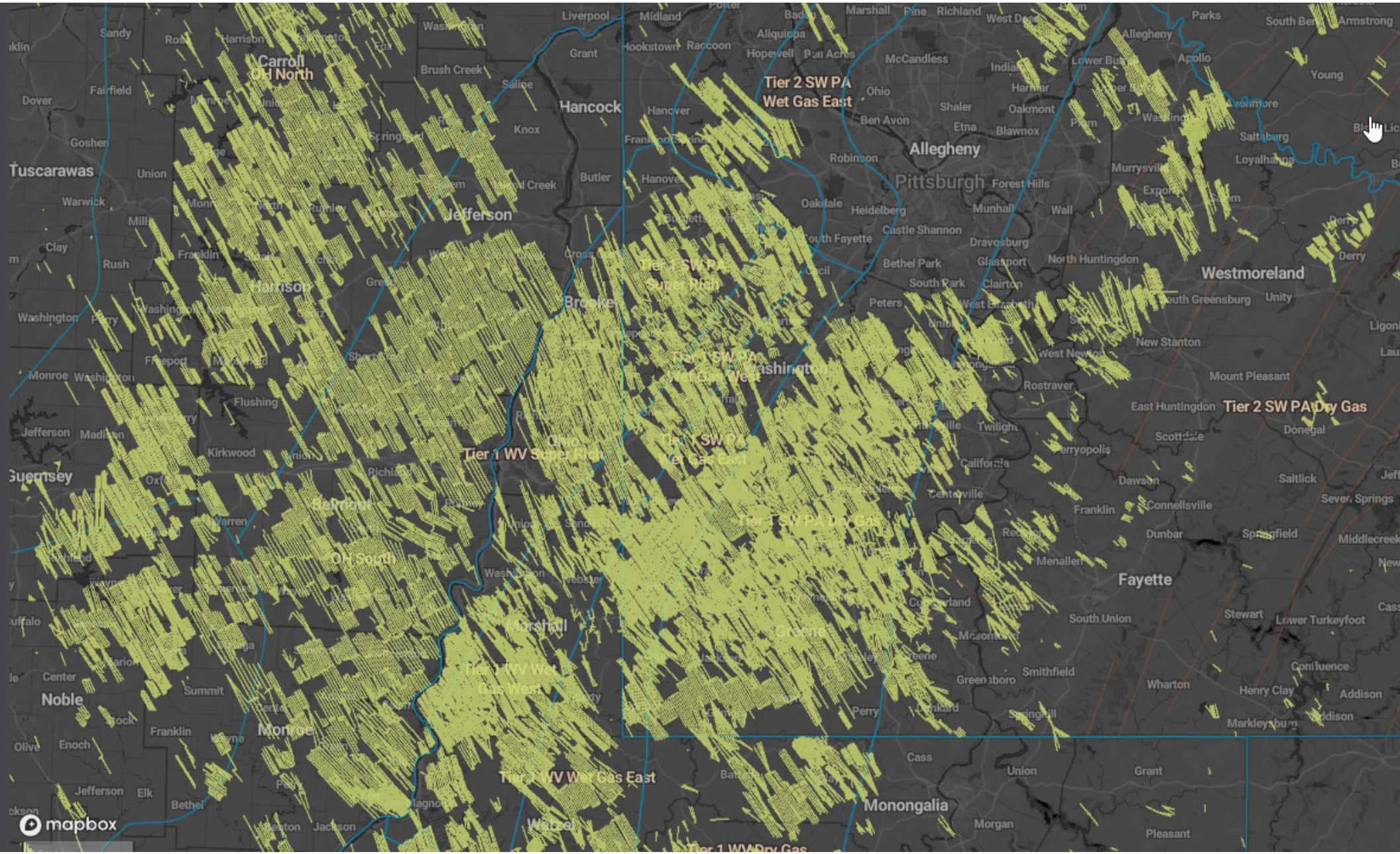
- Yearly Changes to
  - Coal Price
  - Discount Rate
  - Production Rate
  - Mineable Acres (input from mine engineering)
  - Coal Thickness
  - Common Level Ratio

