Mill Notes - Year of 1957

Miscellaneous Data

Shifts Worked	772
Mill Feed - % Moisture	1.85

Meterlogical Observations

Outside Air Temp. °F @ 7:00 A.M. -	Average	50
	Maximum	75
	Minimum	05
Precipitation, Inches	Total	41.25
	Maximum (4/4/57)	2.36

Power for Grinding

	KWH PER TON
Symons Crushers	.203
Gyrasphere Crushers	.227
8x12 Marcy Rod Mills	4.839
Tricone Ball Mill	2.241
4x10 Marcy Regind Mills	.249
Totals	7.759

Composite Screen Analysis of Flotation Feed

Mesh	Cumulative % Retainéd
48	3.9
65	13.1
100	28.0
150	40.8
200	51.2
270	56.7
Minus 270	43.3

X 1086 150M

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ANNUAL SUMMARY REPORT
AUSTINVILLE, VA.
1957

SUMMARY OVERALL OPERATION

Production	Obtained	Scheduled Estimate
Crude Ore		
Tons	720,269	740,100
% Zinc	3.31	3.31
% Lead	0.59	0.61
Zinc Concentrates	36,077	37,074
Lead Concentrates	4,460	4,456
Costs		
Per ton concentrates	$ 66.86	$ 71.00
Per ton crude ore	3.76	3.90

	1957	1956
Payroll total number (End of year)	518	541

MINING

Statistical Summary

	1957	1956
General		
Working days	241	252
Men on payroll	293	310
Percent attendance	95.34	95.0
Manshifts worked	66,039	72,716
Production		
Tons hoisted	720,269	737,841
Tons broken	669,922	702,041
Broken reserve	1,690	13,680
Production shifts	42,051	48,686
Deadwork and/or Development		
Feet advanced	8,133	6,866
Cubic feet	141,480	132,797
Deadwork shifts	5,749	4,258
Diamond drilling feet	13,089	15,291

Operating Efficiencies

	1957	1956
Tons hoisted per day	2,988	2,928
Tons hoisted per shift worked	10.89	10.15
Tons hoisted per production shift	17.20	15.20
Tons broken per drill shift	55.53	56.5
Tons obtained per slusher shift	82.5	70.6
Tons obtained per loading shift	222.19	*
Tons obtained per bulldozing shift	242.24	*
Tons obtained per hauling shift	217.81	*
Car factor	4.13	4.34
Skip factor	5.86	6.20

*No figure available due to change in operations

Waste Handling

	1957		1956	
	Cars	Cu. Yd	Cars	Cu. Yd
Waste Hoisted -				
Austinville	17,603	25,029	15,165	21,000
Ivanhoe	20,746	63,340	24,949	118,000
	38,349	88,369	40,114	139,100

Safety

	1957	1956
Lost time accidents	35	33
Number days lost	955	588
Frequency	65.20	51.65
Severity	3778.92	1023.44

Pumping

	1957	1956
Daily power consumption (KWH)	23,576	20,498
Gallons pumped/minute (calculated)		
Austinville	5,462	*
Ivanhoe	1,137	*

*None available

Rainfall

	1957	1956
Total precipitation	41.25"	37.02"
Maximum	2.36" (4/4/57)	2.57" (9/26/56)

Development & Deadwork

Summary

Austinville

Level	Drifts & X-Cuts	Sublevels	Raises	Total	Cubic Footage
3	244'	116'		360'	1274
4	56'	93'	287'	436'	4243
5	19'	29'	172'	220'	16763
6	676'		609'	1285'	40715
7	609'	146'	859'	1614'	47156
8	5'		225'	230'	80
11	3559'		428'	3987'	31251
Total	5168'	384'	2580'	8132'	141482

Ivanhoe

3	28'		13'	41'	9988
4		166'	169'	335'	10980
5	361'	44'	547'	952'	44174
6	239'	82'	314'	635'	21058
7	2673'			2673'	6122
8	1294'	48'	418'	1760'	35458
9	1463'	19'	591'	2073'	21744
10	1463'			1463'	6778
11	870'		663'	1533'	15197
Total	8391'	359'	2715'	11465'	171499

Austinville Deadwork

Development of the Brown Orebody was halted during February due to mud flows from the Stamping Ground Fault zone in the 71491 XC.

Approximately 320' of 90" I.D. steel tunnel liner plate was installed through the fault area, prepacked with aggregate, and pressure grouted with 8,000 sacks of cement.

This job is complete and further development and production will be initiated in January, 1958.

Other 7th level development consisted primarily of mining drifts and raises into previously developed orebodies in Flatwoods and the 41 to 75 blocks.

The 11th level N.E. heading was advanced to Section 63.

Development of the deep ribbon (38-42 blocks) on the 11th level has resulted in the completion of all mining drifts and four chutes and manways.

Heavy flows of high pressure water were encountered in the footwall of the deep ribbon orebody. All flows are under control and draw down tests in progress.

Ivanhoe Deadwork

Development on the 4th, 5th, and 6th levels in the Austinville formation was completed and stoping initiated.

Due to lack of continuity of ore in the Austinville member, development of the deep ribbon ore between the 7th and 11th level has been expedited.

The 7th level N.E. was advanced to Section 41 and the I-107 orebody will be under development early in 1958.

The main orepass was completed between the 11th level and surface, as was the ventilation raise.

A secondary ventilation raise and orepass raise were advanced from the 11th level to approximately 40' below the 9th level elevation at Section 33 ⁄ 50'.

Hydrology

Three hydrological surveys were conducted during 1957 with no major changes noted.

Stoping - Ore Extraction

Production Summary

Level	No. of Stopes Drawn	Tons Broken	Tons Obtained
4	7	74,728	75,875
5	9	156,528	161,560
6	5	103,468	114,668
7	15	332,100	334,361
8	1	3,135	5,165
Total	37*	669,959	691,629
Ivanhoe Ore			16,926
Development Ore Obtained			11,714
		GRAND TOTAL	720,269

*Stopes from which production was obtained during 1957

Average No. of Stopes Worked/Day	25
Average No. of Stopes Available/Day	26

Mine Geology

Diamond Drilling Summary

	No. of Holes	Shifts	Feet Cored	Feet Non-Cored
Austinville	86	428	8,489	4,022
Ivanhoe	155	481	8,954	12,881
Total	241	909	17,443	16,903

Austinville

Holes Drilled to Delineate Ore

Area	No. of Holes	Ave. Length	No. With Ore	No. Dead
Brown Ore Body	14	145'	9	5
Flatwoods	6	226'	1	5
Mine N.E.	13	123'	4	9
Mine S.W.	25	128'	9	16
100 Ore Body	2	155'	-	2

Underground Drilling for Exploration

None

Non-Core Drilling

No. of Holes	Average Length
26	155'

Ivanhoe

Holes Drilled to Delineate Ore

Area	No. of Holes	Ave. Length	No. With Ore	No. Dead
Austinville Dol.	27	114'	9	18
Ribbon Dol.	35	132'	11	24

Underground Drilling for Exploration

Area	No. of Holes	Ave. Length	No. With Ore	No. Dead
Simmerman	2	405	-	2
S.W. Ribbon Member	2	212	2	-

Non-Core Drilling

No. of Holes	Average Length
89	145'

PLANT

MILLING

Statistical Summary

Days Worked	257-1/3
Tons Milled	720,269
Tons Per Day	2,799
Tons Per Operating Hour	120.17
Mill Operating Time - % of Scheduled	92.51

	Zinc	Lead
Tons of Concentrates	36,077	4,460
Tons of Concentrates Per Day	140	17
Concentration Ratio	20.0	161.5

Metallurgical Comparison

	Year 1957	Year 1956
Feed - % Zinc	3.31	3.21
% Lead	0.59	0.58
% A A Sol Zn	0.16	0.17
Zinc Con. - % Zinc	60.70	61.45
% Lead	0.60	0.77
% Zinc Recovery	91.87	91.11
Lead Conc. - % Lead	74.17	75.44
% Zinc	3.05	2.86
% Lead Recovery	77.62	74.05
Tailings - % Zinc	0.26	0.28
% Lead	0.11	0.12

The metallurgical results obtained during the year of 1957 show a distinct improvement over the 1956 figures.

Zinc recovery increased by a substantial amount. This increase resulted from increased feed grade, a slight reduction in oxidized zinc content of the feed, and decreased loss of zinc to the tailings. The lowered tailings losses were achieved at the expense of a slight reduction in concentrate grade.

A marked improvement in lead recovery was achieved during 1957. This increased recovery was a result of deliberate efforts to lower lead losses to the zinc concentrates and tailings by producing a lower grade of lead concentrates, and thus achieve maximum economic recovery from lead production.

The increased milling rate achieved during 1957 resulted in a continued coarsening of the grind to 28.0% plus 100 mesh. Comparable grinding figures were 22.8% plus 100 mesh in 1955 and 25.6% plus 100 mesh in 1956. Since improved metallurgical performance has been achieved at the coarsest grind, it is planned to continue to grind to approximately 28% - 30% on 100 mesh. It is the opinion of the mill staff that the coarser grind tends to improve lead metallurgy by reducing the sliming of galena, and that the zinc middlings regrind circuit acts to prevent any adverse effect of the coarser grind on zinc metallurgy.

A reduction in power consumption for crushing and grinding has been achieved as a result of the coarser grind. Kilowatt hours per ton of feed have shown a steady decrease from 8.01 in 1955 to 7.84 in 1956 to 7.74 in 1957.

Non-Operating Mill Time

	Hours	
	West	East
Week-end & holiday shutdowns and startups	2281.38	2281.39
Waiting for ore	2.42	5.67
Scheduled repairs	106.34	118.02
Emergency lost time (including 335 hours strike)	351.43	386.00
Total	2741.57	2791.08

Mill Operation

The mill was operated on a 16-shift per week basis during 1957.

Normal mill operation was interrupted by a strike during June and July. Lost time resulting from the strike resulted in an apparently poor percent operating time. Disregarding the months affected by the strike, however, a record high average figure for the year would have been obtained. Improved techniques in shortening down time for repairs and preventive maintenance contributed to this record.

Tons milled per operating hour was a record high. The higher feed rate has increased wear on the mill equipment in proportion to the tonnage milled, with no unusual difficulties being encountered.

While total tonnage milled during 1957 was less than in 1956 because of the strike, both zinc and lead concentrate tonnages were larger as a result of higher feed grades and recoveries.

Two comparison tests were begun during 1957. A test to determine relative costs of the Ni-Hard grinding balls used in the past in the Hardinge Ball Mills and Moly Cop balls produced by Armco Steel Corporation began in March. A comparison test between American Cyanimid Company's collector reagents 303 and 325 was begun to investigate the feasibility of replacing the presently used Reagent 303 with the cheaper reagent 325. It has been concluded that use of Moly Cop grinding balls will decrease costs as a result of lower ball consumption and lower cost. The result of the reagent test is inconclusive at this time.

The practice of building up the Bunker Hill tailings dam with agricultural limestone was continued during 1957. A very satisfactory impounding dam has been constructed at low cost by this method.

Mill Maintenance

The major mill maintenance jobs encountered in 1957 are as follows:

New head and ring liners were installed in the feed and discharge ends of the West 8x12 Marcy Mill.

The jaw and cheek plates in the mine crusher were replaced.

The feed head and ring liners in the East 8x12 Marcy Mill were replaced with new liners.

The shell liners in the East and West 4x10 Marcy Regrind Mills were replaced.

The shell liners in the East 8x12 Marcy Mill were replaced with a set of partially worn liners.

Engineering & Construction

Austinville Area

Remodeling of the former store area of the main office building into useable office space was completed.

Plans and details for installation of two additional pump units on the 7th level and for a new pump column from the 7th level to the 2nd level were completed and the materials ordered.

A sink hole developed behind houses 208 and 209 on April 5. The hole was filled with approximately 450 tons of dead rock and a new sewer was laid to House 208 detouring the sink area.

Ivanhoe Area

A ventilation fan was installed at the ventilation shaft collar.

Approximately 1850 feet of 20-inch half-round flume was installed west of the Ivanhoe shaft as a means of reducing flows of surface water into the mine.

Approximately 2500 tons of agricultural limestone were hauled to Ivanhoe and washed into voids and sinks along Painter Branch.

An addition to the Ivanhoe hoist building was constructed to serve as garage storage for two Ivanhoe Service Company water trucks.

A standpipe and pump house was erected at the Porter's Crossroads well site of the Ivanhoe Service Company.

Arminius Mine, Mineral, Va.

A revised skip was completed and delivered to the Arminius Mine.

Two Ingersoll-Rand Model 90-B air cooled compressors were overhauled and delivered to Mineral.

Miscellaneous equipment maintenance and production of various special items for the Mineral operation were performed in the Austinville shops.

Limestone

Limestone was stocked at the Austin Meadow site from January 1 to March 12, and on bottom area sites 2, 4, and 6 during June, July, and August. During the balance of the year, limestone production was used for dam building at the Bunker Hill tailings disposal area.

Shipments for the year were as follows:

Carload shipments	145,529 tons
Truck shipments	79,594 "
Total	225,123 tons

Sales for the year were as follows:

Carload	145,266 tons
Truck	71,032 "
Total	216,298 tons

Total tonnage sold during 1957 was 216,000 tons as compared to 220,000 in 1956, thus representing a loss of 4,000 tons for 1957. Again the tonnage sold into the State of Virginia decreased while that in North Carolina increased, but unlike 1956, the increase in North Carolina failed to offset completely the loss in Virginia.

According to estimates by agricultural agencies, there was a small decrease in the use of limestone in both North Carolina and Virginia for 1957. The chief reason expressed by all agricultural officials is that present farm income has not kept pace with the ever-increasing cost of crop and livestock production, resulting in a tightening of restrictions on credit extended to farmers by farm supply dealers, banks, and all lending institutions.

Adverse weather conditions prevailed through our sales territory during most of the year. Flooded conditions in January, February, and March prevented the spreading of limestone and drought conditions during July and August severely damaged many crops; thus seriously limiting the amount of money available for limestone use. Extremely wet conditions during November and December completely halted the spreading of limestone except on the few days when frozen land would support the weight of spreader trucks.

Agricultural Stabilization and Conservation officials in North Carolina increased the government's share of the cost of limestone from 60% to 80%, but contrary to the belief of the limestone industry, agricultural college, and ASC, the use of limestone failed to show any substantial increase. The only explanation is that other factors such as the decrease in farm income and wet weather reduced limestone use to an extent that offset any increase.

North Carolina State College appointed Dr. W. C. White to head the Soil Fertility Committee, an organization of limestone and fertilizer producers, State College officials, bankers, and others concerned with the use of limestone and fertilizer. As a member of this organization, we were pleased to note that Dr. White is to work directly with limestone and fertilizer producers in educating farmers to the value of using limestone and fertilizer.

The state-operated limestone plant at Appomattox, Virginia, ceased operations in November without any definite notification as to when the plant would re-open. A small tonnage has moved from Austinville into the area formerly served by this plant, but is certain to be only temporary unless the plant is permanently closed.

An investigation was made into several areas where our sales had decreased considerably in recent months. In every instance a fertilizer producer was selling limestone at a reduced price in order to maintain or increase his fertilizer sales. This practice proves profitable for the fertilizer producer, although he may sell the limestone at cost or even a loss, because the increase in fertilizer sales more than offsets any loss he may incur on the sale of limestone. Most fertilizer producers are unable to use a damp limestone with uncontrolled moisture in their fertilizer mix and as it is more convenient to spread and sell the same limestone used in the fertilizer mix, he is not interested in handling Austinville undried limestone.

Our inability to ship limestone during the strike in June and July proved to have little effect on the total tonnage shipped during the year. According to information received from regular customers, no more than 2,000 tons at the most were ordered from our competitors.

Complaints regarding lumps and compactness were reduced to only several isolated cases which proved to be mechanical defects in customers' unloading equipment or other similar cause rather than the physical condition of our limestone. Complaints from the fertilizer producers who use our limestone in their fertilizer mix increased to the greatest extent since we began serving the fertilizer industry. More than one-third of our customers were lost to other producers who could furnish a dry material or a material containing the exact amount of moisture desired.

The parties in West Virginia who were interested in using our limestone in the production of rock dust have apparently lost all interest due to the refusal of the railroads to reduce freight rates on ground limestone from Austinville to Mabscott, West Virginia. A reduction would have been necessary in order to produce rock dust at a cost that would have permitted marketing at a price comparable to that charged by other rock dust producers.

Plans for 1958 are to continue opening up as much new territory as possible in North Carolina and attempt to hold our present customers in Virginia. As we expect a further decrease in the use of limestone in Virginia, our total sales into this state will undoubtedly show a loss again next year. The use of limestone is expected to remain approximately the same or increase slightly in North Carolina, but such an increase would not offset the expected loss in Virginia, thus the tonnage shipped in 1958 will in all probability be less than 200,000 tons.

The following tabulation reflects sales to date in respect to last year:

CARLOAD - TONS

	1956	1957	± or -	%
Virginia	75,686	68,257	- 7,429	10
North Carolina	76,945	77,009	± 64	1
	152,631	145,266	- 7,365	5%

TRUCK - TONS

Virginia	41,579	41,298	- 281	1
North Carolina	26,416	29,734	± 3,318	13
	67,995	71,032	± 3,037	4%

TOTAL - TONS

Virginia	117,265	109,555	- 7,710	7
North Carolina	103,361	106,743	± 3,382	3
	220,626	216,298	- 4,328	2.0%

Results of 1957 Sales

		Per Ton
*Sales	$ 188,017	$ .869
Cost	80,162	.370
Profit	107,855	.499
Credit per ton concentrates		$2.668

*Includes $3,801 waste rock sales to highway contractor

Personnel

Union Negotiations

Negotiations were opened for wage increases and fringe benefits on May 21, 1957, at the Austinville operation.

The Company informed the Union that at this time any increase in the cost of production of our products would be impossible due to the depressed market for our products.

A strike was called by the Union on June 25, 1957, and this strike lasted until July 15, 1957.

Settlement of the strike was on the basis that either the Union or the Company could reopen negotiations by a 15-day notice to the other party.

Public Relations

During the year of 1957, the Personnel Department made an all-out effort to give publicity to the local newspapers and television stations any material which was considered of value in the field of Public Relations.

Absenteeism

The percentage of absentees due to reported and unreported absences shows a decline for 1957. This marks an encouraging factor in our absentee policy established in January of 1957 and carried out through our warning system by the different departments.

Employment

Hourly

As of January 1, 1957, there were 448 employees on the Austinville hourly payroll, compared to 430 on December 31, 1957.

Salary

As of December 31, 1956, there were 82 salaried employees. As of December 31, 1957, there are 79, a reduction of three.

Safety

Both the Mine and Plant Departments continued to emphasize training in safety during 1957, and eight safety meetings were held during the year. The Personnel Department assisted supervisors who led these meetings with preparation of materials used. The number of accidents was reduced in 1957; there were 37 accidents with lost time in 1957, as against 44 in 1956. The Plant Department showed a marked improvement, with two accidents in 1957, as against 11 in 1956.

Cost Summary

Mining

	Cost Per Ton Year 1957	Year 1956
Deadwork (Absorption)	$ .500	$ .500
Breaking	.330	.315
Handling	.264	.225
Hauling	.267	.344
Gen. Breaking Exp.	.164	.171
Gen. Mining Exp.	.680	.689
	$ 2.205*	$ 2.244

Milling

Coarse Crushing	.021	.021
Fine Crushing	.063	.055
Grinding	.186	.159
Flotation	.166	.171
Filtering, Drying & Handling Conc.	.047	.045
Tailings Disposal	.017	.021
Undistributed	.105	.098
	$ .605	$ .570

General Indirect

Plant Expense	.679	.670
Taxes & Insurance	.021	.021
Depreciation	.184	.188
Depletion	.044	.085
Amortization of Spare Parts	.023	.025
	$ .951	$ .989
Total Cost Per Ton Crude	$ 3.763	$ 3.803
Total Cost Per Ton Concentrates	$ 66.863	$ 71.336

*Ivanhoe ore cost excluded

The decreased cost per ton of concentrates resulted from the slight improvement in grade of ore hoisted followed by the larger tonnage of concentrates produced.

