



1956

OGLEBAY, NORTON AND COMPANY
AND ASSOCIATED COMPANIES

FE003663

PRODUCT
and
SERVICE

I N F O R M A T I O N

- IRON ORE
- LAKE TRANSPORTATION
- COAL
- SLAG
- DOCKS
- MACHINE SHOP
- RAW MATERIALS
- "C & D" HOT TOPS
- COAL MINE SUPPLIES

FE003664

OGLEBAY, NORTON AND COMPANY

Managers and Sales Agents
for
Diversified Industries

. . . stands ready to
serve other industries

Associated Companies

Iron Ore

The Montreal Mining Company
The St. James Mining Company

Lake Transportation

The Columbia Transportation Company
The Pringle Barge Line Company
The Saginaw Dock & Terminal Company

Coal

The Brule Smokeless Coal Company
The Saginaw Dock & Terminal Company
Richwood Sewell Coal Company
The David Z. Norton Company
Tri-Seam Mining, Inc.
R. & F. Coal Company
O. K. Coal, Inc.

Docks

The Toledo Lakefront Dock Company
The Toledo, Lorain & Fairport Dock Company
The Saginaw Dock & Terminal Company

Machine Shop

Fairport Machine Shop, Inc.

"C & D" Hot Tops

The Ferro Engineering Company

General Office:

Cleveland 1, Ohio
Hanna Building
P. O. Box 6508
TOwer 1-3300

Branch Offices:

Duluth 2, Minnesota
300 Christie Building
DULuth 2-6386

St. Clairsville, Ohio
P. O. Box 145
St. Clairsville 901

Washington 4, D. C.
714 Warner Building
STERling 3-4899

Detroit 26, Michigan
1834 Guardian Building
WOODward 3-1277

Brownsville, Texas
P. O. Box 451
LINcoln 2-8570

OGLEBAY, NORTON AND COMPANY

OFFICERS

Robert C. Norton..... Chairman of the Board

Harrie S. Taylor.....President

Courtney Burton Vice President

Fred R. White, Jr..... Vice President

Edward W. Sloan, Jr. Vice President & Treasurer

Frank J. Smith Vice President in Charge of
Iron Ore Mining Operations

John J. Dwyer Secretary & General Counsel

Gordon C. Nichols..... Assistant Secretary

George E. GutheryAssistant Secretary &
Assistant Treasurer

— ★ —

WHOM TO CALL

IRON ORE MINING	F. J. Smith, Vice President Duluth Office
GENERAL SALES	A. B. Rathbone, Special Assistant to President
(Iron Ore, Fluorspar, Alloys)	
VESSELS	W. C. Dressler, Vessel Manager
(Bulk and Self-Unloading)	
.....	A. B. Cozzens, Assistant Vessel Manager
.....	H. F. Wiersch, Marine Superintendent
.....	L. E. Fisher, Chief Vessel Dispatcher
VESSELS	A. B. Cozzens, Crane Vessel Manager
(Crane)	
COAL MINING	W. D. Hamilton, Coal Mines Manager
COAL & SLAG SALES	A. K. Greene, Coal Sales Manager
.....	J. K. Liffiton, Assistant Coal Sales Manager - Southern
.....	A. J. Bailey, Assistant Coal Sales Manager - Ohio
.....	P. G. Sullivan, Lake Coal Sales Manager and Manager Detroit Office
.....	J. W. Hunter, Manager Washington Office
.....	J. Hlad, Lake Forwarding Agent
DOCKS	T. C. Sparks, General Dock Manager



IRON ORE

The Lake Superior region for over 100 years has provided the sinews of the economic growth of the United States. Today over 70 per cent of the iron ore used in the United States comes from this region.

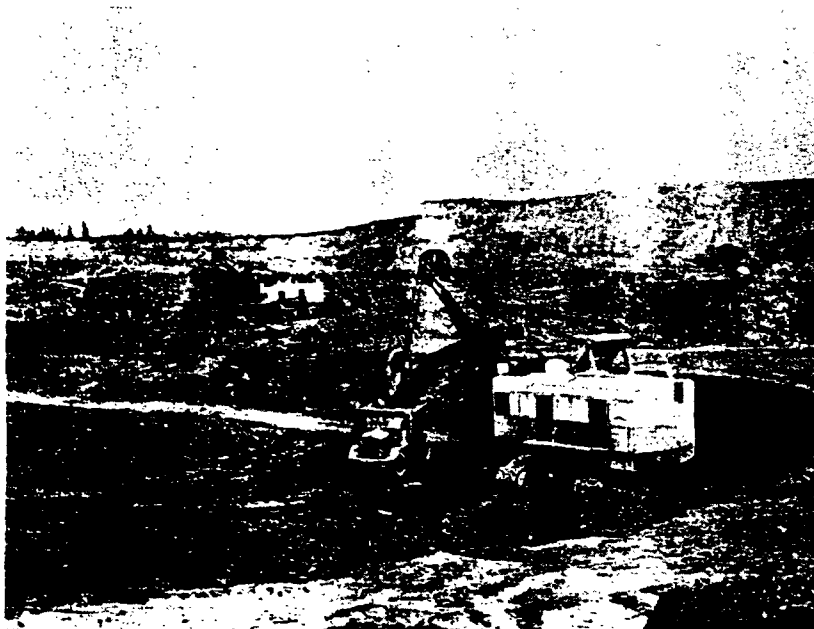
Oglebay, Norton and Company, mine managers and sales agents of iron ore from the Lake Superior district for over 100 years, has played a part in the development and mining of the ores from this area.

The Company is presently engaged in mining operations on the Mesabi and Gogebic Ranges, producing



STOPING IN THE MONTREAL MINE

Bessemer and Non-Bessemer grades of iron ore. The Company also acts in the capacity of consultant in mining and exploration.



MINING AT ST. JAMES
OPEN PIT

LAKE SUPERIOR IRON ORES

THE MONTREAL MINING COMPANY

GOGEBIC RANGE, WESTERN DISTRICT

	NON-BESSEMER HAMILTON GRANULAR RED HEMATITE		NON-BESSEMER BRUNSWICK GRANULAR RED HEMATITE	
	DRIED AT 212° F	NATURAL	DRIED AT 212° F	NATURAL
Iron Guarantee for 1956	58.82 %	52.35 %	58.40 %	51.98 %
Phosphorus	.067	.060	.089	.079
Silica	8.72	7.76	7.40	6.59
Manganese	.72	.64	1.26	1.12
Alumina	2.25	2.00	2.00	1.78
Lime	.32	.28	.55	.49
Magnesia	.50	.45	.70	.62
Sulphur	.010	.009	.010	.009
Loss by Ignition	3.00	2.67	3.95	3.52
Moisture	—	11.00	—	11.00

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BASE PRICES
LAKE SUPERIOR IRON ORES
LAKE ERIE PORTS

YEAR	OLD RANGE		MESABI	
	BESSEMER	NON-BESSEMER	BESSEMER	NON-BESSEMER
1915	\$ 3.75	\$ 3.00	\$ 3.45	\$ 2.80
1916	4.45	3.70	4.20	3.55
1917	5.95	5.20	5.70	5.05
1918	{ 5.95	5.20	5.70	5.05
	{ 6.40	5.65	6.15	5.50
	{ 6.65	5.90	6.40	5.75
1919	6.45	5.70	6.20	5.55
1920	7.45	6.70	7.20	6.55
1921	6.45	5.70	6.20	5.55
1922	5.95	5.20	5.70	5.05
1923	6.45	5.70	6.20	5.55
1924	5.65	4.90	5.40	4.75
1925-1928	4.55	4.40	4.40	4.25
1929-1936	4.80	4.65	4.65	4.50
1937-1939	5.25	5.10	5.10	4.95
1940-1944	4.75	4.60	4.60	4.45
1945	4.95	4.80	4.70	4.55
1946	5.45	5.30	5.20	5.05
1947	5.95	5.80	5.70	5.55
1948	6.60	6.45	6.35	6.20
1949	7.60	7.45	7.35	7.20
1950	8.10	7.95	7.85	7.70
1951	8.70	8.55	8.45	8.30
1952	9.45	9.30	9.20	9.05
1953	{ 10.10	9.95	9.85	9.70
	{ 10.30	10.15	10.05	9.90
1954	10.30	10.15	10.05	9.90
1955	10.40	10.25	10.25	10.10
* 1956	11.25	11.10	11.00	10.85

* FREIGHT CHARGES FOR SELLER'S ACCOUNT.

LAKE SUPERIOR IRON ORE RATES

Cost per gross ton for transporting iron ore from point of origin to point of consumption. Note: Each increment of transportation is subject to 3% Federal Tax.

* Exceptions to 3% Federal Tax Increment

RATES IN EFFECT AS OF MARCH 7, 1956:

RANGE	LOADING PORT	RAIL RATE	CAR TO HOLD OF VESSEL	VESSEL MOVE-MENT	VESSEL RATE	POINT OF CONSUMPTION :	LINE HAUL RATE
CUYUNA	DULUTH, SUPERIOR	1.09	.16	LOWER	1.80	LAKE ERIE PORTS TO: VALLEYS DISTRICT, CANTON & MASSILLON	\$ 1.57
MESABI	DULUTH, SUPERIOR,			LAKE		MIDLAND, STEUBEN- VILLE, WEIRTON & NEVILLE ISLAND	1.82
VERMILION	TWO HARBORS					PITTSBURGH AND WHEELING DISTRICTS	2.09
						MONESSEN, PENNA.	2.19
						JOHNSTOWN, PENNA.	2.33
						VIRGINIA DISTRICT	3.38
GOGEBIC	ASHLAND	1.07				TOLEDO TO:	
						JACKSON, HAMILTON & MIDDLETOWN, OHIO	1.70
						ASHLAND, KY. AND PORTSMOUTH, OHIO	2.25
STEEP ROCK	PORT ARTHUR	1.20 * (CAN.)	.15 * (CAN.)	PORTS		CLEVELAND TO:	
						JACKSON, OHIO	2.05
						ASHLAND, KY. , HAMILTON AND PORTSMOUTH, OHIO	2.25
EASTERN MARQUETTE	MARQUETTE	.77	.16	LOWER	1.62	ASHTABULA, CONNEAUT AND ERIE TO:	
				LAKE		RIDDLESBURG, PENNA.	2.95
WESTERN MARQUETTE	MARQUETTE	.85		PORTS		BUFFALO & ERIE TO:	
						LEHIGH' & SCHUYLKILL VALLEYS, PENNA.	3.22
MARQUETTE	ESCANABA	1.06	.16	LAKE	1.35	SPARROWS POINT, MD.	3.22
				ERIE		BUFFALO TO:	
				PORTS		TROY, N. Y.	2.34
						EVERETT, MASS.	3.29
MENOMINEE				LAKE	1.08	CHICAGO TO:	
				MICH.		GRANITE CITY, ILL.	2.17
				PORTS			

Dock Handling Charges -- From Lower Lake Ports and Lake Erie Ports:

(A) Hold to Rail of Vessel	.24
(B) Rail of Vessel to Stockpile	.38 *
(C) Stockpile to Car	.24
(D) Storage per Month	.01
(E) Rail of Vessel to Car	.16

SUMMARY U. S. IRON ORE STATISTICS

(Gross Tons)



	1951	1952	1953	1954	1955
Shipments					
Lake Superior District (1).....	94,497,707	78,008,389	96,548,261	60,190,617	86,249,108(*)
Other U. S. Districts (2).....	19,219,242	17,537,098	16,801,000	17,001,000	21,820,000
Imports (3).....	10,145,415	9,760,625	11,085,085	15,781,632	23,443,220
Total U. S. Stocks on Hand January 1 (4).....	39,975,035	48,175,488	49,295,881	53,190,580	50,150,896
Exports (5).....	4,328,910	5,121,242	4,251,365	3,148,714	4,501,478
Total U. S. Consumption (5).....	111,837,112	100,640,636	121,348,585	108,619,382	130,008,409
Pig Iron Production (4).....	62,744,888	54,743,692	66,876,273	51,754,951	68,622,690
Steel Production (4).....	93,928,404	83,185,745	99,651,530	78,849,686	104,496,499

(1) The Lake Superior Iron Ore Association.

