nobody! but nobody! has more experience in 100-ton and larger mechanical drive trucks than Dart...

Five years from now... while the other guys are still working the bugs out of their 100-ton-plus mechanical-drive end dump trucks... DART will be another five years ahead in mechanical-drive technology, experience, and proven performance! You might want to remember that when the competition starts outlining one of their latest **"Big Deals."**

It seems everyone in the world is just now jumping on the mechanical-drive bandwagon... even those truck manufacturers who were trying so hard to sell you electric-drive just a year or so ago. Why is that?

It's because everybody in the world suddenly realizes that DART had a great idea after all. You see, it was back in 1965... when electric-drive appeared to be the only answer to powering large capacity trucks... Dart already had started building more than 100 mechanical-drive end dump trucks in the 100-ton-plus category. That's more than the combined production of all other truck manufacturers. And as early as 1970... years before the other guys even put a line on paper to start designing a 100-ton or larger mechanical-drive truck... DART had already perfected mechanical-drive with the Allison transmission and the unique triple reduction Dart drive axles.

Today, DART can claim with confidence, **more than 10 million hours** of cost-effective, cost-efficient, and cost reliable mechanical-drive performance **under actual working conditions** in mines all across North America.

And that **is a Big Deal**, particularly if you're in the position of planning a mine's truck requirements and production capabilities.

There are currently three basic models in the DART 3000 Series mechanical-drive 100-ton and larger end dump trucks. And you can be assured that DART is ready and willing to custom-tailor a truck to fit your specific mine plan...

We believe you deserve to hear the full story about DART's position of leadership in a competitive industry... and how DART intends to maintain that position for years to come with the 3000 Series trucks.

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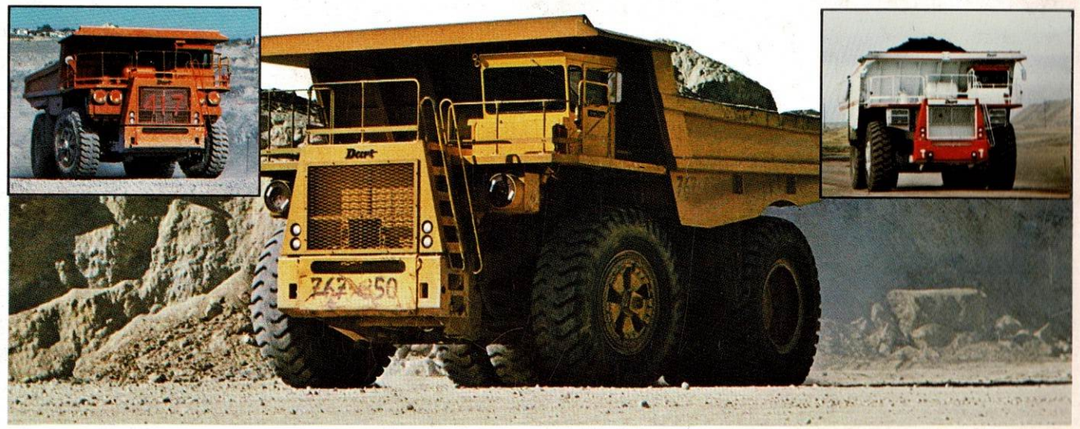
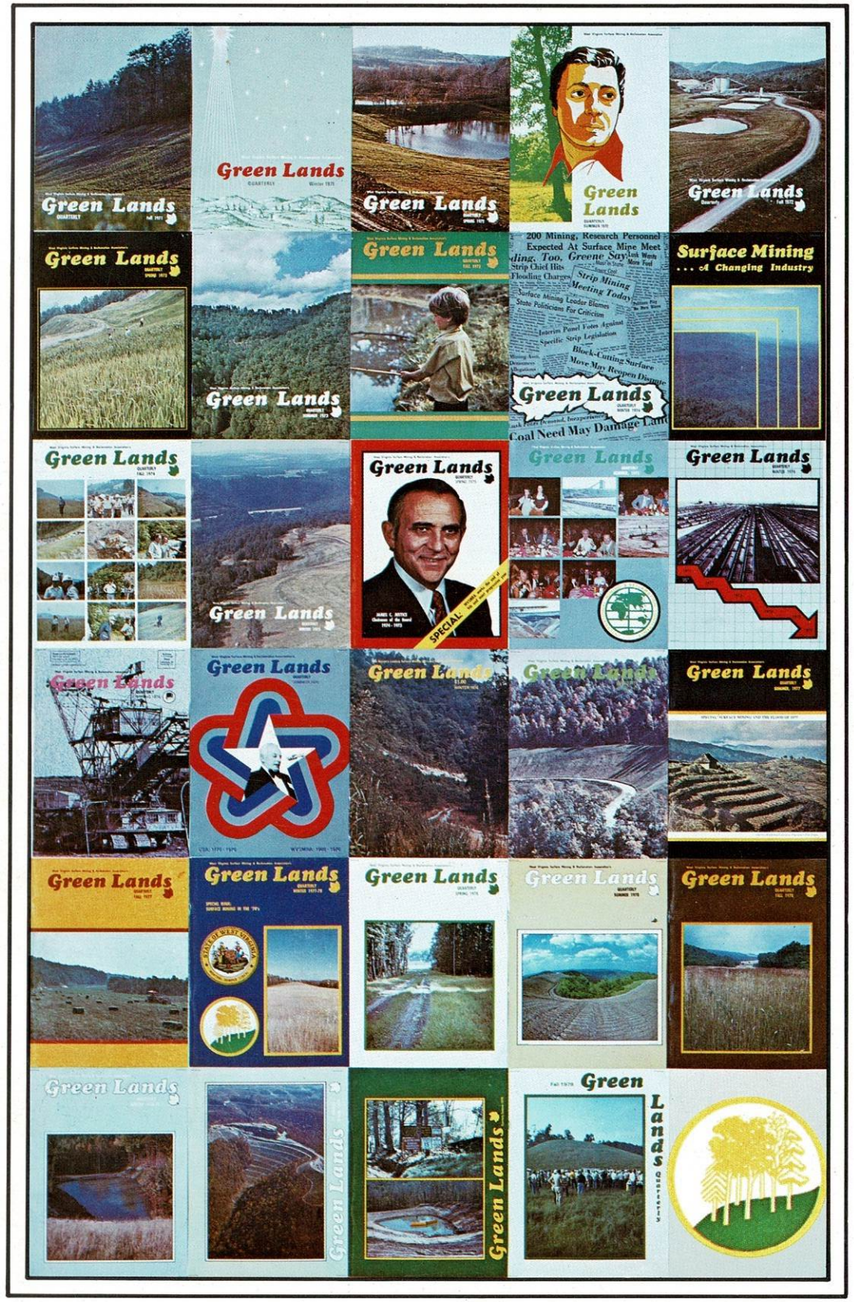
DART 3100 (100 Ton) **DART 3110 (110 Ton)** **DART 3120 (120 Ton)**



Winter 1979-80

Green Lands



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Only a few coal operators make it to the top. Most never get to the point where their operation is big enough to get a Caterpillar 777 off-highway truck.

But if you're among the few operators who have reached the "big time," nothing else can take the place of the Cat 777.

The truck's specs are mind boggling. It has an 85-ton capacity, an 870-horsepower engine and a top speed (loaded) of 37 mph. And its braking system is what you'd expect from Caterpillar, so you don't have any worries as these big trucks come down from the top of the hill.

And that's just the beginning. If you're one of the few coal operators who has made it to the top of the hill, write or call Walker Machinery and ask for our full-color booklet on the Caterpillar 777 off-highway truck.

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Green Lands

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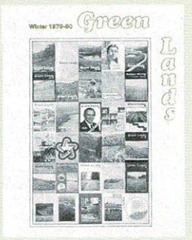
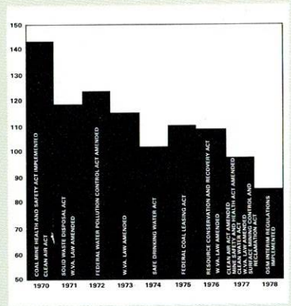


Our Cover

The decade just past, holds a special significance for **Green Lands.** Though the WVSMRA was founded in 1966, the magazine was first published in 1971. This is our 30th issue, an appropriate time, we felt, to remember the first 29.



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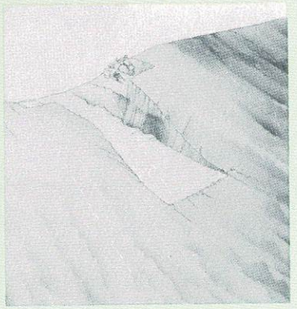

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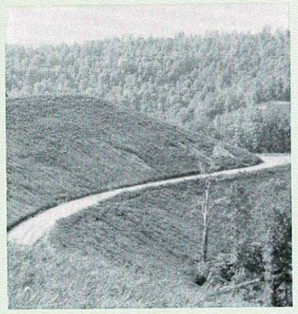

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Foreword

The national image of West Virginia as one vast coal camp is most certainly an exaggerated one. But it is true that few, if any, states and industries share so common an existence as West Virginia and coal.

The Mountain State has remained at or near the top in annual coal production for well over half a century. The state is located in the middle of the richest coal field in the world, and enjoys a yearly production value of $3.5 billion.

The industry statewide directly employs more than 60,000 individuals, or one of every 12 of the state's work force. The annual coal payroll approaches $1 billion, one-seventh of the state total.

Coal production generates $125 million in business and occupation taxes each year, three-fourths of the total paid by all individuals combined. Coal is mined in 33 of West Virginia's 55 counties.

The numbers cited above reflect the industry's direct effect on the state. It would be nearly impossible to calculate the mutipier effect of the entire coal business and its support industries on the economy of West Virginia.

The West Virginia Surface Mining and Reclamation Association may be a fair example of this idea. As the Association approaches its 14th birthday, it boasts a membership of 360 companies, over 60% of which are non-coal producers.

The Mountain State has produced more coal over the years than any other, yet retains more coal reserves than all but three. The unique relationship between West Virginia and the coal industry places the state in an enviable yet vulnerable position as an energy starved nation enters the decade of the 1980's.

This special issue of **Green Lands** attempts to evaluate the state of affairs of West Virginia's most important industry, with an eye toward fulfilling the potential outlined for the state and region by the last five federal administrations.

"Alphabet Soup"

Presented to the
Fourth Annual West Virginia Surface Mining Symposium
January 12-13, 1977

by Jerry Lombardo, Island Creek Coal Co.

Besides members of the coal industry, we have on our panel today personnel from the USEPA, the WVDNR and the Army COE. As you know, we are all here today mainly because back in 1972, Congress passed the FWPCAA (or PL92-500). From that law, the USEPA was given control of the NPDES permit program. Also in the FWPCAA (or PL 92-500) we find three levels of water pollution control. We must meet BPCTCA by July 1, 1977, we must meet BATEA by July, 1983 and somewhere between these two dates, NSPS, as promulgated by the USEPA, will go into effect.

Once NSPS are promulgated, application to the USEPA for an NPDES permit could well involve an EIS under the NEPA of 1969 (or PL 91-190). If the USEPA is required to submit an EIS to CEQ under NEPA, we, as coal operators, will be required to have an EA. The EA will eventually lead to an EAR (or an EIA) which in turn, would be submitted to the USEPA for their use in deriving an EIS. Once the EIS is approved, then, of course, the NPDES permit will be issued by the USEPA. (Bear in mind, however, that approval may be considerably delayed if objections are filed by the EDF, NRDC, SOCM or ARDC).

Now if a state is approved by the USEPA to issue its own NPDES permits (in West Virginia, the DNR would be the control agency), then an EIS would not be required even if NSPS were promulgated. That is true, unless the state had its own "little NEPA," at which time, the same ERA, EIA and EIS consideration as under the NEPA of 1969 (or PL 91-190), would be in effect.

Let us not forget that the WVDNR has its own permit system as authorized under Article 5A (the WVWPCA). Section 20-5A-5 of that article enables the WVDNR to issue permits for water discharges.

Remember also, that if your operation involves crossing a stream of 5 cfs or greater, you must apply to the Army COE for a permit. The Army COE also derives its authority from the FWPCAA (or PL 92-500) under Section 404.

Before you're through putting in a new mine, you will probably have encountered the WVDOR or the DNR, the CR and DC section of the DNR, the WVDOM, the WV DOH, the SCS and MESA.