The slight decrease in cost per ton of crude followed the introduction of improved methods and equipment utilized in hauling ore and the continued standardization of drilling equipment, including drill steel.

Costs were adversely affected by the smaller tonnage of crude ore hoisted, the preponderance of stope slushing required, the greater amount of pump maintenance required as a result of underground mud flows early in the year, and the greater amount of cyclic mill maintenance performed.

Exploration Geology

Southwest Virginia

Porter Bank, Smyth County, Va. (DMEA)

Drilling on four holes totalling 3,180 feet, was completed, all of it dead. The project has been terminated with DMEA.

Beaver Creek, Smyth County, Va. (DMEA)

Drilling in both areas was completed, requiring 3,645 feet of drilling. The southwest area had little of interest. The northeast (Kestner) area had some 45,000 tons of 2.7% zinc. The project has been terminated with DMEA.

James-Woodruff, Wythe County, Va. (DMEA)

In the Woodruff Area 2,349 feet of drilling, on two fences, showed scattered mineralization, the best being five feet of 3% zinc. In the James-Newland Area 8,007 feet of drilling was completed, on two fences. The best to date is three feet of 1.6% zinc.

W. C. Williams, Wythe County, Va., (DMEA)

Four holes totalling 3,314 feet were drilled on the southwest fence, all dead. Two holes in progress on the northeast fence are dead to date, totalling 1,000 feet.

Virginia Piedmont

Surface Drilling

Drilling was recessed in the district pending application for DMEA funds until July 26 when drilling was started on the Bondurant (DMEA) project in Buckingham County.

On the Bondurant, seven holes averaging a little over 300 feet in length were drilled. These disclosed a body of mineralized ground containing an estimated 759,000 tons of 0.89% Zn and 0.25% Pb. The final report has been submitted and the project classified as non productive.

On the Valzinco (DMEA) project, drilling was started in September and completed during December. A total of nine holes have been drilled on this project. Traces of mineralization have been found in each hole but nothing approaching ore has been encountered. We have barely enough zinc to account for the geochemical anomalies on which the project was based.

Drilling on the Cofer during January showed one 15 foot penetration of the vein assaying 13.3% zinc, 3.97% lead, 0.15% copper, 2.7 oz. silver and 0.26 oz. gold. Drilling on this project was recessed after a minimum strike length of 200' and dip length of 300' were indicated.

Arminius Underground Work

The 1200 Level in the Arminius Mine was mapped and channel sampled during January, February and March, giving an average of 3.54% Zn, 0.44% Pb and 0.51% Cu for the exposed portion of the vein which had an average width of 12.9 feet. During April, short, flat diamond drill holes were drilled into the walls to sample the full width of the ore. The average of these holes combined with the chip sampling gives a grade for the 1200 level of 3.67% Zn, 0.51% Pb and 0.44% Cu.

Following this drilling, driving was continued to give a base for deep holes to test the ore shoot 600 and 1200 feet vertically below the 1200 level. The first deep hole encountered 36 feet of 3.82% Zn, 0.61% Pb and 0.49% Cu; 600 feet vertically below 1200, 15-1/2 feet of this ran 4.29% Zn, 0.62% Pb and 0.77% Cu. The second deep hole penetrated 14 feet of 1.97% Cu between 548-1/2 and 562-1/2. This was 540 feet below 1200. Work continues preparing drill bases for the deeper drilling.

Regional Study

Work has continued on the following of the airborne anomalies. At the moment the spontaneous polarization method is growing in stature and seems reliable when it corroborates a geochemical anomaly.

PEM work in December, run on an experimental basis, indicated that increasing the source-to-receiver distance can show up conductive bodies where little or nothing was previously found. This appears to be a promising development for our fastest geophysical screening tool.

North Carolina Piedmont

Prospecting in the North Carolina Piedmont was completed and a report submitted. One property under option was dropped. The North Carolina Slate Belt appears unpromising for commercial tonnages of ore.

CJ Mougenstern

CC: Mr. A. R. Flinn, N. Y.
Mr. S. S. Goodwin, N. Y.
Mr. E. J. Flynn, N. Y.
Austinville (3) ✓

Status of Capital Expenditures

Project & Job. No.	Amount Authorized	Current Expenditures	Spent to Date	Unexpended Balance
Ivanhoe Devop. - 7593	$ 3,285,000.00	$ 36,272	$ 3,277,600	$ 7,400 (a)
Arminius Mine Devop - 7790	465,000.00	13,207	472,546	7,546 (Overrun)
Brown Orebody Ventilation and Power - 7925	28,000.00	26	19,925	8,075
Addl. Mine Pumping - 7th Level 7980	47,000.00	2,452	15,465	31,535
Mine Shovel Loaders - 7992	10,600.00	--	--	10,600
Ivanhoe Domestic Water Tank Installations - 7994	5,000.00	--	--	5,000
Mine Cars & Diesel Locomotive 7995	23,500.00	--	--	23,500
Two Hough Payloaders - ME-20	43,000.00	--	--	43,000

(a) Appropriation closed 12/31/57

cc: Mr. A. R. Flinn, N. Y.
Mr. S. S. Goodwin, N. Y.
Mr. E. J. Flynn, N. Y.
Austinville (3) ✓ 2884

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MONTHLY REPORT
AUSTINVILLE, VA.
DECEMBER, 1957

SUMMARY OVERALL OPERATION

Production	Obtained	Scheduled Estimate
Crude Ore		
Tons	64,160	60,000
% Zinc	3.56	3.30
% Lead	.52	0.60
Zinc Concentrates	3,476	3,018
Lead Concentrates	364	374
Costs		
Per ton concentrates	$ 60.06	$ 70.00
Per ton crude ore	3.59	4.00
Payroll total number ----- (End of month)	518	

MINING

Statistical Summary

General

Working days	20
Men on payroll	293
Percent attendance	94.90
Manshifts worked	5,401

Production

Tons hoisted	64,160
Tons broken	57,347
Broken reserve	1,690
Production shifts	3,564

Deadwork and/or Development

Feet advanced	908
Cubic feet	20,854
Deadwork shifts	552
Diamond drilling feet	973

Operating Efficiencies

	December 1957	1st 6 Mos. 1957 Avg.
Tons hoisted per day	3,208	2,975
Tons hoisted per shift worked	11.88	10.49
Tons hoisted per production shift	18.00	17.86
Tons broken per drill shift	57.52	54.7
Tons obtained per slusher shift	88.55	82.1
Tons obtained per loading shift	221.47	*
Tons obtained per bulldozing shift	239.93	*
Tons obtained per hauling shift	221.47	*
Car factor	4.13	4.26
Skip factor	5.819	5.90

*No figures available due to change in operations

Waste Handling

	Cars	Cubic Yds.
Austinville	734	1,251
Ivanhoe	1,427	4,228
Total	2,161	5,479

Safety

Lost time accidents	2
Number days lost	69
Frequency	42.3
Severity	1459.6

Pumping

Daily power consumption 18,975 KWH

Gallons pumped/minute (calculated)

Austinville	5,034
Ivanhoe	1,280

The indicated reduction in daily power consumption is due to a meter reading period of 27 days versus a calendar month of 31 days.

The 5'x5' pump column raise from the proposed pump station on the 7th level was completed by connecting with the underground shaft approximately 30' below the 6th level.

Rainfall

Total precipitation	2.78"
Maximum (12/25/57)	0.88"

Development & Deadwork

Summary

Austinville

Level	Drifts & X-Cuts	Sub-levels	Raises	Total	Cubic Footage
3		16'		16'	
4					390
5			27'	27'	2692
6		8'	56'	64'	1672
7			34'	34'	9891
8		5'	130'	135'	80
11	463'		169'	632'	6129
Total	463'	29'	416'	908'	20854

Ivanhoe

7	341'			341'	
8	270'	31'	110'	411'	1991
9	249'	10'	219'	478'	60
10	22'			22'	
Total	882'	41'	329'	1252'	2051

Austinville

Grouting of the crushed stone was completed on the 71491 XC tunnel liner with approximately 8,000 sacks of cement being used.

Test holes drilled through grout plug holes in the tunnel liner plate indicated good grout penetration throughout.

Underground diamond drill holes in the 11th level deep ribbon orebody have encountered heavy flows of high pressure water at the updip end of the major orebody on sections 38 and 42.

The ore on 11 level, 61 section mentioned in the previous report, was estimated at 1-2% zinc and less than 1% lead. Only the hanging wall was exposed, giving a thickness in excess of 8 feet. It is near the top of the Ribbon. These beds have no known tonnage to date but several encouraging leads.

Ivanhoe

The 10th level bulkhead door is approximately 50% complete. This is the final door to be installed in accordance with current planning.

Development of stopes in the Ribbon member is progressing as rapidly as they become accessible through level development.

Stoping - Ore Extraction

Production Summary

Level	No. of Stopes Drawn	Tons Broken	Tons Obtained
4	4	7,652	7,662
5	8	12,218	12,393
6	3	8,881	8,881
7	13	28,596	28,646
Total	28	57,347	57,582
Ivanhoe Ore			4,951
Development ore obtained			1,627
		GRAND TOTAL	64,160

No. of stopes working	25
No. of stopes available	28

Ivanhoe ore production was obtained from the 4th and 5th level stopes plus a small amount of ore from previous development.

Mine Geology

Diamond Drilling Summary

	No. of Holes	Shifts	Feet Cored	Feet Non-Cored
Austinville	10	34	600	373
Ivanhoe	11	40	867	850
Totals	21	74	1,467	1,223

Austinville

Holes Drilled to Delineate Ore

Hole No.	Area	Level	Sect	Feet Drilled	Bot	Remarks
U-855	Northeast	6	29	45	205	Dead
U-857	Northeast	6	23	75	75	16-18 B Ore
U-858	Northeast	6	23	54	54	23-35 A Ore 46-51 A Ore
U-859	Southwest	11	38	49	49	Dead
U-860	Flatwoods	3	163	42	42	Dead
U-861	Southwest	11	38	62	62	Dead
U-862	Flatwoods	3	163	75	75	0-8 A Ore 17-67 Low A
U-863	Flatwoods	4	161	198	198	81-102 Py Min

Non-Core Holes

NC-349	Northeast	11	63	273	485	Pilot Hole
NC-350	Southwest	11	40	100	100	Hydrology Hole

Ivanhoe

Holes Drilled To Delineate Ore

J-130		7	16	98	266	Barren
J-131		7	06	234	234	6' A Ore
J-134		7	00	125	125	17' A Ore
J-135		4	00	150	150	4' A Ore
J-136		11	06	160	160	24' A Ore
J-137		11	19	100		17' C Ore (Stopped in ore-excess water-will deepen later)

Non-Core Holes

K-183	9	31⁄53	140	140	Pilot Hole
K-184	8	19⁄82	285	285	Pilot Hole
K-185	7	35⁄80	125	125	Pilot Hole
K-186	9	33⁄71	150	150	Pilot Hole
K-187	7	37⁄82	150	150	Pilot Hole

PLANT

MILLING

Statistical Summary

Days Worked	21-1/3
Tons Milled	64,160
Tons Per Day	3,008
Tons Per Operating Hour	128.50
Mill Operating Time - % of Scheduled	98.10

	Zinc	Lead
Tons of Concentrates	3,476	364
Tons of Concentrates Per Day	163	17
Concentration Ratio	18.5	176

Metallurgical Comparison

	December 1957	1st 6 Mos. 1957 Avg.
Feed - % Zinc	3.56	3.32
% Lead	0.52	0.67
% A A Sol Zn	0.17	0.14
Zinc Conc. - % Zinc	60.87	60.62
% Lead	0.56	0.73
% Zinc Recovery	92.56	92.41
Lead Conc. - % Lead	71.63	75.34
% Zinc	3.44	2.73
% Lead Recovery	78.14	78.27
Tailings - % Zinc	0.26	0.25
% Lead	0.09	0.12

Zinc metallurgy during December was normal. Loss of sulfide zinc to tailings was again as low as any on record.

Lead metallurgy also was normal. The downward trend of lead feed grade for the past six months was reversed during December.

Non-Operating Mill Time

	Hours	
	West	East
Week-end & holiday shutdowns & startups	235.00	235.00
Scheduled repairs	9.08	7.83
Emergency lost time	.57	1.85
Total	244.65	244.68

Distribution Emergency Lost Time

	Hours	
	West	East
Apron feeder chute choked	.49	--
Replacing 8x12 M.M. shell liner bolts	--	1.09
Spiral classifier overloaded	--	.34
Gyrasphere crusher oil line broke	--	.25
Miscellaneous	.08	.17
Total	.57	1.85

Mill Operation

The comparison test of Reagents 303 and 325 continued. The comparison test of Moly-Cop and Ni-Hard grinding balls continued.

Feed tonnage to the mill again averaged better than 3,000 tons per day and again no adverse effect on metallurgy was observed due to the coarseness of grind.

Mill Maintenance

Three major repair jobs were completed during December.

1. The east 8x12 Marcy Mill shell liners were replaced with a set of partly worn liners which were removed from the west mill in November of 1954. A new feed trunnion liner was installed also.

2. A new extension piece and extension piece liner were installed on the east Hardinge ball mill.

3. Filter cloths were replaced in the zinc filter in the filter and dryer plant.

Limestone

Shipped by	Tons		Cost Per Ton	
	December 1957	1st 6 Mos. 1957 Avg.	December 1957	1st 6 Mos. 1957 Avg.
Truck	3,606	7,230		
R. R. Cars	3,195	12,086		
Total	6,801	19,316	$ .788	$ .348

Personnel

The Doctor's Group Medical Service Plan has been established and is operating satisfactorily. There are at present 211 employees participating in this plan.

Asiatic flu vaccine was administered to 194 employees. There are still a few who have indicated they might still like to take advantage of this service.

Three hourly-rated employees were added to the mine payroll.

Two employees were separated; one due to death and one pensioned.

One salaried employee was pensioned and no additions were made during the month.

The real estate account ended the year with a gain of $15.55, which is about as anticipated.

Safety

The Plant Department held a series of safety meetings for all mill employees and mill supervisors. The safety film "Decide to be Safe" was shown and discussed.

A lengthy discussion on hazards in and around the mill was held and means of correcting these hazards discussed.

A safety-graph on "Does Your Accident Show" was presented and discussed.

Cost Summary

Mining

	Cost Per Ton December 1957		Cost Per Ton 1st 6 Mos. 1957 Avg.	
Deadwork (Absorption)	$ .500		$ .500	
Breaking	.307		.334	
Handling	.254		.265	
Hauling	.211		.300	
Gen. Breaking Exp.	.164		.179	
Gen. Mining Exp.	.625		.716	
		$2.061*		$2.294

Milling

Coarse Crushing	.014		.023	
Fine Crushing	.043		.057	
Grinding	.153		.211	
Flotation	.148		.169	
Filtering, Drying & Handling Conc.	.050		.047	
Tailings Disposal	.012		.016	
Undistributed	.113		.105	
		.533		.628

General Indirect

Plant Expenses	.719		.671	
Taxes & Insurance	.020		.021	
Depreciation	.183		.184	
Depletion	.041		.045	
Amortization of Spare Parts	.023		.023	
		.986		.944
Total Cost Per Ton Crude		$ 3.594		$ 3.866
Total Cost Per Ton Concentrates		$60.061		$67.065

*Ivanhoe ore cost excluded

The decrease in cost per ton of crude ore and concentrates followed the greater tonnage of higher grade ore produced.

Exploration Geology

Diamond Drilling Summary

Area		Footage
James-Woodruff	DMEA Contract	1,009
Williams Property (Galena)	" "	1,437
	Total	2,446

Diamond Drilling

Williams Property (Galena)

Hole No.	Footage	Results
CW-4	278	Barren - Complete in Austinville at 1000'.
CW-5	517	Barren - Incomplete in Austinville at 545'.
CW-6	642	Barren - Incomplete in Ribbon at 642'.

James-Woodruff Area

JW-23	410	1' (330-331) Traces ZnS. Bottomed in Ribbon at 410 feet.
JW-24	530	Barren - Bottomed in Ribbon at 530'.
JW-25	69	Incomplete; in Austinville Member.

Virginia Piedmont

Drilling from the 1200 level of the Arminius Mine was recessed until March or April of 1958 to allow preparation of the drill bases.

Drilling was stopped on the north Valzinco (DMEA) area after a total of four holes had been drilled. Combined zinc, lead, copper values of less than 1% were encountered in all holes drilled.

Geochemical results received for one air EM site were non-anomalous, while results over one optioned area in Louisa County confirmed and extended the original "high".

Six other areas in Spotsylvania and Stafford Counties were detailed geochemically over reconnaissance "highs".

PEM results were non-anomalous over the sites of two airborne areas in Spotsylvania County.

Anomalous geophysical response was noted over six areas in Stafford, Spotsylvania and Louisa Counties. Methods used included self potential, PLEM (Power line EM), and PEM with source-receiver distance 800 feet. The latter appears very promising, especially since regular 400 foot spacing shows little or no response over the same area.

Negotiations continued for several small lots adjacent to the Hunter Area in Louisa County.

As an economy measure, five exploration helpers were laid off, effective January 1, 1958.

C J Morgenstern

cc: Mr. A. R. Flinn, N. Y.
Mr. S. S. Goodwin, N. Y.
Mr. E. J. Flynn, N. Y.
Austinville (3) ✓ WSH

Status of Capital Expenditures

Project & Job No.	Amount Authorized	Current Expenditures	Spent to Date	Unexpended Balance
Ivanhoe Devop. - 7593	$ 3,285,000.00	$ 36,272	$ 3,277,600	$ 7,400 (a)
Arminius Mine Devop. - 7790	465,000.00	13,207	472,546	7,546 (Overrun)
Brown Orebody Ventilation and Power - 7925	28,000.00	26	19,925	8,075
Addl. Mine Pumping - 7th Level 7980	47,000.00	2,452	15,465	31,535
Mine Shovel Loaders - 7992	10,600.00	--	--	10,600
Ivanhoe Domestic Water Tank Installations - 7994	5,000.00	--	--	5,000
Mine Cars & Diesel Locomotive 7995	23,500.00	--	--	23,500
Two Hough Payloaders - ME-20	43,000.00	--	--	43,000

(a) Appropriation closed this month

cc: Mr. A. R. Flinn, N. Y.
Mr. S. S. Goodwin, N. Y.
Mr. E. J. Flynn, N. Y.
Austinville (3) ~ WSH

Maintenance Notes - December, 1957

Mill

12/2 - Repaired 7A tailing pump. Installed a new suction sleeve, seal rubber and wear ring.

12/7 - Relined the east 8x12 Marcy Rod Mill. Installed a partly worn set of shell liner plates and lifter bars and a new feed trunnion liner.

The shell liners installed were removed from the west mill on 11/1/54 and had ground 459,460 tons of ore at that time. This was one of the original sets, with 8" wide lifter bars. Dependent upon the ability to hold these liners tight, it is hoped they can be used for a minimum of 18 months.

The old liners removed had been in service since 9/28/54 and had ground 1,111,905 tons of ore. Scrap loss was 62.6% with a wear loss of .0119 lb. per ton of ore ground. The liner plates in the feed end were beginning to crack and break up. Many of them in the discharge end were loose under the lifter bars and could no longer be held by tightening bolts. This was at least in part due to the zinc backing under the lifter bars which filled the space between bars and shell, thus preventing the bars from gripping the plates.