Natural Gas


Ashtabula
Mentor
Meadville
Avon Lake
Sandusky
Tier 2 PA Super Rich
Tier 3 SW PA Wet Gas West
Tier 1 NE PA Dry Gas
Williamsport
Wilkes-Barre
Other Central PA Dry Gas
Akron
Youngstown
Hazleton
Canton
Mansfield
Ordovician Outcrops
Easton
Altoona
OHIO
Johnstown
Reading
Harrisburg
Tier 2 SW PA Dry Gas
Lancaster
Philadel
Wilmington
Hagerstown
Tier 3 WV Dry Gas
Bel Air
MARYLAND
Romney
Parkersburg
Dover
DELAWARE
Alexandria


FIRST 3 MONTH PROD (BOE/1,000 FT), MEAN
26,000
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
9,000
10,000
11,000
12,000
13,000
LATERAL LENGTH (FT). MEAN
GULFPORT
EXPAND ENERGY
EQT
CNX
LOAN ASSET ISSUER LLC, SERIES 2021 NG-1
JAY-BEE O&G
ENCINO ENERGY
EXXON
PENNENERGY
HILCORP
DIVERSIFIED ENERGY


600000
500000
400000
300000
200000
100000
0
FIRST 3 MONTH PROD (BOE), MEAN
140,652
101,535
UTICA
MARCELLUS
ENV PLAY

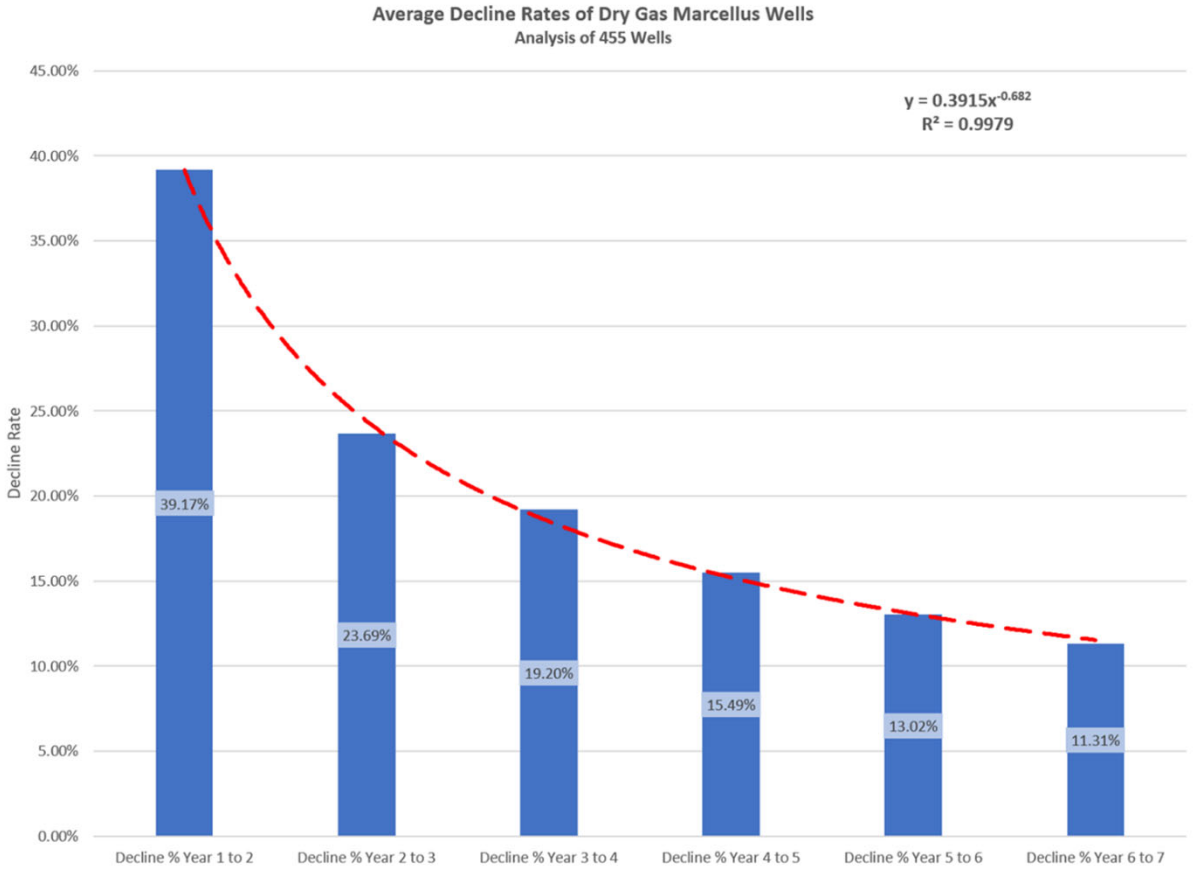

Carroll
OH North
Tier 2 SW PA
Wet Gas East
Hancock
Allegheny
Pittsburgh
Tuscarawas
Jefferson
Harrison
Brooke
Westmoreland
Tier 2 SW PA Dry Gas
Tier 1 WV Super Rich
Belmont
OH South
Fayette
Marshall
Noble
Monroe
Tier 1 WV Wet Gas East
Monongalia
mapbox