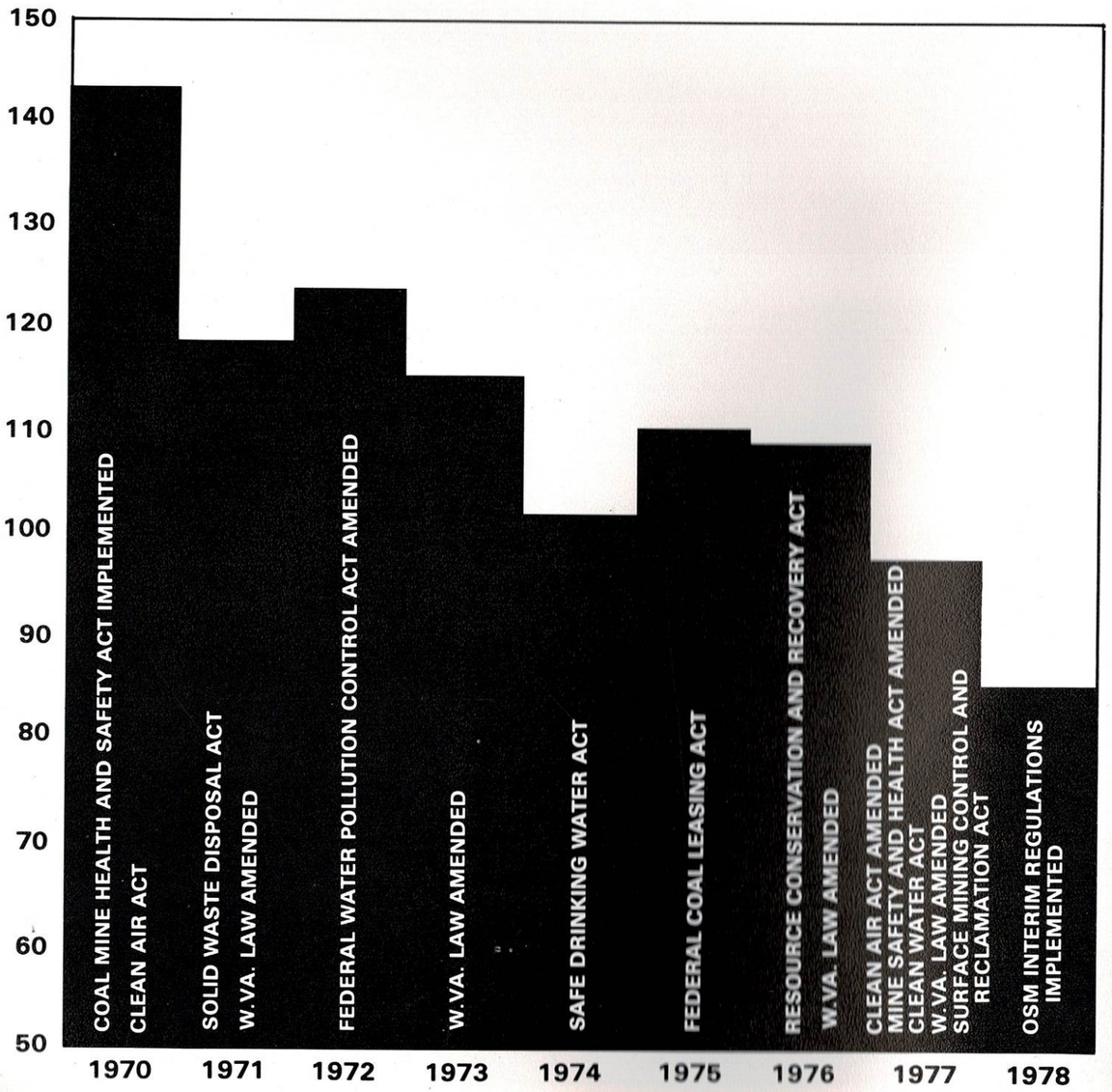
And finally don't forget your "spcc" plan. I might also mention the CAA of 1970 (or PL 91-604) with its NAAQS, AQCR, and its SIP for So2, TSP and probably Nox. However, that's another story. If you want to learn more about that, you have to come back tomorrow.

Paperwork

Editor's Note: The following is a listing, not necessarily complete, of the various reports which a West Virginia coal company must file in order to comply with existing laws and regulations. Altogether, it lists 83 separate reports, 37 due to state government, and 46 to federal. The Mine Safety and Health Administration would appear to be the most prolific agency, requiring 23 separate pieces of paperwork.

GOVERNMENT AGENCY	ACTIVITY	FILINGS PER YEAR
WV State Tax	Motor Carrier Tax	4
WV State Tax	Corporation License Tax	1
WV State Tax	Business Franchise Tax	1
WV State Tax	Business and Occupation Tax	4
WV State Tax	Corporate Income Tax	1
WV State Tax	Payroll Tax Return	12
WV State Tax	Fuel Refund	12
WV Dept. Highways	License, Titles, Fuel Users Permits for On-Highway Vehicles	12
WV Dept. Mines	Oil and Gas Extension	As Required
WV Dept. Mines	Mine Injury Report	Each Injury
WV Dept. Mines	Permit Report	12
WV Work. Comp.	Injury Report	Each Injury
WV Work. Comp.	Tax Return	4
WV Dept. Emp. Sec.	Benefit Claim Report	Each Filing
WV Dept. Emp. Sec.	Tax Return	4
WV C-W Pneu Fund	Tax Return	4
Dept. Natural Res.	Yearly Planting Report	1
Dept. Natural Res.	Final Planting Plan	As Required
Dept. Natural Res.	Monthly Water Quality Report	12
Dept. Natural Res	Surface Mine Permit Removal	1
Dept. Natural Res.	Water Discharge Permit	As Required
Dept. Natural Res.	Water Approval Surface Mine Permit	As Required
Dept. Natural Res.	Water Approval Drainage Permit	As Required
Dept. Natural Res.	Water Prep. Plant Const. Permit	As Required
Dept. Natural Res.	Water Prep. Plant Operation Permit	As Required
Dept. Natural Res.	Dam and Refuse Prep. Plant Operation Permit	As Required
Dept. Natural Res.	Refuse Disposal Permit	As Required
Dept. Natural Res.	Dam Construction Permit	As Required
Dept. Health	Sewage Facilities Application	2
Dept. Health	Sewage System Info. and Design Data Sheet	2
Dept. Health	Water Treatment System Design and Date Sheet	2
Dept. Health	Water Supply Application	2
Dept. Health	Certificate of Supervision	2
Dept. Health	Waste Load Allocation Form	2
Air Pol. Con. Comm.	App. Registration of Prep. Plant	1
Air Pol. Con. Comm.	App. Construction—Stationary Source	1
Air Pol. Con. Comm.	App. for Operation	2
Air Pol. Con. Comm.	App. to Register Refuse Disposal Areas	2
IRS	Use Tax on Highway Vehicles	1
IRS	Use Tax on Civil Aircraft	1
IRS	Corporate Income Tax Return	1
IRS	1099 Report	1
IRS	Form 941 Tax Return	1
IRS	Form 941 Tax Return	4
IRS	Form 941 Tax Deposits	26
Dept. Interior	Distribution of Bituminous Coal Shipments Report	4
Dept. Interior	Reclamation Tax Return	4
Dept. Interior	Progress Maps	1
Dept. Interior	Surface Mine Permit App.	As Required
Dept. Interior	Surface Water Monitoring Report	4
Dept. Interior	Ground Water Monitoring Report	4
Dept. Interior	Permit Renewal	1
Dept. Interior	R. P. E. Inspection and Report	4
MSHA	Employment and Production Report	12
MSHA	Mine Injury Report	Each Injury
MSHA	New Mine Permit Sample Forms	1
MSHA	New Mine Permit Legal Indentity Report	1
MSHA	New Mine Permit Preliminary Plans	1
MSHA	New Mine Permit Proposed Training Program	1
MSHA	New Mine Permit Training Course Form	1
MSHA	New Mine Permit Fire Drill Form	1
MSHA	New Mine Permit Evacuation Drill Form	1
MSHA	New Mine Permit Fire Fighting and Evacuation Plans	1
MSHA	New Mine Permit Fire Fighting Procedures and Protection	1
MSHA	New Mine Permit Smoking Program Plan	1
MSHA	New Mine Permit Noise Level Survey Form	As Required
MSHA	New Mine Permit First Aid for Supervisors	1
MSHA	New Mine Permit Sanitary Toilet Facilities	1
MSHA	New Mine Permit Emergency Medical Assistance	1
MSHA	New Mine Permit Hearing Conservation Plans	1
MSHA	New Mine Permit Dust Sampling and Reporting	2
MSHA	New Mine Emergency Transportation	1
MSHA	Health and Safety Individual Training Record	1
MSHA	Ground Control Plan	1
MSHA	Request for Permit to Enter Auger Holes	1
MSHA	Field Change Application	As Required
Dept. Labor	Employment-Payroll-Hours Report	12
Bureau of Mines	Temporary Surface Certificate	2
EPA	Application for Discharge	As Required
EPA	Discharge Monitoring Report	Daily
EPA	Environmental Impact Statement	As Required
EPA	Air Pollution Control Existing Source Permit	As Required
EPA	Air Pollution Control New Source Permit	As Required

Editors's Note: The West Virginia Surface Mining and Reclamation Association and **Green Lands** do not necessarily condemn any one of the legislative actions mentioned below. Further, we realize that other factors, such as labor conditions, and problems arising from transportation and markets, have contributed to the decline of West Virginia coal production during the 1970's. The intent is simply to illustrate the abundance of government regulation and its role in that decline. The "West Va. Law" referred to on the graph is the West Virginia surface mining law.



Editorial

Spindled, Folded and Mutilated

Over the last three years, **Green Lands** has probably devoted more of its pages to government regulation than to any other single subject, however broad. This is an unfortunate fact, in a publication primarily devoted to reclamation.

It should, however, illustrate the depth of concern which the West Virginia Surface Mining and Reclamation Association feels with regard to the proliferation of government agencies and the effect which they have had on the mining industry.

It is incredible that an industry so basic as mining, and one so vital to the economy of an entire state and region, could suffer such a decline and yet be faced with the threat of still further curbing of its productive powers.

Those who have followed the fortunes and misfortunes of the coal industry from a distance may have become calloused to gloomy reports of fallen production and failing economies. But those who are close to the industry know that the figures are frightenly meaningful.

Those whose businesses, careers, and paychecks have become statistical casualties are not really interested in debating the relative roles of government interference and market instability in the decline of the coal industry, much less the health and welfare of the snail darter, or the number of miles of wilderness available to back packers.

How many industries have ever faced legislative extinction? (Such a bill on surface mining was voted on by the West Virginia House of Delegates in 1971.) How many industries have heard a President call for doubled production within eight years, then watched him sign into law another stifling blanket of bureacracy? That such things could happen in an era of world energy crises is unbelievable.

On the four preceeding pages we have presented, respectively, a tongue-in-cheek recital of government's penchant for initials, a two-page listing of required reports that no one would want to even read word for word, let alone comply with, and a graphic portrayal of the steady decline of this state's leading industry over the past decade. We were not just filling up space. Go back four pages and read again. Is this any way to run a railroad?

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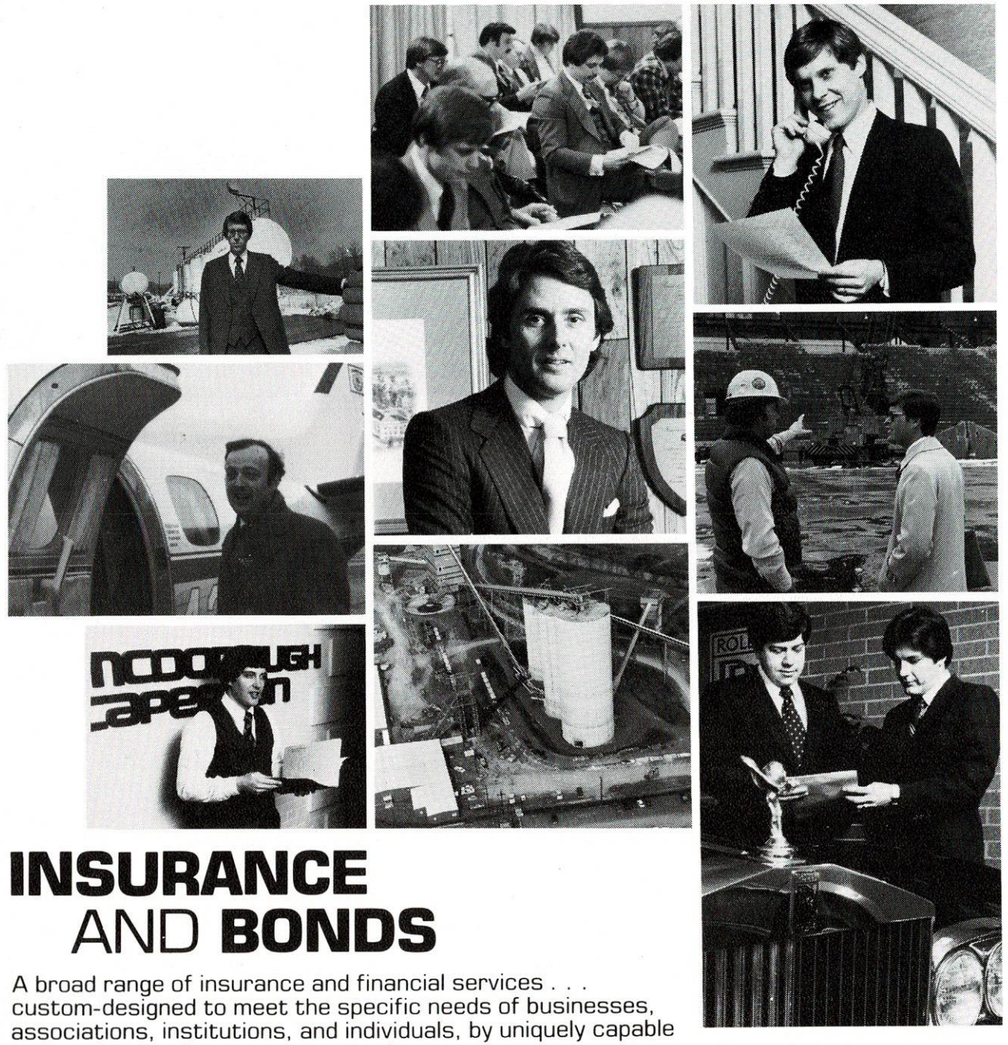