The inside of the shell was closely inspected and found in poor condition. Many of the contact surfaces between liner plates and shell were found worn, especially in the discharge end. These depressions, caused by wear between a loose plate and the shell, were a maximum of 3/16" deep approximately. Perhaps 3 or 4 spots were found worn this badly with many others found 1/16" to 1/8" deep. An estimated 20 to 30 shell liner bolt holes, most of them in the discharge end, were found worn to some degree in an oblong shape due to shifting lifter bars and bolts.

The liners installed were backed with 1/8" sheet rubber completely covering the shell to partly compensate for irregularities in the shell surface. In addition, the first and second circumferential rows of plates from the feed end were backed with 1/4" rubber cut to fit the back of the plates. The third row of plates had no extra rubber backing and the fourth row had 1/8" rubber glued to the plates. This extra rubber backing was used in an attempt to fill the depressions worn in the mill shell and compensate for the wear between plate and bar contact surfaces. It is hoped that by its use the bars will grip the plates tightly and prevent any slippage of the plates.

The feed trunnion liner removed was installed 7/25/55 and had ground 839,322 tons of ore with a scrap loss of 70%.

The complete job, except for preparation and cleanup work, required slightly less than four shifts. The work crew on each

shift consisted of 7 mechanics and a shift boss. Work began at 3:00 P.M. Saturday, December 7, and the job was finished at 11:00 P.M. Sunday, December 8.

12/9 - Routine repair of the east and west units.

Cleaned and checked clearances on the west Tricone Mill pinion shaft and coupling. Found no vertical misalignment and a horizontal misalignment of .003. Found an angular misalignment of .003 with a gap between coupling halves of .297.

Installed a rebuilt feed plate on the west Symons crusher.

Replaced the south cheek plate on the west Symons screen.

Cleaned and inspected the east 4x10 Marcy Mill gear and pinion. The alignment was not adjusted.

Replaced broken stud and tightened nuts on east Tricone mill scoop extension.

Replaced south front wear plate on east apron feeder.

Installed a rebuilt assembly in 1B east lead cleaner cell.

Welded three new flights in zinc concentrate dryer.

Installed a new nihard scoop tip on the east Tricone ball mill.

Replaced rock house motor drive belt.

12/11 - Set up mine crusher 1/4".

12/14 - In order to stop a leak and repair damage to bolt holes caused by broken studs, the extension piece and extension piece liner on the east Tricone mill were replaced. The new extension piece installed was drilled locally for 16 studs. The old piece removed had been installed with only 8 studs. It is felt that use of 16 studs makes for less troublesome operation and extension pieces used in the future will be purchased with 16 hole drilling on the scoop flange. The extension piece removed will be drilled for 16 holes and kept with the liner intact as a spare. Seven hours on B shift Saturday, Dec. 14, were required to complete grouting in the liner and 2 hours on Sunday, December 15, to finish the job.

Tightened all shell liner bolts on the east 8x12 Marcy Mill in order to prevent possible loosening of the new liners installed 12/7/57.

Replaced the filter cloths in the Zn filter. Used style FEON 299 Nylon undercovers with No. 1034 Nylon filter cloth. Calking was done with 1/2" manila rope laid on 4" strips of surplus cider press undercover cloth. While the cloth replacement job was being done, a 5"x5" section of the filter shell

was cut out and a patch welded in the hole. This was done to repair a hole in the shell. Some 6 or 8 screen sections were found with pieces broken out and it is anticipated that they will be replaced during the next cloth replacement. The job required the full B and C shifts on Saturday, December 14, and 3 hours on the A shift, Sunday, December 15. This time could be improved if no extra work is attempted and less cleaning work done.

12/16 - Repaired 7B tailing pump. Installed a new suction bell liner, suction sleeve, clamp plate, wear ring and seal rubber.

Installed a rebuilt gear motor on the west feed wig wag sampler.

12/18 - ~~Repaired motor and speed reducer on West feed sampler~~.

Installed new flexible oil lines on the east Gyrasphere crusher.

12/23 - Routine repairs for east and west units.

Checked alignment of east 8x12 Marcy Mill pinion shaft coupling. Found a lateral misalignment of .007 and a horizontal misalignment of .003 with a gap clearance of .258 and .254 at widest and narrowest points.

Replaced 11 outer wear shoes on the west Spiral Classifier.

Installed a new scoop tip on the west Tricone ball mill.

Inspected inside of the east 8x12 Marcy Mill 6-inch rubber discharge pipe. Found 1/8" wear in botton half of pipe.

Replaced two sections of the dryer plant furnace dump grate.

Welded two flights in zinc concentrate dryer. Replaced two outer wear shoes on the east Spiral Classifier.

12/30 - Installed a new impeller in the east lead froth pump.

Maintenance Notes - December, 1957

Electric Shop

12/2/57 - Repaired light circuit line at river pumping station. Also checked electric starting equipment to pump motors.

12/3 - Replaced reverse drum on 4-ton Atlas locomotive controller at Ivanhoe shaft.

12/4 - Cleaned and checked all electric starting equipment in Ivanhoe 7th level mine pump station.

12/6 - Repaired heater motor in Blacksmith Shop by installing new bearings in motor.

12/9 - Repaired wiring to torque switch on Lidgerwood hoist control.

12/10 - Repaired electric starter to elevator motor at dryer plant.

12/11 - Replaced burned out 1-1/2 KW transformer in light circuit on 4th level Van Mater shaft. A 2 KW transformer was installed.

12/11 - Installed flood lights at deads car dumper on the 11th level Van Mater shaft.

12/12 - Repaired electric heater in fuse and cap house.

Repaired light circuit at Flatwoods shaft 7th level.

12/13 - Installed chromalox electric radiant heater for benefit of hoist operator at Ivanhoe shaft.

Repaired wiring to soil heaters in discharge chute on dead rock bin at Ivanhoe shaft. Checked electric fan equipment at Ivanhoe ventilation shaft.

Installed electric oven in chemical laboratory.

12/16 - Repaired contactor to AC electric welder.

Installed flood lights at school house parking lots.

12/17 - Repaired control to circulating pump at Ivanhoe air compressors.

Replaced worn limit switches on Vulcan hoist north and south skips.

12/19 - Repaired timing device and switch on the hot plate in the chemical laboratory.

12/20 - Repaired street lights, bulletin board, safety poster boards and shop lights.

12/20 - Installed 10 HP motor and electric starting equipment on lime loading conveyor, After removing 5 HP electric motor and starting equipment.

Replaced burned wiring on 2-1/2 ton locomotive at Ivanhoe shaft.

Repaired electric sterilizer at Dr. Benda's office.

Repaired water still at 7th level Van Mater shaft.

12/23 - Repaired battery water filler at 7th level battery charging station Van Mater shaft.

Repaired battery charging panel hoist cage phones and electric heater in change house and office at Ivanhoe shaft.

12/26 - Repaired light circuit and heater at 7th level battery charging station Van Mater shaft and a 15 HP electric slusher.

Repaired electric slusher 440 volt cable feeder line at 7th level Flatwoods shaft.

Repaired light circuit and switch in mill rock house.

Reinstalled electric starter for sample grinder motor in mill laboratory.

12/27 - Repaired 50 HP electric slusher starting equipment at Flatwoods shaft 4th level.

Replaced electric motor and pump at clear branch pumping station.

Removed electric reset and installed hand reset overload trip spring mechanism on Vulcan hoist.

12/30 - Replaced final limit switch control metal tripping arm with heavy rubber tripper arm on man hoisting cage at Flatwoods shaft to eliminate breaking of limit switches.

Repaired control contactor to Lilly brake control on hoist at Flatwoods shaft.

Replaced thermostat on boiler control at main office.

12/31 - Repaired two blasting galonometers for Mine Dept.

Repaired cap lamp charging panel at Flatwoods shaft.

Maintenance Notes - December, 1957

Machine Shop

12/3/57 - Changed oil in #5 Ingersoll-Rand air compressor which is located at the Flatwoods shaft area.

12/10 - Drained water treatment solution out of the Ivanhoe water tube boiler and cleaned boiler internally and externally.

Overhauled one set of trucks for the Granby type mine cars, using new seals and bearings.

Installed a used American-Blower steam heating unit on the lower floor of the drinking water filter plant building to prevent freezing of the valves and piping. This heater was originally installed in the old store building.

Drained water treatment solution out of the Flatwoods water tube boiler and cleaned boiler internally and externally.

12/11 - Set up the mine crusher 1/4", making the shim total 2".

12/16 - Overhauled the water pump on the 2-ton water tank truck which is used in transporting drinking water to the Ivanhoe community.

12/17 - Overhauled the circulating water pump on the #6 and #7 air compressors at Ivanhoe.

12/21 - Installed new piston leathers and one new Jalloy steel front wearing plate in the north side of the skip measuring pocket, Van Mater shaft.

12/23 - Installed a rebuilt skip in the north side, Van Mater shaft. This skip is equipped with wearing shoes made of Jalloy plate. Down time was 2-1/2 hours.

12/26 - Changed oil in #6 and #7 Ingersoll-Rand air compressors at Ivanhoe.

12/27 - Removed one of the Clear Branch pumps which is used in supplying water to the Flatwoods area for overhaul, installing a spare pump in its place.

Mill Notes - December, 1957

Miscellaneous Data

Shifts Worked	64
Mill Feed - % Moisture	1.85

Meteorological Observations

Outside Air Temp. - °F @ 7:00 AM -	Average	37
	Maximum	52
	Minimum	05
Precipitation, Inches	Total	2.78
	Maximum (12/25/57)	.88

Power for Grinding

	KWH Per Ton
Symons Crushers	.200
Gyrasphere Crushers	.213
8x12 Marcy Rod Mills	4.305
Tricone Ball Mill	2.018
4x10 Marcy Regrind Mills	.266
Totals	7.002

Composite Screen Analysis of Flotation Feed

Mesh	Cumulative % Retained
On 48	4.8
65	15.3
100	31.2
150	43.8
200	54.2
270	59.9
Minus 270	40.1

General Plant Maintenance

The fire truck answered two calls during December. At 2:00 P.M. on December 9 the truck answered a call to the Tomlinson residence in Ivanhoe, arriving too late to participate. At 11:00 P.M. on December 16, the truck answered a call to the Morgan residence approximately 1/2 mile up Cripple Creek from the U.S. 94 bridge. The fire was in an outbuilding near the rear of the residence. Our crew and truck extinguished the fire, pumping from Cripple Creek. The Ivanhoe truck was present but inoperative, but did pump some water before breaking down. The truck was returned to the fire house at 1:00 A.M.

Real Estate Maintenance

Interior painting of House No. 403 was completed.

Floors were repaired in Newtown as follows:

#260 floors sanded & refinished

#273 new oak flooring in four rooms

#293 new oak flooring in two rooms

Other real estate maintenance was minor or routine.

Agricultural Limestone

All production was pumped to waste in the Bunker Hill area.

WSH

MONTHLY REPORT
AUSTINVILLE, VA.
NOVEMBER, 1957

SUMMARY OVERALL OPERATION

Production	Obtained	Scheduled Estimate
Crude Ore		
Tons	65,164	60,000
% Zinc	3.19	3.30
% Lead	0.42	0.60
Zinc Concentrates	3,142	3,018
Lead Concentrates	272	374
Costs		
Per Ton Concentrates	$ 66.11	$ 70.00
Per Ton Crude Ore	3.46	4.00
Payroll Total Number -- (End of Month)	518	

MINING

Statistical Summary

General

Working Days	20
Men on Payroll	291
Percent Attendance	90.48
Manshifts Worked	5,054

Production

Tons Hoisted	65,164
Tons Broken	58,332
Broken Reserve	1,935
Production Shifts (Total)	3,388

Deadwork and/or Development

Feet Advanced	679
Cubic Feet	15,587
Deadwork Shifts	448
Diamond Drilling Feet	865

Operating Efficiencies

Tons Hoisted Per Day	3,258
Tons Hoisted Per Shift Worked	12.89
Tons Hoisted Per Production Shift	19.23
Tons Broken Per Drill Shift	63.75
Tons Obtained Per Slusher Shift	89.23
Tons Obtained Per Loading Shift	227.68
Tons Obtained Per Bulldozing Shift	245.70
Tons Obtained Per Hauling Shift	226.80
Car Factor	4.07
Skip Factor	5.859

Waste Handling

Waste Hoisted -	Cars	Cubic Yards
Austinville	749	1,276
Ivanhoe	1,092	3,236
		4,512

Safety

Lost time accidents	7
Number days lost	152
Frequency	157.5
Severity	17,098.6

Pumping

Daily Power Consumption	22,874 KWH
Gallons pumped/minute (calculated)	
Austinville	5,080
Ivanhoe	1,010

A 4'x4' drain raise from the 8th level to the proposed 7th level pump station was completed. Approximately 50' of 5'x5' inclined pump column raise was advanced from the proposed pump station towards the old underground shaft.

Rainfall

Total precipitation	3.88"
Maximum (11/17/57)	1.80"

Development & Deadwork

Summary

Austinville

Level	Drifts & X Cuts	Sublevels	Raises	Total	Cubic Footage
3		94'		94'	
5		29'		29'	1192
6	12'		14'	26'	5625
7					5376
8			95'	95'	
11	284'	29'	122'	435'	3394
Total	296'	152'	231'	679'	15,587

Ivanhoe

7	296'			296'	
8	191'		33'	224'	880
9	186'			186'	
10	211			211	
11			147'	147'	664
Total	884'		180'	1,064'	1,544

Austinville

Two chutes and manways, both encountering ore, were completed in the 11th level deep ribbon ore bodies.

The 1100 N.E. drift encountered ore at approximately 61 section where a lay-by is being developed.

Ivanhoe

The 33 ⁄ 50 orepass and ventilation raises were advanced to approximately 9th level elevation and work was halted until the 9th level drift reaches 33 ⁄ 50 section.

Stope development is in progress on the 8th and 9th levels as is rock work for the installation of the 10th level bulkhead door.

Stoping - Ore Extraction

Production Summary

Level	No. of Stopes Drawn	Tons Broken	Tons Obtained
4	4	7,707	7,742
5	8	14,462	15,044
6	3	7,358	7,408
7	11	28,805	28,775
Total		58,332	58,969
Ivanhoe Ore			5,031
Development Ore Obtained			1,164
GRAND TOTAL			65,164
No. of stopes working		24	
No. of stopes available		26	

Production from Ivanhoe was primarily from the 5th level stopes; however, some development ore was obtained from the 8th level Northeast Drift.

Mine Geology

Diamond Drilling Summary

	No. of Holes	Shifts	Feet Cored	Feet Non-Cored
Austinville	3	13	248	212
Ivanhoe	15	53	1,256	855
Total	18	66	1,504	1,067

Austinville

Holes Drilled to Delineate Ore

Hole No.	Area	Level	Sect.	Feet Drilled	Bot	Results
U-854	Southwest	3	40	86	96	Dead
U-855	Northeast	6	29	160		Dead

Non Core Holes

Hole No.	Level	Sect.	Feet Drilled	Bot	Results
NC-349	11	63	212		Pilot Hole

Ivanhoe

Holes Drilled to Delineate Ore

Hole No.	Level	Sect.	Feet Drilled	Bot	Results
J-79	7	02	0		9' 10.5% Zn, 1.4% Pb
J-121	7	12	0		9' 0.5% Zn, 0.3% Pb
J-122	7	04	0		9' 1.7% Zn, Nil Pb
					13' 3.2% Zn, 0.2% Pb
J-123	10	09	0		2' 5.8% Zn, 0.1% Pb
					3' Barren
					5' 7.0% Zn, 1.7% Pb
J-124	7	16	29	337	8' B Ore
					Oct. Drilling - Assays:
					4' 5.2% Zn, 0.2% Pb
					30' Barren
					3' 1.0% Zn, 7.5% Pb
J-125	4	01	114	114	Barren
J-126	7	06/46	250	250	Barren
J-127	7	01	69	69	Barren
J-128	9	06	126	126	Barren
J-129	10	09	95	95	14' B Ore

Hole No.	Level	Sect.	Feet Drilled	Bot	Results
J-130	7	16	168		6' Mineralization
J-132	11	Aust 148	145	550	3' 7.0% Zn, 0.2% Pb
J-133	11	Aust 148	260	260	Dead
Non Core Holes					
K-177A	7	31 ∠ 10	130	130	Pilot Hole
K-178	9	29 ∠ 37	130	130	Pilot Hole
K-179	10	06 ∠ 4	140	140	Pilot Hole
K-180	8	17 ∠ 56	175	175	Pilot Hole
K-181	10	09 ∠ 26	135	135	Pilot Hole
K-182	7	33 ∠ 37	145	145	Pilot Hole

PLANT

MILLING

Statistical Summary

Days Worked	21-2/3
Tons Milled	65,164
Tons Per Day	3,007
Tons Per Operating Hour	128.56
Mill Operating Time - % of Scheduled	98.04

	Zinc	Lead
Tons of concentrates	3,142	272
Tons of concentrates per day	145	13
Concentration Ratio	20.7	240

Metallurgical Comparison

	November 1957	1st 6 Mos. 1957 Avg.
Feed - % Zinc	3.19	3.32
% Lead	0.42	0.67
% A A Sol Zn	0.18	0.14
Zinc Conc. - % Zinc	60.65	60.62
% Lead	0.51	0.73
% Zinc Recovery	91.60	92.41
Lead Conc. - % Lead	73.96	75.34
% Zinc	3.02	2.73
% Lead Recovery	73.63	78.27

Zinc metallurgy during November was normal. No adverse effects on recovery were experienced although the coarseness of grind was the highest in recent years. The loss of sulphide zinc to tailings was as low as any on record.

Lead feed grade during November was the lowest ever experienced with a resulting low concentrate production.

Non-Operating Mill Time

	Hours	
	West	East
Weekend & holiday shutdowns & startups	203.00	203.00
Scheduled repairs	8.67	6.75
Emergency lost time	3.14	1.66
Total	214.81	211.41

Distribution Emergency Lost Time

	Hours	
	West	East
Apron feeder chute choked	1.06	.08
Apron feeder hung	.42	--
Replacing & tightening 8x12 Marcy Mill shell liner bolts	.17	1.09
Symons crusher motor kicked off	1.17	.00
Replacing stud in Tricone dipper extension	--	.41
Miscellaneous	.32	.08
Total	3.14	1.66

Mill Operation

The comparison test of Reagents 303 and 325 continued. The comparison test of Moly-Cop and Ni-Hard grinding balls continued.

A record high of 128.56 tons per operating hour was achieved by running the mill to capacity for the full month. For the first time, the average tons milled per day exceeded 3,000. It is felt that even though the increased tonnage rate caused the coarseness of grind to exceed any previous figure, the effect on metallurgy and mill equipment has not been harmful.

Mill Maintenance

Only one major repair job was undertaken during November. The West pan feeder was removed and a locally rebuilt feeder installed in its place.

Engineering & Construction

Approximately 290 tons of limestone was hauled to Ivanhoe and washed into sink holes along Painter Branch.

Erection of a tank and pump house at the Porter's Crossroads well site was completed and the plant was placed in operation.

Limestone

Shipped by	Tons November 1957	Tons 1st 6 Mos. 1957 Avg.	Cost Per Ton November 1957	Cost Per Ton 1st 6 Mos. 1957 Avg.
Trucks	4,681	7,230	$ .181	$ .158
R. R. Cars	8,046	12,086	.310	.208
Total	12,727	19,316	$ .662	$ .348

Personnel

The Personnel Department prepared request and deduction cards for employees wishing to participate in Dr. Benda's Group Medical Service Plan. This plan provides normal medical attention for employees and their families at a standard fee of $2.00 per month for family and $1.00 for single employees.