(2) U. S. Bureau of Mines.

(3) U. S. Census Bureau.

(4) American Iron & Steel Institute. (Converted to gross tons.)

(5) U. S. Bureau of Mines.

(*) Estimated

SUMMARY OF LAKE SUPERIOR IRON ORE STATISTICS

(Gross Tons)



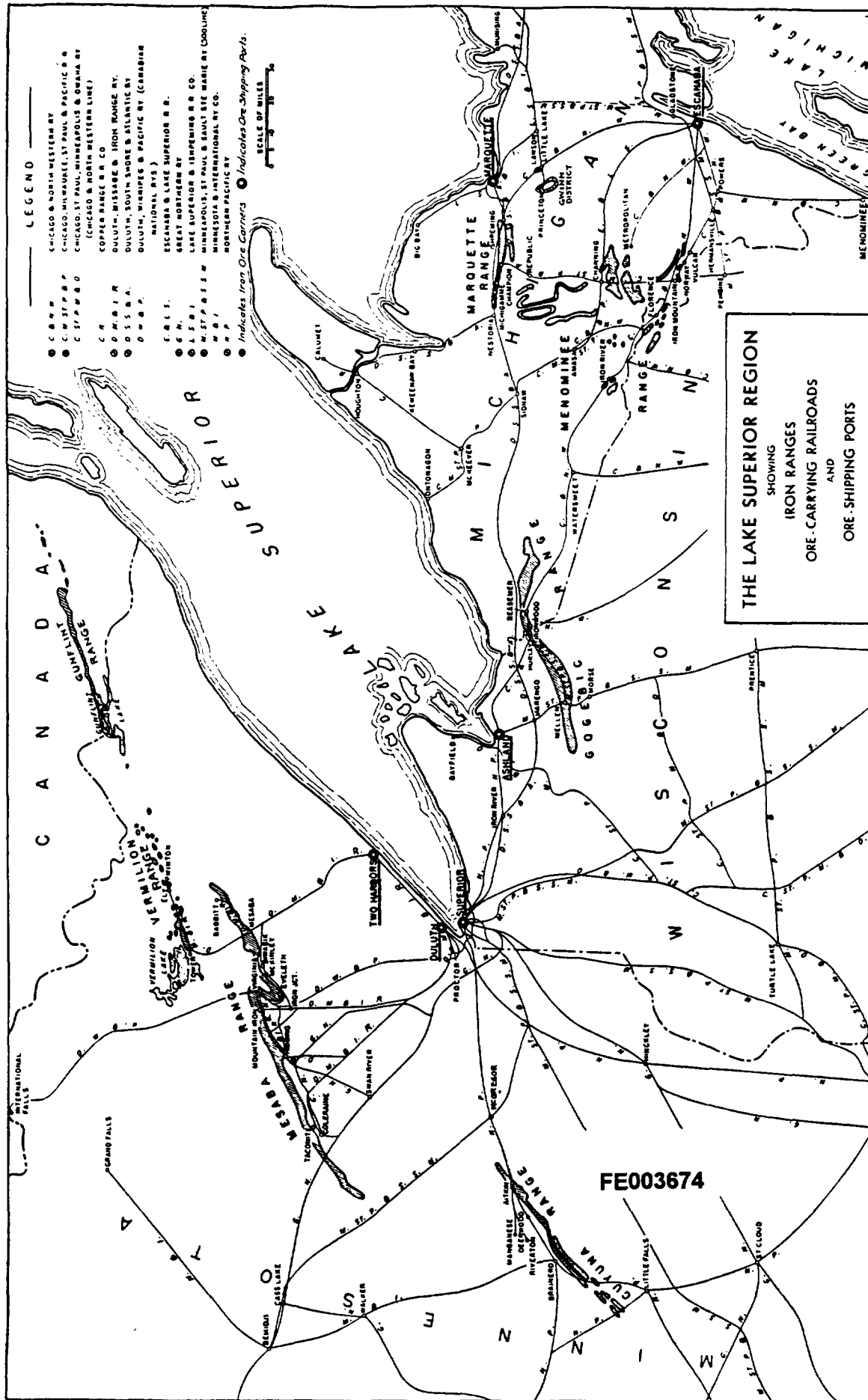
Year	Annual Shipments		Stock on Hand January 1			Total Annual Consumption U.S. and Canada	Number of Blast Furnaces Operating January 1 U.S. and Canada
	Total Shipments Rail and Lake	Shipments of U.S. Lake Superior Ores	Total Stocks U.S. and Canada	At Lake Erie Docks	At U.S. Furnace Yards		
		(1)		(2)	(2)		(3)
1945	76,981,151	76,318,834	37,823,876	4,941,150	31,597,124	74,575,878	170
1946	61,012,513	59,570,907	39,058,650	4,398,886	33,397,227	62,093,056	158
1947	79,704,232	77,990,167	37,464,533	4,408,508	31,773,753	80,806,627	176
1948	84,690,010	83,491,566	36,094,870	4,346,114	30,406,284	80,597,745	178
1949	70,986,968	69,225,093	39,460,497	4,903,256	32,841,454	70,998,420	186
1950	82,177,207	79,952,076	38,628,510	6,084,605	31,270,534	83,536,678	171
1951	97,010,810	94,497,707	37,168,873	5,398,298	30,459,727	89,369,439	184
1952	80,435,486	78,008,389	43,710,659	6,395,884	35,578,544	78,340,223	187
1953	99,024,613	96,548,261	45,171,753	6,116,337	36,969,794	94,887,504	196
1954	62,347,470	60,190,617	48,815,444	7,670,666	39,095,756	67,027,594	159
1955	89,959,853*	86,249,108	44,017,825	6,591,051	35,479,258	88,406,680	160

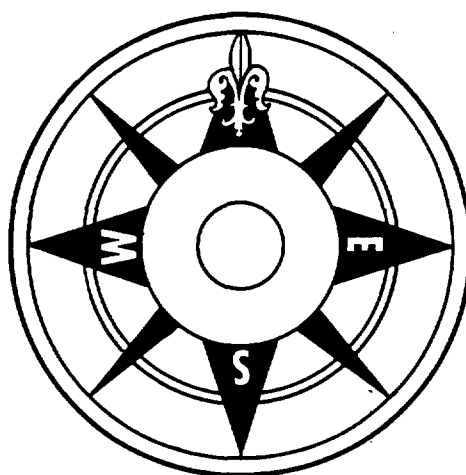
(*) Estimated

(1) Does not include Lake Superior Ores mined in Canada.

(2) Does not include stocks on hand at Canadian Furnaces, only stocks on hand for U. S. Furnace Operations.

(3) Only those Blast Furnaces in U. S. and Canada operating on Lake Superior Ores.







THE STEAMER ARMCO - FLAGSHIP OF THE COLUMBIA FLEET

Great Lakes shipping, which observed its 100th anniversary last year, has grown under our free enterprise and private ownership into a transportation system unmatched anywhere in the world. Today, tremendous quantities of ore, coal, limestone, grain and other commodities are moved on the Great Lakes at much less cost than any form of land transportation.

Operating for many years on the five Great Lakes, The Columbia Transportation Company comprises three types of vessels: bulk, self-unloader and crane. These three types offer diversified

equipment serving most bulk and non-bulk Great Lakes transportation requirements.

The bulk division of Columbia contains nine conventional bulk vessels.

The self-unloader division comprises a total of nine; two of the nine are self-unloading tug barge units operated by The Pringle Barge Line Company, a subsidiary of Columbia.

Included in the Columbia fleet are five crane vessels adaptable to the loading and unloading of steel products, pig iron, scrap iron, sulphur and other commodities.

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THE COLUMBIA TRANSPORTATION COMPANY

BULK VESSELS

For Handling Iron Ore, Coal and Grain

VESSEL	CAPACITY (G.T.)	OVER-ALL LENGTH	BEAM	DEPTH	NO. COM- PARTMENTS	NO. HATCHES
Armco	20,000	647 FT	70 FT	36 FT	4	19
Reserve	20,000	647 FT	70 FT	36 FT	4	19
Joseph H. Frantz	14,000	618 FT	62 FT	32 FT	4	18
W. W. Holloway	11,000	552 FT	56 FT	31 FT	4	31
J. Clare Miller	11,000	545 FT	55 FT	31 FT	4	17
Charles W. Galloway	10,000	524 FT	54 FT	30 FT	4	15
Howard M. Hanna, Jr.	10,000	524 FT	54 FT	30 FT	4	15
David Z. Norton	9,000	500 FT	52 FT	30 FT	4	14
Wm. F. Stifel	7,500	441 FT	52 FT	28 FT	4	12

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THE COLUMBIA TRANSPORTATION COMPANY

SELF-UNLOADING VESSELS

For Handling Coal, Coke, Gravel, Sand, Slag and Limestone

VESSEL	CAPACITY (G.T.)	CAPACITY (N.T.)	OVER-ALL LENGTH	BEAM	DEPTH	NO. COM- PART- MENTS	BOOM LENGTH
Crispin Oglebay	10,500	11,000	557 FT	58 FT	31 FT	6	240 FT
J. R. Sensibar	9,500	9,000	552 FT	56 FT	31 FT	6	196 FT
Sierra	6,600	6,600	461 FT	52 FT	28 FT	5	182 FT
R. J. Paisley	5,800	6,300	414 FT	48 FT	28 FT	4	170 FT
Ben E. Tate	5,500	5,500	376 FT	50 FT	28 FT	4	166 FT
E. G. Mathiott	5,200	5,000	366 FT	48 FT	28 FT	4	146 FT *
R. E. Moody	5,200	4,500	374 FT	48 FT	28 FT	4	146 FT *

* Equipped with 16 Ft. Chute.