Gas Cash Flow Analysis

- Price / Production / Discount Rate
- Add Decline Rate

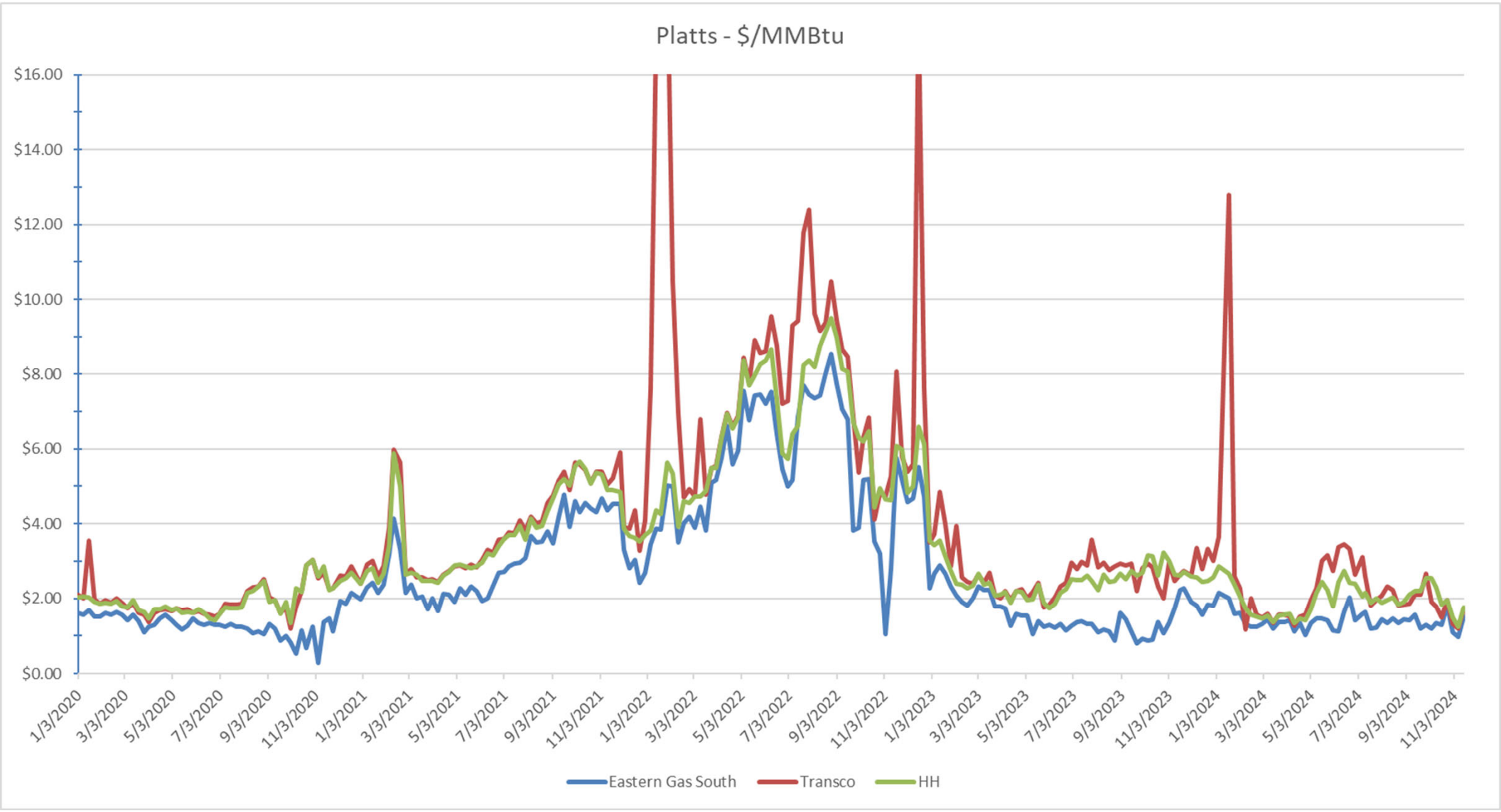
Decline Rate

- What does historical production show for decline rates in Marcellus?
- RTC examined production history for over 400 Marcellus wells (dry gas).
- Wells had to have:
  1. Long and consistent production history (7 years)
  2. No gaps in production history
  3. Greater than 1,000 mcf in a given month
- RTC analysis shows:
  1. Lower initial average decline (40%)
  2. Declines continue falling after Year 3
  3. A strong power trendline fit (.9979)