As of November 30, 185 employees had received Asiatic Flu vaccine made available to all employees by the company.

The rates for the Pulaski Hospital Plan were advanced effective November 1.

One hourly employee returned to the mine department from Military Service.

One hourly employee quit the mine department and one employee from the Plant Department died.

Safety

The mine department completed the current series of safety lectures which covered the remaining department employees.

Cost Summary

Mining

	Cost Per Ton November 1957		Cost Per Ton 1st 6 Mos. 1957 Avg.	
Deadwork (Absorption)	$ .500		$ .500	
Breaking	.288		.334	
Handling	.241		.265	
Hauling	.225		.300	
Gen. Breaking Exp.	.127		.179	
Gen. Mining Exp.	.629		.716	
		$2.010*		$2.294

Milling

Coarse Crushing	.020		.023	
Fine Crushing	.079		.057	
Grinding	.138		.211	
Flotation	.157		.169	
Filtering, Drying & Handling Conc.	.047		.047	
Tailings Disposal	.013		.016	
Undistributed	.108		.105	
		.562		.628

General Indirect

Plant Expense	.608		.671	
Taxes & Insurance	.020		.021	
Depreciation	.181		.184	
Depletion	.042		.045	
Amortization of Spare Parts	.022		.023	
		.873		.944
Total Cost Per Ton Crude		$ 3.463		$ 3.866
Total Cost Per Ton Concentrates		$ 66.107		$ 67.065

*Ivanhoe Ore Cost Excluded

The decrease in cost per ton of crude ore and concentrates produced followed the improved breaking efficiency, and the relatively smaller amount of mill, general mine, and drill maintenance performed.

Costs were adversely affected by the sharp reduction in grade of crude ore hoisted.

Exploration Geology

Diamond Drilling Summary

Area		Footage
James-Woodruff	DMEA Contract	197
Williams Property (Galena)	" "	982
	Total	1,179

Diamond Drilling

Williams Property

Hole No.	Footage	Results
CW-3	232	Barren - Complete in Austinville at 916'.
CW-4	722	Barren - Incomplete in Austinville at 722'.
CW-5	28	Barren - Incomplete in Austinville at 28'.

James-Woodruff Area

JW-22	197	Barren - Bottomed in Ribbon Member at 681'.

Virginia Piedmont

Deep drilling continued on the 1200 level, Arminius Mine. The second hole, U-59A, was bottomed at 720 feet after having penetrated a mineralized zone of 79½'. This included a barren footage of 36½' in its center which separated a zone of low zinc, good copper values in the upper portion from a zone of moderate zinc, low copper values in the lower portion. The following are weighted assays for zinc, lead and copper through the mineralized zone:

531-539	0.06% Zn, nil Pb, 0.59% Cu
539-548½	0.05% Zn, nil Pb, 0.17% Cu
548½-562½	0.01% Zn, nil Pb, 1.97% Cu
562½-599	0.11% Zn, nil Pb, 0.07% Cu
599 -609½	1.29% Zn, 0.62% Pb, 0.55% Cu

Collar locations for the remaining six holes in the underground drilling program were changed following analysis of the first two holes drilled. Inclinations in these first holes remain essentially as expected but bearing deviation was considerably further north than expected.

Drilling on the north and south Valzinco (DMEA) projects continued with the completion of four holes. Traces of sphalerite and galena were encountered.

The sites of four airborne anomalies were reconnoitered with In-line PEM and soil sampling. The geophysical response was largely one-sided with local high out-of-phase. Further exploration on one anomaly with power-line PEM revealed two possible conductors. Further power-line EM work is planned for this area.

Geochemical results received for 12 air EM anomalies show that all except one are non-anomalous. The one exception has been scheduled for detailing following receipt of check analysis confirming the original high.

In other areas geophysical reconnaissance revealed relatively low magnetic relief over the anomalous area of the north Valzinco as well as similar low relief using self-potential traverses on Mattaponi River Area 55, Spotsylvania County.

In Louisa County negotiations were begun with three property owners who adjoin the Hunter Area on the west. In Buckingham County negotiations were recessed with the Williams Slate Company pending option or sale of their assets.

W. L. Albers/bgm

STATUS OF CAPITAL EXPENDITURES

November, 1957

Project & Job No.	Amount Authorized	Current Expenditures	Spent to Date	Unexpended Balance
Ivanhoe Development - 7593	$ 3,250,000	$ 38,140	$ 3,241,330	$ 8,670.*
Arminius Mine Dev. - 7790	465,000	13,850	459,340	5,660
Brown Orebody Ventilation and Power - 7925	28,000	170	19,900	8,100
Addl. Mine Pumping - 7th level 7980	47,000	3,325	13,010	33,990
Mine Shovel Loaders - 7992	10,600	--	--	10,600

*Expect to close appropriation next month

Distribution: Mr. A. R. Flinn, N. Y.
Mr. S. S. Goodwin, N. Y.
Mr. E. J. Flynn, N. Y.
✓Austinville - 3 - 2784

Mill Notes -November, 1957

Miscellaneous Data

Shifts Worked		65
Mill Feed - % Moisture		1.91

Meterological Observations

Outside air temp., °F @ 7 AM	- Average	40
	Maximum	60
	Minimum	20
Precipitation, Inches	Total	3.88
	Maximum (11/17/57)	.80

Power for Grinding

	KWH Per Ton
Symons Crusher	.208
Gyrasphere crusher	.219
8x12 Marcy Rod Mills	4.711
Tricone Ball Mills	2.191
4x10 Marcy Regrind Mill	.284
Total	7.613

Composite Screen Analysis of Flotation Feed

Mesh	Cumulative % Retained
On 48	5.0
65	15.3
100	31.1
150	43.5
200	53.9
270	59.1
Minus 270	40.9

General Plant Maintenance

The IBC directional overcurrent relays in the Van Mater Shaft 7th level substation and both Ivanhoe substations were cleaned, checked, and calibrated by the AEP Co. at our request. The potential leads to the IBC relays in the Van Mater shaft were found to be reversed. This was corrected.

The north skip rails in the headframe were replaced. The south skip rails were checked and were built up with weld metal near the "frog" casting. Replacement of the south skip rails is anticipated for 1958.

New sheaves were received to replace the headframe sheaves on the Lidgerwood hoist. These will be installed in the near future.

The fire truck answered a call to the residence of Harvey Crowder at Shorts Creek at approximately 10:30 A.M. on November 7. The fire was under control when the truck arrived at the scene, so no action on the part of our employees was necessary.

Real Estate Maintenance

Interior painting of house #203 was started in preparation for occupancy by a new tenant. A garage and sink were purchased from the former tenant.

Other real estate maintenance was minor or routine.

Mobile Equipment Maintenance

Repairs were made to #2 northwest power shovel consisting of new valves in the engine and relining the main clutch.

Other repairs to mobile equipment were minor or routine.

Maintenance Notes - November, 1957

Mill

11/2/57 - Cleaned and recoated the west Tricone mill gear and pinion. Checked backlash in three places approximately 90 degrees apart. Found .022 and .022, .023 and .027, .0345 and .0315 with a depth clearance of .167. No adjustment was made.

Adjusted propeller clearance on the east No. 2 conditioner tank to approximately 5/8".

11/4 - Extended bunker hill tailing dam standpipe "D" 24".

Replaced 60 feet of the east 303 reagent line to the zonc cells.

11/6 - Repaired the Solenoid valve in zinc sump pump gland water line.

11/7 - Relocated the dryer plant zinc sump pump discharge line.

Repaired tailing sampler.

11/8 - Repaired the filter plant lead sump pump mercoid switch.

11/11 - Routine repair of the east and west units.

Replaced 6 outer wear shows on discharge end of the west spiral classifier.

Replaced the back wear plate and one section of rubber skirt under the west Gyrasphere crusher.

Changed oil in the west Gyrasphere crusher.

Five missing flights were welded in the zinc concentrate dryer.

The west Weightometer conveyor belt was replaced. The belt removed was installed November 8, 1954, and removed November 11, 1957. Total tonnage carried during this time was 1,047,208 tons.

The pan feeder removed from the east unit was rebuilt with new pins, bushings and three new pans and installed in the west unit. New head and tail shaft assemblies, new rails and side wear plates and a new tail shaft takeup assembly were also installed. The pan feeder removed had been in operation 31 months and had conveyed 916,839 tons.

Installed a new 10" locally built regrind cyclone classifier in the west unit.

Installed a 3" rubber pinch valve in the circulating water pump sump overflow line.

The west Tricone mill motor coupling clearance was checked. Horizontal alignment was found .004 out of adjustment. Angular alignment was found .005 out of adjustment. No adjustment was made.

The east Tricone mill motor coupling clearance was checked. Vertical alignment was found .004 out of adjustment. Angular alignment was found .002 out of adjustment. No. adjustment was made.

Inspected and adjusted clearance on the east Denver cleaner cells.

11/14 - Adjusted the east classifier overflow density meter pen -- .014.

11/18 - Removed the west 8x12 Marcy Mill feed chute extension.

11/20 - Repaired the east lead froth pump. Replaced the suction sleeve, suction bell liner, and shell liner.

11/22 - Repaired the lead sump pump. Installed a new shaft and water ring.

11/24 - The gear and pinion on the west 8x12 Marcy Mill was completely cleaned and the alignment checked at two points approximately 180 degrees apart. Back lash at one point was .033 and .033; at the other point it was .028 and .035.

The alignment was not adjusted. The horizontal offset of the motor coupling was .006 and the vertical offset .006 with no angular misalignment. Speed reducer coupling horizontal offset was .005 with no vertical misalignment found. The coupling was open .007 on one side.

11/25 - Routine repair of the east and west units.

Repaired west Symons screen by replacing the cross bars and rubber spacers.

Tightened west apron feeder one inch.

Welded four missing flights in zinc concentrate dryer.

Replaced north end wear plate on the east apron feeder.

Installed a rebuilt mantle feed plate on the east Symons crusher.

Cleaned and inspected west 4x10 Marcy Mill gear and pinion. The alignment was not adjusted.

11/26 - Repaired the east rateograph. Replaced the release cam armature bracket, two springs, and one pawl.

11/29 - Installed a 6" standard victaulic 90° elbow with 1/4" #40-E rubber lining in the 1-B tailing booster pump discharge pipe line.

A standard unlined new elbow was placed in the 1-A tailing line adjacent to the rubber lined elbow. A wear life comparison test is planned to determine the economics of using rubber lined pipe fittings in lines carrying abrasive material.

Maintenance Notes - November, 1957

Machine Shop

11/1/57 - Shimmed bearings in #5A mine pump at the Van Mater Shaft.

11/3 - Replaced the worn guide rails for the north skip in V. M. Shaft headframe with new rails.

11/4 - Thoroughly cleaned the main plant and change house boilers and flues and added water treatment to the boilers.

11/5 - Installed new brake rigging on #4 Atlas 2-1/2 ton locomotive which is in service on the Ivanhoe section of the mine.

11/8 - Installed a spare transmission in the Whitcomb locomotive which is in service in the Ivanhoe section and brought the old transmission to the machine shop for overhaul.

Changed oil in the Flatwoods hoist speed reducer.

11/9 - Repaired and adjusted mine crusher bearings and installed new swing jaw wearing plates.

11/12 - Overhauled Gardner-Denver grout pump; also installed new slush valve seats.

Made up a set of spare trucks for Granby mine cars, using reconditioned wheels and axles fitted with new bearings.

11/13 - Made up a new aftercooler for the #6 and #7 Ingersoll-Rand air compressors at Ivanhoe, using a housing made from 8" black iron pipe, fitted with a new tube nest.

11/14 - Installed a new set of brake shoes on the #5, 2-1/2 ton Atlas locomotive which is in service in the Ivanhoe section; also repaired all the brake rigging.

11/16 - Because of mechanical seal and bearing failure the shaft assembly in #7C mine pump was replaced with a rebuilt assembly. The assembly which was removed had been in service a total of 861 hours and was rebuilt at a cost of $196.02 for parts and $27.60 for labor, making a total of $223.62.

Three mechanics were scheduled to work on "B" shift, repairing #3 Sullivan air compressor. To eliminate a knock in the compressor, it was necessary to remove the shims from the main bearings and adjust the connecting rods. The job was completed in 21 man hours.

11/18 - Made up one set of Granby type mine car trucks from reconditioned wheels and axles and new wheel bearings.

11/19 - Installed the new Wallace and Tiernan hypochlorinator in the Porter's Cross Roads pump house for treating the drinking water which is being delivered to the Ivanhoe community.

11/20 - Because of mechanical seal failure the shaft assembly in #5D mine pump was replaced with a rebuilt assembly. The assembly which was removed was in service a total of 1370 hours, and was rebuilt at a cost of $23.76 for parts and $20.70 for labor, making a total cost of $44.46.

11/21 - Repaired the cable and chain assemblies on the Model 21, #4628 Eimco rocker shovel which is in service in the Ivanhoe section of the mine.

11/23 - Made and installed new drip pans under the rear toggles on the mine crusher; also tightened all bolts.

11/25 - Repalced the worn out casing on #5B mine pump. This casing had been in service a total of 20,645 hours. Also installed a rebuilt shaft assembly; the assembly which was removed having been in service a total of 4,295 hours, and was rebuilt at a cost of (including new casing) $530.23 for parts and $36.80 for labor, making a total cost of $567.03.

Installed new links, latches, bushings and pins in the south skip loading gate in the Van Mater shaft.

11/26 - Added water treatment to the water tube boiler at the Ivanhoe plant.

Repaired the brake rigging on a 2-1/2 ton Atlas locomotive on the 1100 level of Van Mater Shaft.

Repacked #6A Aldrich 1,000 gpm pump on the 600 level of Van Mater Shaft.

11/30 - Because of bearing failure the shaft assembly in #7A mine pump was removed and replaced with a rebuilt assembly. The assembly which was removed was in service a total of 2959 hours and was rebuilt at a cost of $60.73 for parts and $38.45 for labor, making a total cost of $99.18.

Maintenance Notes - November, 1957

Electric Shop

11/1-4/57 - Removed 440 volt power feeder line to Grayson Mill.

11/5 - Replaced damaged wiring to Mancha locomotive 7th level Van Mater Shaft.

11/6 - Replaced motor to 4 ton Atlas locomotive 7th level Van Mater Shaft.

11/7 - Repaired Euclid hoist in mill controller and brake.

Replaced grid resistance to Whitcomb locomotive at the Ivanhoe shaft.

11/8 - Replaced foot switch control on the 2-1/2 ton locomotive at the Ivanhoe shaft.

Installed radio cage phone loop antenna on headframe to 3rd level Ivanhoe shaft.

Cleaned and calibrated IBC relays 7th level substation Van Mater shaft and Ivanhoe shaft. Also surface substation at Ivanhoe shaft.

11/10 - Repaired automatic control assembly on 7C pump Van Mater shaft.

Checked Ivanhoe pumping station equipment.

11/11 - General mill repairs.

Repaired lead electric sump pump at the zinc and lead drying plant.

11/12 - Replaced cage landing chairs signal switch at the Ivanhoe shaft.

11/13 - Patrolled Ivanhoe 13,000 volt transmission line. Checked for broken insulators, guys, etc.

11/14 - Removed and rearranged lighting at 11th level ore car dumper Van Mater shaft.

11/15 - Replaced worn final limit switches on the Vulcan ore hoist at the Van Mater shaft.

Wired electric equipment at Ivanhoe deep well water service station at Porter's crossroads.

11/18 - Installed electric slusher starting equipment and 440 volt feeder line cable in 7th level Flatwoods shaft.

11/19 - Installed signal lights at 11th level car dumper Van Mater shaft.

11/20 - Replaced burned resistor in Mancha locomotive on 5th level.

11/21 - Replaced A.L. 250 main line circuit breaker to No. 2 transformer switch gear after repairs to breaker in 7th level substation Van Mater shaft.

Replaced foot switch on 2-1/2 ton locomotive at Ivanhoe.

Installed controller, foot switch, and control on old 2 ton locomotive for use in top landing at Van Mater shaft.

11/22 - Repaired 7D pump starter and overhauled pump impeller and case.

11/26 - Repaired Greensburg locomotive contactor and foot switch and replaced motor brushes.

Replaced brushes in #3 air compressor motor.

11/27 - Repaired 5C pump starter in 7th level pumping station Van Mater shaft.

11/29 - Replaced 15 HP electric slusher motor on 6th level Van Mater shaft.

X 1086 150M

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MONTHLY REPORT
AUSTINVILLE, VA.
OCTOBER, 1957

SUMMARY OVERALL OPERATION

Production	Obtained	Scheduled Estimated
Crude Ore		
Tons	70,790	69,000
% Zinc	3.29	3.30
% Lead	0.44	0.60
Zinc Concentrates	3,521	3,470
Lead Concentrates	323	430
Costs		
Per Ton Concentrates	$ 64.10	$70.00
Per Ton Crude Ore	3.48	4.00
Payroll Total Number -- (End of month)	519	

MINING

Statistical Summary

General

Working days	23
Men on Payroll	291
Percent Attendance	94.57
Manshifts Worked	6,037

Production

Tons Hoisted	70,790
Tons Broken	65,300
Broken Reserve	2,265
Production Shifts (Total)	4,206

Deadwork and/or Development

Feet Advanced	545
Cubic Feet	5,117
Deadwork Shifts	452
Diamond Drilling Feet	1,205

Operating Efficiencies

Tons hoisted per day	3,078
Tons hoisted per shift worked	11.73
Tons hoisted per production shift	16.83
Tons broken per drill shift	56.44
Tons obtained per slusher shift	87.16
Tons obtained per loading shift	236.47
Tons obtained per bulldozing shift	236.47
Tons obtained per hauling shift	218.28
Car factor	4.08
Skip factor	5.745

Waste Handling

Cubic Yards Waste Hoisted -

		Cars
Austinville	1,526	924
Ivanhoe	6,856	2,314
	8,382	

Safety

Lost time accidents	5
Number days lost	51
Frequency	94.6
Severity	2,136.9

Pumping

Daily power consumption	22,201 KWH
Gallons pumped/minute (calculated)	
Austinville	5,397 gpm
Ivanhoe	1,157 gpm

A new 12" pump discharge line was installed on 5C pump, and a concrete collar poured around an 18" lateral on the 5th level to eliminate serious pump column leakage.

Rainfall

Total precipitation	1.14"
Maximum (10/16/57)	0.30"

Development & Deadwork

Summary

Austinville

Level	Drifts & X-Cuts	Sub-Levels	Raises	Total	Cubic Footage
4	19'		56'	75'	
6			55'	55'	2,690
7	53'			53'	2,153
11	362'			362'	274
Total	434'		111'	545'	5,117

Ivanhoe

5					7,056
7	266'			266'	880
8	171'			171'	1,428
9	150'			150'	880
10	217'			217'	
11			87'	87'	186
Total	804'		87'	891'	10,430

Austinville

Rockwork for the new 7th to 2nd level pumping system was completed between the 4th and 2nd level.

Approximately 98' of tunnel liner remains to be installed in 71491 X-Cut, prior to grouting.

Ivanhoe

The Ivanhoe ventilation system was placed in operation during October, and anemometer readings indicate a flow of approximately 20,000 cubic feet of air per minute in the Ivanhoe-Austinville haulage tunnel. This quantity of air is approximately 2-1/2 times the amount required for operation of the diesel locomotive.