THE COLUMBIA TRANSPORTATION COMPANY

CRANE EQUIPPED VESSELS

VESSEL	W.C. RICHARDSON	BUCKEYE	O.S. MCFARLAND	G.G. POST	HARRY T. EWIG
Capacity (G. T.)	7,200	6,800	5,900	5,400	5,400
Over-All Length	440 FT	428 FT	380 FT	366 FT	366 FT
Beam	52 FT	51 FT	50 FT	48 FT	48 FT
Depth	28 FT	28 FT	28 FT	28 FT	28 FT
No. Compartments	4	3	3	3	3
Boom Length	75 FT	75 FT	65 FT	65 FT	65 FT
Hatch No. 1	52 FT X 34 FT	62 FT X 32 FT	48 FT X 32 FT	48 FT X 28 FT	48 FT X 31 FT
Hatch No. 2	64 FT X 34 FT	83 FT X 32 FT	78 FT X 32 FT	80 FT X 28 FT	80 FT X 31 FT
Hatch No. 3	64 FT X 34 FT	62 FT X 32 FT	48 FT X 32 FT	48 FT X 28 FT	48 FT X 31 FT
Hatch No. 4	58 FT X 34 FT				

The Steamer Richardson is equipped with two fast revolving traveling Diesel electric cranes. The Steamers Buckeye, O.S. McFarland, G. G. Post and Harry T. Ewig are each equipped with two fast revolving stationary steam cranes. The cranes on all of these vessels operate interchangeably 77 inch electro magnets, 3 to 4 yard clam shell buckets, as well as slings and other tackle, thus having flexibility to load and unload cargoes of Pig Iron, Scrap Iron, Steel, Sulphur, Limestone, Sand, Ferro Alloys, etc.

THE SAGINAW DOCK & TERMINAL COMPANY

STEAMER CARROLLTON

A vessel, specially adapted for transportation of Steel, Pig Iron, Scrap, Ferro Alloys and miscellaneous cargo, is maintained to serve the dock at Saginaw and this trade on the Great Lakes.

Capacity (G. T.)	2,700
Over-All Length	247 FT
Beam	43 FT
Depth	21 FT
No. Compartments	1
Hatch No. 1	64' x 28'
Hatch No. 2	57' x 28'

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THE PRINGLE BARGE LINE COMPANY

SELF-UNLOADING BARGES

	BARGE MAIDA	BARGE CONSTITUTION
Capacity (N. T.)	5,500	5,500
Over-All Length	375 FT	452 FT
Beam	46 FT	44 FT
Boom Length	141 FT	130 FT

TUGS

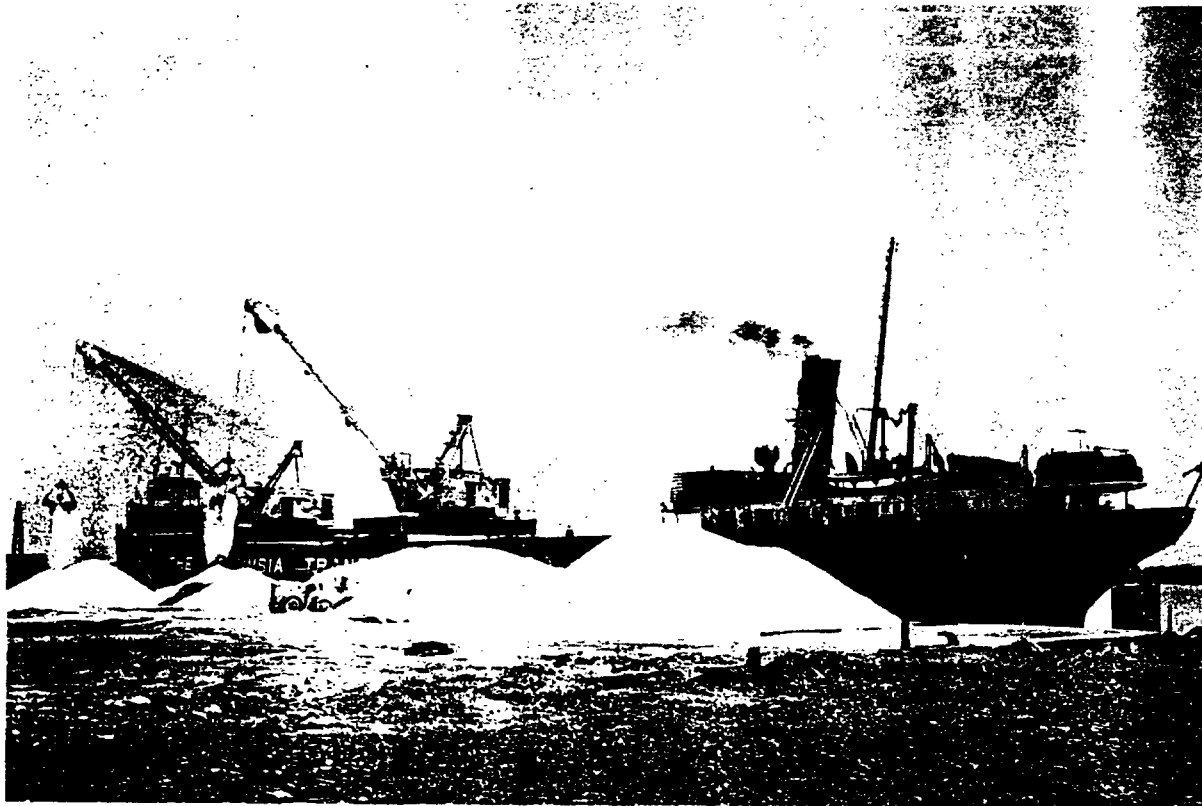
S. M. Dean
(Diesel Powered)

1,600 H. P.

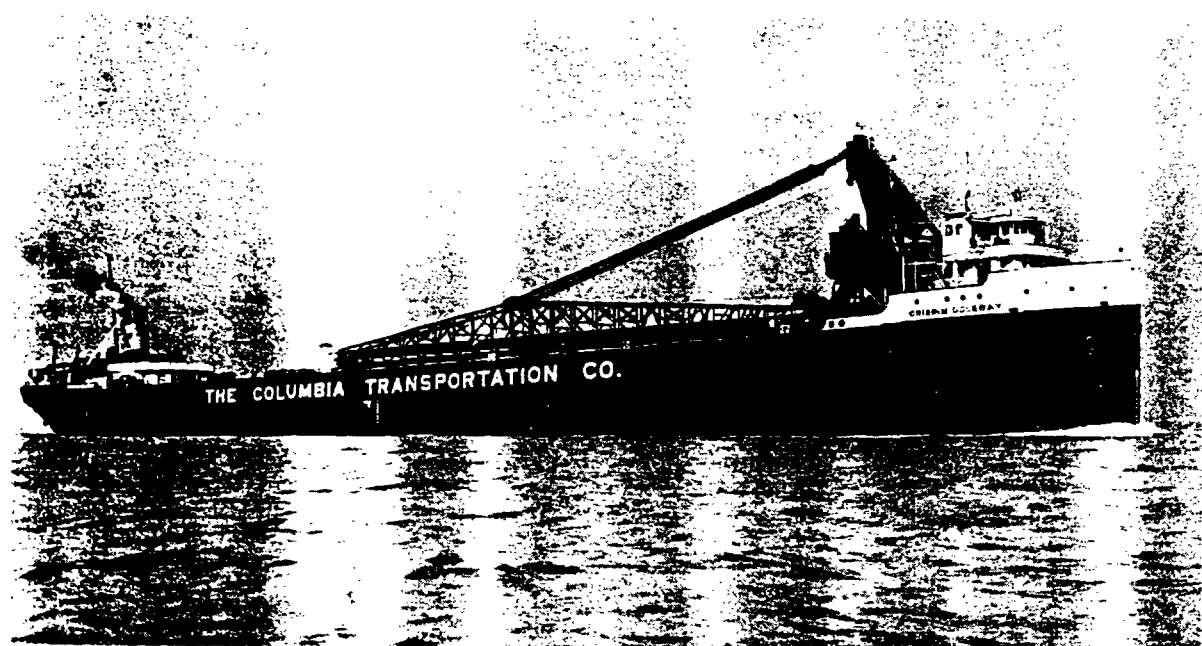
Jesse James

750 H. P.

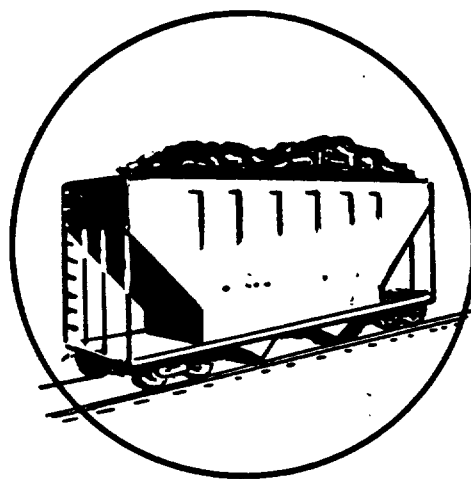
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THE STEAMER W. C. RICHARDSON -- A CRANE VESSEL



THE STEAMER CRISPIN OGLEBAY -- A SELF-UNLOADING VESSEL



MODERN COAL TIPPLE
AND PREPARATION PLANT
AT BURTON MINE.



EXTENSIBLE BELT IN
OPERATION - NORTON #3
MINE.

COAL

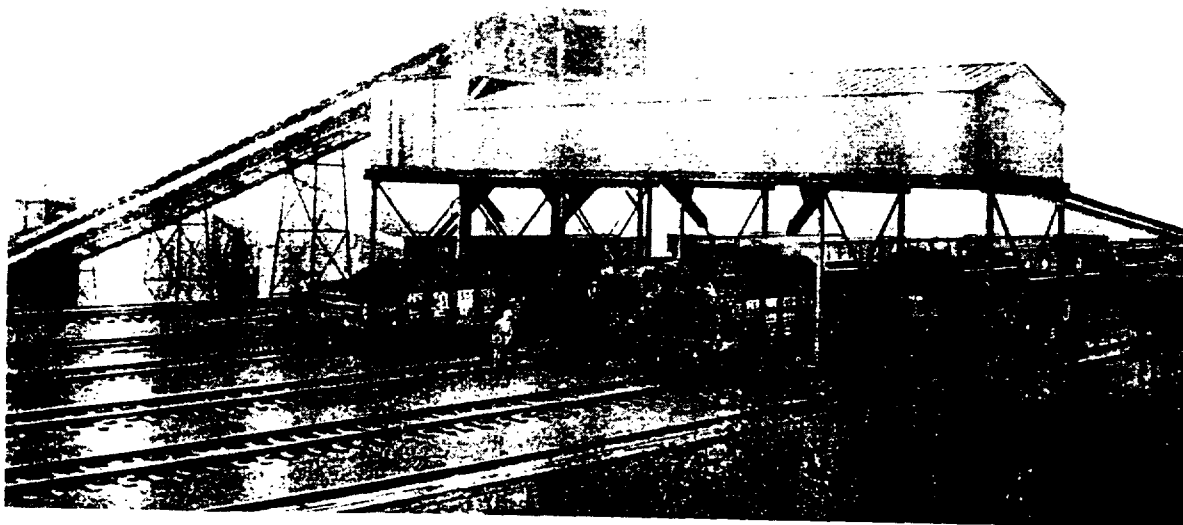
Oglebay, Norton and Company is operating manager and exclusive sales agent for mines located in Ohio and West Virginia and distributor for other mines in major coal-producing centers.

These select and highly versatile coals are available for industrial, domestic, by-product application and electric power requirements.