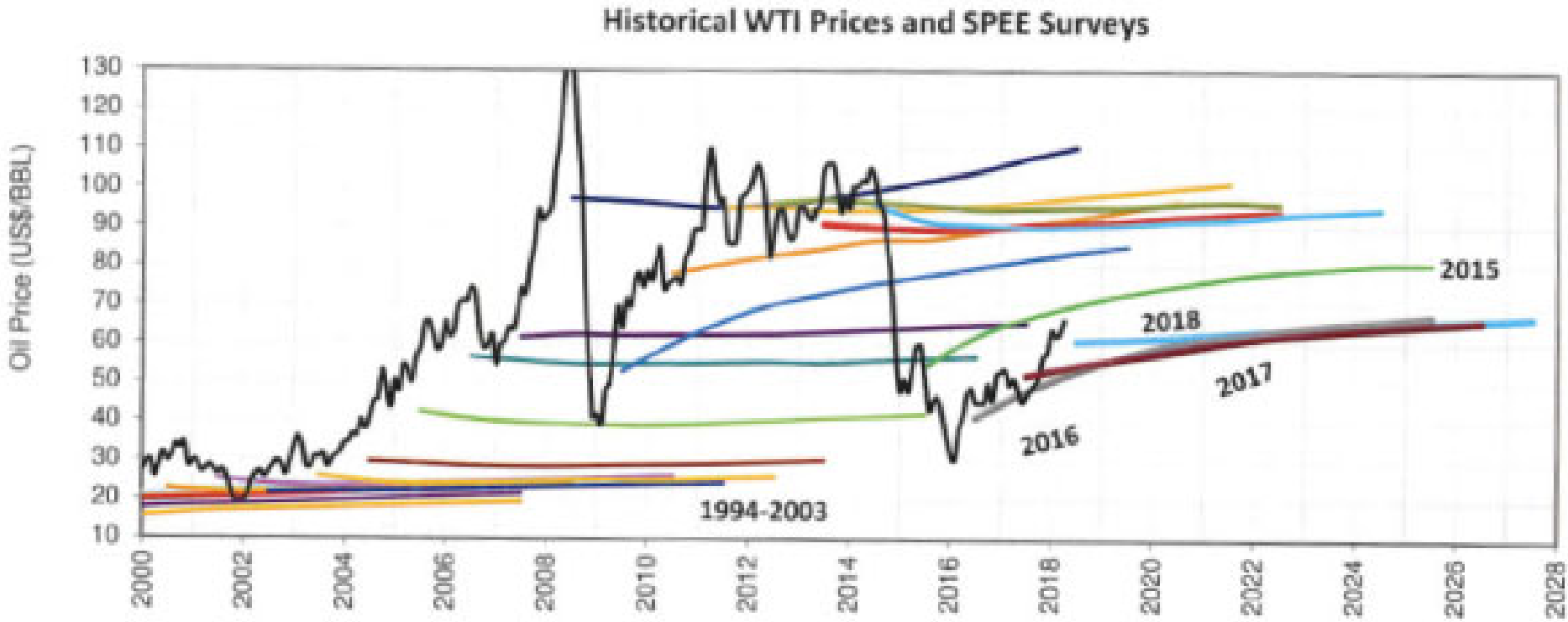
Gross Value	$3,000,000	as reported by operator - Year 1
Discount Rate	13.10%	as published by the WVTD
Well Age (Years)	1	as reported by Operator