Stoping - Ore Extraction (Austinville)

Production Summary

Level	No. of Stopes Drawn	Tons Broken	Tons Obtained
4	3	8,142	8,122
5	8	17,718	17,768
6	4	7,936	7,811
7	11	31,504	31,564
Total	26	65,300	65,265
Ivanhoe			4,397
Development Ore Obtained			1,128
	GRAND TOTAL		70,790

No. of Stopes Working	25
No. of Stopes Available	28

During October, ore haulage from Ivanhoe to Austinville was continued. Approximately 100 percent of the tonnage delivered to the mine was obtained from stoping on the third and fifth levels.

Mine Geology

Diamond Drilling Summary

	No. of Holes	Shifts	Feet Cored	Feet Non Cored
Austinville	7	41	1,205	0
Ivanhoe	11	46	775	1,440
Total	18	87	1,980	1,440

Austinville

Holes Drilled to Delineate Ore

Hole No.	Area	Lev.	Sect.	Feet Drilled	Bot.	Results
U-846	Southwest	3	18	0		17' 2.4% Zn, Nil Pb
						28' Dead
						11' 1.9% Zn, Nil Pb
U-848	Flatwoods	4	161	136	221	14' 5.7% Zn, 0.4% Pb
U-849	Northeast	5	17	230	230	Dead
U-850	Flatwoods	4	161	239	239	5' 1.0% Zn, 0.1% Pb
U-851	Simmerman	11	148	405		Dead
U-852	Southwest	3	34	100	100	3' A ore
U-853	Southwest	3	34	87	87	69' Mineralization
U-854	Southwest	3	40	10		Dead

Ivanhoe

Hole No.	Lev.	Sect.	Feet Drilled	Bot.	Results
J-79	7	02	40	294	9' C Ore
J-114	6	04	0		5' 7.4% Zn, 0.1% Pb
J-117	6	02	0		14' 3.8% Zn, Nil Pb
J-119	6	06	0		17' 3.5% Zn, Nil Pb
J-120	6	06	0		8' 5.5% Zn, 1.6% Pb
J-121	7	12	149	149	16' Mineralization
					66' Barren
					9' Low A Ore
J-122	7	04	148	148	22' A Ore
J-123	10	09	130	130	2' C Ore
					3' Barren
					5' C Ore
J-124	7	16	308		6' Mineralization
					10' Barren
					4' B Ore
					30' Barren
					3' B Ore

Non Core Holes

Hole No.	Level	Sect.	Feet Drilled	Bot.	Results
K-172	7	27	145	205	Pilot Hole
K-173	10	00 ≠ 8'	280	280	Pilot Hole
K-174	7	19 ≠ 91'	300	300	Pilot Hole
K-175	7	20 ≠ 22'	285	285	Pilot Hole
K-176	9	25 ≠ 87'	140	140	Pilot Hole
K-177	8	17 ≠ 8'	290	290	Pilot Hole

PLANT

MILLING

Statistical Summary

Days Worked	24-1/3
Tons Milled	70,790
Tons Per Day	2,910
Tons Per Operating Hour	123.60
Mill Operating Time, % of Scheduled	98.43

	Zinc	Lead
Tons of Concentrates	3,521	323
Tons of Concentrates Per Day	145	13
Concentration Ratio	20.1	219

Metallurgical Comparison

	October 1957	1st 6 Mos. 1957 Avg.
Feed - % Zinc	3.29	3.32
% Lead	0.44	0.67
% A A Sol Zn	0.19	0.14
Zinc Conc. - % Zinc	60.38	60.62
% Lead	0.44	0.73
% Zinc Recovery	91.21	92.41
Lead Conc. - % Lead	72.66	75.34
% Zinc	3.31	2.73
% Lead Recovery	75.81	78.27

Zinc metallurgy during October was normal. Zinc recovery was slightly below normal as a result of continued high oxidized zinc content of the ore.

Lead metallurgy was normal with a loss to tailings as low as any on record as a result of low feed grade.

Non-Operating Mill Time

	Hours	
	West	East
Weekend shutdowns & startups	162.08	162.08
Scheduled repairs	7.42	7.67
Emergency lost time	1.16	2.08
Total	170.66	171.83

Distribution Emergency Lost Time

	Hours	
	West	East
Symons Crusher feed chute choked	--	.58
Replacing & tightening 8x12 M. M. shell liner bolts	--	1.17
Inspecting Symons crusher	.25	.08
Apron feeder chute choked	.41	--
Miscellaneous	.50	.25
Total	1.16	2.08

Mill Operation

The comparison test of Reagents 303 and 325 continued.

The comparison test of Moly Cop and Ni-Hard grinding balls continued.

Unusually high consumption of grinding rods and balls resulted from building up the 8x12 rod mill and Tricone ball mill charge levels to normal. This was done to permit an increase in the milling rate.

Operating time as a percent of scheduled time and total tons milled for the month were both record highs for the Austinville mill.

The figure of 3,000 tons per day was exceeded on two days during October. This also is a new record for Austinville. No apparent harmful effects on metallurgy resulted from the increased feed rate during this period.

The revised repair day schedule which was adopted on September 16 was continued during October. This system of repairing both sides of the mill simultaneously at two-week intervals is proving itself to be quite satisfactory, and it is felt that the increased percent of operating time achieved this month was at least partially a result of this practice.

Mill Maintenance

Four major maintenance jobs were completed during October.

1. The West Symons Crusher bowl liner was replaced.

2. The East Symons Crusher bowl liner was replaced.

3. Four hundred feet of 3" pipe in the lead concentrate line to the dryer plant was replaced.

4. A leak under the feed trunnion liner in the West Tricone Ball Mill was repaired.

Engineering and Construction

Ivanhoe Development - Approp. 7593

Approximately 550 tons of limestone was hauled from Austinville and washed into sink holes along Painter Branch in Ivanhoe.

Erection of a tank and pump house at the Porter's Crossroads well site was started during October in preparation for use of the well by the Ivanhoe Service Company.

Limestone

	Tons		Cost Per Ton	
Shipped by	October 1957	1st 6 Mos 1957 Avg.	October 1957	1st 6 Mos 1957 Avg.
Truck	6,305	7,230	$ .151	$ .158
R. R. Cars	17,660	12,086	.148	.208
Total	23,965	19,316	$ .285	$ .348

Personnel

One salaried employee, Dr. Rudolf Benda, was added during the month. There were no hourly additions.

One hourly employee retired on pension effective October 31.

Safety

The Mine Department commenced a series of safety lectures during the month which will be completed during November.

The Plant Department was supplied with a safety graph and film for its October supervisors' meeting.

Cost Summary

Mining

	Cost Per Ton October 1957		Cost Per Ton 1st 6 Mos. 1957 Avg.	
Deadwork (Absorption)	$ .500		$ .500	
Breaking	.316		.334	
Handling	.259		.265	
Hauling	.231		.300	
Gen. Breaking Exp.	.157		.179	
Gen. Mining Exp.	.627		.716	
		$ 2.090*		$ 2.294

Milling

Coarse Crushing	.021		.023	
Fine Crushing	.071		.057	
Grinding	.152		.211	
Flotation	.157		.169	
Filtering, Drying & Handling Conc.	.040		.047	
Tailings Disposal	.026		.016	
Undistributed	.107		.105	
		.574		.628

General Indirect

Plant Expense	.558		.671	
Taxes & Insurance	.020		.021	
Depreciation	.166		.184	
Depletion	.042		.045	
Amortization of Spare Parts	.021		.023	
		.807		.944
Total Cost Per Ton Crude		$3.481		$3.866
Total Cost Per Ton Concentrates		$64.096		$67.065

*Ivanhoe Ore Cost Excluded

The decrease in cost per ton of crude ore and concentrates followed the substantially greater tonnage hoisted and the smaller amount of mill maintenance performed.

Costs were adversely affected by the lower grade of ore produced.

Exploration Geology

Diamond Drilling Summary

Area		Footage
James-Woodruff	DMEA Contract	413
Williams Property (Galena)	" "	684
	Total	1,097

Diamond Drilling

Williams Property

Hole No.	Footage	Results
CW-3	684	Barren - Incomplete in Austinville at 684'.

James-Woodruff Area

JW-22	413	Barren - Incomplete in Ribbon Member at 484'.

Virginia Piedmont

Deep drilling was begun on the 1200 level, Arminius Mine on October 4, 1957 and the first hole, U58A, was completed. A hole distance of 52 feet of ore (true width 40 feet) was penetrated in the position expected.

Drilling was begun in the south Valzinco area on October 3, 1957 and three holes were completed. Traces of sphalerite and galena were encountered.

Geochemical and PEM reconnaissance surveys were made on the sites of seven airborne anomalies in Spotsylvania, Louisa, and Buckingham Counties plus PEM at the Waller Gold Mine, Goochland County. PEM response was weak or one-sided in all cases. Self-potential surveys disclosed an anomaly at airborne anomaly 48, Buckingham County. Gish-Rooney at anomaly 48 indicated the PEM conductor is in the bedrock. Gish-Rooney at the south Valzinco indicates this method cannot be used to predict overburden depth in areas of deep weathering.

Tonnage and grade of mineralization was calculated for the Bondurant Area.

The Earl Dickinsons signed an option agreement for property in Louisa County.

Negotiations were begun with the William Slate Company, major property owner at airborne anomaly 48, Buckingham County.

WLAlbers:rjl

cc: Mr. A. R. Flinn, N. Y.
Mr. S. S. Goodwin, N. Y.
Mr. E. J. Flynn, N. Y.
Austinville (3) - 2482

Status of Capital Expenditures

October, 1957

Project & Job. No.	Amount Authorized	Current Expenditures	Spent to Date	Unexpended Balance
Ivanhoe Development - Approp. 7593	$ 3,250,000	$ 42,295	$ 3,203,190	$ 46,810
Arminius Mine Dev. - Approp. 7790	465,000	12,935	445,490	19,510
Brown Orebody Ventilation and Power - Approp. 7925	28,000	--	19,730	8,270
Additional Mine Pumping - 7th Level Approp. 7980	47,000	630	9,790	37,210
Mine Shovel Loaders - Approp. 7992	10,600	--	--	10,600

cc: Mr. A. R. Flinn, N. Y.
Mr. S. S. Goodwin, N. Y.
Mr. E. J. Flynn, N. Y.
Austinville (3)

Austinville, Va.
Monthly Report
October, 1957

Mill Notes

Miscellaneous Data

Shifts Worked	72
Mill Feed - % Moisture	1.76

Meterological Observations

Outside air temperature, °F at 7:00 A.M. --	Average	45
	Maximum	59
	Minimum	32
Precipitation - Inches	Total	1.14
	Maximum (10/16/57	.30

Power for Grinding

	KWH Per Ton
Symons Crusher	.200
Gyrasphere Crusher	.232
8x12 Marcy Rod Mills	4.631
Tricone Ball Mills	2.144
4x10 Marcy Regrind Mill	.277
Total	7.484

Composite Screen Analysis of Flotation Feed

Mesh	Cumulative % Retained
On 48	4.0
65	13.5
100	28.6
150	41.3
200	52.2
270	57.4
Minus 270	42.6

General Plant Maintenance

The aftercooler on #5 compressor at the Flatwoods Shaft was found to be completely clogged with lime scale. The aftercooler was removed and temporary piping installed in its place. Several shifts of shop work were necessary to clean the tube nest so that the aftercooler could be returned to service.

As a result of this incident, a spare tube nest is being procured so that the aftercoolers on this compressor and #6 and #7 compressors at Ivanhoe can be changed and cleaned on a routine basis.

The north motor on the Lidgerwood Hoist (Serial #359-532) was removed and shipped to the National Electric Coil Company at Bluefield, W. Va., for alteration of the slip rings and brush assembly. Motor, Serial #359-511, which had previously been altered, was installed as a replacement.

Motor, Serial #359-511, was received from the National Electric Coil Company and placed in storage as a spare Lidgerwood Hoist motor. This completed the renovation of these motors. All three motors have been equipped with new slip rings of larger diameter and increased ring clearance. No difficulty has been experienced with any of these motors since alteration.

Real Estate Maintenance

No major maintenance of real estate was performed during October.

Maintenance Notes - Mill - October, 1957

10/1/57 - Opened and inspected cyclones. Replaced stainless steel feed orifice in #6 and #7 and crystolon underflow orifices in #1 and #4.

10/5/57 - The west Symons crusher bowl liner was replaced. This part had been in service since November, 1956, with a total of 5,365 operating hours, during which it treated 315,674 tons of ore with a scrap loss of 40.5%. The liner had begun to break up and caused some wear on the bowl which was built up by welding and machined before a new bowl liner could be zinced in.

In view of this experience, it appears that after a tonnage of 300,000 has been crushed, this part should be carefully inspected for cracks and breakage around the lower edge.

10/9/57 - A new suction sleeve and clamp plate and a used impeller were installed in the #7A tailings pump.

Replaced 400 feet of of 3" pipe in the lead concentrate line to the filter plant.

10/10/57 - Replaced cyanide pipe line from mixing tank to storage tank.

10/14/57 - Routine repair of the east and west units.

Installed new access door with ball feeder on west Tricone mill scoop box.

Back lash was checked at .019 and .020 on the east Hardinge Tricone mill drive gears. No adjustment was made.

The east Gyrasphere conveyor belt was replaced. The belt removed had been in service on the west unit from March 16, 1953, to July 5, 1955. It was installed on the east unit November 28, 1955, and removed October 14, 1957. Total tonnage carried during this time was

Installed a safety screen under the east 8x12 Marcy Mill.

Installed new starter and a 50 HP motor on the slimes tailing pump.

Installed a new shaft assembly in the American well works auxiliary water pump.

A loose discharge head liner in the west 8x12 Marcy Mill was pulled out and the space behind it cleaned of muck and broken zinc. It was replaced after two strips of oakum were inserted between the liner and the mill head.

The bolts holding the west Tricone mill extension piece to the trunnion were tightened in another attempt to stop the leak under the feed trunnion liner.

10/16/57 - A rebuilt suction bell and suction bell liner were installed in the Austin Meadows tailing pump.

Completed stairway from top floor of mill to rock house.

10/19/57 - A new bowl liner was installed in the east Symons crusher. The liner removed had crushed 294,437 tons of ore and was beginning to break up around the lower edge.

It was found that the new Flexco hinged belt fastener installed on the east weightometer belt on July 15, 1957, has begun to separate and it was replaced with a complete new fastener. The flexible cable used as a connector could not be removed except by taking off all the fasteners. It is felt that after all the spare sets of fasteners are used this type of fastener will be discontinued.

10/21/57 - Repaired 7B tailings pump by installing a new shell liner.

Repaired a broken vacuum line on the lead filtrate pump at the dryer plant.

Repaired 7B tailing pump. Replaced the shell liner.

10/25 - Repaired 7A tailing pump. Replaced the shell liner, suction sleeve and suction bell liner.

10/27 - In order to stop a leak through the feed end trunnion which could not be stopped by repeated tightening of bolts, the space between the feed trunnion and trunnion liner was cleaned and regrouted in the west Tricone ball mill. Four of the threaded holes for the extension piece studs in the end of the trunnion were drilled and tapped 3/4" deeper to provide a better grip for the studs. A 1/16" rubber gasket was placed between the trunnion and extension piece and the grout used was a mixture of Lumnite and water. The job required a total of 14 hours for four men.

The gear and pinion on the east Tricone mill was completely cleaned and the alignment checked at two points approximately and 90 degrees apart. Backlash at one point was .018 and .018/at another point was .0175 and .019. This is considered satisfactory and the alignment was not adjusted. This job required 12 hours for three men.

10/28 - Routine repair of the west and east units.

Inspected and adjusted clearance on the west zinc denver cleaner cells.

Replaced two contacts on the west 8x12 Marcy Mill starter.

10/28 - Four missing flights were welded in the zinc concentrate dryer.

Repaired west spiral classifier. Built up first flight with hardweld.

Repaired No. 2 east conditioner tank. Replaced bottom suction of the sands relief line.

Changed oil and the oil filter element in the east Gyrasphere crusher and filter.

10/29 - Repaired 1A tailing booster pump. Replaced the suction bell liner, suction sleeve, shell liner, engine side liner, and installed a used impeller.

Maintenance Notes - October, 1957

Machine Shop

10/4/57 - Completed overhaul of Whitcomb locomotive with installation of an Atlas type controller and a Mancha type handwheel brake. This locomotive was sent to Ivanhoe to be put in service in the Ivanhoe section of the mine.

10/8 - Repaired three Granby type mine cars. One car required new wheel bearings. Replaced coupler handle on one car and the other which had been wrecked was straightened with some new side plates being used.

Because of bearing failure, the shaft assembly in #7C mine pump which had run a total of 4092 hours was removed and replaced with a rebuilt assembly. The assembly which was removed was rebuilt at a cost of $48.87 for parts and $18.40 for labor, making a total cost of $67.27.

10/10 - Cut 5 feet from the Lidgerwood hoist cables, with the service hoist being out of service for 2 hours for the job.

10/11 - Because of bearing failure, the shaft assembly in #5A mine pump, which had run a total of 2329 hours, was removed and replaced with a rebuilt assembly. The assembly which was removed was rebuilt at a cost of $176.93 for parts and $23.00 for labor, making a total cost of $199.93.

10/14 - Cut 5 feet from the Vulcan hoist cables and pulled 7 feet from the drums, with the ore hoist being out of service 4 hours and 20 minutes for the job.

10/16 - Cleaned Clear Branch pumps sump. These pumps are used for the Flatwoods area water supply.

10/19 - Changed oil in #1, 2, 3 and 4 main plant air compressors.

10/20 - Adjusted brakes and tightened all bolts on the Vulcan ore hoist.

10/23 - Set up the 11th level mine crusher 1/4", making shim total 1-3/4".

10/25 - Completed installation of one 1,000 gallon capacity underground fuel oil storage tank at Ivanhoe. This tank which is made of #10 gauge material, measures 45-1/2" diameter by 144" in length, will hold the diesel fuel oil supply for the Plymouth diesel locomotive. The tank is equipped with a model 1200 Rotaboy direct mount hand pump.

10/26 - After several days of trouble with the cooling water system in #5 air compressor at the Flatwoods shaft building, the aftercooler was examined and found to be completely stopped up with mud and scale. The aftercooler was removed and taken to the machine shop for a thorough cleanup, and is scheduled for reinstallation on November 2, 1957.

10/28 - Installed a rebuilt ore skip in the south side, V. M. shaft, with a down time of 1 hour, 55 minutes. Work was started immediately on rebuilding the skip which was removed.

10/29 - Thoroughly cleaned and inspected the Ivanhoe water tube boiler.

Maintenance Notes - Electric Shop - October, 1957

10/1/57 - Installed light circuit on 11th level at ore loading chute for diesel locomotive hauling.

10/2 - Installed signal light system on 11th level in tunnel leading to Ivanhoe shaft for benefit of diesel locomotive operator and other locomotive operators.

10/3 - Installed electric switches and welding receptacles on 4th and 9th levels at the Ivanhoe shaft.

Removed old electric entrance circuit and installed new entrance with outdoor A. E. Power Co. meter service to House #212.

10/4 - Replaced damaged circuit breaker to 15 HP electric slusher 5th level Van Mater Shaft.

Installed electric power line to building #201 - new doctor's office.

10/5 - Removed Lidgerwood hoist north motor serial #359-532 for overhaul. Installed motor serial #359-511 which had been altered and overhauled.

10/7 - Repaired radio cage phones for Ivanhoe shaft.

10/9 - Replaced control switch 11th level crusher motor.

10/10 - Repaired Greensburg locomotive controller. Contacts were burned.

10/11 - Removed electric starting equipment for 15 HP electric slusher on the 5th level at the Van Mater shaft.

10/14 - Wired two Goulds lead acid batteries for use on Whitcomb locomotive for Ivanhoe shaft.