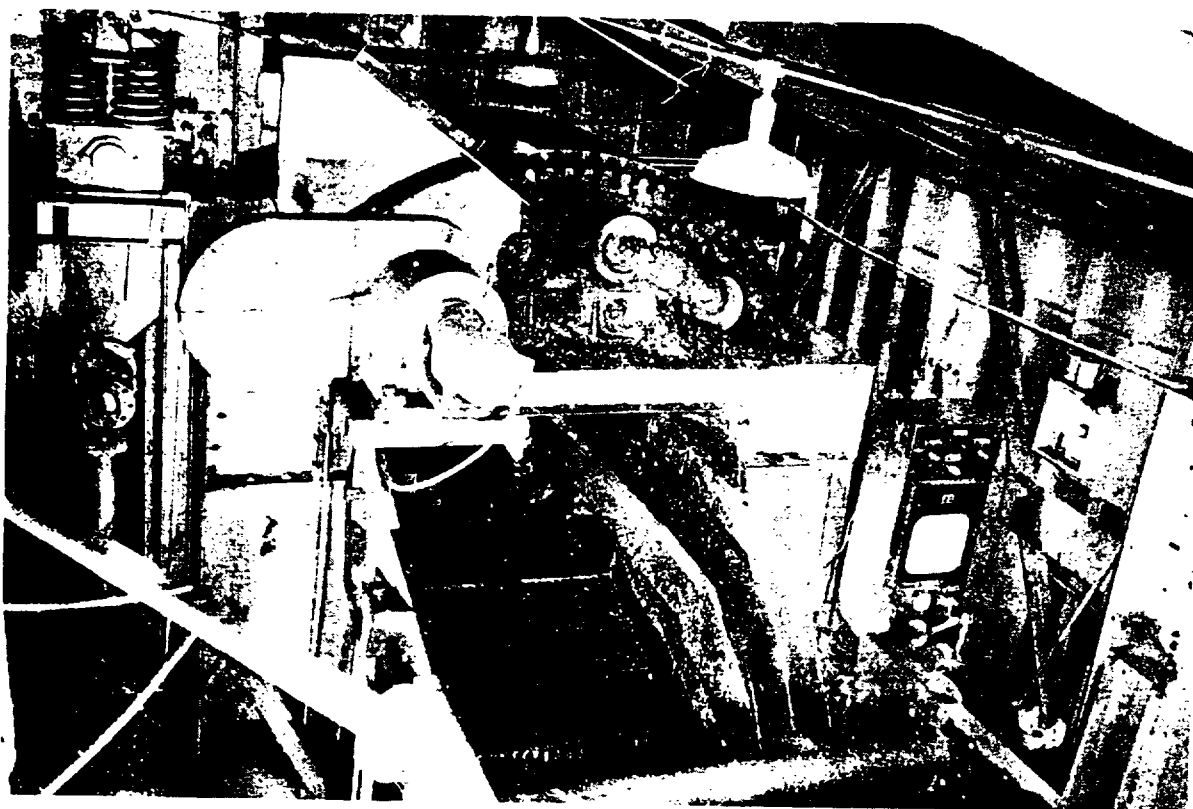
A pioneer in the use of the continuous miner, the company operates with

modern mining methods and equipment. The latest designs in preparation plants have been installed to meet the requirements of varied consumption.

In addition to all rail movements of coal from the mines direct to destination, Oglebay, Norton and Company and its associated companies offer integrated dock and vessel operations for the trans-shipment of coal via the Great Lakes.



NORTON # 3 SCREENING PLANT



HEAVY MEDIA SEPARATOR AT NORTON # 3 TIPPLE

COAL MINES

OHIO NO. 8 SEAM

COMPANY	NAME AND TYPE OF MINE	LOCATION	RAILROAD
The David Z. Norton Company	Norton No. 3 (Deep)	Onco, Ohio	Penna.
The Saginaw Dock & Terminal Co.	Saginaw (Deep)	St. Clairsville, Ohio	N K P.

OHIO NO. 9 SEAM

R. & F. Coal Company	Rice (Strip)	Flushing, Ohio	B. & O.
R. & F. Coal Company	Jenny (Strip)	Adena, Ohio	N K P.

OHIO NO. 4, 5, 6 SEAM

O. K. Coal Co., Inc.	Nimishillen Colliery (Preparation Plant)	North Industry, Ohio	--
Tri-Seam Mining Co.	Tri-Seam (Strip)	Canton, Ohio	--

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See Analysis on Following Pages

COAL MINES

POCAHONTAS NO. 3 SEAM

The Brule Smokeless Coal Co.	Brule (Deep)	Otsego, W. Va.	Vgn.
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SEWELL SEAM

Richwood Sewell Coal Co.	Burton (Deep)	Gauley River Line Junction, W. Va.	B. & O.
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CHILTON SEAM

Jewell Ridge Coal Corp.	Peach Creek (Deep)	Peach Creek, W. Va.	C. & O.
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KITTANNING AND FREEPORT SEAMS

Mays Coal Co.	Mays (Strip)	Limestone, Pa.	N. Y. C.
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See Analysis on Following Pages

DOMESTIC AND STEAM COAL

Operating Company..... The David Z. Norton Company

PROXIMATE ANALYSIS :	5 " x 2 " EGG	2 " x 1 1/4 " NUT	1 1/4 " x 3/8 " 3/4 " x 3/8 " STOKER	1 1/4 " x 3/8 " 3/4 " x 3/8 " MOD. STOKER	3/8 " x 0 " SLACK
Moisture	3.77	3.67	3.60	3.65	4.00
Volatile	39.92	38.92	39.52	39.30	39.85
Fixed Carbon	49.11	50.18	49.33	49.34	45.43
Ash	7.20	7.23	7.55	7.71	10.67
Sulphur	3.65	3.52	3.72	3.67	3.83
B. T. U. As Received	13,165	13,165	13,125	13,025	12,515
B. T. U. Dry	13,615	13,595	13,515	13,485	13,215
Fusion	2,230	2,215	2,205	2,190	2,170
Grindability	57	57	57	57	57
Coke Button	5	5	5	5	5

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OHIO NO. 8 SEAM

DOMESTIC AND STEAM COAL

Name of Mine.....Saginaw (Deep)

Shipping Point ...St. Clairsville, Ohio

Railroad.....N K P.

District.....No. 4

CountyBelmont

SeamPittsburgh, Ohio No. 8

Daily Production3,000 N. T.

Preparation Equipment Davis Heavy Media Washery, Stoker Dryer and Slack Dryer, Crusher, Picking Tables, Vibrator & Shaker Screens, Loading Booms, Freeze Proofing

Operating Company..... The Saginaw Dock & Terminal Company

PROXIMATE ANALYSIS :	5" x 2" EGG	2" x 1 1/4" NUT	1 1/4" x 3/8" 3/4" x 3/8" STOKER	1 1/4" x 3/8" 3/4" x 3/8" MOD. STOKER	3/8" x 0" SLACK
Moisture	3.77	3.66	3.62	3.79	4.15
Volatile	39.02	38.96	39.50	38.30	40.00
Fixed Carbon	50.11	50.15	49.33	50.30	45.38
Ash	7.20	7.23	7.55	7.61	10.47
Sulphur	3.57	3.46	3.82	3.76	3.83
B. T. U. As Received	13,150	13,160	13,150	13,010	12,450
B. T. U. Dry	13,610	13,590	13,510	13,455	13,242
Fusion	2,210	2,205	2,180	2,170	2,110
Grindability	57	57	57	57	57
Coke Button	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2

All 2", 1-1/4", 3/4" nut and slack can be modified to suit problems of various burning equipment installations.

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OHIO NO. 9 SEAM

STEAM COAL

Name of Mine..... Jenny (Strip)

Shipping Point Adena, Ohio

District..... No. 4

Seam No. 9

Railroad..... N K P.

County Belmont

Daily Production 1,200 N. T.

Preparation Equipment Picking Table, Crusher

Operating Company R. & F. Coal Company

PROXIMATE ANALYSIS :	MINE RUN	2 " CRUSHED	1 1/4 " CRUSHED
Moisture	5.15	5.15	5.15
Volatile	37.82	37.82	37.82
Fixed Carbon	47.10	47.10	47.10
Ash	9.93	9.93	9.93
Sulphur	2.96	2.96	2.96
B. T. U. As Received	12,075	12,075	12,075
B. T. U. Dry	12,865	12,865	12,865
Fusion	2,325	2,325	2,325
Grindability	53	53	53
Coke Button	4 1/2	4 1/2	4 1/2

OHIO NO. 9 SEAM

STEAM COAL

Name of Mine.....Rice (Strip)

Shipping PointFlushing, Ohio

District..... No. 4

Seam Ohio, No. 9

Preparation Equipment Picking Table, Crusher

Operating Company.....R. & F. Coal Company

Railroad..... B. & O.

County Belmont

Daily Production1,200 N. T.

PROXIMATE ANALYSIS :	MINE RUN	2 " CRUSHED	1 1/4 " CRUSHED
Moisture	5.15	5.15	5.15
Volatile	37.82	37.82	37.82
Fixed Carbon	47.10	47.10	47.10
Ash	9.93	9.93	9.93
Sulphur	2.96	2.96	2.96
B. T. U. As Received	12,380	12,380	12,380
B. T. U. Dry	13,185	13,185	13,185
Fusion	2,325	2,325	2,325
Grindability	53	53	53
Coke Button	4 1/2	4 1/2	4 1/2

OHIO MIDDLE DISTRICT

STEAM AND DOMESTIC COAL

Name of Mine... Nimishillen Colliery (Strip)

Shipping Point North Industry, Ohio Railroad.....Truck Only

District..... No. 4 County Stark

Seam No. 4, 5, 6 Daily Production 950 N. T.

Preparation Equipment .. Baum Jig Washery, Crusher, Shaker Screens, Dryer

Operating Company..... O. K. Coal, Inc.

PROXIMATE ANALYSIS :	5" x 2" EGG	2" x 1 1/4" NUT	1 1/4" x 3/4" STOKER	1 1/4" x 60 MESH	3/4" x 60 MESH	2" CRUSHED EGG
Moisture	4.10	4.21	4.53	5.41	5.00	4.00
Volatile	39.94	38.97	39.88	39.57	38.82	39.68
Fixed Carbon	48.91	49.70	48.04	47.50	49.08	49.20
Ash	7.05	7.12	7.55	7.52	7.10	7.12
Sulphur	2.98	2.96	2.84	3.07	3.03	3.05
B. T. U. As Received	12,755	12,709	12,715	12,411	12,375	12,710
B. T. U. Dry	13,282	13,263	13,230	13,147	13,065	13,230
Fusion	2,275	2,278	2,285	2,300	2,275	2,265
Grindability	56	56	56	56	56	56
Coke Button	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2

OHIO MIDDLE DISTRICT

STEAM COAL

Name of Mine.....Tri-Seam (Strip)

Shipping Point North Industry, Ohio

Railroad.....Truck Only

District..... No. 4

CountyStark

SeamNo. 4, 5, 6

Daily Production950 N. T.

Preparation EquipmentDirect from Stripping Pits

Operating Company..... Tri-Seam Mining, Inc.