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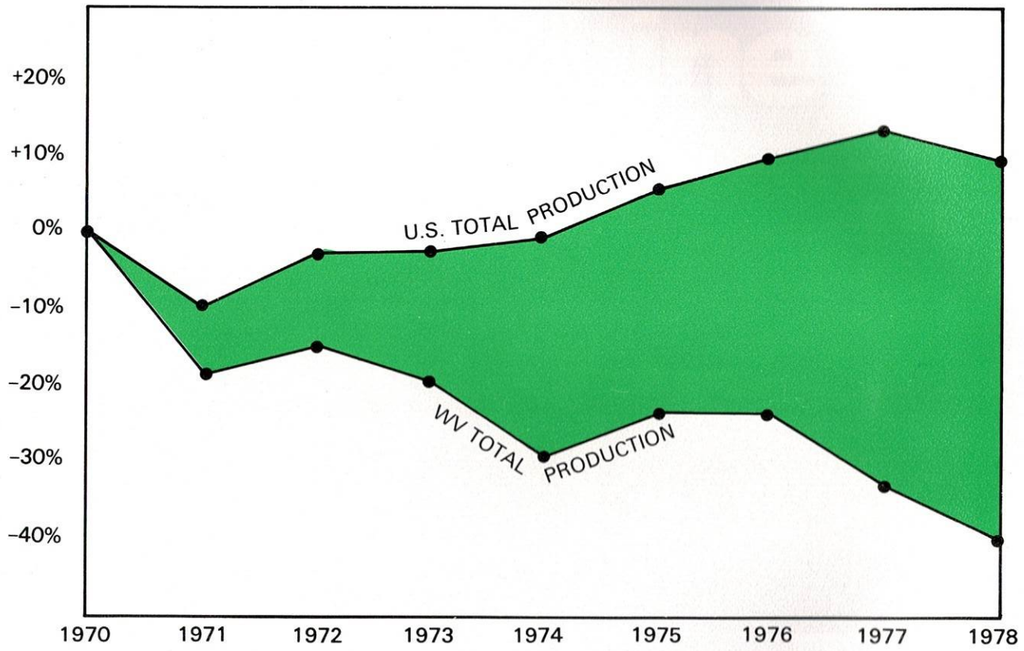


The Widening Production Gap

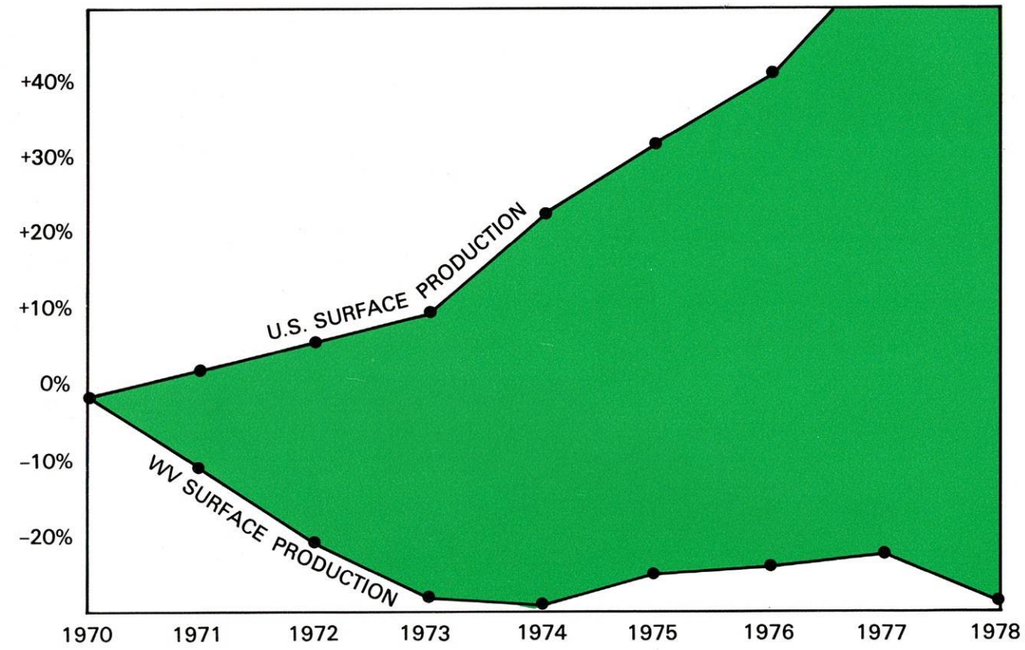
When 1979 production figures are totaled, it will be found that West Virginia has produced over one billion tons of coal during the 1970's, one of only two states to do so.

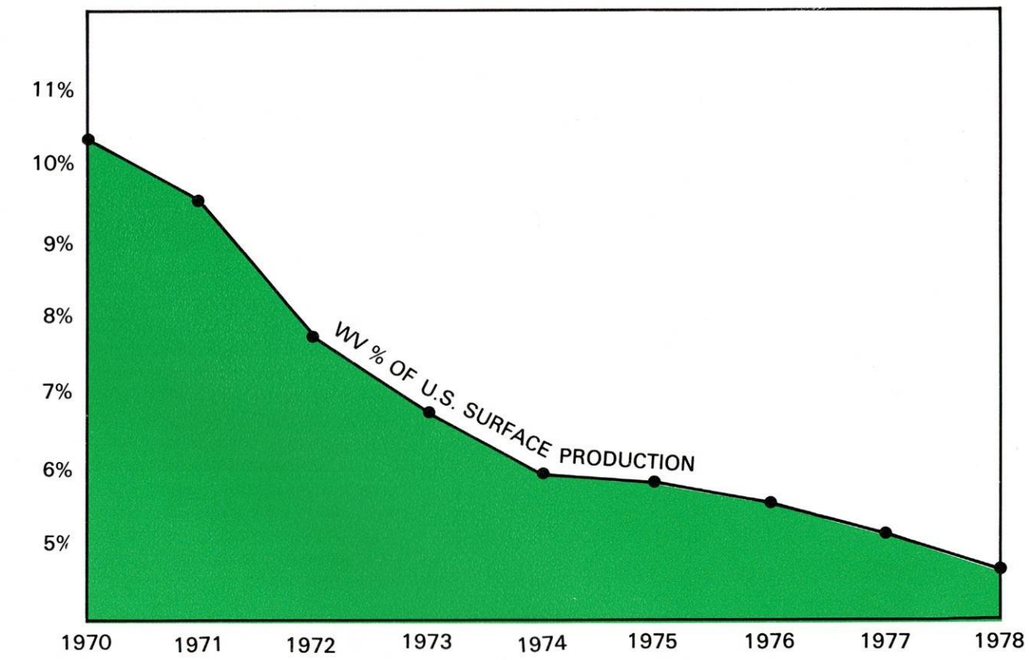
West Virginia began the decade as the nation's leading producer of bituminous coal, having held that position for 40 consecutive years. But prolonged strikes, excessive regulation, and problems with transportation and markets have taken their toll, and as the decade closes, the Mountain State can expect an annual output of no more than two-thirds that of neighboring Kentucky.

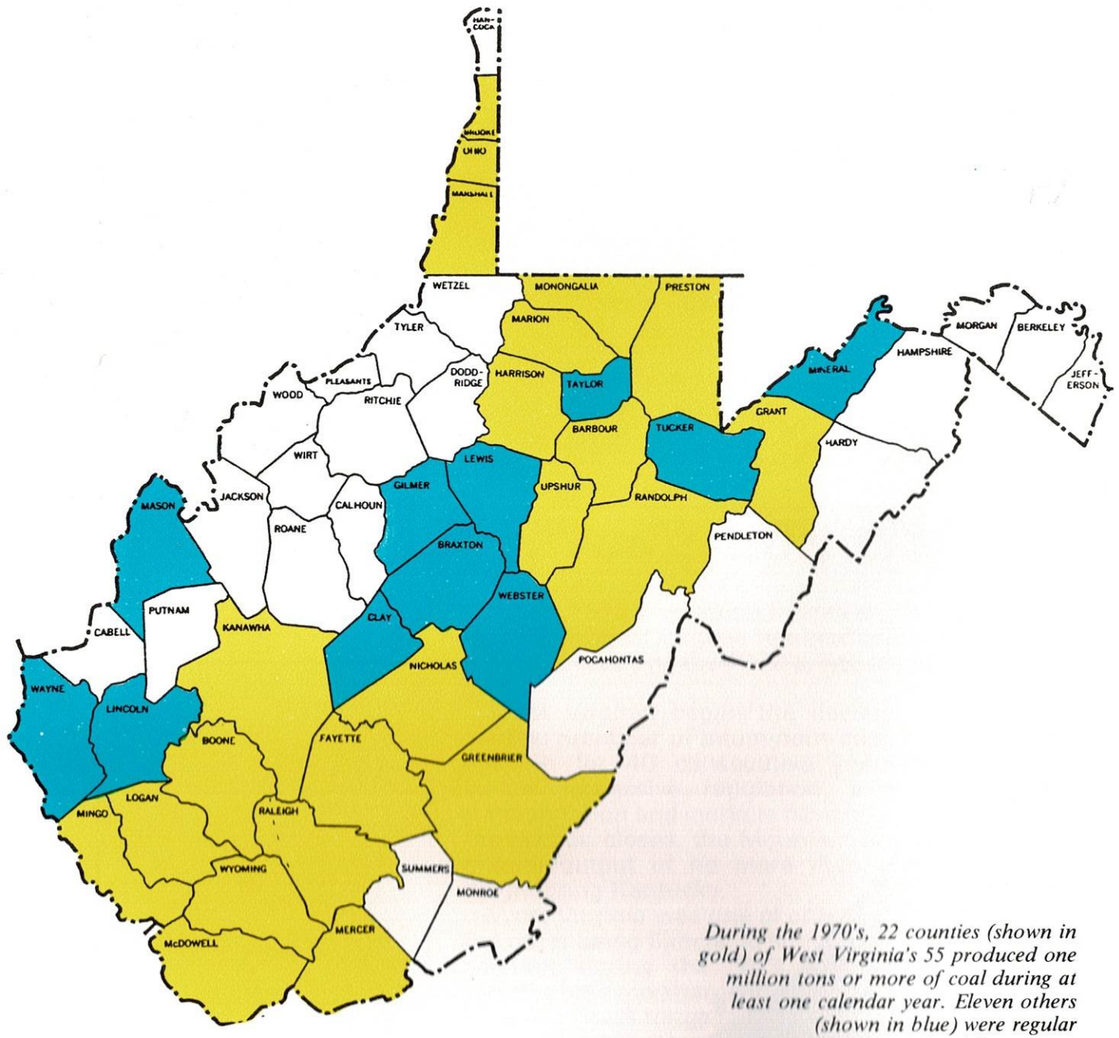
West Virginia was one of only two major coal states, the other being Illinois, to suffer significant production declines during the '70's. Needless to say, West Virginia bore the sharper decline of the two, losing over 30% of annual tonnage.

The loss has been shared proportionately between the surface and underground segments of the industry. Surface mining in the state continues to account for roughly 20% of production. This is in sharp contrast to the national picture, where surface mining shows an increase from 44% to 63% of national annual tonnage.

Though final 1979 figures will reflect a rebound from the disaster of 1978, when production hit a 60 year low, it remains an ominous fact that none of this state's top 15 production years occured in the decade just concluded.







During the 1970's, 22 counties (shown in gold) of West Virginia's 55 produced one million tons or more of coal during at least one calendar year. Eleven others (shown in blue) were regular contributors to the state's coal economy. McDowell and Monongalia Counties led the way, each turning out over 100 million tons for the decade. In the surface mining segment of the industry, the leaders were Kanawha, Barbour, and Boone Counties. Complete production and employment statistics appear on the pages following.