Well Life Year	Decline Rate (%)	Declined Value ($)	Discount Multiple	Discounted Value ($)	Cum. Discounted Value ($)
0		$3,000,000	1.000000	$3,000,000	$3,000,000
1	52.12%	$1,436,287	0.940305	$1,350,547	$4,350,547
2	24.55%	$1,083,713	0.831392	$900,991	$5,251,538
3	18.49%	$883,342	0.735095	$649,340	$5,900,879
4	15.12%	$749,770	0.649951	$487,314	$6,388,193
5	12.94%	$652,769	0.574670	$375,126	$6,763,319
6	11.39%	$578,422	0.508108	$293,901	$7,057,220
7	10.23%	$519,273	0.449255	$233,286	$7,290,506
8	9.31%	$470,904	0.397219	$187,052	$7,477,558
9	8.58%	$430,508	0.351211	$151,199	$7,628,757
10	7.97%	$396,199	0.310531	$123,032	$7,751,789
11	7.46%	$366,659	0.274563	$100,671	$7,852,460
12	7.02%	$340,934	0.242762	$82,766	$7,935,226
13	6.63%	$318,317	0.214643	$68,325	$8,003,550
14	6.30%	$298,265	0.189782	$56,605	$8,060,156
15	6.00%	$280,369	0.167800	$47,046	$8,107,202
16	6.00%	$263,547	0.148364	$39,101	$8,146,303
17	6.00%	$247,734	0.131180	$32,498	$8,178,800
18	6.00%	$232,870	0.115986	$27,010	$8,205,810
19	6.00%	$218,898	0.102551	$22,448	$8,228,258
20	6.00%	$205,764	0.090673	$18,657	$8,246,916
21	6.00%	$193,418	0.080171	$15,507	$8,262,422
22	6.00%	$181,813	0.070885	$12,888	$8,275,310
23	6.00%	$170,904	0.062675	$10,711	$8,286,021
24	6.00%	$160,650	0.055415	$8,902	$8,294,924
25	6.00%	$151,011	0.048997	$7,399	$8,302,323
26	6.00%	$141,950	0.043322	$6,150	$8,308,472
27	6.00%	$133,433	0.038304	$5,111	$8,313,583
28	6.00%	$125,427	0.033867	$4,248	$8,317,831
29	6.00%	$117,902	0.029944	$3,530	$8,321,362
30	6.00%	$110,828	0.026476	$2,934	**$8,324,296**


Platts - $/MMBtu
$16.00
$14.00
$12.00
$10.00
$8.00
$6.00
$4.00
$2.00
$0.00
1/3/2020
3/3/2020
5/3/2020
7/3/2020
9/3/2020
11/3/2020
1/3/2021
3/3/2021
5/3/2021
7/3/2021
9/3/2021
11/3/2021
1/3/2022
3/3/2022
5/3/2022
7/3/2022
9/3/2022
11/3/2022
1/3/2023
3/3/2023
5/3/2023
7/3/2023
9/3/2023
11/3/2023
1/3/2024
3/3/2024
5/3/2024
7/3/2024
9/3/2024
11/3/2024
Eastern Gas South
Transco
HH