PROXIMATE ANALYSIS :	MINE RUN
Moisture	5.90
Volatile	36.97
Fixed Carbon	46.90
Ash	10.23
Sulphur	3.26
B. T. U. As Received	11,815
B. T. U. Dry	12,625
Fusion	2,275
Grindability	56
Coke Button	5 1/2

FE003693

LOW VOLATILE
BY-PRODUCT -- STEAM AND DOMESTIC COAL

Name of Mine.....	Brule (Deep)	
Shipping Point	Otsego, West Virginia	Railroad.....Vgn.
District.....	No. 7	County Wyoming
Seam	Pocahontas No. 3	Daily Production2,200 N. T.
Preparation Equipment	Belknap Washery, Vibrator and Shaker Screens, Loading Booms	
Operating Company.....	The Brule Smokeless Coal Company	

PROXIMATE ANALYSIS :	4" x 1 ³ / ₄ " STOVE	1 ³ / ₄ " x 7/ ₈ " NUT	7/ ₈ " x 3/ ₈ " PEA	7/ ₈ " x 0" SLACK
Moisture	2.58	3.36	3.22	2.36
Volatile	16.94	17.21	17.34	16.91
Fixed Carbon	74.84	74.30	73.30	74.91
Ash	5.64	5.13	6.14	5.82
Sulphur	.68	.66	.66	.62
B. T. U. As Received	14,412	14,213	14,160	14,301
B. T. U. Dry	14,790	14,570	14,430	14,731
Fusion	2,808	2,753	2,730	2,840
Grindability				103
Coke Button				9

Brule Pocahontas is well known as a superior quality coal, excellent for by-product and metallurgical application. Inherent characteristics make it highly desirable for domestic and industrial operations. Ample reserves assure a constant supply for many years.

SEWELL SEAM
MEDIUM VOLATILE
BY-PRODUCT -- STEAM AND DOMESTIC COAL

Name of Mine..... Burton (Deep)
Shipping Point.. Gauley River Line Jct., W.Va. Railroad..... B. & O.
District No. 3 County Nicholas
Seam Sewell Daily Production ... 1,800 N. T.
Preparation Equipment..... Pittsburgh Jig Type Washer, Thermal Coal Dryer,
Deister Tables, Vibrator & Shaker Screens, Load-
ing Booms
Operating Company..... Richwood Sewell Coal Company

PROXIMATE ANALYSIS :	10" x 3" EGG	3" x 1 1/4" STOVE	1 1/4" x 3/4" NUT	3/4" x 3/8" PEA	1 1/4" x 0" SLACK	3/8" x 0" SLACK
Moisture	3.10	3.40	3.70	3.90	4.00	3.60
Volatile	29.20	29.47	28.70	29.50	28.75	29.40
Fixed Carbon	63.70	63.03	62.98	62.44	62.80	62.64
Ash	4.00	4.10	4.62	4.16	4.45	4.36
Sulphur	.71	.73	.73	.68	.72	.76
B. T. U. As Received	14,445	14,440	14,290	14,220	14,320	14,217
B. T. U. Dry	14,970	14,930	14,740	14,680	14,815	14,690
Fusion	2,460	2,440	2,475	2,455	2,448	2,435
Grindability					84	84
Coke Button					9	9

Burton Sewell is well qualified to meet the requirements of a by-product coal. The essential requirement of low sulphur, medium volatile and medium fusion, together with other important requisites, are met by Burton-Sewell and the result is outstanding performance. Reserve acreage assures availability of Burton Mine Coal for many years.

CHILTON SEAM
HIGH VOLATILE
DOMESTIC AND STEAM COAL

Name of Mine.....Peach Creek (Deep)
Shipping Point....Peach Creek, West Virginia Railroad.....C. & O.
DistrictNo. 8 CountyLogan
SeamChilton Daily Production....2,500 N. T.
Preparation Equipment.....Jeffrey Jigs, Crusher, Vibrator and Shaker
Screens, Loading Booms
Operating Company.....Jewell Ridge Coal Corporation

PROXIMATE ANALYSIS :	6 " LUMP	6 " x 3 " EGG	3 " x 2 " STOVE	2 " x 1/8 " NUT	2 " N - S
Moisture	3.00	3.09	3.10	3.25	3.50
Volatile	36.08	36.77	36.57	36.47	36.30
Fixed Carbon	56.62	55.89	55.93	55.63	55.40
Ash	4.30	4.25	4.40	4.65	4.80
Sulphur	.70	.64	.64	.65	.70
B. T. U. As Received	13,900	14,022	13,950	13,800	13,790
B. T. U. Dry	14,390	14,400	14,330	14,310	14,287
Fusion	2,750	2,750	2,750	2,750	2,750
Grindability					54
Coke Button					5

LOWER KITTANNING SEAM

HIGH VOLATILE -- STEAM COAL

Name of Mine..... Mays (Strip)

Shipping Point..... Limestone, Penna.

Railroad..... N. Y. C.

District No. 2

County Clarion

Seam Lower Kittanning

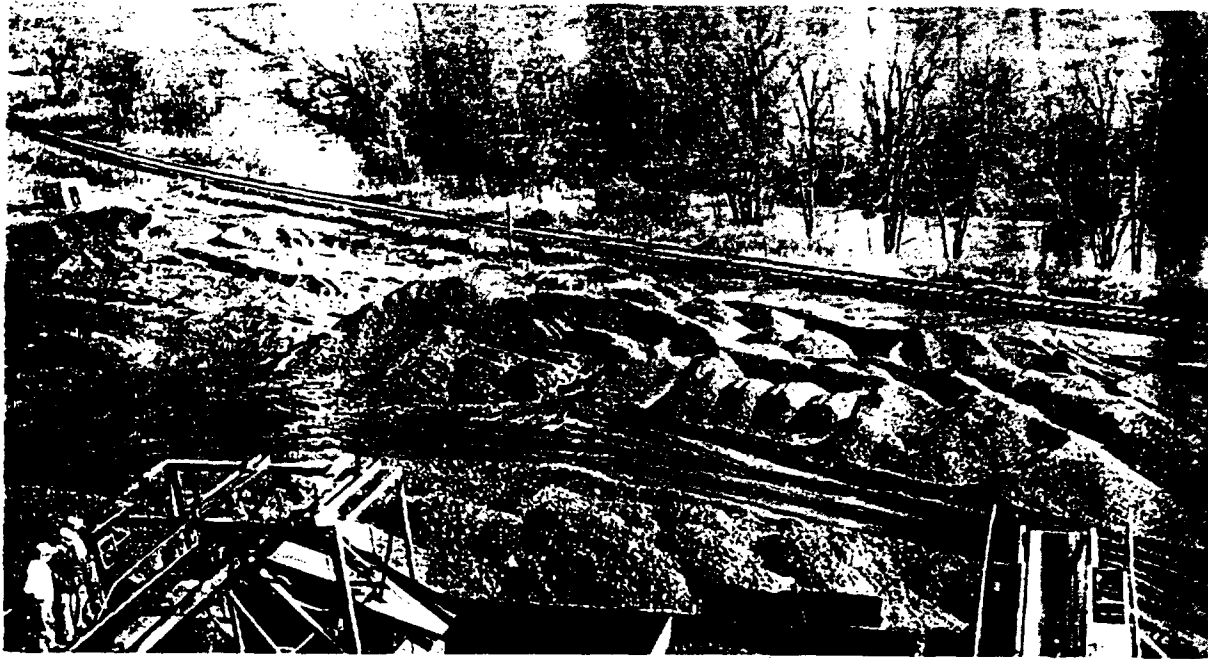
Daily Production 1,800 N. T.

Mining Equipment 4-Yard Stripping Shovel, Two 2-Yard Loading Shovels, 17-Yard Scraper, 3 Bulldozers, One Road Grader

Preparation Equipment..... One Broom for Coal Surface Cleaning, Shaker Screens, Picking Tables, Crusher

Operating Company..... Mays Coal Company

PROXIMATE ANALYSIS :	2 " x 0" CR. M/R
Moisture	3.71
Volatile	36.88
Fixed Carbon	52.14
Ash	7.27
Sulphur	1.97
B. T. U. As Received	13,291
B. T. U. Dry	13,707
Fusion	2,460
Grindability	58
Coke Button	5 1/2



TRUCKLOADING LINES AND STORAGE PILES -- O. K. COAL COMPANY



MAIN HAULAGE ENTRY -- NORTON #3 MINE

FACTS OF INTEREST

COAL FIELDS

The United States has 40 per cent of the whole world's coal supply. If all the land in the U. S. underlain with coal could be placed side by side, in one continuous and massive block, it would sprawl over an area larger than Great

Britain, Eire and France combined. Actually 31 states and Alaska have mineable coal deposits. Nearly 2-1/2 trillion tons of all types of coal lie sleeping in American soil, roughly 16,000 tons for every man, woman and child.

* * *

MASS PRODUCTION

The modernized coal mines of our day are mass production factories underground and aboveground, and today's coal miner is, for the most part, a skilled operator of mining machinery. He works in an

industry where about 98 per cent of it is loaded mechanically. The pick and shovel of old, and the mules and horses to haul coal, have virtually vanished from our coal mines.

* * *

KINDS OF MINES

Coal mines are of four kinds, three of them underground. If the mass of coal can be reached horizontally, say from the side of a hill on a level grade straight to the heart of the coal, it is called a "Drift" mine. If the coal seam is below ground level, it is reached either by an inclined tunnel or slope, or by a vertical shaft. These are called "Slope" or "Shaft" mines. The

miners may go to the working areas by "man-trip" cars, which are trains of especially designed passenger cars pulled by electric mine locomotives. If the coal lies near the surface of the earth and you can rip it out by huge electrically operated shovels and bulldozers, you have an "Open-Cut" or "Surface" (sometimes called "Strip") mine.