County by County Through the 70's

KEY—
U—Underground
S—Surface
T—Total (combined underground and surface)

BARBOUR

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	16	18	34	19	19	38	543	315	848	1,605,774	1,899,419	3,505,193
71	14	23	37	15	25	40	547	490	1,047	1,295,502	2,459,840	3,755,352
72	9	17	26	14	44	58	563	479	1,042	1,312,684	2,476,208	3,788,892
73	6	22	28	9	56	65	471	497	968	1,326,086	3,237,742	4,563,828
74	8	15	23	12	33	45	510	596	1,106	1,218,148	2,490,756	3,708,904
75	9	14	23	14	31	45	669	650	1,319	1,226,130	2,474,455	3,700,585
76	11	19	30	12	38	50	696	737	1,433	950,046	2,047,244	2,997,290
77	8	20	28	9	36	45	772	703	1,475	1,008,629	2,477,447	3,486,076
78	11	27	38	20	64	84	1,015	764	1,779	1,211,029	1,851,733	3,062,762
										PRODUCTION TOTALS	11,154,028	21,414,844	32,568,872

BOONE

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	35	24	59	48	45	93	2,574	881	3,455	8,157,369	3,449,847	11,607,216
71	32	22	54	53	50	103	3,136	993	4,129	7,132,279	2,783,708	9,915,987
72	28	20	48	50	55	105	3,717	758	4,475	8,908,863	1,976,595	10,885,458
73	28	17	45	57	36	93	3,909	605	4,514	8,890,372	2,241,812	11,132,184
74	25	9	34	52	23	75	3,983	344	4,327	7,572,214	1,617,112	9,189,326
75	27	13	40	65	31	96	4,542	457	4,999	7,790,109	1,868,302	9,658,411
76	27	13	40	56	29	85	5,053	676	5,729	8,263,056	2,204,986	10,468,042
77	27	16	43	58	32	90	4,954	611	5,565	6,122,891	1,885,076	8,007,967
78	32	17	49	87	49	130	4,807	948	5,755	6,531,247	2,087,746	8,618,993
										PRODUCTION TOTALS	69,368,400	20,115,184	89,483,584

BRAXTON

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	0	0	0	0	0	0	0	0	0	0	0	0
71	1	1	2	1	1	2	3	14	17	677	21,958	22,635
72	1	0	1	1	0	1	5	0	5	1,533	0	1,533
73	2	0	2	2	0	2	13	0	13	909	0	909
74	2	0	2	2	0	2	10	0	10	11,268	0	11,268
75	3	2	5	6	4	10	30	89	119	21,455	66,882	88,337
76	4	5	9	4	7	11	27	87	114	29,132	148,303	177,435
77	1	4	5	1	7	8	55	283	338	30,980	152,837	183,817
78	6	5	11	7	7	14	70	46	116	38,489	90,045	128,534
PRODUCTION TOTALS										134,443	480,025	614,468

BROOKE

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	3	9	12	3	9	12	158	48	206	678,985	372,238	1,051,223
71	2	8	10	2	8	10	176	57	233	511,153	282,114	793,267
72	2	8	10	2	12	14	207	56	263	681,972	220,318	902,290
73	2	5	7	2	8	10	219	37	256	639,134	141,931	781,065
74	2	3	5	2	3	5	231	18	249	602,748	97,778	700,526
75	2	2	4	2	4	6	277	35	312	653,219	86,125	739,344
76	2	4	6	2	5	7	344	31	375	748,228	126,938	875,166
77	1	5	6	1	5	6	340	32	372	635,206	128,241	763,447
78	4	6	10	4	10	14	340	69	409	527,935	254,654	792,589
PRODUCTION TOTALS										5,678,580	1,720,337	7,398,917

CLAY

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	3	0	3	4	0	4	38	0	38	43,221	0	43,221
71	4	1	5	4	1	5	39	23	62	43,971	74,339	118,310
72	2	1	3	2	1	3	33	9	42	26,737	3,734	30,471
73	1	0	1	9	0	9	55	0	55	35,288	0	35,288
74	3	3	6	6	3	9	24	16	40	55,840	21,862	77,702
75	4	1	5	5	1	6	44	0	44	69,176	0	69,176
76	4	2	6	6	2	8	29	5	34	40,497	22,234	62,731
77	2	0	2	2	0	2	9	0	9	5,123	0	5,123
78	8	4	12	13	4	17	36	18	54	11,827	36,439	48,266
PRODUCTION TOTALS										331,680	158,608	490,288

FAYETTE

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	36	15	51	50	20	70	1,705	183	1,888	3,530,379	1,692,063	5,222,442
71	34	13	47	48	25	73	1,638	339	1,977	2,547,707	1,137,331	3,685,038
72	25	12	37	38	29	67	1,611	202	1,813	2,872,178	634,174	3,506,352
73	20	11	31	26	29	55	1,350	224	1,574	2,576,871	910,470	3,487,341
74	18	8	26	27	19	46	1,464	166	1,630	2,192,637	526,998	2,719,635
75	24	12	36	40	25	65	1,649	324	1,973	2,296,113	564,080	2,860,193
76	25	16	41	40	30	70	1,649	502	2,151	2,259,810	927,114	3,186,924
77	21	22	43	37	36	73	1,944	532	2,476	1,790,618	965,931	2,756,549
78	28	28	56	54	65	119	1,925	678	2,603	1,601,712	854,323	2,456,035
PRODUCTION TOTALS										21,668,025	8,212,484	29,880,509

GILMER

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	4	2	6	4	2	6	23	15	38	39,635	55,162	94,797
71	3	1	4	3	2	5	17	20	37	23,501	79,428	102,929
72	1	1	2	1	2	3	4	12	16	30	49,494	49,524
73	0	0	0	0	0	0	0	0	0	0	0	0
74	1	1	2	1	1	2	24	1	25	64,598	1,107	65,705
75	2	1	3	2	1	3	23	26	49	33,692	85,693	119,385
76	2	1	3	3	1	4	26	12	38	28,289	16,381	44,670
77	3	1	4	3	1	4	22	9	31	61,883	8,333	70,216
78	4	5	9	7	6	13	23	81	104	19,231	174,952	194,183
PRODUCTION TOTALS										270,859	470,550	741,409

GRANT

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	2	4	6	4	5	9	456	158	614	1,865,214	704,167	2,569,381
71	7	0	7	3	7	10	542	184	726	1,510,177	614,537	2,124,714
72	2	5	7	3	15	18	486	194	680	1,313,863	487,080	1,800,943
73	2	3	5	3	8	11	480	114	594	1,409,974	201,081	1,611,055
74	2	3	5	3	11	14	571	61	632	1,230,255	305,876	1,536,131
75	2	3	5	4	10	14	698	65	763	1,476,925	343,029	1,819,954
76	2	2	4	4	9	13	780	62	842	1,299,251	301,636	1,600,887
77	2	2	4	5	10	15	875	64	939	1,219,126	409,941	1,629,067
78	2	6	8	7	27	34	956	99	1,055	1,190,353	388,558	1,578,911
PRODUCTION TOTALS										12,515,138	3,755,905	16,271,043

GREENBRIER

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	15	3	18	22	3	25	227	37	264	345,345	95,052	440,397
71	13	4	17	16	3	19	172	40	212	185,044	188,018	373,062
72	5	6	11	8	18	26	113	149	262	108,196	455,449	563,645
73	5	6	11	10	11	21	96	75	171	143,059	259,793	402,852
74	9	9	18	15	15	30	149	167	316	215,574	368,802	584,376
75	7	11	18	17	20	37	196	402	598	330,293	539,768	870,061
76	12	16	28	15	23	38	241	490	731	504,707	524,730	1,029,437
77	12	12	24	18	16	34	269	347	616	438,576	473,130	911,706
78	18	15	33	25	28	53	358	342	700	389,862	549,238	939,100
PRODUCTION TOTALS										2,660,656	3,453,980	6,114,636

HARRISON

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	11	21	32	14	21	35	1,307	248	1,555	5,443,409	1,653,700	7,097,109
71	11	20	31	16	22	38	1,575	325	1,900	4,533,670	1,287,352	5,821,022
72	7	20	27	12	40	52	1,449	365	1,814	3,967,350	1,356,495	5,323,845
73	4	12	16	6	27	33	790	135	925	3,206,022	778,755	3,984,777
74	6	13	19	7	20	27	854	170	1,024	3,100,011	804,708	3,904,719
75	9	26	35	11	37	48	998	414	1,412	8,294,806	1,138,997	4,433,803
76	15	30	45	26	42	68	1,105	561	1,666	3,950,524	1,210,939	5,161,463
77	14	27	41	18	37	55	1,079	634	1,713	3,189,506	1,022,164	4,211,670
78	20	36	56	34	67	101	1,134	661	1,795	2,342,458	1,129,583	3,472,041
PRODUCTION TOTALS										33,027,756	10,382,693	43,410,449

KANAWHA

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	28	23	51	60	50	110	2,623	459	3,082	8,885,906	3,085,800	11,971,706
71	22	26	48	44	48	92	2,863	684	3,547	6,206,654	3,466,521	9,673,175
72	16	31	47	50	78	128	2,844	853	3,697	6,812,928	3,719,475	10,532,403
73	19	22	41	51	58	109	3,039	606	3,645	6,520,876	2,473,405	8,994,281
74	19	18	37	44	31	75	2,918	442	3,360	5,269,690	2,647,322	7,917,012
75	18	18	36	58	41	99	3,269	489	3,758	5,422,861	2,386,901	7,809,762
76	17	16	33	51	38	89	3,378	554	3,932	5,412,582	2,272,320	7,684,902
77	16	14	30	48	35	83	3,366	672	4,038	4,403,809	1,896,626	6,300,435
78	20	15	35	64	52	116	3,837	739	4,576	4,531,956	1,942,131	6,474,087
PRODUCTION TOTALS										53,467,262	23,890,501	77,357,763

LEWIS

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	2	9	11	2	9	11	11	136	147	3,335	683,998	687,333
71	1	13	14	1	15	16	4	192	196	2,516	541,048	543,564
72	0	9	9	0	16	16	0	94	94	0	394,239	394,239
73	1	11	12	1	18	19	3	125	128	1,286	274,917	276,203
74	2	5	7	2	17	19	4	126	130	2,005	589,929	591,934
75	3	8	11	3	20	23	15	208	223	50,040	664,356	714,396
76	2	10	12	2	17	19	8	158	166	41,493	340,759	382,252
77	2	11	13	3	25	28	25	266	291	67,863	611,036	678,899
78	6	15	21	8	40	48	23	274	297	64,392	381,827	446,219
PRODUCTION TOTALS										232,930	4,482,109	4,715,039

LOGAN

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	20	17	37	41	32	73	3,463	0	3,463	11,015,592	2,296,316	13,311,908
71	24	20	44	45	35	80	3,663	472	4,135	8,468,807	1,153,955	9,622,762
72	28	16	44	64	39	103	3,767	333	4,100	8,445,543	1,049,943	9,495,486
73	22	15	37	58	28	86	3,348	253	3,601	7,567,060	989,636	8,556,696
74	33	7	40	65	11	76	3,531	303	3,834	6,945,773	823,286	7,769,059
75	50	15	65	105	18	123	4,509	424	4,933	7,297,567	928,095	8,225,662
76	57	14	71	101	12	113	4,567	475	5,042	7,113,887	1,498,266	8,612,153
77	55	14	69	102	19	121	4,305	810	5,115	5,540,225	1,673,189	7,213,414
78	63	17	80	158	29	187	4,563	747	5,310	5,052,402	1,768,391	6,820,793
PRODUCTION TOTALS										67,446,856	12,181,077	79,627,933

MARION

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	5	5	10	11	5	16	2,482	28	2,510	8,932,230	223,881	9,156,111
71	4	4	8	10	4	14	2,484	47	2,531	6,919,310	146,309	7,065,619
72	4	5	9	8	5	13	2,266	33	2,299	7,133,659	94,216	7,227,875
73	5	1	6	8	1	9	2,216	6	2,222	6,199,421	20,411	6,219,832
74	5	1	6	7	1	8	1,588	3	1,591	3,643,466	400	3,643,866
75	5	3	8	8	3	11	2,606	18	2,624	5,487,285	30,366	5,517,651
76	6	5	11	9	5	14	2,846	21	2,867	5,615,695	86,156	5,801,851
77	6	7	13	9	8	17	2,832	954	3,786	4,922,420	137,403	5,059,823
78	6	9	15	9	9	18	2,732	32	2,764	3,630,414	81,214	3,711,628
PRODUCTION TOTALS										52,483,900	820,356	53,304,256

MARSHALL

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	4	0	4	6	0	6	1,573	0	1,573	5,161,974	0	5,161,974
71	2	0	2	4	0	4	1,815	0	1,815	4,805,353	0	4,805,353
72	2	0	2	4	0	4	1,927	0	1,927	6,388,988	0	6,388,988
73	2	0	2	4	0	4	1,941	0	1,941	6,106,513	0	6,106,513
74	2	0	2	4	0	4	1,973	0	1,973	4,934,560	0	4,934,560
75	3	0	3	5	0	5	2,259	0	2,259	5,265,921	0	5,265,921
76	2	0	2	4	0	4	2,362	0	2,362	5,131,175	0	5,131,175
77	2	0	2	4	0	4	2,345	0	2,345	4,546,466	0	4,546,466
78	2	0	2	4	0	4	2,432	0	2,432	4,340,211	0	4,340,211
PRODUCTION TOTALS										46,681,161	0	46,681,161

MASON

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	6	0	6	7	0	7	236	0	236	457,340	0	457,340
71	3	0	3	3	0	3	198	0	198	420,138	0	420,138
72	1	0	1	1	0	1	120	0	120	180,980	0	180,980
73	1	0	1	1	0	1	167	0	167	354,927	0	354,927
74	2	0	2	2	0	2	200	0	200	146,422	0	146,422
75	2	0	2	2	0	2	207	0	207	294,927	0	294,927
76	3	0	3	3	0	3	49	0	49	45,550	0	45,550
77	1	0	1	1	0	1	29	0	29	57,318	0	57,318
78	2	0	2	2	0	2	39	0	39	10,272	0	10,272
PRODUCTION TOTALS										1,967,874	0	1,967,874

McDOWELL

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	121	25	146	187	31	218	5,824	330	6,154	15,192,571	1,273,969	16,466,540
71	84	23	107	158	26	184	6,407	297	6,704	12,330,120	1,049,084	13,379,204
72	58	21	79	122	31	153	6,277	249	6,526	13,021,491	862,485	13,883,976
73	51	18	69	96	21	117	5,775	225	6,000	12,004,180	672,819	12,676,999
74	49	9	58	100	12	112	6,060	97	6,157	9,826,968	349,337	10,176,305
75	66	12	78	119	16	135	6,619	342	6,961	10,099,208	758,162	10,857,370
76	83	13	96	155	19	174	6,979	346	7,325	9,516,678	946,466	10,463,144
77	77	12	89	143	18	161	6,979	284	7,263	7,383,392	783,926	8,167,318
78	97	20	117	220	37	257	7,049	441	7,490	5,792,171	598,494	6,390,665
PRODUCTION TOTALS										95,166,779	7,294,742	102,461,521