L N G
LNG RIVERS

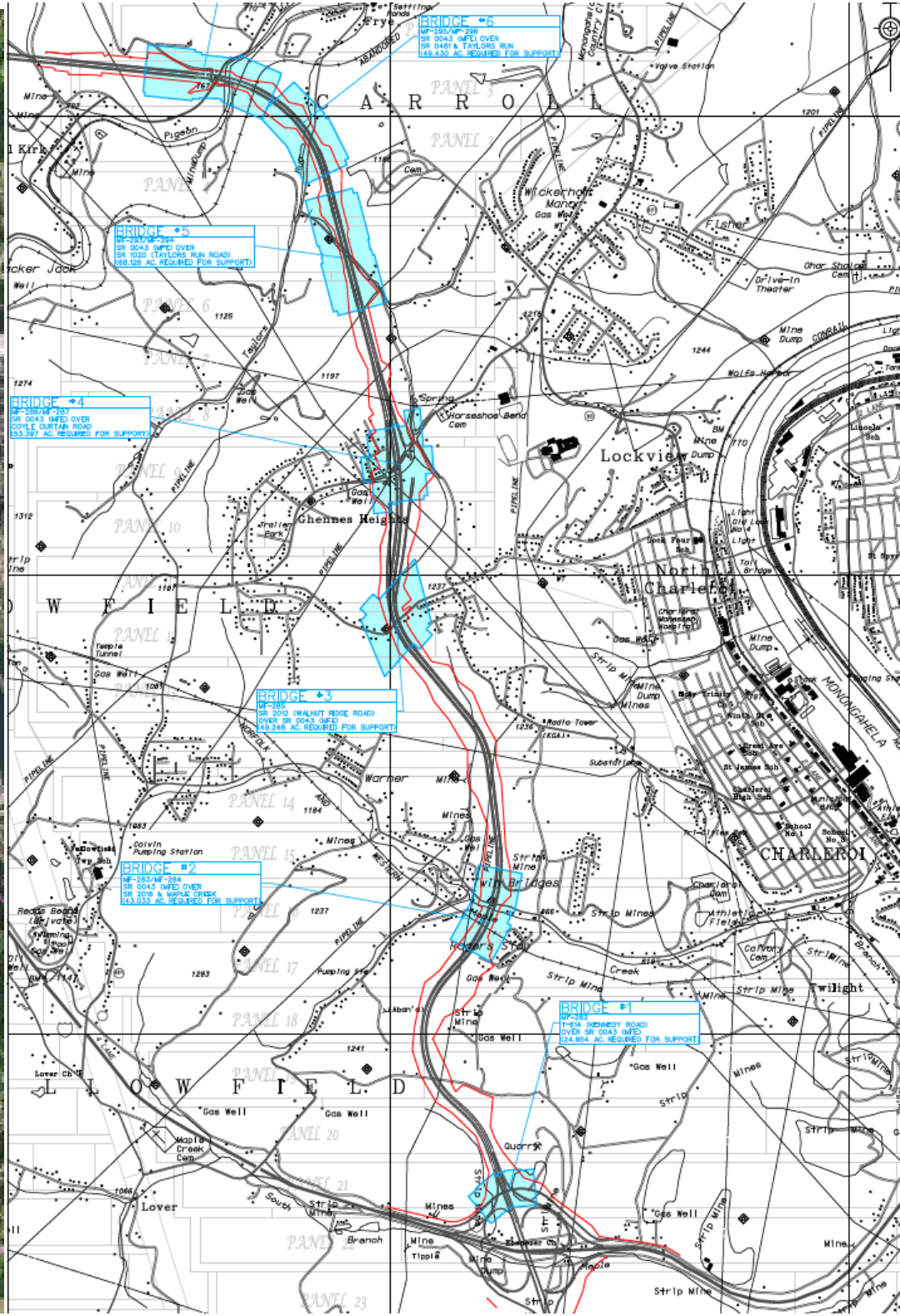
Price Predictions