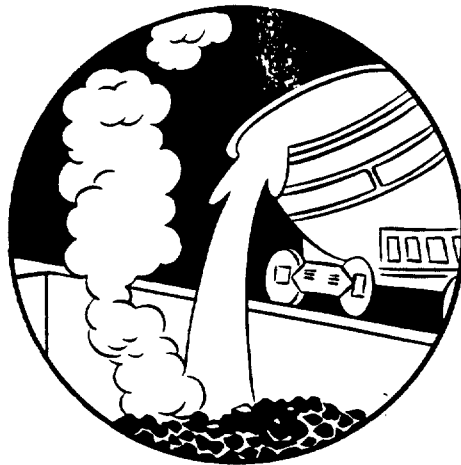
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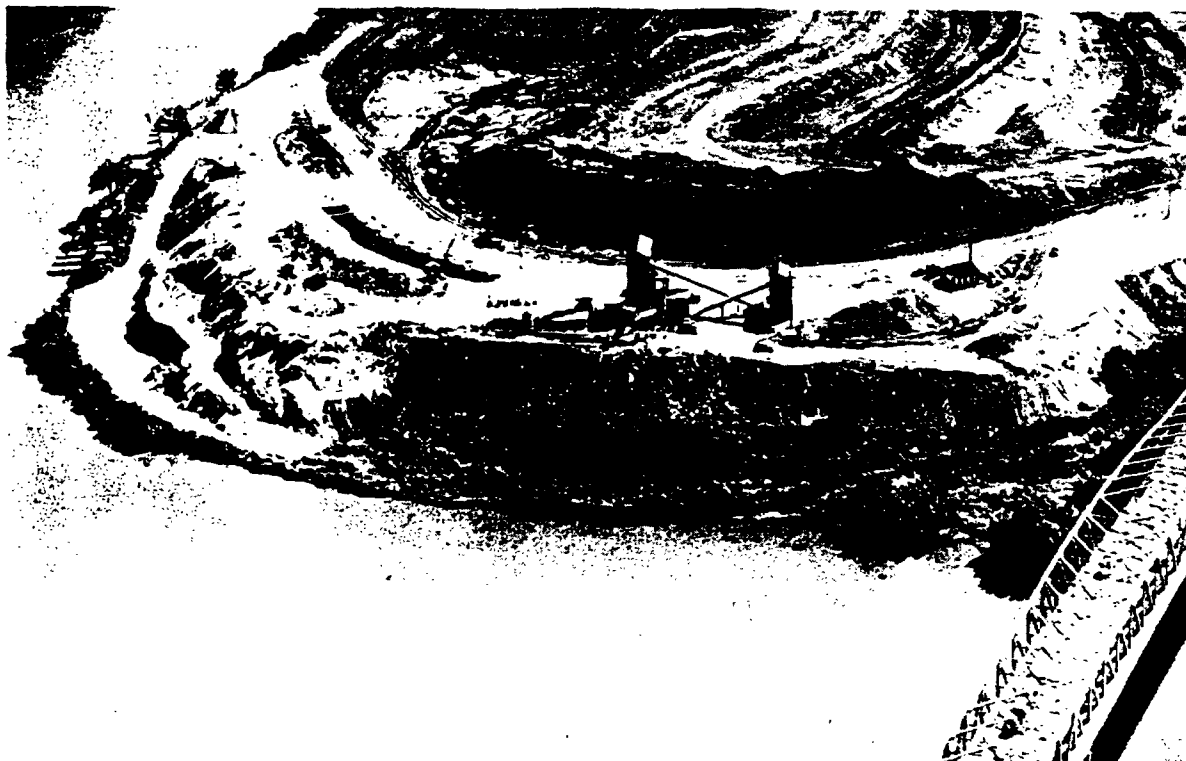
COAL PRODUCTION — UNITED STATES

(NET TONS)



	<u>BITUMINOUS</u>	<u>ANTHRACITE</u>
1935—1949 AVERAGE	400,078,000	51,236,000
1940—1944 AVERAGE	553,473,000	58,505,000
1945—1949 AVERAGE	555,910,000	54,494,000
1945	577,617,000	54,934,000
1946	533,922,000	60,507,000
1947	630,624,000	57,190,000
1948	599,518,000	57,140,000
1949	437,868,000	42,702,000
1950	516,311,000	44,077,000
1951	533,665,000	42,670,000
1952	466,840,000	40,582,000
1953	457,290,000	30,949,000
1954	392,546,000	27,118,000
1955 PRELIMINARY	465,000,000	24,922,000





AERIAL VIEW OF THE LORAIN SLAG PLANT

SLAG

Oglebay, Norton and Company is the exclusive Lake Sales Agent of Lorain Expanded Slag.

Lorain Expanded Slag has been used extensively around the Great Lakes region in the production of lightweight concrete construction units and in the production of Ready-Mix Lightweight Concrete. The blend of coarse and fines for these types of jobs are specified by the ultimate user of the lightweight aggregate.

Lorain Expanded Slag is produced by the pit method and accumulated in large quantities before grinding and grading. This means that the end product is uniform in color, texture, analysis and weight.

Loading facilities and availability of self-unloader vessels permit cargo shipments of approximately 5,000 net tons up to approximately 7,500 net tons.

CHARACTERISTICS OF LORAIN EXPANDED SLAG

Approximate Chemical Analysis

Silica	(S_1O_2)	38.50 %	Iron Oxide	(FeO)	.36 %
Alumina	(Al_2O_3)	11.67 %	Titania	(TiO_2)	1.35 %
Lime	(CaO)	42.12 %	Sulphur	(S)	.80 %
Magnesia	(MgO)	4.90 %	Manganese Oxide	(MnO)	.30 %

Approximate Mechanical Analysis of 70% - 30% Lightweight Concrete Block Blend

Total Per Cent Passing Square Opening Sieves

<u>Screen Size</u>	<u>Per Cent Passing</u>	<u>Screen Size</u>	<u>Per Cent Passing</u>
7/16"	100.0	# 30	27.9
1/4"	93.8	# 50	16.4
# 4	78.4	#100	9.4
# 8	57.3	#200	4.8
# 16	40.6		

Approximate Physical Analysis

	<u>70-30 Blend</u>	<u>Fine</u>	<u>Coarse</u>
Weight per Cubic Foot Dry - Loose	60.0#	63.4#	45.7#
Absorption 24 Hours	6.6		
Bulk Specific Gravity Dry	1.86		

Concrete blocks produced from this blend weigh between
28 and 30 pounds and test 1000 P.S.I.

CHARACTERISTICS OF LORAIN EXPANDED SLAG

LORAIN EXPANDED SLAG CONCRETE

With Type A — Portland Cement

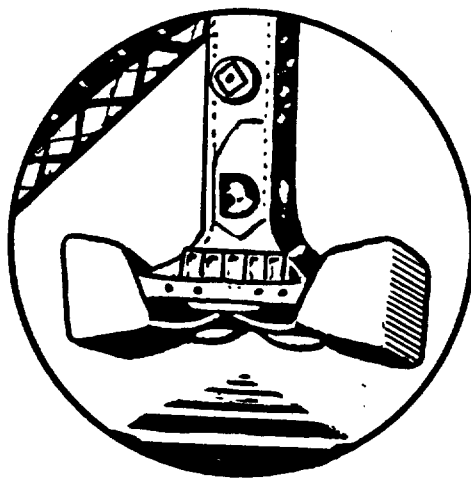
MIX NO.	1	2	3	4	5	6
Cement Sks. per cu. yd.	7.76	9.06	7.72	8.84	8.05	9.32
% Coarse Agg. by Wt. plus #4	30	30	35	35	40	40
% Fine Agg. by Wt. minus #4	70	70	65	65	60	60
Coarse Agg. (Dry) lbs/cu yd.	489	500	584	574	685	679
Fine Agg. (Dry) lbs/cu yd.	1142	1166	1084	1065	1041	1019
Total Agg. (Dry) lbs/cu yd.	1631	1666	1668	1639	1726	1698
Total Water gal/cu yd.	55.3	58.4	54.0	56.0	54.4	57.2
Properties of Fresh Concrete Wt. lbs/cu ft.	104.4	111.2	105.5	108.9	108.0	112.9
Air %	17.8	13.6	17.3	13.5	14.8	13.6
Slump Inches	4"	3-1/2"	3"	4"	3"	3-3/4"
Total Bleeding 3 hrs. cu. cm/sq cm.	.455	.343	.398	.335	.398	.264
Workability	Exc.	Exc.	Good	Good	Good	Good
Properties of Hardened Concrete Wt. lbs/cu ft. (Dry)	101.1	104.5	102.0	103.9	104.0	106.4
Bulk Sp. Gr. (Dry)	1.62	1.67	1.64	1.66	1.67	1.71
Abs. 24 hrs. lbs/cu ft.	10.2	10.6	10.4	10.6	10.0	10.3
Compressive Str. psi						
7 days	2118	2819	2234	2782	2474	3235
28 days	3034	4008	3320	3712	3576	4115
365 days	3876	4878	3526	4766	4705	5053

Note A:

75 % of the mixing water added to mixture of fine and coarse aggregate allowed to absorb 5 minutes before addition of cement and mixing.

Note B:

No apparent benefit by increasing coarse aggregate above 30% by weight because of decrease in workability of concrete.

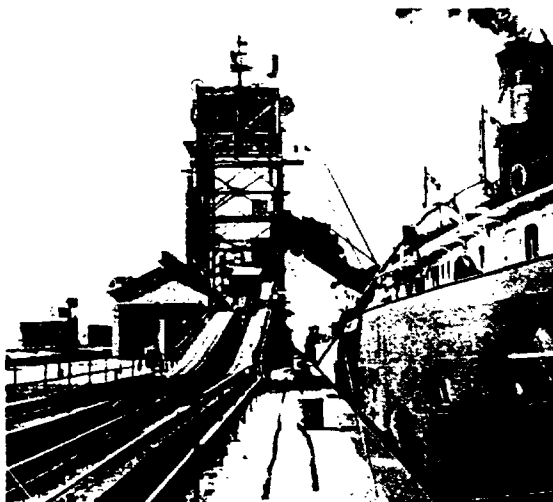


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DOCKS

The Toledo Lakefront Dock Company manages the dock facilities at Toledo jointly owned by The Baltimore and Ohio and New York Central Railroads. These consist of 3 electric car dumpers and 4 electric Hulett's, making it the largest combined operation on the Great Lakes.

HULETT OPERATION AT THE
TOLEDO LAKEFRONT DOCK .



The Toledo, Lorain & Fairport Dock Company manages the Baltimore and Ohio iron ore and coal handling facilities at Lorain and coal handling facilities at Fairport. Lorain has a modern electric car dumper and 3 Brownhoist ore unloaders, while Fairport has a car dumper.

ELECTRIC CAR DUMPER IN
ACTION AT LORAIN DOCK .

The Saginaw Dock & Terminal Company operates dock and terminal facilities at Saginaw, Michigan. Dock space is available for open storage as well as warehousing for all types of raw and finished material. Retail coals are available for industrial and domestic use.

AERIAL VIEW OF PROPERTY
AT THE SAGINAW DOCK &
TERMINAL COMPANY .



THE TOLEDO LAKEFRONT DOCK COMPANY

Operating and Managing

The Iron Ore and Coal Docks

of

The Baltimore & Ohio Railroad Company

and

The New York Central Railroad Company

at

Toledo, Ohio

----- * -----

Three Electric Car Dumpers

Four Electric Hulett Ore Unloaders

Loading Capacity, Coal..... 2,500 Tons per Hour per Car Dumper

Unloading Capacity, Iron Ore 2,500 Tons per Hour

25 Ft. Minimum Depth of Water at Dockside

Largest Combined Ore and Coal Dock

on

The Great Lakes

----- * -----

Telephone - Toledo, Ohio

CHerry 4-8346

THE TOLEDO, LORAIN & FAIRPORT DOCK COMPANY

Operating and Managing

The Iron Ore and Coal Docks

of

The Baltimore & Ohio Railroad Company

at

Lorain and Fairport, Ohio

— * —

LORAIN, OHIO

One Electric Heyl-Patterson Car Dumper

Loading Capacity Coal..... 2,500 Tons per Hour

Three Brownhoist Ore Unloaders

Unloading Capacity Ore..... 1,000 Tons per Hour

Telephone

Lorain 6-9751 or 6-9761

— * —

FAIRPORT, OHIO

One McMyler Car Dumper

Loading Capacity Coal..... 1,500 Tons per Hour

Telephone

Painesville -- Elmwood 7-7522

THE SAGINAW DOCK & TERMINAL COMPANY
SAGINAW, MICHIGAN

STEAMSHIP, DOCKS AND STORAGE WAREHOUSES

Dock and terminal facilities for raw and finished materials and various classes of merchandise available for domestic and foreign commerce via Saginaw River, Great Lakes and St. Lawrence.