MERCER

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	6	7	13	10	7	17	409	47	456	991,483	103,934	1,095,417
71	6	2	8	6	6	12	440	33	473	753,422	83,989	837,411
72	2	5	7	6	10	16	471	33	504	1,023,774	90,280	1,114,054
73	1	5	6	4	11	15	485	37	522	1,100,194	71,909	1,172,103
74	1	3	4	4	5	9	496	12	508	991,499	54,258	1,045,757
75	2	2	4	5	3	8	525	11	536	947,725	28,497	976,222
76	6	3	9	8	4	12	567	16	583	784,804	20,717	805,521
77	4	4	8	7	4	11	559	15	574	583,897	19,847	603,744
78	6	3	9	13	4	17	525	18	543	397,899	11,321	409,220
PRODUCTION TOTALS										7,574,697	484,752	8,059,449

MINERAL

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	3	5	8	3	9	12	37	38	75	46,842	226,220	273,062
71	1	6	7	1	11	12	25	38	63	111,365	266,135	377,500
72	1	4	5	1	13	14	30	43	73	106,394	211,148	317,542
73	1	4	5	1	10	11	31	115	146	144,032	251,281	395,313
74	2	5	7	2	9	11	37	65	102	153,543	312,517	466,060
75	1	5	6	1	14	15	3	88	91	11,028	318,016	329,044
76	0	7	7	0	16	16	0	99	99	0	358,638	358,638
77	0	6	6	0	10	10	0	63	63	0	356,559	356,559
78	1	6	7	1	6	7	0	96	96	0	353,349	353,349
PRODUCTION TOTALS										573,204	2,653,863	3,227,067

MINGO

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	32	14	46	43	23	66	1,263	247	1,510	2,309,142	655,826	2,964,968
71	29	19	48	34	32	66	1,181	494	1,675	2,022,675	1,469,282	3,491,957
72	36	12	48	44	27	71	1,287	319	1,606	2,417,763	1,033,384	3,451,147
73	32	10	42	35	13	48	1,170	195	1,365	2,776,534	509,381	3,285,915
74	36	4	40	48	6	54	1,349	156	1,505	3,234,302	495,899	3,730,201
75	47	8	55	66	13	79	1,631	327	1,958	4,012,069	555,019	4,567,088
76	51	8	59	65	12	77	1,916	379	2,295	3,796,526	638,147	4,434,673
77	39	7	46	54	12	66	1,915	341	2,256	2,882,275	524,515	3,406,790
78	56	10	66	97	17	114	1,718	205	1,923	2,672,771	344,199	3,016,970
PRODUCTION TOTALS										26,124,057	6,225,652	32,349,709

MONONGALIA

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	25	10	35	29	13	42	2,501	87	2,588	12,013,843	509,518	12,523,361
71	21	11	32	25	11	36	2,819	76	2,895	10,154,680	431,300	10,585,980
72	15	11	26	19	19	38	2,986	97	3,083	11,911,957	635,310	12,547,267
73	14	8	22	19	15	34	2,785	110	2,895	10,573,550	988,677	11,562,227
74	14	6	20	20	11	31	3,495	175	3,670	10,504,593	1,054,679	11,559,272
75	14	7	21	21	15	36	3,136	271	3,407	10,088,208	967,815	11,056,023
76	23	9	32	28	14	42	3,221	195	3,416	9,649,969	925,283	10,575,252
77	21	11	32	26	20	46	3,421	248	3,669	9,363,783	1,116,428	10,480,211
78	26	14	40	44	29	73	3,645	240	3,885	7,750,332	1,053,941	8,804,273
PRODUCTION TOTALS										92,010,915	7,682,951	99,693,866

NICHOLAS

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	44	21	65	62	22	84	2,444	190	2,634	5,895,069	944,847	6,839,916
71	35	15	50	53	18	71	2,292	223	2,515	4,420,041	923,654	5,343,695
72	38	19	57	50	33	83	2,036	364	2,400	4,621,279	1,316,951	5,938,230
73	33	21	54	46	36	82	2,010	360	2,370	4,778,576	1,276,445	6,055,021
74	33	13	46	51	23	74	2,057	295	2,352	4,337,922	1,440,387	5,778,309
75	37	18	55	70	32	102	2,313	393	2,706	4,335,036	1,271,766	5,606,802
76	34	15	49	57	33	90	2,572	441	3,013	3,964,981	1,265,688	5,230,669
77	30	23	53	50	39	89	2,475	563	3,038	3,809,908	1,207,727	5,017,635
78	45	32	77	80	70	150	2,621	606	3,227	3,382,068	1,065,007	4,447,075
PRODUCTION TOTALS										39,544,880	10,712,472	50,257,352

OHIO

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	1	0	1	2	0	2	792	0	792	2,625,415	0	2,625,415
71	1	0	1	2	0	2	829	0	829	1,796,279	0	1,796,279
72	1	0	1	2	0	2	835	0	835	2,204,370	0	2,204,370
73	1	0	1	5	0	5	846	0	846	1,967,104	0	1,967,104
74	1	0	1	2	0	2	835	0	835	1,580,740	0	1,580,740
75	1	0	1	2	0	2	892	0	892	1,411,824	0	1,411,824
76	1	0	1	2	0	2	939	0	939	1,501,590	0	1,501,590
77	1	0	1	2	0	2	923	0	923	1,232,477	0	1,232,477
78	1	0	1	2	0	2	860	0	860	1,031,953	0	1,031,953
PRODUCTION TOTALS										15,351,752	0	15,351,752

PRESTON

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	35	0	35	42	26	68	378	238	616	872,803	1,597,527	2,470,330
71	23	19	42	26	27	53	285	284	569	635,842	1,270,738	1,906,580
72	16	21	37	16	50	55	240	255	495	670,899	971,061	1,641,960
73	10	19	29	10	32	42	227	181	408	779,222	887,350	1,666,572
74	12	23	35	13	37	50	247	423	670	819,917	2,002,121	2,822,038
75	14	30	44	18	49	67	318	494	812	815,475	1,732,605	2,548,080
76	13	33	46	16	50	66	309	440	749	971,007	1,508,943	2,479,950
77	13	25	38	17	48	65	376	441	817	1,074,699	1,712,837	2,787,536
78	24	33	57	33	78	111	418	515	933	1,020,527	1,171,637	2,192,164
PRODUCTION TOTALS										7,660,391	12,854,819	20,515,210

RALEIGH

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	45	24	69	59	33	92	3,192	599	3,791	7,234,478	2,576,752	9,811,230
71	30	20	50	45	29	74	3,262	682	3,944	5,292,784	2,292,442	7,585,226
72	23	14	37	36	42	78	3,054	496	3,550	5,494,149	1,223,596	6,717,745
73	24	11	35	44	30	74	3,214	292	3,506	5,282,341	905,130	6,187,471
74	27	11	38	42	19	61	3,479	284	3,763	4,609,083	582,451	5,191,534
75	30	14	44	50	30	80	4,240	422	4,662	5,438,393	825,890	6,264,283
76	39	12	51	60	27	87	4,662	633	5,295	5,730,110	1,097,708	6,827,818
77	41	13	54	62	23	85	5,050	426	5,476	5,328,966	952,068	6,281,034
78	48	17	65	83	43	126	5,157	482	5,639	4,877,375	683,144	5,560,519
PRODUCTION TOTALS										49,287,679	11,139,181	60,426,860

RANDOLPH

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	13	5	18	18	5	23	285	50	335	464,297	164,946	629,243
71	12	9	21	15	9	24	231	148	379	335,540	522,156	857,696
72	9	9	18	11	18	29	225	199	424	250,538	677,422	927,960
73	8	10	18	8	19	27	160	269	429	156,546	756,266	912,812
74	6	6	12	7	10	17	74	152	226	117,811	817,534	935,345
75	10	9	19	20	15	35	222	224	446	196,771	691,668	888,439
76	11	8	19	25	13	38	297	217	514	404,388	672,705	1,077,093
77	11	8	19	18	11	29	374	171	545	457,248	738,978	1,196,226
78	20	12	32	40	29	69	548	264	812	483,836	807,628	1,291,464
PRODUCTION TOTALS										2,866,975	5,849,303	8,716,278

TAYLOR

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	5	6	11	6	6	12	23	58	81	6,521	212,580	219,101
71	0	5	5	0	7	7	0	41	41	0	190,732	190,732
72	0	3	3	0	5	5	0	38	38	0	288,397	288,397
73	0	4	4	0	6	6	0	48	48	0	154,816	154,816
74	0	3	3	0	3	3	0	39	39	0	97,368	97,368
75	0	9	9	0	10	10	0	154	154	0	173,023	173,023
76	1	7	8	1	8	9	0	93	93	0	227,227	227,227
77	1	4	5	1	4	5	88	50	138	2,849	111,100	113,949
78	1	5	6	1	8	9	4	63	67	4,515	98,552	103,067
PRODUCTION TOTALS										13,885	1,553,795	1,567,680

TUCKER

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	0	2	2	0	4	4	0	64	64	0	300,044	300,044
71	0	2	2	0	3	3	0	39	39	0	376,135	376,135
72	0	2	2	0	3	3	0	18	18	0	143,201	143,201
73	0	2	2	0	3	3	0	22	22	0	179,709	179,709
74	0	2	2	0	4	4	0	45	45	0	306,198	306,198
75	0	2	2	0	11	11	0	51	51	0	357,040	357,040
76	0	2	2	0	10	10	0	56	56	0	364,706	364,706
77	0	2	2	0	8	8	0	56	56	0	350,518	350,518
78	0	2	2	0	29	29	0	84	84	0	297,157	297,157
PRODUCTION TOTALS										0	2,674,708	2,674,708

UPSHUR

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	9	12	21	9	14	23	99	196	295	299,444	579,875	879,319
71	5	13	18	5	16	21	101	226	327	281,660	892,842	1,174,502
72	7	10	17	7	18	25	124	157	281	301,132	626,845	927,977
73	7	9	16	7	17	24	155	142	297	344,364	907,510	1,251,874
74	5	12	17	5	21	26	169	196	365	580,916	1,075,982	1,656,898
75	5	15	20	5	25	30	268	305	573	957,509	1,041,713	1,999,222
76	6	16	22	7	21	28	341	321	662	949,022	453,697	1,402,719
77	5	17	22	6	21	27	381	386	767	681,022	1,043,722	1,724,744
78	11	20	31	16	47	63	408	559	967	693,834	751,962	1,445,796
PRODUCTION TOTALS										5,088,903	7,374,148	12,463,051

WAYNE

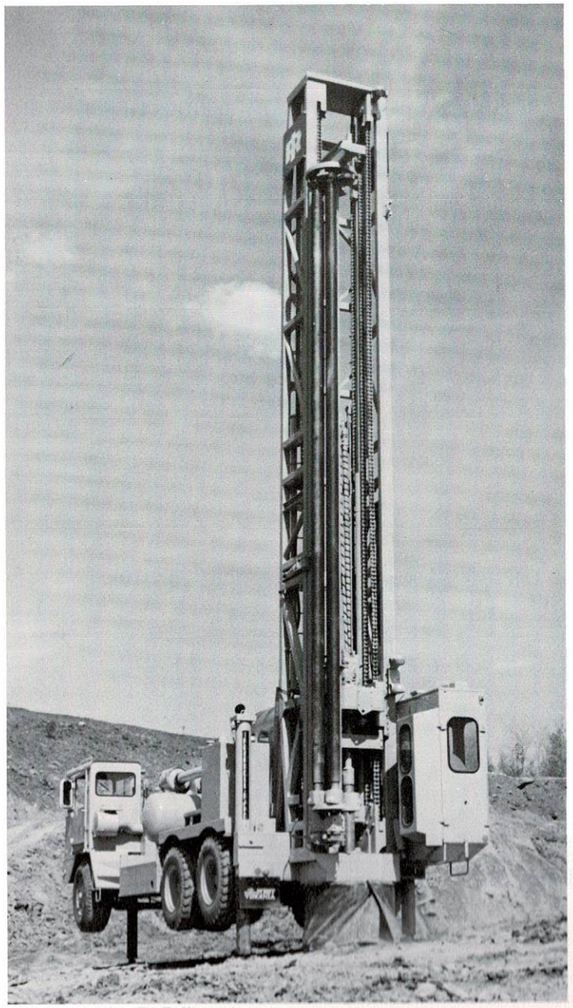
	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	4	1	5	4	1	5	65	8	73	90,558	7,668	98,226
71	3	2	5	3	2	5	97	16	113	274,576	9,655	284,231
72	3	0	3	3	0	3	150	0	150	379,866	0	379,866
73	3	0	3	3	0	3	180	0	180	582,319	0	582,319
74	2	0	2	2	0	2	193	0	193	449,137	0	449,137
75	2	0	2	2	0	2	201	0	201	547,886	0	547,886
76	2	1	3	2	1	3	189	0	189	494,250	0	494,250
77	2	0	2	2	0	2	178	0	178	284,336	0	284,336
78	3	0	3	3	0	3	169	0	169	205,056	0	205,056
PRODUCTION TOTALS										3,307,984	17,323	3,325,307