Replaced 25 HP motor with 50 HP electric motor and starting equipment on mill slime tailings pump.

10/15 - Dielectric oil tested on all Pyranol and Transil oil high voltage (13000 V) transformers.

10/16 - Installed light circuit in diesel locomotive repair pit 11th level Ivanhoe.

10/17 - Cleaned substation equipment in bottom 800 KVA bank.

10/18 - Checked and cleaned electric equipment at river pumping station.

10/22/57 - Replaced old brush holders and brushes on Lidgerwood hoist motor Serial No. 359-532.

10/23/57 - Replaced charging receptacle on Edison C-4 battery and No. 5 lead acid battery at Ivanhoe shaft.

Repaired two heater motors in change house at Ivanhoe Shaft.

10/24 - Replaced fire eye in plant boiler.

Replaced fuel igniter in plant boiler.

10/25 - Replaced recording hour time meter on No. 1 air compressor.

10/28 - Repaired TK relay on automatic control to 7H pump Ivanhoe shaft.

Replaced contacts on contactor in starting panel to hoist motors at Ivanhoe shaft.

10/29 - Checked and cleaned switch gear 7th level Ivanhoe shaft.

10/30 - Finished signal system on 11th level for diesel locomotive and other haulage locomotives.

10/31 - Replaced fuel igniter and checked and cleaned burner control at the Ivanhoe change house.

Repaired telephone system and installed large bell for telephone signal on the 12th level Van Mater shaft.

WSH

MONTHLY REPORT
AUSTINVILLE, VA.
SEPTEMBER, 1957

SUMMARY OVERALL OPERATION

Production	Obtained	Scheduled Estimate
Crude Ore		
Tons	53,553	59,000
% Zinc	3.07	3.30
% Lead	0.53	0.60
Zinc Concentrates	2,418	2,968
Lead Concentrates	313	368
Costs		
Per Ton Concentrates	$81.81	$70.00
Per Ton Crude Ore	4.17	4.00
Payroll Total Number -- (End of Month)	519	

MINING

Statistical Summary

General

Working days	20
Men on Payroll	291
Percent Attendance	96.92
Manshifts Worked	5,260

Production

Tons Hoisted	53,553
Tons Broken	49,986
Broken Reserve	2,230
Production Shifts	3,649

Deadwork and/or Development

Feet Advanced	522
Cubic Feet	9,161
Deadwork Shifts	411
Diamond Drilling Feet	791

Operating Efficiencies

Tons hoisted per day	2,678
Tons hoisted per shift worked	10.18
Tons hoisted per production shift	14.68
Tons broken per drill shift	51.59
Tons obtained per slusher shift	73.8
Tons obtained per loading shift	198.13
Tons obtained per bulldozing shift	209.69
Tons obtained per hauling shift	196.59
Car factor	3.59
Skip factor	5.53

Waste Handling

Cubic Yards Waste Hoisted -

		Cars
Austinville	1,272	928
Ivanhoe	5,022	1,695
	6,294	

Safety

Lost time accidents	3
Number days lost	27
Frequency	55.3
Severity	9,039

Pumping

Daily power consumption	23,986 KWH
Gallons pumped/minute (calculated	
Austinville	5,400 gpm
Ivanhoe	910 gpm

The decrease in pumping time at Austinville was due to a notable drop in flow from the Stamping Ground Fault Area of 71491 XC.

Heavy rains during the month resulted in slightly increased water flows at Ivanhoe from the 3rd, 4th, 6th, and 7th levels.

Rainfall

Total precipitation	8.38"
Maximum (9/16/57)	2.07"

Development & Deadwork

Summary

Austinville

Level	Drifts & X-Cuts	Sub-levels	Raises	Total	Cubic Footage
4			102	102	
6	26		17	43	375
7	53		80	133	878
11	238		6	244	7,908
Total	317		205	522	9,161

Ivanhoe

4	30'			30'	
5			89'	89'	
7	278'			278'	768
8	15'			15'	1,144
9	130'			130'	
10	250'			250'	306
11			192'	192'	50
Total	703'		281'	984'	2,268

Austinville

Waste disposal from the 11th level through the 1202 waste pass was initiated during September.

The capacity of the two 12th level waste cars has been increased from 37 to 46 cu. ft. in an effort to alleviate the problem of disposing waste rock from four 11th level development shifts during only the two normal hoisting shifts.

Ivanhoe

Work was resumed on the 8th level southwest during September, there remaining 1,000' of drift to be advanced for connection with the ore pass and ventilation system at Section 33.

Stoping - Ore Extraction

Production Summary

Level	No. of Stopes Drawn	Tons Broken	Tons Obtained
4	4	6,606	6,601
5	8	12,015	12,515
6	4	6,419	6,444
7	12	24,946	24,766
Total	28	49,986	50,326
Ivanhoe			2,547
Development Ore Obtained			680
GRAND TOTAL			53,553

No. of Stopes Working	26
No. of Stopes Available	28

During September, ore haulage from Ivanhoe to Austinville was initiated. Approximately 50% of the tonnage delivered to the mill was obtained from stoping on the 3rd and 5th levels, with the remainder from development, both current and the surface stockpile.

Operation of the Plymouth Diesel Locomotive has proven very satisfactory.

Mine Geology

Diamond Drilling Summary

	No. of Holes	Shifts	Feet Cored	Feet Non-Coring
Austinville	7	40	791	0
Ivanhoe	18	40	952	753
Total	25	80	1,743	753

Austinville

Holes drilled to delineate ore

Hole No.	Area	Lev.	Sect.	Feet Drilled	Bot.	Results
U-841	Northeast	5	115	0	155	27' 0.6% Zn, Nil Pb 14' 2.2% Zn, 1.0% Pb 22' Dead 18' 1.0% Zn, 0.5% Pb
U-842	Flatwoods	7	169	296	296	3' 1.3% Zn, 0.4% Pb 45' Dead 3' 2.2% Zn, Nil Pb 6' Dead 3' 1.1% Zn, Nil Pb
U-843	Northeast	5	113	80	102	7' 1.1% Zn, 0.3% Pb 26' 1.2% Zn, Nil Pb 8' 3.1% Zn, 0.7% Pb 11' Dead 5' 1.5% Zn, 0.1% Pb
U-844	Northeast	5	115	120	120	30' 1.9% Zn, 0.2% Pb
U-845	Northeast	5	115	60	60	Dead
U-846	Southwest	3	18	90	90	15' Est 1% Zn 10' -1% Zn
U-847	Northeast	5	85	60	60	Dead
U-848	Northeast	4	161	85		Dead, incomplete
U-849	Northeast	5	17			Collared only

Ivanhoe

Holes drilled to delineate ore

Hole No.	Level	Section	Feet Drilled	Bottomed		Results
J-106	11	06	51	223	18'	Mineralization
J-110	6	02	24	194		Barren
J-111	6	00				August drilling; Assays: 6' Nil Pb, 4.5% Zn. 68' Barren 12' 6.4% Zn, 0.4% Pb
J-112	6	06				August Drilling; Assays: 19' 3.1% Zn 0.7% Pb
J-113	6	06 ≠ 30	23	123	2'	Mineralization
J-114	6	04	105	105	12'	Mineralization
					5'	B ore
J-115	6	00	182	182		Local mineralization
J-116	6	02	67		67'	Local mineralization
J-117	6	02	211	211	2'	Mineralisation
					22'	Barren
					5'	Low A ore
					70'	Barren
					4'	B ore
					3'	Barren
					7'	A ore
J-118	3	03 ≠ 93	30	30	7'	Mineralization
J-119	6	06	109	109	6'	Mineralization
					3'	C ore
					8'	Mineralization
J-120	6	06	150	150	9'	Mineralization
					8'	B ore

Non-Core Holes

K-165	7	23 ≠ 19	116	116	Pilot Hole
K-166	7	23 ≠ 97	150	150	Pilot Hole
K-167	9	23 ≠ 50	140	140	Pilot Hole
K-168	3	03 ≠ 65	65	65	Drainage
K-169	3	03 ≠ 67	82	82	Drainage
K-170	3	03 ≠ 70	100	100	Drainage
K-171	3	03 ≠ 93	40	40	Drainage, 15 gpm
K-172	7	27	60		Pilot Hole

PLANT

MILLING

Statistical Summary

Days Worked	21-1/3
Tons Milled	53,553
Tons Per Day	2,511
Tons Per Operating Hour	107.54
Mill Operating Time, % of Scheduled	97.66

	ZINC	LEAD
Tons of Concentrates	2,418	313
Tons of Concentrates Per Day	113	15
Concentration Ratio	22.1	171

Metallurgical Comparison

	SEPTEMBER 1957	1st 6 Mos. 1957 Avg.
Feed - % Zinc	3.07	3.32
% Lead	0.53	0.67
% A A Sol Zn	0.18	0.14
Zinc Conc. - % Zinc	61.05	60.62
% Lead	0.45	0.73
% Zinc Recovery	89.67	92.41
Lead Conc. - % Lead	71.21	75.34
% Zinc	3.77	2.73
% Lead Recovery	78.25	78.27

Zinc metallurgy during September suffered as a result of decrease in feed grade and continued high oxidized zinc in the ore.

Satisfactory lead metallurgy was achieved during September despite the fact that lead feed grade dropped to the lowest point since August, 1956. Lead recovery was normal. Lead concentrate grade was slightly lower than the desired grade of 72-73%.

Non-Operating Mill Time

	HOURS	
	West	East
Weekend & holiday shutdowns and startups	210.00	210.00
Scheduled repairs	6.33	13.92
Waiting for ore	--	--
Emergency Lost Time	2.41	1.24
Total	218.74	225.16

Distribution Emergency Lost Time

Cause	HOURS West	East
Tightening bolts in 8x12 Marcy Mill Feed chute gasket	-	.17
Tightening bolts in 8x12 Marcy Mill ring liners feed & discharge end		.42
Replacing & tightening 8x12 Marcy Mill shell liner bolts		.40
Tightening bolts in Tricone extension piece	1.17	--
Replacing Symons crusher feed plate	.75	--
Symons crusher feed chute choked	--	.25
Cleaning ore bin for chute repair	.33	--
Miscellaneous	.16	--
Total	2.41	1.24

Mill Operation

The comparison test between Reagents 303 and 325 was resumed on September 9 in order to obtain more data for evaluating metallurgical results of the two reagents.

The east 4x10 Marcy Regrind Mill was returned to operation on September 3 bringing the flotation circuit back to normal.

On September 16, a new repair day schedule was begun in which the east and west units are repaired on the same day at two-week intervals rather than repairing one unit each week as was the former practice.

Mill Maintenance

Two major maintenance jobs were completed during September:

1) The west ore bin discharge chute liner plates were removed and replaced with used 4x10 Marcy Mill shell liner plates.

2) The pipeline on the Bunker Hill tailings dam was raised eight feet in order to build up the dam level.

Engineering and Construction

Ivanhoe Development - Approp. 7593

Approximately 750 tons of limestone was hauled from Austinville and washed into various sink holes along Painter Branch in Ivanhoe.

Limestone

Shipped by	TONS		COST PER TON	
	September 1957	1st 6 Mos. 1957 Avg.	September 1957	1st 6 Mos. 1957 Avg.
Trucks	4,647	7,230	$ .156	$ .158
R. R. Cars	20,647	12,086	.187	.208
TOTAL	25,294	19,316	$ .308	$ .348

Personnel

There were two quits in the Mine Department and no additions to the hourly payroll. A Plant Engineer was added to the salary payroll.

Safety

The mill division held a safety meeting for supervisors and other employees.

A film and safety graphs have been obtained for the Mine Department for scheduled October safety meetings.

Cost Summary

Mining

	Cost Per Ton			
	September		1st 6 Mos. 1957 Avg.	
Deadwork (Absorption)	$.500		$ .500	
Breaking	.372		.334	
Handling	.292		.265	
Hauling	.273		.300	
Gen. Breaking Expense	.154		.179	
Gen. Mining Expense	.761		.716	
		$ 2.352		$ 2.294

Milling

Coarse Crushing	.019		.023	
Fine Crushing	.081		.057	
Grinding	.212		.211	
Flotation	.176		.169	
Filtering, Drying and Handling Conc.	.054		.047	
Tailings Disposal	.026		.016	
Undistributed	.117		.105	
		.685		.628

General Indirect

Plant Expense	.825		.671	
Taxes & Insurance	.025		.021	
Depreciation	.220		.184	
Depletion	.043		.045	
Amortization of Spare Parts	.027		.023	
		1.140		.944
Total Cost Per Ton Crude		$ 4.172		$ 3.866
Total Cost Per Ton Concentrates		$81.806		$67.065

The marked increase in cost per ton of concentrates followed the lower grade of crude ore produced.

Costs were also adversely affected by increased mill maintenance (4x10 Marcy Mill and Gyrasphere crusher), holiday pay (Labor Day), and the smaller tonnage of crude ore hoisted.

Exploration Geology

Diamond Drilling Summary

Area		Footage
James-Woodruff	DMEA Contract	568
Williams Property (Galena)	" "	523
	Total	1091

Diamond Drilling

James-Woodruff

Hole No.	Footage	Results
JW-21	497	4' Est 1-2% Zn, 2' Est 2% Zn, bottomed in Ribbon at 550'.
JW-22	71	Incomplete; in Austinville Member

Williams Property

CW-1	125	Barren - Bottomed in Austinville at 1000'
CW-2	398	Barren - Bottomed in Austinville at 398'

Competitor's Activities

The U. S. Steel Company has apparently abandoned their office in Marion, Virginia. The personnel from this office has been sent to various offices. Mr. Homer Furguson, who was in charge at Marion has gone to their Pittsburg Office.

Virginia Piedmont

Four additional holes were drilled on the Bondurant Area (DMEA) in Buckingham County, completing the planned program there. A twenty foot wide mineralized zone containing submarginal lead and zinc values and extending at least 1400 feet along strike has been outlined by this drilling. Assay returns are still incomplete.

Geochemical and PEM reconnaissance surveys were made on the sites of four airborne anomalies in Spotsylvania and Louisa Counties. PEM response was weak or one-sided in all cases.

Deep drilling of the Arminius ore was contracted to Longyear. The beginning of October was set as the starting date.

Negotiations continued with Earl Dickinson in Louisa County.

Negotiations were begun for property options in the area of airborne anomaly 48, Buckingham County.

Status of Capital Expenditures

September, 1957

Project & Job No.	Amount Authorized	Current Expenditures	Spent to Date	Unexpended Balance
Ivanhoe Development - 7593	$ 3,250,000	$ 39,550	$ 3,160,900	$ 89,100
Arminius Mine Development - 7790	465,000	11,710	432,550	32,450
Brown Orebody Ventilation and Power - 7925	28,000	---	19,730	8,270
Addl. Mine Pumping - 7th Level 7980	47,000	5,650	9,150	37,850

cc: Mr. A. R. Flinn
Mr. S. S. Goodwin
Mr. E. J. Flynn
Austinville (3) ✓ - 2821

Mill Notes - September, 1957

Miscellaneous Data

Shifts Worked	64
Mill Feed - % Moisture	1.99

Meterological Observations

Outside air temperature, °F @ 7:00 AM -	Average	62
	Maximum	69
	Minimum	42
Precipitation, Inches	Total	8.38
	Maximum (9/16/57)	2.07

Industrial Water Supply (Mine Water)

	Average	Maximum	Minimum
Turbidity, LaMotte Std. @ 9:00 A.M.	38	60	- 5
pH @ 9:00 A.M.	7.7	7.7	7.5

Power for Grinding

	KWH Per Ton
Symons Crusher	.220
Gyrasphere Crusher	.270
8x12 Marcy Rod Mills	5.486
Tricone Ball Mills	2.500
4x10 Marcy Regrind Mill	.324
Total	8.800

Composite Screen Analysis of Flotation Feed

	Mesh	Cumulative % Retained
On	48	2.8
	65	10.5
	100	25.6
	150	38.6
	200	50.0
	270	55.9
Minus	270	44.1

General Plant Maintenance

The Pittman bearing of the mine crusher became hot on A shift, 9/25/57. The bearing cap was removed and scraped during the B shift. The crusher was out of service for 7 hours. The cause of this failure was obscure, but was thought to be a result of failure of the operator to lubricate properly.

Roller chain drives have been ordered for the frequency generators on the Lidgerwood and Vulcan hoists.

Motor, serial #359511, has been revised and will be installed on the Lidgerwood hoist early in October.

Real Estate Maintenance

Painting of the interior of House #409 was completed.

The interior of house #212 was painted and exterior trim and repair was done in preparation for occupancy by a new tenant.

The conversion of House #201 was completed except for rocking the parking lot and planting grass. An oil burning hot-air furnace has been installed, three rooms repainted, and two additional interior doorways installed.

Mill Maintenance Notes - September, 1957

9/3/57 - Routine repair of the east unit.

Replaced south side wear plate on apron feeder.

Replaced south side and back wear plates on Gyrasphere crusher discharge chute.

Repaired No. 1BW tailing booster pump. Replaced the suction sleeve, suction bell liner and installed a rebuilt suction bell.

Repaired No. 5AW zinc middling pump. Replaced the suction sleeve, suction bell liner and installed a rebuilt suction bell and a used impeller.

Repaired Symons screen. Replaced the cross bars and rubber spacers.

The east 4x10 Marcy Mill was put back in the circuit.

Began stocking whole tails at Bunker Hill.

Welded missing flight in zinc concentrate dryer.

9/4/57 - Installed safety guard under Rock House cross belt drive chain.

Installed guard on west 4x10 Marcy Mill motor.

9/10/57 - Replaced diaphragm on lead thickener ODS pump.

9/14/57 - Replaced wear plates in the west ore bin discharge chute. The job was done on overtime and required 9 hours for completion by 4 mechanics. It was necessary to operate the West Unit intermittently for 2 hours after the usual shutdown time in order to clean the bin.

9/16/57 - Routine repair of the east and west units.

Tightened west apron feeder 1-1/4".

Replaced east and west 8x12 Marcy Mill trommel screens.

Replaced five outer wear shoes on east spiral classifier.

Installed new cover on east Tricone mill scoop box.

Replaced 3 bolts in west Tricone mill scoop extension.

9/19/57 - The flocculating tank at the drinking water plant was cleaned and the filter tank was cleaned and painted down to the sand level with one coat of phenol resin zinc dust paint.

9/20/57 - A new shell liner, suction sleeve and impeller were installed in the west zinc middlings pump.

9/21/57 - Replaced the ball check valve on the lead thickener pump.

9/23/57 - Installed a rebuilt feed plate on the west Symons crusher.

Replaced the shell liner, suction sleeve, suction bell liner and impeller on the east zinc middlings pump.

9/24/57 - Replaced the east zinc cleaner cell froth paddle shaft and two paddle shaft bearings.

9/27/57 - Completed raising the Bunker Hill tailings dam pipeline. The old section of the pipe was raised a distance of 8 feet through its whole length on the same grade as its original position. Approximately 200 feet of pipe was added to the southwest end of the pipe in order to extend the dam. This pipe was installed on a 1.75% grade.

9/30/57 - Routine repair of the west and east units.

Turned wear plate in Symons crusher feed chute.

Replaced the dryer discharge conveyor belt with a used section of belt.

Replaced the Gyrasphere conveyor belt. The belt removed was installed 7/5/55.

Installed a ball feeder to the east Tricone mill scoop box. This feeder allows dropping of a small charge of balls into the open end of the scoop as it rotates, allowing the mill to be charged during operation. Charging the east mill by this method began on 9/30.

In an attempt to stop a race inside the discharge end of the east 8x12 Marcy Mill shell, approximately 6 or 8 short round bars were inserted between the discharge ring liner and the end of the lifter bars and welded in place to the ring liners. It is felt that these rods will block the muck race and prevent further wear.