Uncovered Storage Capacity

120,000 Tons

Covered Storage Capacity

38,000 Square Feet
354,000 Cubic Feet

DOCK EQUIPMENT

One 25 Ton and two 45 Ton Diesel Cranes -- Equipped with 65 Inch and 55 Inch Magnets and Clam Shell Buckets.

One Diesel Electric Locomotive
Railroad and Truck Scales are Available

Developed Dock Frontage

400 Feet

Depth of Water at Dock

20 Feet

Direct Rail Connections

Chesapeake & Ohio
Grand Trunk
Michigan Central

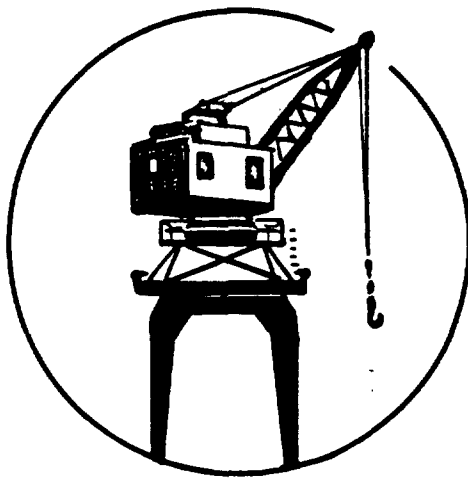
Telephone -- Saginaw, Michigan ... 2-7165

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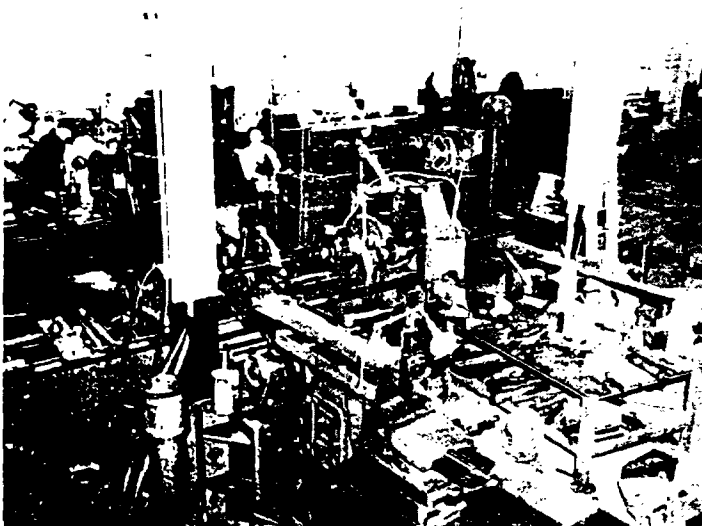


AERIAL VIEW OF THE COAL AND ORE DOCKS AT LORAIN
THE TOLEDO, LORAIN & FAIRPORT DOCK COMPANY

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MACHINE SHOP

Fairport Machine Shop, Inc. offers complete marine repair service, other than dry docking, to the lake transportation industry.

Convenient to lower lake ports, Fairport is equipped to handle marine boiler repairs, hull repairs, all types of machine shop work, fabrication and general vessel repairs.

Although specializing in marine work, Fairport Machine Shop is capable of and has performed machining, fabricating and welding for other industries.

Capacity and flexibility of operations at Fairport permit efficient performance in the machining and fabricating field.

EXTERIOR VIEW OF SHOP



FAIRPORT MACHINE SHOP, INC.
FAIRPORT HARBOR, OHIO

Complete Machine Shop Facilities

Lathes..... Up to 36 Inch Swing
Shapers..... Up to 24 Inch
Portable Bars To Bore Up to 96 Inch
Radial Drills Up to 5 Feet

Other Small Equipment to Match

Marine Boiler Repairs and Welding

* * *

General Vessel Hull Repairing

Diesel Locomotive Crane

Complete Welding Service

Rolls Up to 12 Inches

* Chase Deck Engines

* Complete Deck Engines and Spare Parts in Stock

TELEPHONES

Day

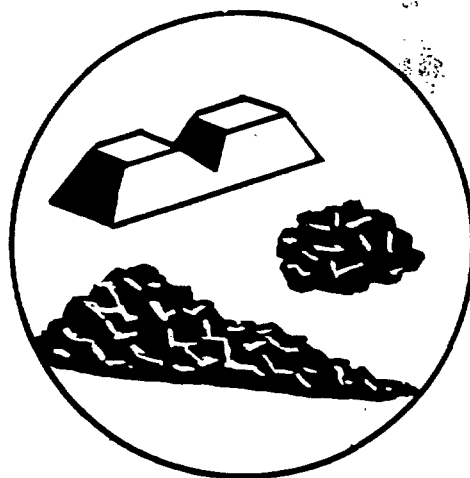
Painesville -- Elmwood 7-7130

Painesville -- Elmwood 7-7450

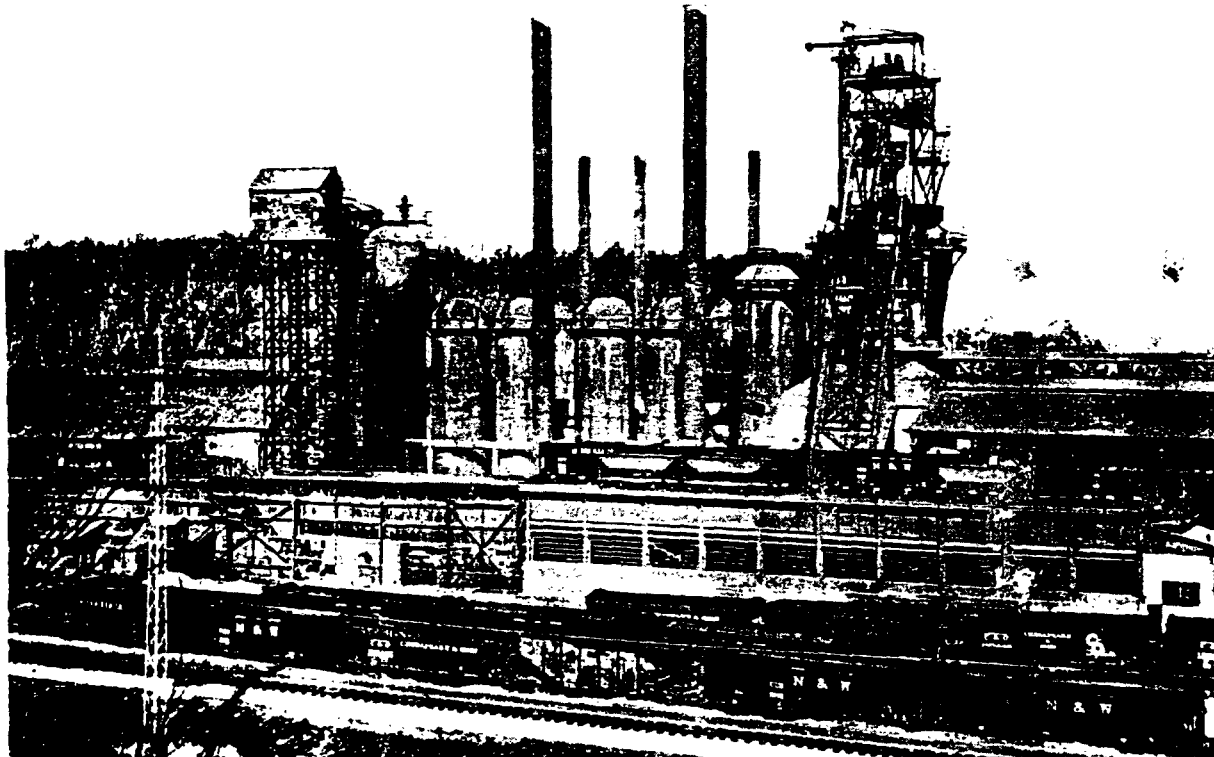
Night

Painesville -- Elmwood 4-4257

Ashtabula -- 3-4040



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FERRO MANGANESE BLAST FURNACE - E. J. LAVINO & CO.

RAW MATERIALS

Oglebay, Norton and Company acts as sales agent for Fluorspar, Ferro Manganese, Spiegeleisen and Phosphate Rock.

Fluorspar, a crystalline, non-metallic mineral, is used in the steel, ceramic and chemical industries.

Ferro Manganese is the most commonly used alloy in the production of steel. Spiegeleisen is another source of Manganese to the steel industry.

Phosphate Rock, generally found as the mineral Phosphorite, is of great value as a source of Phosphorus in the manufacture of high phos pig iron.

MEXICAN METALLURGICAL FLUORSPAR

"PENNSALT" -- "ONMEX" BRANDS

Guaranteed Metallurgical Analysis:

Effective Calcium Fluoride Units	72.5%
Silica	4%
Total Calcium Fluoride	80-85%

Screen Analysis: 1-1/2 Inch Maximum 1/16 Inch Minimum
Fines not to Exceed 10%

"HI - GRADE LUMP"

Guaranteed Lump Analysis:

Effective Calcium Fluoride Units	90%
Silica	2%
Total Calcium Fluoride	94-96%

Screen Analysis: 6 Inch Maximum 4 Inch Minimum
4 Inch Maximum 2 Inch Minimum
Free of fines

SHIPMENT VIA --- BARGE

Port of Brownsville, Texas ...

Direct to:

Chicago, Ill. Area
Pittsburgh, Penna. Area
St. Louis, Ill. Area
Wheeling, W. Va. Area

Transfer Docks At:

Cincinnati, Ohio
Pittsburgh, Penna.

For Rail Beyond

SHIPMENT VIA --- BARGE --- CRANE VESSEL

Transfer at Chicago, Illinois...

For: Detroit, Lorain, Cleveland, Buffalo, Hamilton.

SHIPMENT VIA --- ALL RAIL

From: All Texas Border Points

From: Stockpile at Aliquippa, Pennsylvania

MEXICAN CERAMIC GRADE FLUORSPAR

"MINAC" BRAND

OGLEBAY, NORTON AND COMPANY is the exclusive sales agent for American Smelting and Refining Company's "MINAC" brand ceramic fluorspar. The association of these two well-established companies gives to our customers quality, reliability and availability of product.

CHEMICAL AND PHYSICAL ANALYSES

There follow chemical, physical and spectrographic analyses of the three grinds of "MINAC" brand fluorspar available for shipment. Although the calcium fluoride content is guaranteed 97% minimum, shipments average 98% and other constituents decrease. You will note that the iron content is particularly low and other deleterious elements, such as lead, zinc and sulfur, are relatively non-existent.

We will gladly furnish samples of any or all grinds.

"MINAC" BRAND
FLUORSPAR

MEDIUM GRIND-A

Chemical Analysis

CaF ₂	97% Min.
SiO ₂	.3%
CaCO ₃	1.4%
Fe ₂ O ₃	.021%
Combined Oxides (R ₂ O ₃)	.65%
Moisture	1.00% Max.

Approximate Screen Size

100.00% thru 35 Mesh
99.28% thru 40 Mesh
96.50% thru 48 Mesh
81.25% thru 65 Mesh
70.75% thru 100 Mesh
55.75% thru 150 Mesh
44.75% thru 200 Mesh
30.50% thru 325 Mesh

"MINAC" BRAND
FLUORSPAR

COARSE GRIND-B

Chemical Analysis

CaF ₂	97% Min.
SiO ₂	.5%
CaCO ₃	1.0%
Fe ₂ O ₃	.021%
Combined Oxides (R ₂ O ₃)	.65%
Moisture	1.00% Max.