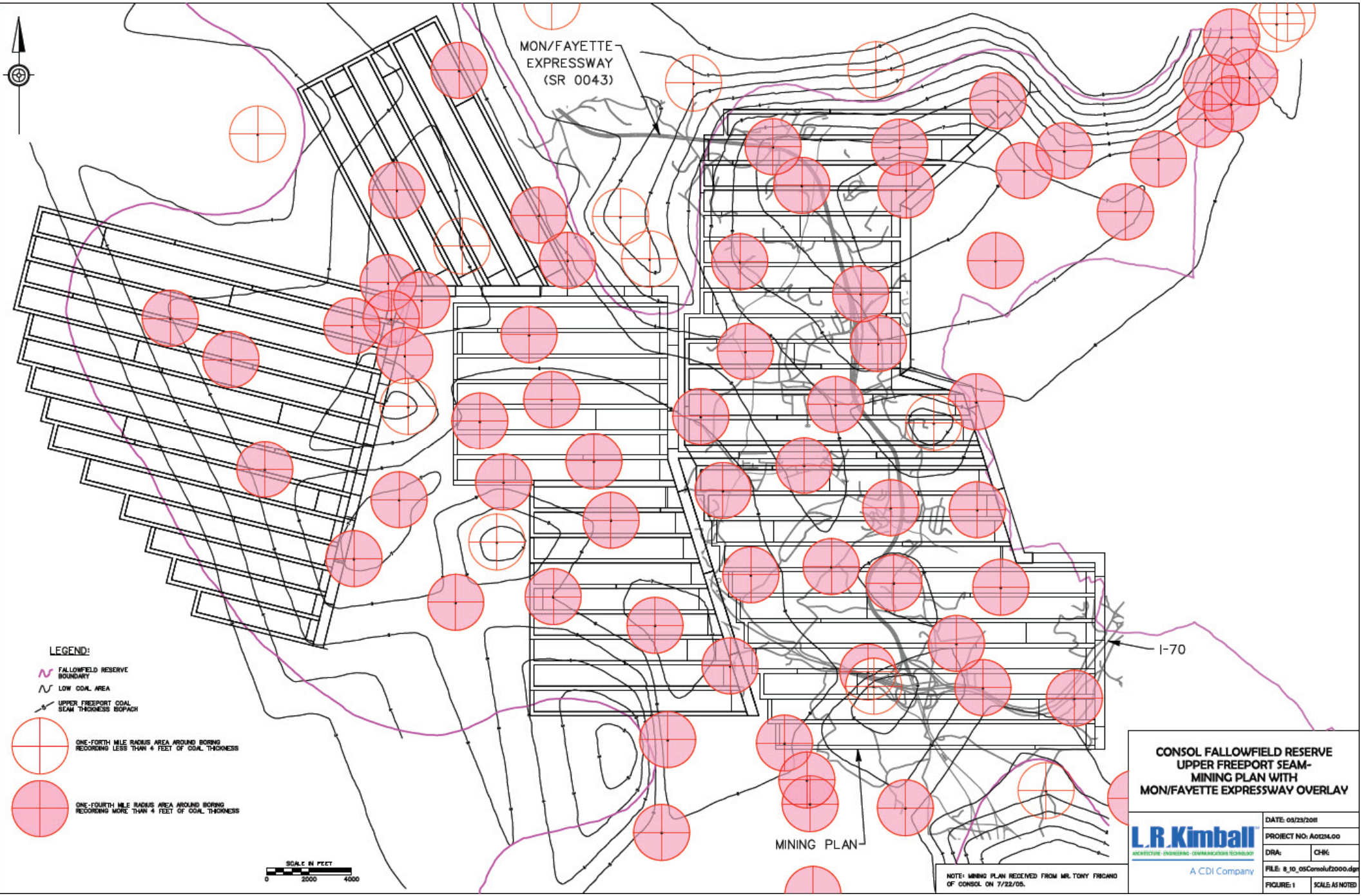
Condemnation Case - PA Turnpike vs Consol