Maintenance Notes - September, 1957

Machine Shop

9/4 - Because of a worn out casing, #5D mine pump was removed and replaced with a new casing and a rebuilt shaft assembly. This was the original casing which was in service a total of 13,488 hours. The assembly which was removed had run a total of 2,316 hours. The cost of the casing and rebuilding the shaft assembly was $622.23 for parts and $76.78 for labor, making a total cost of $699.01 for the job.

9/11 - Set up mine crusher 1/4", making a total of 1-1/2" shims.

9/18 - Repaired rings, welded up breaks and tightened bolts in 700 level car dumper, Van Mater Shaft.

Due to bearing failure, the shaft assembly in #2A industrial water pump was removed and replaced with a rebuilt assembly. The assembly which was removed had run a total of 426 hours and was rebuilt at a cost of $11.82 for parts and $25.30 for labor, making a total cost of $37.12.

9/23 - Inspected and cleaned the powermaster steam generator which supplies emergency heat to the chemical laboratory building.

9/24 - Cleaned, inspected and relubricated the #2595, Model 12B Eimco rocker shovel.

Changed oil in the #6 and #7 Ingersoll-Rand XLE air compressors at the Ivanhoe plant.

Cleaned Ivanhoe boiler internally and externally. Cleaned and checked water level controller.

9/25 - On the regular weekly inspection ofthe mine crusher, the Pittman bearing cap was found to be running hot. After failing to cool the bearing down by pumping extra grease into it during the day shift, the cap was removed at shift's end for inspection.

The babbitt had started to pull in the cap and the greaseways clogged by the pulled babbitt.

The bearing was scraped down and the greaseways cleaned with the crusher being put back into service at 10:00 P.M.

The crusher was out of service approximately 7 hours for this job.

9/26 - Cut 5' from the Flatwoods hoist cables, the hoist being out of service 2 hours for this job.

9/28 - Cut 16' from the Ivanhoe hoist cables and installed 6 new counterweight wearing shoes.

9/30 - Because of water seal failure the shaft assembly in #6B mine pump was removed and replaced with a rebuilt shaft assembly. The assembly which was removed had been in service a total of 979 hours and was rebuilt at a cost of $87.98 for parts and $23.00 for labor, making a total cost of $110.98.

Maintenance Notes - September, 1957

Electric Shop

9/4 - Replaced 5D pump motor, 200 HP, Serial No. 107647. Bearings were damaged.

9/5 - Overhauled spare 5D pump motor. Cleaned and checked winding; also replaced bearings after refinishing shaft.

9/6 - Replaced 15 HP slusher motor that was damaged by blasting on 6th level Van Mater Shaft.

Changed oil on all sleeve bearing pump motors in mines.

9/10 - Replaced all the brushes on collector rings on the north motor of the Vulcan hoist.

9/10 - Replaced float switch on 3rd level pump control.

9/11 - Repaired telephones in Van Mater Shaft.

Completed electric wiring to new addition of main office including heating system controls

9/12 - Installed new set of armature brushes in exciter to #4 air compressor.

Replaced Atlas locomotive motor on 4th level. The armature winding was burned.

9/13 - Repaired antenna to radio cage phones in Ivanhoe shaft.

Installed remote push-button control to ventilation fan at Ivanhoe vent shaft.

9/17 - Overhauled Edison C-8 locomotive batteries.

9/18 - Overhauled Lidgerwood hoist motor Serial #359-511. Installed complete set of type MBE brushes, National Electric Coil Co. Installed new collector rings.

9/19 - Removed old fused lighting panel and installed new breaker type panel in mill on west side.

9/20 - Checked and cleaned surface and underground sub-station switch gear breakers.

9/23 - Checked and cleaned all electric starting equipment at the 7th level pumping station.

9/24/57 - Installed 15 HP electric slusher on 4th level at Flatwoods Shaft.

9/27 - Installed lights and 3-way control switches for new stairway lighting in rock house.

WSH (2)
JEP

CONCENTRATE LOADING COSTS

September, 1957

	SEPTEMBER, 1957		1st 6 Mos. 1957 Average	
Tons	2716	Per Ton	3538	Per Ton
Labor	$ 338.81	$ .125		$ .111
Supplies	1.08	.000		.001
Tractor	15.04	.006		.008
Payloader	21.84	.008		.011
Total	$ 376.77	$ .139		$ .131
Maintenance	--	--		.011
Total on Cars	$ 376.77	$ .139		$ .142

SHIPMENTS

	TONS		TONS	
	Zinc	Lead	Zinc	Lead
Dried & Filtered	2368	348	3112	426
Wet	--	--	--	--
Totals	2368	348	3112	426
Total Tonnage	2716		3538	

10/2/57

COPY

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MONTHLY REPORT
AUSTINVILLE, VA.
August, 1957

SUMMARY OVERALL OPERATION

Production	Obtained	Scheduled Estimate
Crude Ore		
Tons	62,609	62,600
% Zinc	3.34	3.30
% Lead	0.59	0.60
Zinc Concentrates	3,117	3,149
Lead Concentrates	402	390
Costs		
Per Ton Concentrates	$67.15	$70.00
Per Ton Crude Ore	3.77	4.00
Payroll Total Number ---- (End of Month)	521	

MINING

Statistical Summary

General

Working Days	22
Men on Payroll	293
Percent Attendance	96.8
Manshifts Worked	5,696

Production

Tons Hoisted	62,609
Tons Broken	62,593
Broken Reserve	2,770
Production Shifts	3,908

Deadwork and/or Development

Feet Advanced	581
Cubic Feet	7,806
Deadwork Shifts	414
Diamond Drilling Feet	1,404

Operating Efficiencies

Tons Hoisted Per Day	2,846
Tons Hoisted Per Shift Worked	10.99
Tons Hoisted Per Production Shift	16.02
Tons Broken Per Drill Shift	56.90
Tons Obtained Per Slusher Shift	81.24
Tons Obtained Per Loading Shift	216.41
Tons Obtained Per Bulldozing Shift	234.44
Tons Obtained Per Hauling Shift	216.41
Car Factor	4.05
Skip Factor	5.859

Waste Handling

Cubic Yards Waste Hoisted -		Cars
Austinville	2,076	1,510
Ivanhoe	5,627	1,895
	7,703	

Safety

Lost Time Accidents	1
Number Days Lost	1
Frequency	20.1
Severity	3395.2

Pumping

Daily Power Consumption	24,135
Gallons Pumped/Minute (Calculated)	
Austinville	6,115 GPM
Ivanhoe	900 GPM

The hydrological survey completed during July was plotted in August. As compared to the previous survey in March, there was little change in the water table. However, the elevation of the water table over the 71491 XC was the lowest in a two-year period.

Rainfall

Total Precipitation 0.74"

Development & Deadwork

Summary

Austinville

Level	Drifts & X Cuts	Sublevels	Raises	Total	Cubic Footage
4			33'	33'	
6	50'		17'	67'	148
7	42'	18	120'	180'	2094
11	288'		13'	301'	1616
12					3948
TOTAL	380'	18	183'	581'	

Ivanhoe

4		50'		50'	
5			39'	39'	9638
6					816
7	343'			343'	
9	151'			151'	
10	167'			167'	896
11			97'	97'	
TOTAL	661'	50'	136'	847'	11,350

Austinville

The 1202 waste pass to the 11th level was stripped to completion and will be in use in September.

Ground and ditch water in 71491 X-Cut has been brought under temporary control, and tunnel liner installation will be commenced in September.

Ivanhoe

The installation of ladders in the vent raise has been completed between the 3rd and 11th levels.

Work is in progress on ore pass and ventilation raises from the 11th level to the I-107 orebody.

Stoping - Ore Extraction

Production Summary

Level	No. of Stopes Drawn	Tons Broken	Tons Obtained
4	4	8,961	9,011
5	8	16,271	15,521
6	4	7,522	7,522
7	13	29,786	29,786
8	1	53	53
Total		62,593	61,893

Development Ore Obtained - -		716
GRAND TOTAL		62,609
No. of Stopes Working	25	
No. of Stopes Available	29	

The transition from three to two-shift operation is essentially complete at Austinville and a production rate of 2800 tons per day with a slight increase in ore grade seems very probable.

Mine Geology

Diamond Drilling Summary

	No. of Holes	Shifts	Feet Cored	Feet Non Coring
Austinville	11	22	817	587
Ivanhoe	10	22	540	722
Total	21	44	1357	1309

Austinville

Holes drilled to delineate ore

Hole No.	Area	Lev.	Sect.	Feet Drilled	Bot.	Results
U-833	Southwest	3	40	0	124	7' 2.4% Zn, Tr Pb
U-835	Southwest	3	12	0	135	2' 5.6% Zn, Nil Pb
						8' Dead
						11' 6.2% Zn, 1.0% Pb
						49' Dead
						2' 10.3% Zn, Nil Pb
U-836	Southwest	5	14	0	118	5' 1.2% Zn, 1.7% Pb
						34' Dead
						5' Nil, 0.2% Pb
						6' Dead
						24' 3.1% Zn, 0.4% Pb
U-837	Southwest	3	08	77	77	Dead
U-838	Southwest	5	24	130	130	"
U-839	Northeast	5	13	100	100	"
U-840		2	00	80	80	14' Mineralization
U-841	Northeast	5	115	155	155	28' Mineralization
						13' A Ore
U-842	Flatwoods	7	169	0		Collared only
U-843	Northeast	5	113	22		Dead

Non Cored Holes

Hole No.	Level	Section	Feet Drilled	Bottomed	Results
NC-347	11	38	87	185	Pilot Hole
NC-348	11	49	500	500	Pilot Hole

Ivanhoe

Holes drilled to delineate ore

Hole No.	Level	Section	Feet Drilled	Bottomed	Results
J-106	11	06	14	172	Barren

Hole No.	Level	Section	Feet Drilled	Bottomed	Results
J-107	11	19			
J-108	9	01			July drilling; Assays: 38' 8.6% Zn 1.9% Pb
					July drilling, assays; 7' 6.7% Zn, 1.0% Pb 9' Barren 2' 1.8% Zn, 0.2% Pb 14' Barren 2' 5.6% Zn, 1.0% Pb 12' Barren 25' 16.2% Zn, 2.7% Pb
J-110	6	02	29	152	
J-111	6	00	262	262	July drilling, assays: 4' 3.4% Zn, Nil Pb 6' A ore 68' Barren 12' B ore 2' Low A 13' Barren 4' A ore Barren
J-112	6	06	135	135	
J-113	6	06	100	-	
Non-Core Holes					
K-160	9	19 ∠ 20'	130	130	Pilot Hole
K-161	7	18 ∠ 38'	110	110	Pilot Hole
K-162	7	21	125	125	Pilot Hole
K-163	9	21 ∠ 24'	142	142	Pilot Hole
K-164	10	05 ∠ 60'	215	215	Pilot Hole

PLANT

MILLING

Statistical Summary

Days Worked	23-2/3
Tons Milled	62,609
Tons Per Day	2,645
Tons Per Operating Hour	113.02
Mill Operating Time - % of Scheduled	97.97

	Zinc	Lead
Tons of Concentrates	3,117	402
Tons of Concentrates Per Day	132	17
Concentration Ratio	20.1	156

Metallurgical Comparison

		August 1957	1st 6 Mos. 1957
Feed	- % Zinc	3.34	3.32
	% Lead	0.59	0.67
	% Acetic Acid Sol. Zn	0.18	0.14
Zinc Conc.	- % Zinc	61.16	60.62
	% Lead	0.42	0.73
	% Zinc Recovery	91.11	92.41
Lead Conc.	- % Lead	72.22	75.34
	% Zinc	3.61	2.73
	% Lead Recovery	78.81	78.27

Zinc metallurgy during August was normal. Zinc recovery decreased slightly as a result of an increase in oxidized zinc in the ore.

Lead metallurgy returned to normal during August. The lead concentrate grade decreased and the percent zinc in the lead concentrate increased slightly as a result of continued efforts to increase lead recovery.

Non-Operating Time - Mill

Cause	Hours West	Hours East
Weekend shutdowns & startups	178.58	178.58
Scheduled Repairs	5.33	11.59
Emergency Lost Time	1.16	4.83
TOTAL	185.07	195.00

Distribution Emergency Lost Time

Cause	Hours West	Hours East
Tightening bolts in Tricone Scoop extension piece	.50	--
Replacing & tightening 8x12 Marcy Mill shell liner bolts	--	.67
Replacing broken apron feeder shaft	--	3.00
Replacing apron feeder starter switch	--	.50
Repairing gyrasphere conveyor tail pulley shaft	--	.25
Symons crusher feed chute choked	.25	--
Miscellaneous	.41	.41
Total	1.16	4.83

Mill Operation

No changes were made in mill operation during August. Tonnage milled per operating hour declined due to the restricted ore supply from the mine. The zinc middlings from both units continued to be fed to the west 4x10 regrind mill and the return split as in the past several weeks.

Mill Maintenance

Three major repairs were made during August:

1. A new feed scoop was installed on the east Hardinge mill.

2. A new pan feeder assembly and tail shaft assembly were installed in the east unit.

3. The shell liners, scoop tip and feed end trunnion liner were replaced in the east 4x10 regrind mill.

Engineering & Construction

Additional Mine Pumping - Appropriation 7980

Preparation of drawings was in progress during the month. A carload of spiral welded pipe and fittings was received.

Ivanhoe Development - Appropriation 7593

A 2-inch pipe line was constructed from the Ivanhoe Shaft to the business area of Ivanhoe and approximately 390 tons of limestone was washed into a sink hole in an attempt to prevent subsidence of the surrounding area.

Limestone

Shipped By	Tons August	Tons 1st 6 Mos. 1957 Avg.	Cost Per Ton August	Cost Per Ton 1st 6 Mos. 1957 Avg.
Trucks	8,559	7,230		
R. R. Cars	18,059	12,086		
TOTAL	26,618	19,316	$ .257	$ .348

Personnel

One salaried employee in the Personnel Department was transferred to the New York Office. One Service Department salaried employee retired as of August 31, and one Plant Department (Mill Division) salaried employee resigned during the month.

Safety

The Plant Department held a safety meeting for foremen and other employees.

The Plant Chief and Mine Chief attended a one-week safety training course for supervisory personnel, sponsored by the Virginia Manufacturers Association and conducted by the Virginia Department of Labor and Industry. Several foremen attended one-day sessions of this course.

Cost Summary

Mining	Cost Per Ton August	Cost Per Ton 1st 6 Mos. 1957 Avg.
Deadwork (Absorption)	$ .500	$ .500
Breaking	.333	.334
Handling	.266	.265
Hauling	.222	.300
Gen. Breaking Expense	.163	.179
General Mining Expense	.612	.716
	$ 2.096	$ 2.294
Milling		
Coarse Crushing	.025	.023
Fine Crushing	.082	.057
Grinding	.166	.211
Flotation	.182	.169
Filtering, Drying & Handling Conc.	.049	.047
Tailings Disposal	.013	.016
Undistributed	.096	.105
	$ .613	$ .628
General Indirect		
Plant Expense	.788	.671
Taxes & Insurance	.021	.021
Depreciation	.188	.184
Depletion	.045	.045
Amortization of Spare Parts	.023	.023
	$ 1.065	$ .944
Total Cost Per Ton Crude	$ 3.774	$ 3.866
Total Cost Per Ton Concentrates	$67.148	$67.065

The slightly lower cost per ton of crude ore followed a reduction in mine maintenance expenditures and the gradual improved efficiency in two-shift mine operation.

Costs were adversely affected by increased mill maintenance, the greater vacation expense and increased group insurance premiums.

Exploration Geology

Diamond Drilling Summary

Area		Footage
James-Woodruff	DMEA Contract	931
Williams Property (Galena)	" "	450
	Total	1,381

Diamond Drilling

James-Woodruff

Hole No.	Footage	Results
JW-18	134	5' 0.6% Zn - Bottomed at 134 in Ribbon Member.
JW-19	422	3' 1.6% Zn, 17' trace ZnS, bottomed in Ribbon at 422'.
JW-20	322	Barren - bottomed at 322' in Ribbon Member.
JW-21	53	Incomplete; in Austinville Member

Williams Property (Galena)

CW-1	450	Incomplete at 875', in Austinville dolomite

Virginia Piedmont

Three completed holes on the Bondurant Area (DMEA), in Buckingham County, showed a 20 foot thickness of weak Zn-Pb mineralization to be continuous along strike for 400 feet. Percentages of combined Zn-Pb are locally estimated to be as high as two per cent.

Anomalous geochemical areas posted during the month included: one air EM site in Buckingham County, Mattaponi River sample area 55 in Spottsylvania County, and a southwest extension of the Cofer area in Louisa County.

Re-assays of mineralized core from the Arminius surface holes showed little change from the original assays.

With the Arminius crosscut almost at the first drill station, contractors' bids were requested for the deep drilling. It was estimated 45 weeks would be needed to complete the planned program.

PEM reconnaissance on the sites of three air borne anomalies showed only weak crossovers or locally high out-of-phase response.

Experimental traverses with the new 420 cycle PLEM (powerline EM) indicated it may be a useful aid to PEM in areas of extreme powerline signals. Similar traverses with the new 880 cycle Boliden showed relatively poor response.

Agreement for a fee option was reached with Earl Dickinson in Louisa County.

Field crews of Beers, Inc. remained active in our area during the month.

WLAlbers:rjl

cc: Mr. A. R. Flinn, N. Y.
Mr. S. S. Goodwin, N. Y.
Mr. E. J. Flynn, N. Y.
✓ Austinville (3) - 24 Sept

Status of Capital Expenditures

August 31, 1957

Project & Job No.	Amount Authorized	Current Expenditures	Spent to Date	Unexpended Balance
Ivanhoe Development - 7593	$ 3,250,000	$ 48,400	$ 3,121,335	$ 128,665
Arminius Mine Development - 7790	465,000	13,700	420,845	44,155
Brown Orebody Ventilation and Power - 7925	28,000	---	19,730	8,270
Additional Mine Pumping - 7th Level - 7980	47,000	2,690	3,500	43,500

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Mr. E. J. Flynn, N. Y.
Austinville (3)

Maintenance Notes - August, 1957

General Plant Maintenance

The following progress was made during August toward revising the motors and control on the Lidgerwood Hoist:

Motor, Serial #360041 was shipped to the National Electric Coil Co. and the collector rings were replaced with maximum possible clearance of approximately 3/4" between the rings. Three hand holes were cut in the end bell of this motor to facilitate inspection and adjustment of the brushes. A new set of Ohio Carbon grade MBE brushes was installed in this motor and it was placed in service on August 24, 1957.

Motor, Serial #359511, was shipped to the National Electric Coil Co. for a similar replacement of rings on August 29, 1957. Hand-holes were cut in the end bell before shipment.

Necessary materials for converting the overload relays to hand reset were ordered.

An EC&M type ZMP relay was ordered to replace the original ICR relay.

The frequency generator drives of the Vulcan and Lidgerwood hoists were measured in preparation for ordering roller chain drives to replace the present V-belt drives.

Real Estate Maintenance

The interior of House #271 was painted.

Painting of the interior of House #409 was underway at the end of the month.

Miscellaneous exterior repair and trim painting was completed on Houses 406 through 412.

Work was started to convert House #201 into a doctor's office. The porch was rebuilt, two additional interior doors were installed, and a bumper fence was installed in the back yard preparatory to converting it into a parking lot. A contractor has been hired to install an oil burning hot air furnace in the building. A new fuel tank has been installed in preparation for the furnace installation. Construction of a concrete sidewalk and front steps is under way.