Approximate Screen Size

100.00% thru 35 Mesh
99.09% thru 40 Mesh
92.00% thru 48 Mesh
78.00% thru 65 Mesh
68.00% thru 80 Mesh
52.50% thru 100 Mesh
34.00% thru 150 Mesh
26.50% thru 200 Mesh
7.25% thru 325 Mesh

FE003719

"MINAC" BRAND
FLUORSPAR

FINE GRIND-C

Chemical Analysis

CaF ₂	97% Min.
SiO ₂	.1%
CaCO ₃	2.0%
Fe ₂ O ₃	.021%
Combined Oxides (R ₂ O ₃).....	.65%
Moisture	1.00% Max.

Approximate Screen Size

100.00% thru 40 Mesh
99.70% thru 48 Mesh
97.60% thru 65 Mesh
95.40% thru 80 Mesh
90.30% thru 100 Mesh
80.90% thru 150 Mesh
69.60% thru 200 Mesh
37.00% thru 325 Mesh



OPEN HEARTH ADDITIONS

FERRO MANGANESE

Domestic

Lavino Brand

Standard

74% - 76% Manganese

Also Available

78% - 80% Manganese

Sales Agent

for

E. J. LAVINO & COMPANY

Philadelphia, Pennsylvania

Produced at

Reusens, Virginia - Sheridan, Pennsylvania

Approximate Analysis

74% - 76% Manganese

Manganese.....	75.50%
Iron.....	15.00%
Silicon	1.25% Max.
Phosphorus	.25% Max.
Sulphur.....	.015%
Carbon.....	7.00%

SPIEGELEISEN

Domestic

Product of

THE NEW JERSEY ZINC COMPANY

Produced at

Palmerton, Pennsylvania

Representative Analysis

* Manganese.....	19.00% - 21.00%
Iron	71.00% - 75.50%
Combined Carbon.....	4.25% - 5.00%
Graphitic Carbon.....	.15% - .35%
Silicon	1.00% - 3.00%
Phosphorus	.05% - .08%
Sulphur.....	.01% - .03%

* Also available with the following ranges of manganese content:

16% - 19%: 21% - 23%: 23% - 25%

_____ * _____

PHOSPHATE ROCK

LUMP

From Tennessee

Special Blast Furnace Size

Dried, cleaned and especially sized not to pass 1/4 inch ring -- all to pass 4 inch ring.

— * —

Approximate Analysis (Dry Basis)

Phosphoric Acid	36.00% *
Ferric Oxide	2.02%
Aluminum Oxide	1.40%
Silica	2.95%
Calcium	50.30%
Magnesium Oxide	.56%
Manganese Oxide	.16%
Potassium Oxide	.26%
Sodium Oxide	.81%
Carbon Dioxide	1.24%
Fluorine	2.65%
Sulphur	.38%
Organic Matter	.27%
Undetermined	1.00%

— * —

Guaranteed Analysis

14.39% Phosphorus

Equivalent to

72% Bone Phosphate of Lime

Moisture as Loaded not to Exceed 3%

* Equivalent to 15.73% Phosphorus

* Equivalent to 78.62% Bone Phosphate of Lime

PHOSPHATE ROCK

NODULIZED

From Tennessee

Blast Furnace Size

Screened to exclude all minus ten mesh and all will pass through 2-1/2 inch ring.

— * —

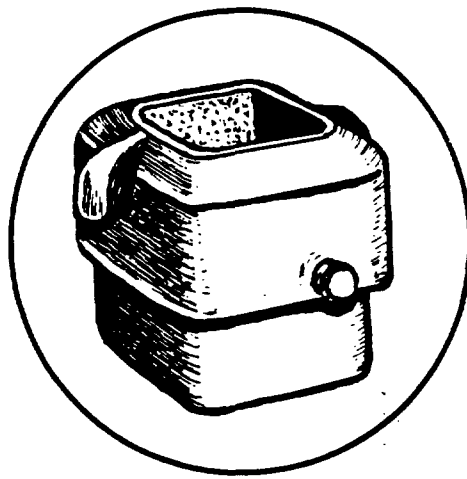
Approximate Analysis (Dry Basis)

Total Phosphoric Acid	25.85%
Calcium Oxide	34.68%
Magnesium Oxide	0.27%
Manganese Oxide	0.18%
Potassium Oxide	0.43%
Sodium Oxide	0.29%
Sulphur Trioxide	0.26%
Carbon Dioxide.....	0.31%
Fluorine	2.56%
Iron Oxide	3.98%
Alumina	2.87%
Insoluble Matter	27.82%
Organic Matter	Traces
Undetermined.....	0.45%
Moisture	0.05%

— * —

Guaranteed Analysis

25% Phosphoric Acid
Equivalent to
Approximately
54.6% Bone Phosphate of Lime
or
10.91% Phosphorus



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"C & D" HOT TOPS

The proven practicability of the "C & D" Hot Top, spanning a quarter of a century of use in steel plants throughout the United States, Canada and Europe, has been established on a policy of sound engineering, attentive and prompt service.

The original characteristics of adjustability for product weight, cleanliness and economy have been the basis for its successful adoption by the industry in the manufacture of carbon and alloy steels of exacting quality and performance.

◀ STRIPPER CRANE STARTING
TO STRIP A DRAG OF "C & D"
HOT TOPS.

(COURTESY THE TIMKEN
ROLLER BEARING CO.)



POURING STEEL INTO BIG END UP MOLDS EQUIPPED WITH "C & D" HOT TOPS.

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THE FERRO ENGINEERING COMPANY

"C&D" HOT TOPS

For Molds Used In Casting Steel Ingots

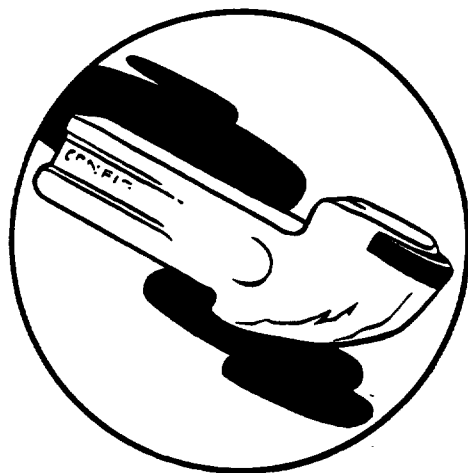
Steels which are used for the highly stressed parts of any modern vehicle, machine or other equipment must be of the highest quality possible. Such steels may or may not be strengthened by alloy additions, but in any event should be fully deoxidized to impart certain required properties.

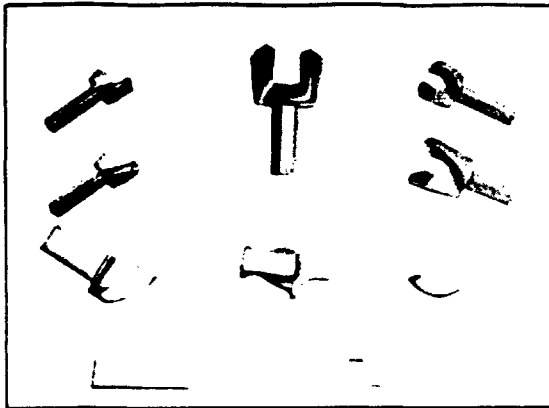
Deoxidized steels shrink in volume during solidification in the ingot mold, and a "pipe" cavity is formed. Adjacent to this "pipe", are concentrated areas of segregates and non-metallic impurities. To eliminate this cavity and related impurities from the body of the ingot, it is necessary to use a hot top on each ingot mold. The hot top provides a reservoir of molten metal which feeds the pipe cavity as it is tending to form, so that upon complete solidification, the ingot body is sound and homogeneous, and the pipe and impurities are confined to the sinkhead contained within the hot top itself, thereby producing higher yields of sound quality steels. The sinkhead is later sheared from the ingot and returned to the furnace as scrap.

During the last quarter century, the "C&D" Hot Top has been adopted as standard equipment by a great many steel plants in the United States and Canada, as well as in Europe. The "C&D" Hot Top is full floating, which minimizes the possibility of transverse tears or "hanger" cracks in the ingot. Its insertion into the ingot mold is adjustable, permitting the ingot body length and weight to be varied in accordance with the weight of rolled or forged product ordered. It is reuseable, since its cast iron casing is lined with a suitable refractory, which can be quickly and easily reconditioned after each use. The bottom of the casing is protected from the molten steel by a refractory bottom ring, which is renewed during the reconditioning of the hot top.

The use of "C&D" Hot Tops assures a cleaner ingot making operation. Freedom from hot top refractory debris results in cleaner molds, stools, cars, tracks, and ingot handling areas, therefore contributing to better housekeeping and higher steel quality.

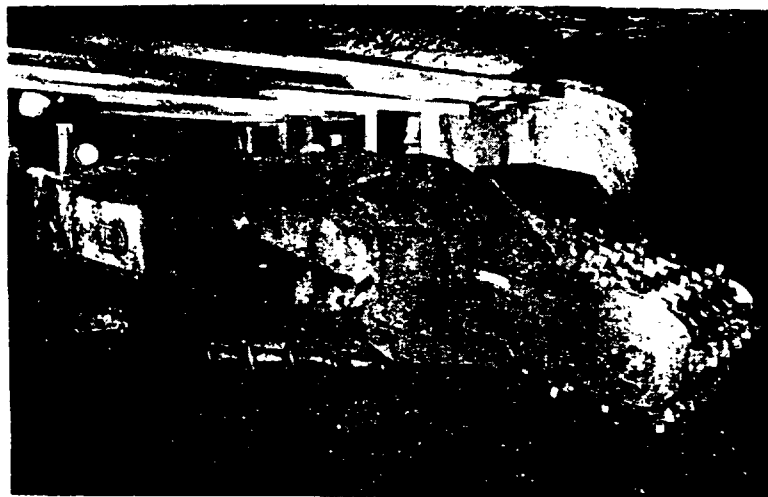
All of these factors plus the policy of sound engineering, attentive and prompt service, and progressive research have made the "C&D" Hot Top an economical and widely used piece of steel mill equipment.





DISPLAY OF AUGER BITS
AND
COAL CUTTING BITS

CONTINUOUS MINER
SAGINAW MINE
SHOWING USE OF
CARMET BITS



COAL MINE SUPPLIES

"Carmet" mining bits have been developed under actual mining conditions for use by continuous miners and various types of cutting machines in the mining of all seams of coal. They are designed by operating personnel to fit specific needs and for maximum life with low power consumption.

Forgings have been developed through experience to incorporate the best type of steel to withstand breakage and deformation. The optimum composition obtained in the carbide tips provides the finest cutting edge resistant to fracture.

COAL MINE SUPPLIES

Distributors for

Allegheny Ludlum Steel Corporation

"Carmet" Mining Bits

United States Rubber Company

Electrical Cable

Joy Manufacturing Company

"Surgeprof" Hydraulic Hose

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Field Warehouses:

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Otsego, West Virginia

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Telephone - Washington 1684

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MEMORANDUM

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