PA Turnpike vs Consol

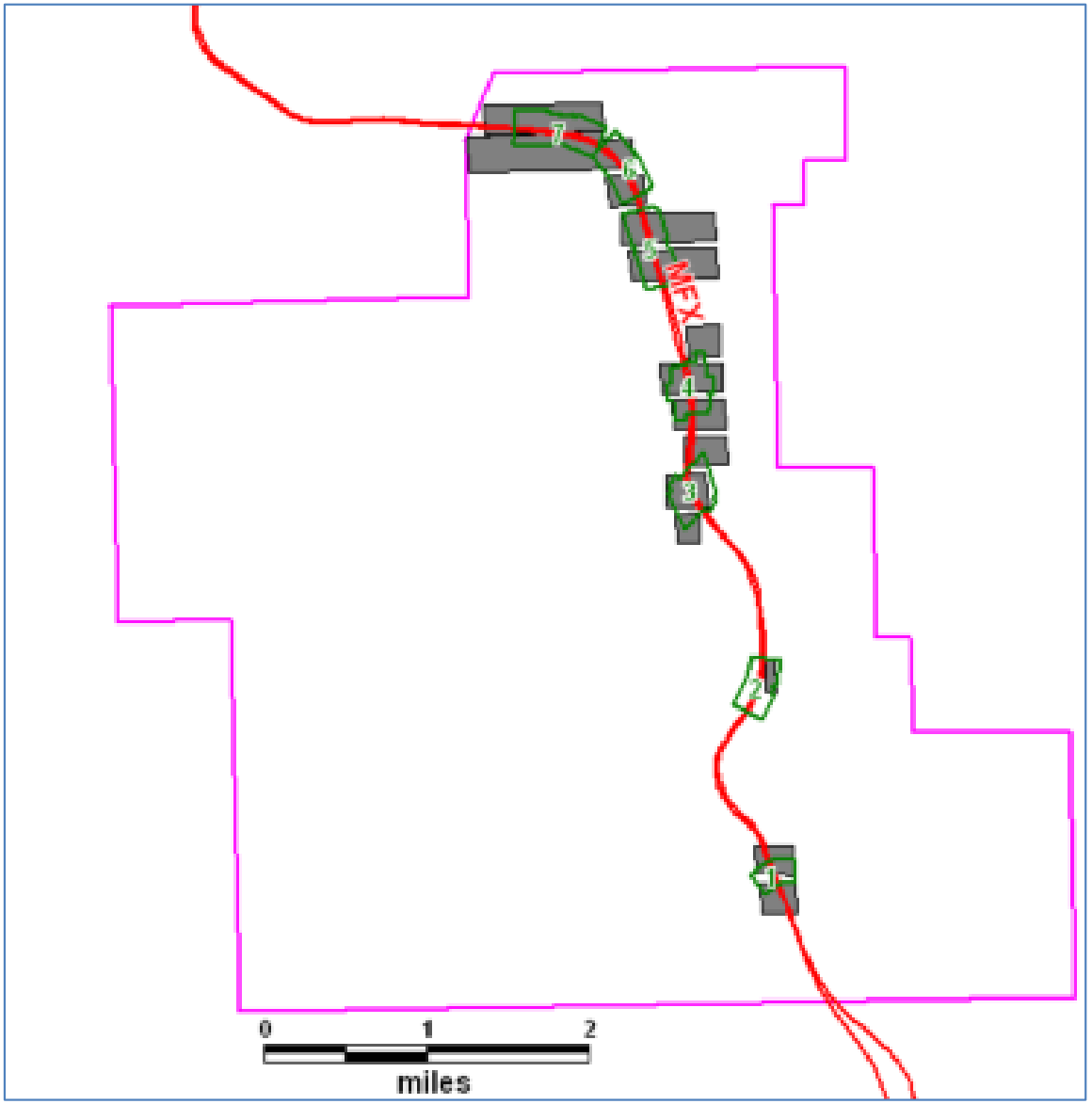
11/20/2024



PA Turnpike vs Consol



PA Turnpike vs Consol



Operating Assumptions

- Total Reserve – 50 Million Tons
- Condemnation of 10 million tons
- Production Rate – 5,000,000 tpy
- Recovery Rate 80%
- Discount Rate – 12%
- Coal Price - $50/ton
- Market Royalty Rate – 5%

Clues

- No Permit
- Yellow Book

Whitney Benefits Facts

- Whitney Benefits' land of 1327 acres which were irrigated and sub-irrigated by the Tongue River alluvial valley floor.
- The land was leased to PKS in 1974, and advanced royalties were paid to Whitney.
- PKS expended exploration costs of $1 million in 1976.
- PKS filed a permit application with the Wyoming Department of Environmental Quality (DEQ).

Whitney Benefits

- A year later, SMCRA was enacted.
  - » No permit or application shall be approved if it should "interrupt, discontinue or preclude farming on alluvial valley floors that are irrigated or subirrigated
  - » Thus, Whitney's right to mine the coal on its property was invalidated by the enacted legislation of SMCRA and was the basis for the alleged taking in 1983.

Whitney Benefits Exchange Failed

- SMCRA provided for an exchange mechanism as a "method for ascertaining and paying just compensation”
- 1981: PKS had requested an exchange for federal lands to the BLM:
  - BLM offered Ash Creek, PKS spent $130,000 on exploration costs on it
- BLM also offered the Hidden Water tract, which PKS refused *as it had mined it in the late 40s to early 50s and was not interested in the remaining coal*
- PKS and Whitney proceeded with their 1983 claim under the Tucker Act for a 5th Amendment regulatory taking

Whitney - Is it a Taking?

Consider three factors:

1 The economic impact of the restriction

The Court found that:

-There was a market for Whitney coal

-The coal was economically and technologically mineable

-SMCRA had a "devastating economic impact on the property“

2 The restriction's interference with investment expectations

-Investors could reasonably expect the returns on investments as projected

-In-place assigned reserves were valued at $1.01/ton, and residual reserves at $0.20/ton

3 The character of the government's action

-There were no economically viable alternative uses for the property

Court’s Conclusion: "... the substantial public interest at stake does not outweigh the private interest so that plaintiffs must bear the full burden imposed by the government action"

Whitney Findings

The Court established a final sum of $60,296,000 for the total 1977 value of recoverable Whitney Coal assuming:

- An annual production rate of 2.5 million tons
- Cost of $2 million for backfilling
- Interest was payable to Whitney from Aug. 3, 1977 to date of payment

The amount was intended to represent what a willing purchaser would have paid Whitney *as a willing seller, to mine the Whitney Coal after calculating all mining related costs.*

The Court held that:

- *the enactment of SMCRA totally eliminated economic value of plaintiffs' coal and constituted a taking under the Fifth Amendment;*
- *the taking occurred at the time SMCRA became effective*
- *the valuation method incorporating the discounted cash flow approach offered a reliable method for determining the fair market value of the coal on the day of the taking*
- *the plaintiffs were entitled to pre-judgment interest*

Questions