WEBSTER

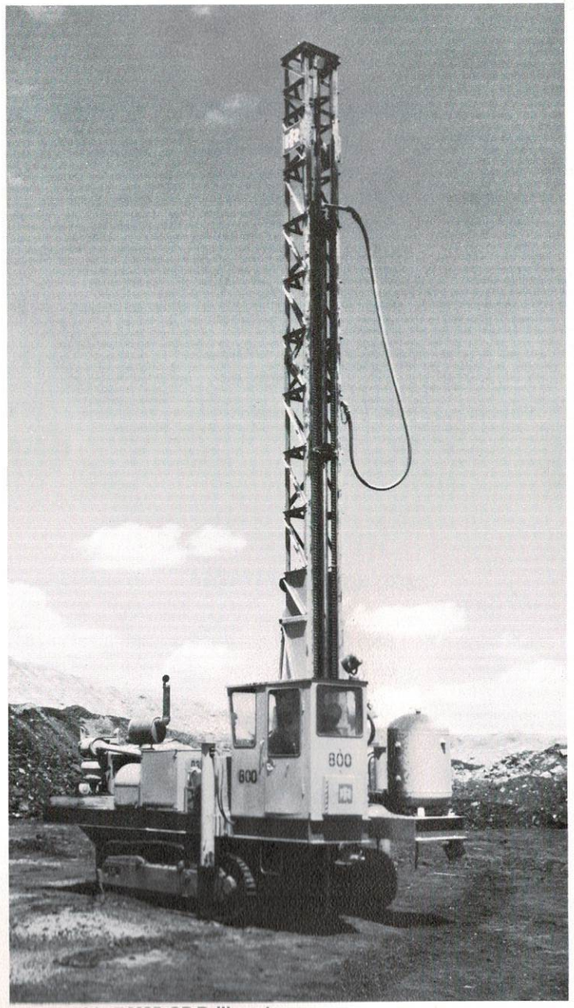
	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	16	4	20	21	5	26	164	50	214	130,159	125,371	255,530
71	19	3	22	21	3	24	169	50	219	124,988	51,444	176,432
72	20	5	25	22	6	28	144	46	190	93,470	15,933	109,403
73	12	2	14	14	3	17	120	42	162	125,973	166,431	292,404
74	14	5	19	14	5	19	95	58	153	166,019	186,894	352,913
75	20	7	27	25	10	35	148	117	265	177,027	266,182	443,209
76	14	7	21	23	12	35	120	176	296	213,145	303,149	516,294
77	11	8	19	12	13	25	76	174	250	109,731	364,091	473,822
78	26	13	39	34	25	59	105	169	274	117,539	439,041	556,580
PRODUCTION TOTALS										1,258,051	1,918,536	3,176,587

WYOMING

	COMPANIES			OPERATIONS			EMPLOYEES			PRODUCTION (TONS)		
	U	S	T	U	S	T	U	S	T	U	S	T
70	61	26	87	103	29	132	4,823	409	5,232	11,602,866	1,605,004	13,207,870
71	50	21	71	88	28	116	4,924	365	5,289	9,255,095	1,287,790	10,542,885
72	36	14	50	80	24	104	5,117	242	5,359	10,389,109	800,253	11,189,362
73	43	13	56	82	24	106	4,904	167	5,071	9,855,157	533,579	10,388,736
74	41	11	52	94	16	110	4,946	129	5,075	7,636,475	392,339	8,028,814
75	50	11	61	103	13	116	5,700	163	5,863	8,252,443	469,633	8,722,076
76	70	8	78	119	16	135	6,402	248	6,650	8,224,163	471,236	8,695,399
77	61	10	71	109	11	120	6,409	148	6,557	6,604,118	252,142	6,856,260
78	82	12	94	171	19	190	5,978	111	6,089	5,265,575	64,195	5,329,770
PRODUCTION TOTALS										77,085,001	5,876,171	82,961,172



Top-head drive T4 Drillmaster



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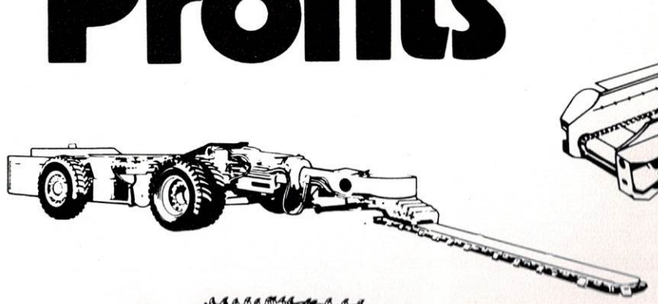

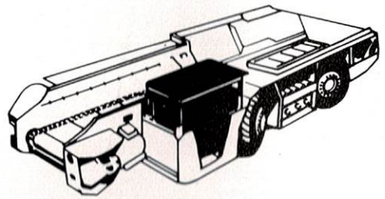

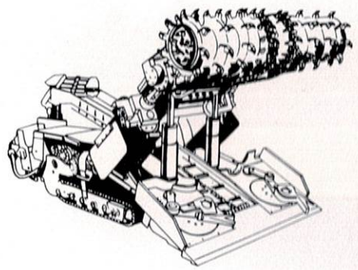

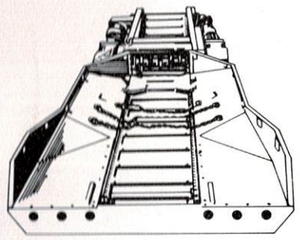

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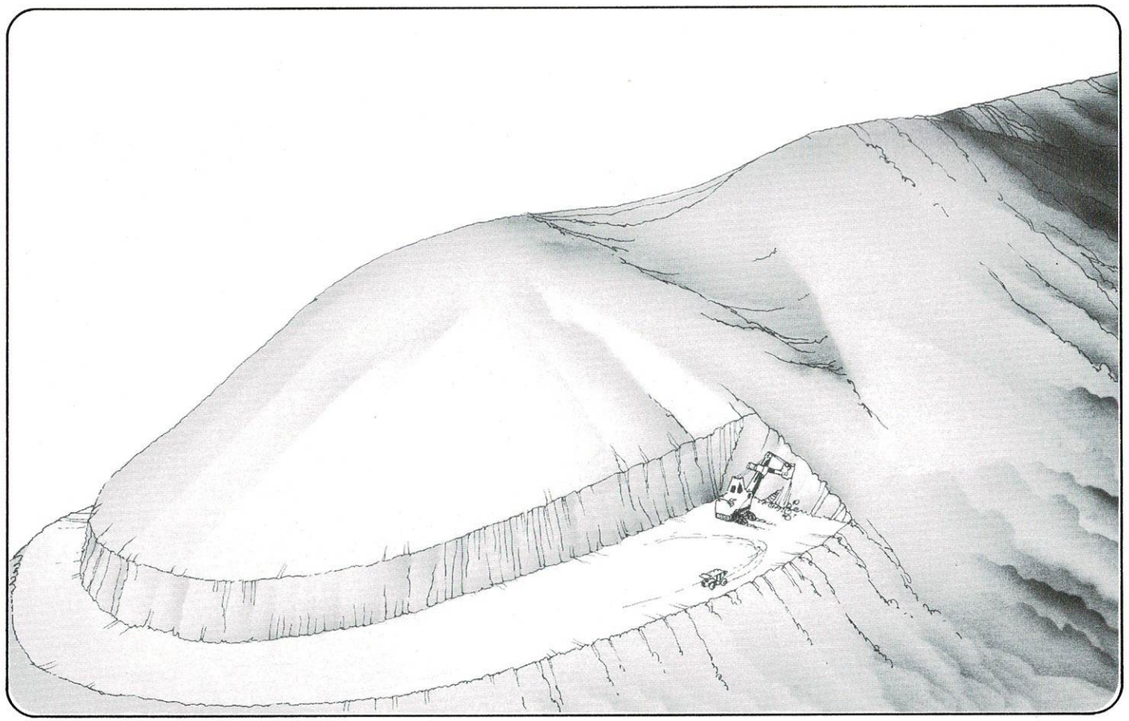
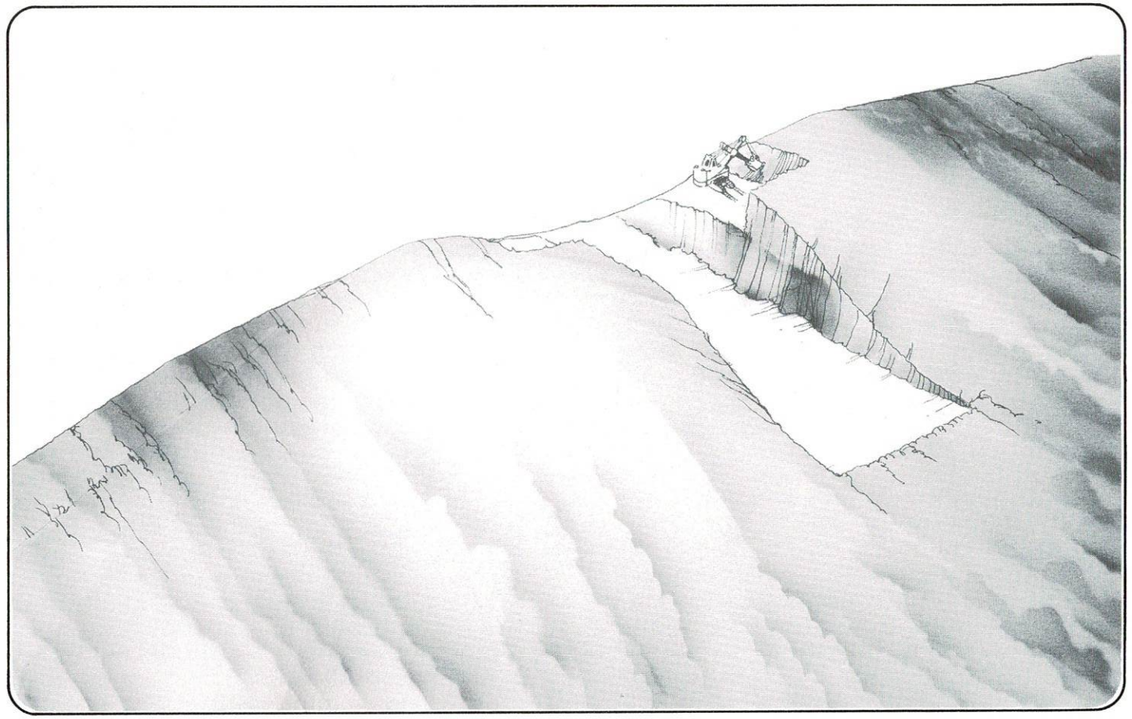


A) Conventional Mountaintop removal method

The Cross-Ridge Concept

THE STUDY

In 1977, the United States Bureau of Mines engaged Skelly and Loy Engineers of Harrisburg, Pa. for a "Design and Evaluation of Cross-Ridge Mountaintop Mining." Cross-Ridge is a relatively new and innovative approach to complete mountaintop removal where mining advances perpendicular to the long axis of a ridgeline rather than along the outcrop. The project involves assessment of potential for environmental preservation, equipment and manpower requirements, physical limitations, and adherence to mandated environmental and mining regulations. The following report illustrates the differences between conventional and cross-ridge mountaintop removal mining and identifies the benefits that may be realized through cross-ridge applications.



B) Initial cut in cross ridge mining through a low point in the ridge

CONVENTIONAL MOUNTAINTOP REMOVAL

Over the past several years, mountaintop removal surface mining has experienced increasing popularity in the Appalachian coal fields. Although the mountaintop removal projects vary in mining procedure, they have one factor in common: most of them use some form of conventional contour mining. With the intention of removing the entire mountaintop, mining is initiated at the coal outcrop, with the highwall either parallel to the long axis of the ridge or possibly encircling the entire mountain. The overburden to coal ratio is lowest near the coal outcrop, and initial profits are relatively high. However, as mining continues into the mountain, the overburden to coal ratio increases, thus increasing the cost of coal removal. This increased cost, together with the fluctuating coal market, can often force closure of these operations prior to completion. Ultimately, this results in burial of much needed coal reserves as overburden is replaced and regraded to conform to acceptable reclamation standards. This situation is less likely to occur using cross-ridge mountaintop removal.

CROSS—RIDGE MOUNTAINTOP REMOVAL

Because of the environmental and/or economic problems related to conventional mountaintop removal, the concept of cross-ridge has great potential. Cross-ridge mining is a type of mountaintop removal in which the highwall is oriented perpendicular to the long axis of the ridge. The initial cut may be through a low point in the ridge or it may begin at one end of the ridge. Because mining progresses across the ridge, this method of mining combines removal of "low cost" outcrop coal (low overburden ratio) with removal of "high cost" center-of-the-ridge coal (high overburden ratio). Consequently, each block being removed represents an average overburden ratio. Although the initial profits are not as high as from conventional

mountaintop removal, profits, as well as coal production, will be fairly consistent throughout the entire operation. In some cases, if a high profit is required early due to such things as high mine site preparation costs, the initial cut could be in a contour method, with subsequent cuts following the cross-ridge method. With a fairly uniform overburden ratio, the economics are much more stable and predictable. Because of this stability, cross-ridge operations have more promise of going to completion, with total recovery of coal.

RECLAMATION AND FUTURE LAND USE.

Reclamation is a necessary and important part of surface mining today and can often dictate the profitability of an operation. Conventional mountaintop removal mining often requires intermediate solutions to overburden storage, necessitating costly rehandling of spoil. In cross-ridge mining, reclamation is an integral part of the mine plan, and is carried out concurrently with the mining operation. Disposal of overburden can be a real problem, particularly in the steep terrain common to southern West Virginia. In this area, most surface mining methods, including conventional mountaintop removal, are forced to rely heavily on valley fill techniques. Conversely, cross-ridge mountaintop removal provides a bench upon which overburden can be dumped. As mining proceeds through the ridge, the overburden is backstacked behind the operation on the bench. In this manner, the mining and reclamation operations are confined to one area, and occur simultaneously. This makes an efficient operation, with equipment and manpower concentrated in one area. Another advantage of this mining technique is that, in most cases, only the first cut must be disposed of in a head-of-hollow fill. However, in the situation where the ridge widens as mining advances, head-of-hollow fills may become necessary for overburden disposal, due to lack of available ridge backstacking space. It is important to stress that the cross-ridge method usually relies on head-of-hollow fill only for its first cut material, whereas conventional mountaintop removal methods rely much more heavily on head-of-hollow fills for overburden disposal.

Because of the steep terrain, level land is at a premium in areas conducive to mountaintop removal. Locating suitable sites for housing and industrial developments, airports, municipal facilities, farming and numerous other uses is a major problem, accentuated by the fact that flooding often makes the narrow valleys unsuitable. Removing the entire mountaintop can provide a level upland terrain. The overburden deposited on the bench, as well as the head-of-hollow fill material, can usually be levelled, graded, and stabilized with vegetation. Other mining methods, in which the highest portion of the ridge is left standing, cannot produce such extensive level areas when reclaimed.

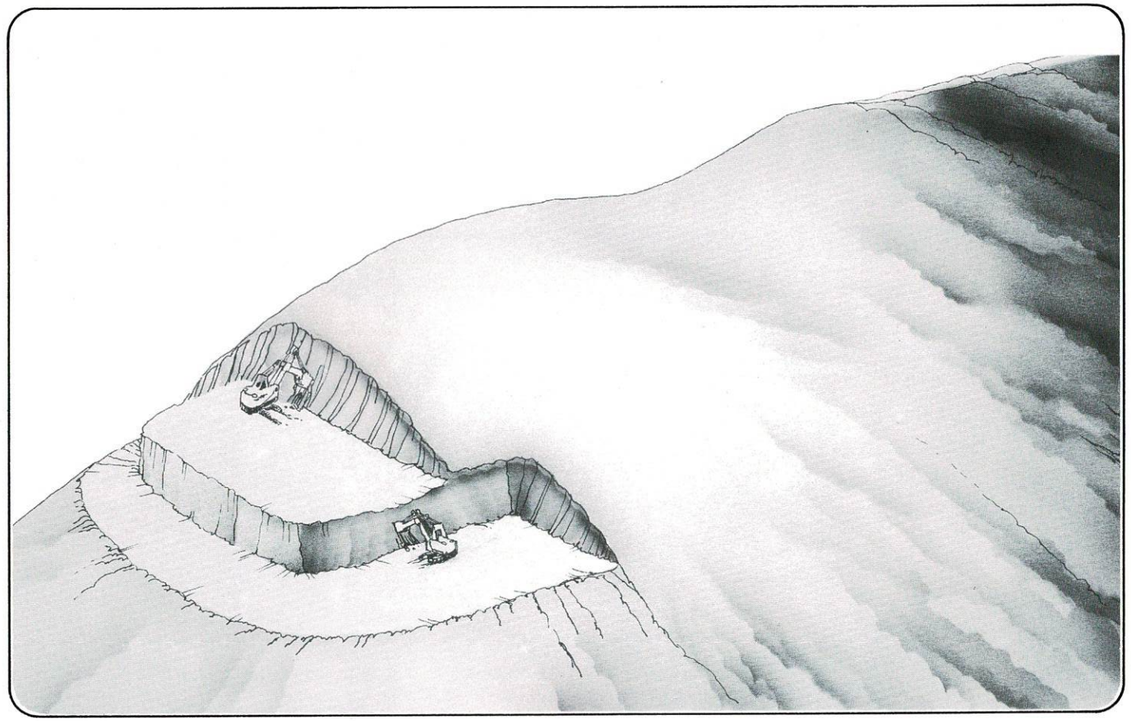
At first consideration, it may appear that cross-ridge mining will require more manpower and more expensive and sophisticated excavation mehtods than other mining methods. The intent of this project is to prove that the reverse is true.

Cross-ridge mountaintop removal mining may not be the best mining techniques for every situation. However, in steep terrain, when mining a defined ridge with flatlaying, consistent coal seams, cross-ridge may be a highly viable mining method.

A FUTURE FOR CROSS—RIDGE MINING

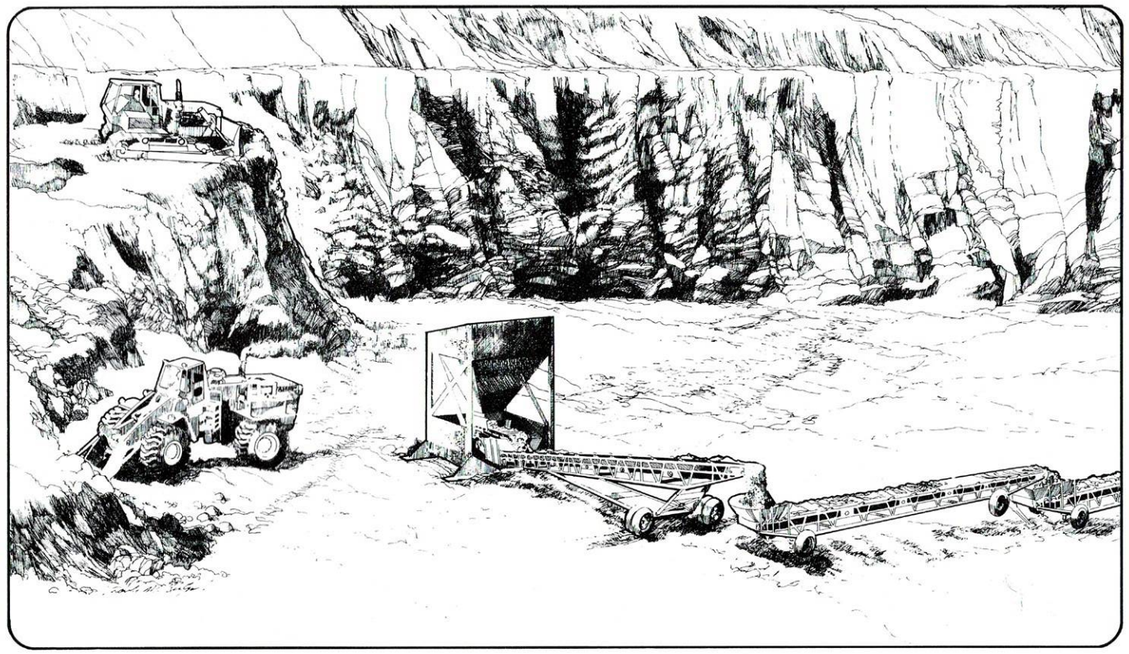
There is a growing interest in cross-ridge mountaintop removal mining among coal companies today. A number of companies are considering the use of the cross-ridge techniques at selected locations.

Cross-ridge mountaintop removal appears to be a viable, promising mining technique for mining of long ridges in steep terrain. This technique has the potential to offer total coal recovery, consistent profits, stable economics, and good reclamation practices as an integral, efficient part of the mining operation.



C) Initial cut in cross ridge mining at one end of the ridge

D) Conveyor hauling overburden during cross ridge mining



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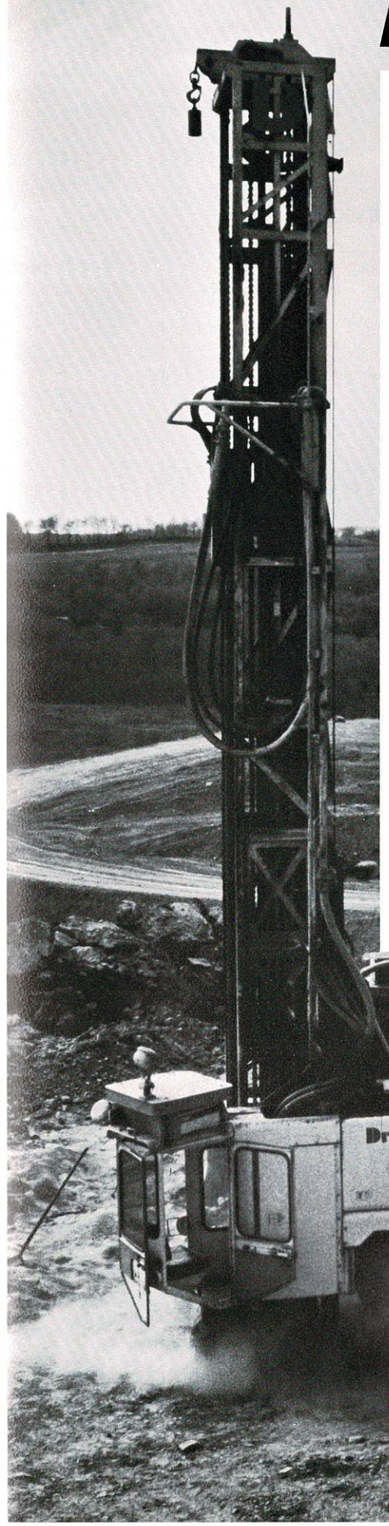

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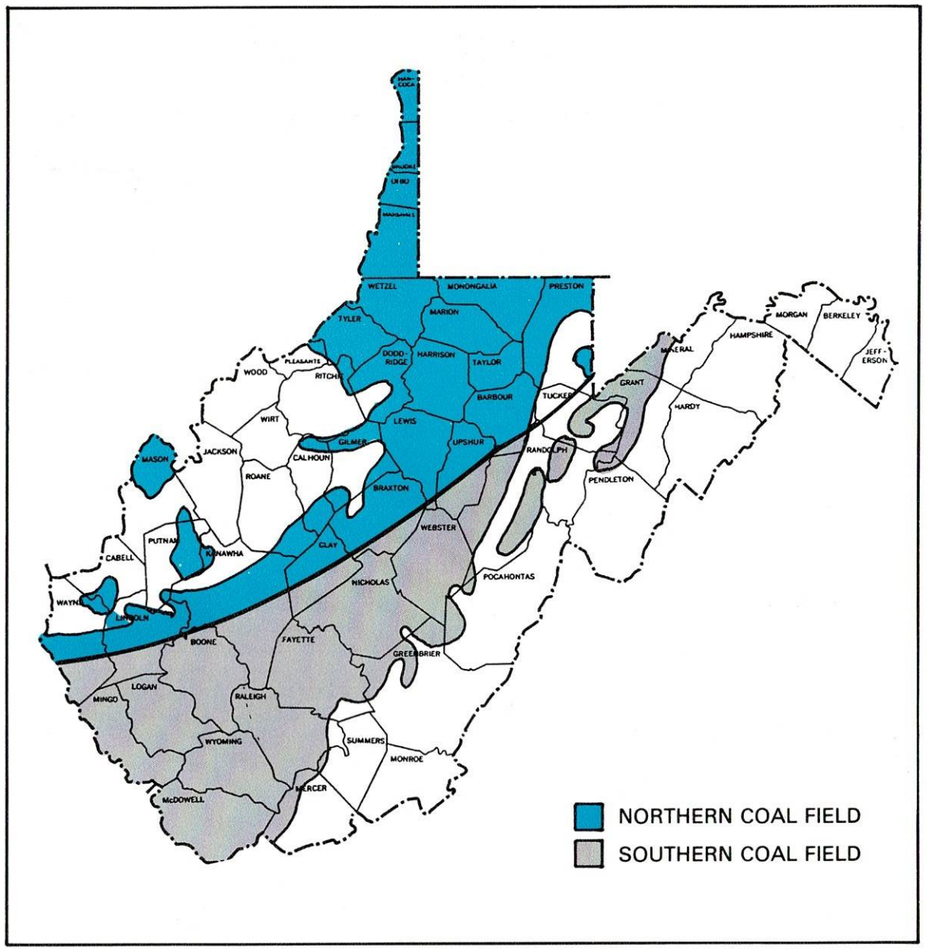

West Virginia's Coal Fields

The following statistics should lend some credence to the assertion that coal is our nation's most abundant energy resource.

West Virginia has thus far mined over eight billion tons of coal, more than any other state. This production has occurred over a period of roughly a half century. There remains an estimated recoverable reserve of over 57 billion tons.

At this rate, (current production levels are running far below average) it will take another 400 years to "mine out" West Virginia. That's four centuries—two more bicentennials.

West Virginia coal, particularly that in the southern counties, is of the highest quality in the world. This accounts for the state's traditional position as the nation's leading exporter of coal.

There are 62 minable seams in the state, but 18 of these account for 90% of annual production. The most important single seam is the Pittsburgh, which alone contained an original minable tonnage of over 13 billion, and has been called "the most valuable single mineral deposit in the world."

A capsule analysis of West Virginia's major seams follows.

DUNKARD GROUP

WASHINGTON—original minable tonnage, 3.5 billion; 1650 sq. mi.; 3-6 ft. thick; occurs in Calhoun, Gilmer, Ritchie, Lewis, Doddridge, Harrison, Pleasants, Tyler, Wetzel, Marion, Monongalia, Marshall, and Ohio counties.

MONONGAHELA GROUP

WAYNESBURG—original minable tonnage, 2 billion; 780 sq. mi.; 3-12 ft. thick; occurs in Brooke, Ohio, Marshall, Wetzel, Marion, and Monongalia counties.

UNIONTOWN—original minable tonnage, 600 million; 285 sq. mi.; 2-3 ft. thick; occurs in Doddridge, Tyler, and Wetzel counties.

SEWICKLEY—original minable tonnage, 3.7 billion; 930 sq. mi.; 4-6 ft. thick; occurs in Marion, Monongalia, Wetzel, Marshall, and Ohio counties.

REDSTONE—original minable tonnage, 1 billion; 300 sq. mi,; 2-6 ft. thick; occurs in Braxton, Lewis, Upshur, Barbour, Harrison, Monongalia, and Mason counties.

PITTSBURGH—original minable tonnage, 13.2 billion; 2,100 sq. mi.; 2-20 ft. thick; occurs in Brooke, Ohio, Marshall, Wetzel, Monongalia, Marion, Doddridge, Harrison, Taylor, Preston, Mineral, Barbour, Upshur, Lewis, Gilmer, Braxton, Calhoun, Clay, Roane, Kanawha, Putman, Mason, Cabel, and Wayne counties.

CONEMAUGH GROUP

ELK LICK—original minable tonnage, 650 million; 230 sq. mi.; 1-8 ft. thick; occurs in Lewis, Upshur, Barbour, Preston, Mineral, and Grant counties.

BAKERSTOWN—original minable tonnage, 2 billion; 980 sq. mi.; 2-8 ft. thick; occurs in Clay, Roane, Calhoun, Braxton, Gilmer, Lewis, Harrison, Barbour, Taylor, Preston, Tucker, Mineral, and Grant counties.

UPPER FREEPORT—original minable tonnage, 3.5 billion; 1,165 sq. mi.; 2-12 ft. thick; occurs in Wayne, Lincoln, Clay, Braxton, Webster, Lewis, Upshur, Barbour, Taylor, Marion, Monongalia, Preston, Tucker, Mineral, Grant, and Randolph counties.

LOWER FREEPORT—original minable tonnage, 700 million; 265 sq. mi.; 2-6 ft. thick; occurs in Nicholas, Roane, Webster, Braxton, Preston, Ohio, Brooke, and Hancock counties.

UPPER KITTANNING—original minable tonnage, 4 billion; 1,400 sq. mi.; 2-5 ft. thick; occurs in Kanawha, Nicholas, Clay, Braxton, Webster, Upshur, Lewis, Randolph, Barbour, Harrison, Taylor, Marion, Monongalia, and Preston counties.

MIDDLE KITTANNING—original minable tonnage, 1 billion; 320 sq. mi.; 2-10 ft. thick; occurs in Fayette, Kanawha, Nicholas, Clay, Braxton, Webster, and Hancock counties.

LOWER KITTANNING—original minable tonnage, 10 billion; 2,640 sq. mi.; 2-12 ft. thick; occurs in Wayne, Lincoln, Mingo, Logan, Boone, Kanawha, Nicholas, Fayette, Clay, Roane, Braxton, Webster, Randolph, Upshur, Lewis, Barbour, Taylor, Marion, Monongalia, Preston, and Mineral counties.

CLARION—original minable tonnage, 1.3 billion; 715 sq. mi.; 2-10 ft. thick; occurs in Clay, Nicholas, Upshur, Randolph, Barbour, and Preston counties.

POTTSVILLE GROUP

UPPER MERCER—original minable tonnage, 1.6 billion; 530 sq. mi.; 2-7 ft. thick; occurs in Webster, Lewis, Upshur, Randolph, Barbour and Preston counties.

LOWER MERCER—original minable tonnage, 4.5 billion; 1,350 sq. mi.; 2-9 ft. thick; occurs in Wayne, Lincoln, Mingo, Logan, Wyoming, Boone, Raleigh, Fayette, Kanawha, Nicholas, Clay, Braxton, Webster, Randolph, and Upshur counties.

COALBURG—original minable tonnage, 3.3 billion; 875 sq. mi.; 2-10 ft. thick; occurs in Mingo, Logan, Wyoming, Boone, Kanawha, Fayette, Nicholas, Clay, and Webster counties.

WINIFREDE—original minable tonnage, 3.5 billion; 1,310 sq. mi.; 2-12 ft. thick; occurs in Mingo, Wyoming, Logan, Lincoln, Boone, Kanawha, Raleigh, Fayette, Nicholas, Clay, Webster, Upshur, Randolph, and Preston counties.

CHILTON—original minable tonnage, 3.5 billion; 1,170 sq. mi.; 1-8ft. thick; occurs in Mingo, Logan, Wyoming, Boone, Fayette, Kanawha, Nicholas, Clay, Webster, and Braxton counties.

HERNSHAW—original minable tonnage, 1.1 billion; 361 sq. mi.: 2-8 ft. thick; occurs in Boone, Kanawha, and Raleigh counties.

DINGESS—original minable tonnage, 600 million; 470 sq. mi.; 2-3 ft. thick; occurs in Logan and Mingo counties.

WILLIAMSON—original minable tonnage, 1.2 billion; 560 sq. mi.; 1-8 ft. thick; occurs in Mingo, Logan, Boone, and Wyoming counties.

CEDAR GROVE—original minable tonnage, 4.3 billion; 1,470 sq. mi.; 2-8 ft. thick; occurs in Mingo, Logan, Wyoming, Boone, Lincoln, Kanawha, Fayette, Nicholas, Clay, Webster, and Braxton counties.

LOWER CEDAR GROVE—original minable tonnage, 1.1 billion; 365 sq. mi.; 2-6 ft. thick; occurs in Mingo, Wyoming, and Logan counties.

ALMA—original minable tonnage, 3.2 billion; 1,230 sq. mi.; 2-7 ft. thick; occurs in Mingo, Logan, Wyoming, Boone, Raleigh, Fayette, Nicholas, and Webster counties.

PEERLESS—original minable tonnage, 1.9 billion; 750 sq. mi.; 1-4 ft. thick; occurs in Kanawha, Fayette, Nicholas, Clay, Webster, Randolph, and Upshur counties.

CAMPBELL CREEK—original minable tonnage, 8 billion; 2,100 sq. mi.; 2-10 ft. thick; occurs in Wayne, Mingo, Wyoming, McDowell, Logan, Lincoln, Boone, Raleigh, Fayette, Kanawha, Nicholas, Clay, and Calhoun counties.

POWELLTON—original minable tonnage, 735 million; 270 sq. mi.; 2-11 ft. thick; occurs in McDowell, Wyoming, Logan, Boone, Raleigh, Fayette, and Kanawha counties.

MATEWAN—original minable tonnage, 1.2 billion; 80 sq. mi.; 3-9 ft. thick; occurs in Wyoming and McDowell counties.

EAGLE—original minable tonnage, 4.2 billion; 1,360 sq. mi.; 2-10 ft. thick; occurs in McDowell, Mingo, Wyoming, Boone, Raleigh, Kanawha, Fayette, Nicholas, Clay, Webster, Braxton, Upshur, and Randolph counties.

LITTLE EAGLE—original minable tonnage, 900 million; 975 sq. mi.; 1-4 ft. thick; occurs in McDowell, Wyoming, Logan, Boone, Raleigh, Kanawha, Fayette, and Nicholas counties.

LOWER WAR EAGLE—original minable tonnage, 910 million; 430 sq. mi.; 2-6 ft. thick; occurs in McDowell, Mingo, Logan, Wyoming, Boone, Raleigh, and Webster counties.

GLENALUM—original minable tonnage, 625 million; 345 sq. mi.; 2-10 ft. thick; occurs in McDowell, Mingo, Wyoming, Logan, and Fayette counties.

GILBERT—original minable tonnage, 1.3 billion; 750 sq. mi.; 1-8 ft. thick; occurs in McDowell, Wyoming, Raleigh, Fayette, Nicholas, Webster, Pocahontas, and Randolph counties.

NEW RIVER FORMATION

IAEGER—original minable tonnage, 1.6 billion; 740 sq. mi.; 1-4 ft. thick; occurs in McDowell, Wyoming, Webster, Pocahontas, Upshur, and Randolph counties.

CASTLE—original minable tonnage, 600 million; 300 sq. mi.; 1-3 ft. thick; occurs in Randolph and Upshur counties.

SEWELL—original minable tonnage, 6.2 billion; 2,000 sq. mi.; 2-10 ft. thick; occurs in McDowell, Wyoming, Raleigh, Fayette, Greenbrier, Nicholas, Pocahontas, Webster, Braxton, Upshur, Randolph, Barbour, and Tucker counties.

WELCH—original minable tonnage, 965 million; 350 sq. mi.; 2-5 ft. thick; occurs in Wyoming, McDowell, Webster, and Randolph counties.

BECKLEY—original minable tonnage, 2 billion; 600 sq. mi.; 2-5 ft. thick; occurs in McDowell, Wyoming, Raleigh, and Greenbrier counties.

FIRE CREEK—original minable tonnage, 2.5 billion; 930 sq. mi.; 2-8 ft. thick; occurs in McDowell, Wyoming, Raleigh, Fayette, Greenbrier, Nicholas, Webster, and Randolph counties.

POCAHONTAS #6—original minable tonnage, 855 million; 300 sq. mi.; 2-6 ft. thick; occurs in McDowell, Mercer, Wyoming, Raleigh, Summers, Fayette and Greenbrier counties.

POCAHONTAS #4—original minable tonnage, 800 million; 155 sq. mi.; 3-6 ft. thick; occurs in McDowell and Wyoming counties.

POCAHONTAS #3—original minable tonnage, 2.8 billion; 650 sq. mi.; 2-10 ft. thick; occurs in McDowell, Mercer, Wyoming, Raleigh, Summers, Fayette, and Greenbrier counties.

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The West Virginia Surface Mining And Reclamation Association

The West Virginia Surface Mining and Reclamation Association is the largest trade organization of its kind in the nation, representing over 360 companies involved directly and indirectly with the surface mining of coal.

The organization was founded in 1966 to serve as spokesman for the industry in West Virginia, and to assist member companies in compliance with the State's constantly evolving mining and reclamation laws.

Tailoring its services to meet the needs of its members and the industry at large, the Association has confronted problems on many fronts.

One trait common to the handful of companies that formed the WVSMRA was a sense of responsibility to the communities in which they lived and worked, and one of the initial tasks facing that group was to transmit that responsibility to the rest of the industry. Today's membership rolls and the respect for West Virginia operators throughout the industry are testimonies to the success of that effort.

The Association took active part in the passage in 1967, of what became known as the most stringent surface mining law in the country. From the legislative battles emerged a law that turned the corner environmentally, yet allowed the industry the opportunity to adapt and comply.

It was fortunate for the surface mining industry that by 1971, the WVSMRA was firmly established. For in that year, the abolition movement was near its peak. The story of the attempt to abolish surface mining in West Virginia was perhaps more widely covered in the gubernatorial election of 1972. But in 1971, an abolition bill actually went to the floor of the House of Delegates for a vote.

The Association effort played a key role in the legislative compromise which led to a revision of the 1967 surface mining law.

Throughout the 70's the WVSMRA has been involved in legislative proposals on the federal level, through testimony, guided tours, and exhaustive meetings and consultations. The result was a federal bill modeled largely on West Virginia's nationally recognized program. The Association was the only state coal organization in the nation invited to the signing of the Surface Mining Control and Reclamation Act by President Jimmy Carter on August 3, 1977.

Association influence has also been heavily felt in the implementation phases of these laws. More restrictive laws emphasize the need for advance technology in mining and reclamation techniques.

West Virginia operators have perfected the "controlled placement" theory of surface mining in developing the two most innovative mining methodologies of the 70's, steep slope haulback and mountaintop removal. In addition, the Association itself was awarded two EPA grants to further the cause of mining technology research.

A tripartite research agreement signed in 1968 among the Association, the West Virginia Department of Natural Resources, and the U.S. Forest Service is still in effect, helping members achieve higher standards of reclamation through improved revegetation, mining methods, water disposal and control, mulching, and other techniques.

In spring of 1977, the Association lent its support to an amendment to the West Virginia law, which required the total elimination of highwalls and officially banned placement of spoil over the outslope, a practice discontinued four years earlier.

The thrust of the Association in the coming years will continue to be a "trouble-shooting" effort. As we move deeper into the implementation phase of federal regulation, the emphasis of the Association and its member companies must shift towards dealing with the harsh realities created by government interference and an unstable market situation.

It is the recorded position, however, of the West Virginia Surface Mining and Reclamation Association, that economic, environmental, an energy goals are not mutually exclusive, and that our members should, and will, do everything in their power to simultaneously protect and utilize the abundant natural resources of West Virginia.

GREEN LANDS GALLERY

The pictures on the following pages represent some of the best work of recent years by the membership of the West Virginia Surface Mining and Reclamation Association. Incidentally, there are plenty more where these came from, as you will see in future issues of **Green Lands.**