MILL NOTES - August, 1957

Miscellaneous Data

Shifts Worked	71
Mill Feed - % Moisture	1.80

Meterological Observations

Outside Air Temperature, ^{O}F @ 7:00 AM -	Average	63
	Maximum	72
	Minimum	52
Precipitation, Inches	Total	.74
	Maximum	.28 (8/18/57)

Industrial Water Supply (Mine Water)

	Average	Maximum	Minimum
Turbidity, LaMotte Std. @ 9:00 AM	36	40	- 5
pH @ 9:00 AM	7.7	7.8	7.7

Power for Grinding

	KWH Per Ton
Symons Crusher	.194
Gyrasphere Crusher	.224
8x12 Marcy Rod Mills	5.042
Tricone Ball Mills	2.296
4x10 Marcy Regrind Mill	.160
Total	7.916

Composite Screen Analysis of Flotation Feed

Mesh	Cumulative % Retained
On 48	2.8
65	10.6
100	25.7
150	38.5
200	49.8
270	55.8
Minus 270	44.2

MAINTENANCE NOTES - August, 1957

Mill

8/2/57 - Repaired the zinc concentrate pump. New parts used were a shaft, impeller, guide bearing, pump bearing, oil seals, and shell.

8/5 - Routine repair of the east unit.

Completed installation of gear splash guard on 8x12 Marcy Mill.

The scoop on the east Hardinge ball mill was replaced. Scoop #5 removed had been in service for 9,682 operating hours since January 3, 1956. During this time, the mill had ground 552,252 tons of ore.

A rubber-faced wear plate was installed in the bottom of lead rougher cell #21BE.

8/6 - The head shaft on the east apron feeder broke and was replaced.

8/7 - The 500,000 gallon water tank was cleaned and the stand pipe repaired.

8/12 - Routine repair of the west unit.

Installed wear plate in Symons screen feed chute.

Cleaned the 10,000 gallon auxiliary water tank and repaired the Eddy plug valve in the drain line.

The dryer feed screw was replaced.

8/17 - A new pan feeder and a new tail shaft assembly were installed in the east unit. A new tail shaft takeup assembly was also installed. The pan feeder removed had been in operation 28 months and had conveyed 823,141 tons of ore

8/19 - Routine repair of the east unit.

Repaired the east 8x12 Marcy Mill capacitors by installing new contacts and heater elements.

Checked backlash clearance on dryer drive gears. Found a variation from 0.036" to 0.076". Tooth depth clearance was 0.020".

Installed new baffles in dryer rotoclone.

Installed a new south cheek plate on the east Symons screen.

Installed a 6" plug valve in #7B tailing pump discharge line.

Replaced the west 10" middling cyclone with a spare 10" locally built cyclone.

8/20 - Rebuilt 7A tailing pump with a new impeller, suction sleeve and suction nipple.

8/26 - Routine repair of the west unit.

Turned 8x12 Marcy Mill discharge trammel screen. Replaced five outer wear shoes on spiral classifier. Replaced scoop tip on Hardinge tricone mill. Two missing flights were welded in the zinc concentrate dryer.

Tightened rock house apron feeder 1-1/4". Replaced the south wear plate on Gyrasphere crusher discharge chute.

8/27 - Replaced cyanide line to the west zinc cleaner with a new 1/2" rigid plastic pipe.

8/28 - Repaired 7B tailing pump. Replaced suction sleeve and seal rubber. Repaired 6A zinc concentrate pump. Replaced suction sleeve, shell liner and suction side liner.

8/30 - Extended Bunker Hill tailing dam standpipe B 18" and standpipe D 24".

Completed replacement of east 4x10 Marcy Mill shell liners, ~~and returned the mill to service~~. This job was begun on 8/19/57 and completed in 9 working shifts. The east zinc middlings were fed to the west 4x10 mill and the discharge from the west 4x10 mill was split between east and west units during the relining job.

The shell liners as removed weighed 5950 lbs. They were installed used on 6/6/55.

New shell liners were installed on a 1/8" thick rubber backing which was laid over a thick coating of Plastigum. The same feed and discharge head liners were replaced in the mill and were backed with 1/4" thick rubber belt backing rather than being zinced in as before.

It was noted that the new shell liners were concave lengthwise on the back or shell side. All the liners were warped to some degree, the maximum being about 3/8". The liners installed in the east mill appeared to be higher quality castings than those installed in the west mill on 4/8/57. No blow holes were

found in the castings as were found in the set installed in the east mill and the warpage was not as great as in that set.

During the shell lining job a new feed end trunnion liner and feed scoop tip were also installed.

Machine Shop Maintenance Notes - August, 1957

8/3/57 - Repaired Birdsboro mine crusher, replacing five worn out grizzly fingers, one wedge block bolt, and three cheek plate bolts. The fingers removed were the original ones installed with the new crusher in October, 1953.

The #3 air compressor at the Van Mater Shaft was checked. Both main bearings, crank bearings, crosshead pin bearings and slide shoes were adjusted to eliminate knocks. The lubrication system was checked over and cleaned.

8/6 - Repaired Granby mine car axle with 2 new wheels and bearings. Trouble was due to bearing failure.

8/7 - The 500,000 gallon industrial water tank was given the annual cleaning and inspection. The tank had approximately 3 feet of mud in it. The paint in the lower part of the tank was in fair condition, but it was beginning to scale on the upper section. This should be checked closely on the next annual inspection. The tank was out of service about 8 hours for the job. The job was done without interrupting the operation of the mill or air compressors by pumping directly from the 2nd level pumps into the mill water main.

8/8 - The #2 Sullivan air compressor at the Van Mater Shaft developed a knock on starting up. A set of rebuilt H. P. valves and both H. P. atmospheric relief valves were installed to stop the knocking. All the bearings were checked and adjusted to eliminate knocks.

Flushed out all fire mains and repacked fire pump (upper plant).

8/10 - Inspected and cleaned innercoolers in #5 air compressor at Flatwoods shaft and #6 and #7 compressors at Ivanhoe. Changed oil in Vulcan ore hoist speed reducer.

8/13 - Repaired Granby mine car which had wrecked in bulkhead door. Installed new gate, etc.

8/16 - Made yearly inspection of all fire fighting equipment. Discharged and recharged all foamite and soda-acid extinguishers, tested all fire hose, packed stems, cleaned threads and repainted all fire plugs.

8/17 - Cleaned 50,000 gallon water tank at Ivanhoe. The tank had approximately 2 feet of mud. The paint was inspected and found to be in good condition.

Due to bearing failure, the shaft assembly in #2A industrial water pump was removed and a rebuilt assembly installed. The

defective assembly was in service a total of 1671 hours and was rebuilt at a cost of $193.59 for parts and a labor cost of $27.90 making a total cost of $221.49.

8/21 - Inspected and tightened all headframe bolts at Ivanhoe shaft.

8/26 - Installed a rebuilt ore skip on the north side of the Van Mater Shaft. The skips were out of service 1 hour and 55 minutes for the job. The skip removed had been in service since 3/11/57.

8/27 - Installed new brake shoes on Greensburg locomotive on the 7th level. The shoes removed had been in service since 3/7/57.

8/31 - On the weekly inspection of the 11th level mine crusher, the welded angle clips holding the 8" supporting beams under the car dumper hooper was found to be breaking loose. The mechanics came in on "B" shift to replace loose bolts and weld on new, heavier clips in the places where the lighter clips were breaking loose. They also replaced four worn cheek plate bolts in the crusher and changed oil in the drive speed reducer.

Electric Shop Maintenance Notes - August, 1957

8/1 & 2 - Installing water still on the 7th level at the Ivanhoe Shaft.

8/2 - Transferred one small charging panel from the 7th to the 11th level; transferred one large charging panel from the 11th level to the 7th level at Ivanhoe.

8/5 - Weekly mill repair.

8/7 - Installing 440 volt cable feeder line to 25 HP electric slusher; also lights and starting equipment at the Ivanhoe shaft.

8/8 - Repaired telephones on the 7th and 11th levels at the Ivanhoe shaft.

Replaced Howe flow switches in water line to air compressors at the Ivanhoe shaft.

Removed 15 HP electric slusher and all starting equipment on the 6th sublevel of the Flatwoods shaft.

8/9 - Repaired burned wiring on Greensburg locomotive on the 11th level of the Van Mater Shaft.

Replaced circuit breaker to pan feeder motor starting equipment in mill.

Electric Shop Maintenance Notes - August, 1957

8/12/57 - Weekly mill repair.

Replaced broken magnet arm on 7A contactor Vulcan hoist.

8/13 - Repaired centrifugal switch to laboratory sample crusher motor.

8/14 - Replaced 15 HP electric slusher motor at Flatwoods shaft. Motor winding was burned.

8/15 - Repaired burned wiring on battery charging rectifier at Ivanhoe shaft.

8/16 - Replaced blowout coil on 4-ton Atlas locomotive controller 7th level Van Mater shaft.

8/19 - Replaced burned contacts on A.B. starter to 8x12 Marcy Mill capacitor control.

8/19 - Cleaned and checked 440 volt main line feeder switches to crushers and grinding mills in subway.

8/20 - Replaced flood lamps and sockets at the crusher station on the 11th level.

8/23 - Transferred Atlas locomotive and batteries along with battery charging panel, from the 7th level to the 11th level.

8/24 - Removed Lidgerwood south hoist motor Serial #359-511 to be altered, overhauled. Installed in place motor Serial #360041 after it had been altered or overhauled with new collector rings spaced to maximum clearance between rings total of approximately 3/4". Holes were cut in the end bell and bearing bracket to give workable access to brushes and rings.

8/27 - Transferred Greensburg locomotive and battery; also Syntron battery charging rectifier from 11th level to 7th level.

8/29 - Replaced burned Atlas 4-ton locomotive motor 7th level.

Repaired Copco mine flood light lamps.

WSH (2)
JEP

CONCENTRATE LOADING COSTS

	AUGUST, 1957		1st 6 Mos. 1957 Average	
Tons	3628	Per Ton	3538	Per Ton
Labor	$ 368.40	$ .102		$ .111
Supplies	1.07	.000		.001
Tractor	27.32	.007		.008
Payloader	54.75	.015		.011
Total	$ 451.54	$ .124		$ .131
Maintenance	65.04	.018		.011
Total on Cars	$ 516.58	$ .142		$ .142

SHIPMENTS

	TONS		TONS	
	Zinc	Lead	Zinc	Lead
Dried & Filtered	3173	455	3112	426
Wet	--	--	--	--
Totals	3173	455	3112	426
Total Tonnage	3628		3538	

9/5/57

X 1066 150M

Plant Dept

COPY

MONTHLY REPORT
AUSTINVILLE, VA.
JULY, 1957

SUMMARY OVERALL OPERATION

Production	Obtained	Scheduled Estimate
Crude Ore		
Tons	37,385	63,800
% Zinc	3.26	3.30
% Lead	0.60	0.60
Zinc Concentrates	1,833	3,496
Lead Concentrates	223	368
Costs		
Per ton Concentrates	$63.57	$70.00
Per ton Crude Ore	3.50	4.00
Payroll total number ---- (End of Month)	526	

MINING

Statistical Summary

General

Working days	13
Men on payroll - end of month	294
Percent attendance	95.02
Manshifts worked	3,694

Production

Tons hoisted	37,385
Tons broken	34,369
Broken reserve	3,270
Production shifts	2,581

Deadwork &/or Development

Feet advanced	290
Cubic feet	382
Deadwork shifts	293
Diamond drilling feet	803

Operating Efficiencies

Tons hoisted per day	2,879
Tons hoisted per shift worked	10.12
Tons hoisted per production shift	14.48
Tons broken per drill shift	51.96
Tons obtained per slusher shift	77.2
Tons obtained per loading shift	233.3
Tons obtained per bulldozing shift	287.2
Tons obtained per hauling shift	227.31
Car Factor	4.20
Skip Factor	5.811

Waste Handling

Cubic Yds. waste hoisted -	
Austinville	985
Ivanhoe	4,140
	5,125

Safety

Lost time accidents	0
Number days lost	0
Frequency	-
Severity	2617.18

Pumping

Daily power consumption		22,525
Gallons pumped/minute (calculated)		
	Austinville	6,030
	Ivanhoe	890

A complete hydrological survey of Austinville and Ivanhoe was conducted during July.

Rainfall

Total precipitation	3.48"

Development & Deadwork

Summary

Austinville

Level	Drifts & X Cuts	Sublevels	Raises	Total	Cubic Footage
6	36'			36'	
7	49'		32'	81'	382
11	103'		59'	103'	—
	188		91	220	382

Ivanhoe

Level	Drifts & X Cuts	Sublevels	Raises	Total	Cubic Footage
3	19'			19'	
4	18'			18'	1,728
5			33'	33'	3,820
7	209'			209'	
9	91'			91'	
10	99'			99'	192
	436		33	469	5,740

Austinville

The 1202 waste pass raise was completed, and pending completion of 11th level waste dumping and 12th level waste loading, facilities should be available for use in late August.

Ivanhoe

The ventilation raise is complete except for ladder and brattice installation from the surface to the 11th level.

Stoping - Ore Extraction

Production Summary

Level	No. of Stopes Drawn	Tons Broken	Tons Obtained
4	5	4,981	4,956
5	8	8,699	10,124
6	4	2,818	3,969
7	12	17,386	17,490
8	1	512	512
TOTAL	30	34,396	37,051
Development ore obtained --			334
		GRAND TOTAL	37,385

No. of Stopes Working 26
No. of Stopes Available 30

Mine Geology

Diamond Drilling Summary

	No. of Holes	Shifts	Feet Cored	Feet Non Coring
Austinville	6	26	473	330
Ivanhoe	10	26	404	635
Total	16	52	877	965

Austinville

Holes drilled for delineation of ore

Hole No.	Area	Lev.	Sect.	Feet Drilled	Bot.	Results
U-831	Southwest	3	42	45	125	32' 3.5% Zn 0.2% Pb 14' Dead 10' 11.8% Zn 8.7% Pb
U-832	Brown OB	7	93	175	272	52' 3.4% Zn 4.1% Pb
U-833	Southwest	3	40	124	124	7' A ore
U-834	Southwest	3	42	129	129	Dead

Non Cored Holes

Hole No.	Level	Section	Feet Drilled	Bottomed	Results
NC-346	11	38	232	232	Pilot Hole
NC-347	11	38	98		Pilot Hole

Ivanhoe

Holes drilled for delineation of ore

Hole No.	Level	Section	Feet Drilled	Bottomed	Results
J-64	9	02 ∠ 2	39	140	18' mineralization
J-106	11	06	12		Barren June drilling - assays Late Assays 5' 4.3% Zn 0.3% Pb 5' 0.2% Zn Tr Pb 12' 1.4% Zn 0.1% Pb
J-107	11	19	41	251	4' A ore 17' C ore 5' mineralization June drilling - assays 50' 2.2% Zn 1.0% Pb

Hole No.	Level	Section	Feet Drilled	Bottomed	Results
J-108	9	01	130	130	7' B ore 9' Barren 2' A ore 14' Barren 2' B ore 12' Barren 25' C ore
J-109	6	00	58		3' A ore 11' Mineralization
J-110	6	02	123		41' Barren 9' Mineralization 37' Barren 6' Mineralization

Non-Cored Holes

K-156	9	17 ∠ 4	125	125	Pilot Hole
K-157	7	16 ∠ 27	135	135	Pilot Hole
K-158	10	03 ∠ 43	250	250	Pilot Hole
K-159	7	19	125	125	Pilot Hole

PLANT

MILLING

Statistical Summary

Days Worked	13-2/3
Tons Milled	37,385
Tons Per Day	2,735
Tons Per Operating Hour	119.9
Mill Operating Time - % of Scheduled	56.05

	Zinc	Lead
Tons of Concentrates	1,833	223
Tons of Conc./Day	134	16.3
Concentration Ratio	20.4	168

Metallurgical Comparison

		July	1st 6 Mos. 1957
Feed	- % Zinc	3.26	3.32
	% Lead	0.60	0.67
	% Acetic Acid Sol. Zn	0.16	0.14
Zinc Conc.	% Zinc	60.64	60.62
	% Lead	0.47	0.73
	% Zinc Recovery	91.30	92.41
Lead Conc.	% Lead	74.78	75.34
	% Zinc	3.30	2.73
	% Lead Recovery	74.20	78.27

Zinc metallurgy during July was normal. Recovery was slightly below average as a result of high losses to tailings during the first four days of operation following the strike.

Lead metallurgy suffered as a result of abnormally high losses to tailings on six isolated shifts of the forty-one shifts worked. Lead losses to zinc concentrates continued to decline.

Non Operating Mill Time

Cause	Hours West	Hours East
Weekend & holiday shutdowns and startups	186.58	186.58
Waiting for ore	1.17	.83
Scheduled repairs	11.75	13.50
Emergency Lost Time	231.09	232.76
TOTAL	430.59	433.67

Distribution Emergency Lost Time

Cause	Hours West	Hours East
Strike	230.50	230.50
Gyrasphere Crusher trouble	--	1.00
Replacing & tightening 8x12 Marcy Mill shell liner bolts	--	1.09
Miscellaneous	.59	.17
TOTAL	231.09	232.76

Mill Operation

Operation was resumed following the strike with no changes in milling procedure. Tonnage milled per operating hour increased during July due to the increased ore supply from the mine.

Mill Maintenance

Major repairs made during July were as follows:

1. The East Gyrasphere crusher concave and mantle were replaced.
2. The West Gyrasphere crusher concave and mantle were replaced.
3. The west 8x12 Marcy Mill motor was removed for repairs and replaced by a spare motor.

Engineering & Construction

Additional Mine Pumping - Approp. 7980

Preparation of drawings and shop assembly of pump control panels was in progress during the month.

Ivanhoe Garage Addition

The addition of a garage to the Ivanhoe Hoist Building was approximately 95% complete on July 31. Interior and exterior painting will be completed early in August.

Limestone

Shipped By	Tons July	Tons 1st 6 Mos. 1957 Avg.	Cost Per Ton July	Cost Per Ton 1st 6 Mos. 1957 Avg.
Trucks	3,414	7,230		
R. R. Cars	5,406	12,086		
TOTAL	8,820	19,316	$ .517	$ .348

Personnel

The Union officers met with Company representatives on July 13 to advise the men had voted to return to work on July 15, ending work stoppage of June 25. Negotiations were suspended subject to resumption on 15 days' notice by either party.

Safety

Safety films and meetings scheduled for Plant Department for first week of July were postponed due to plant being on strike.

Cost Summary

Mining

	Cost Per Ton		1st 6 Mos. 1957 Avg.	
	July			
Deadwork (Absorption)	$ .500		$ .500	
Breaking	.348		.334	
Handling	.272		.265	
Hauling	.239		.300	
Gen. Breaking Exp.	.105		.179	
Gen. Mining Exp.	.603		.716	
		$2.067		$2.294

Milling

Coarse Crushing	.013		.023	
Fine Crushing	.061		.057	
Grinding	.128		.211	
Flotation	.166		.169	
Filtering, Drying & Handling Conc.	.047		.047	
Tailings Disposal	.009		.016	
Undistributed	.093		.105	
		$ .517		$ .628

General Indirect

Plant Expense	.654		.671	
Taxes & Insurance	.019		.021	
Depreciation	.173		.184	
Depletion	.045		.045	
Amortization of Spare Parts	.021		.023	
		$ .912		$ .944
Total Cost Per Ton Crude		$3.496		$3.866
Total Cost Per Ton Concentrates		$63.573		$67.065

The lower unit costs as compared to the first six months average are due to a general reduction in maintenance and supply costs.

Costs were adversely affected by the lower grade and tonnage of crude ore hoisted. The reduction in tons hoisted per day followed the recent transition from three to two shift mine operation. It is expected that the production rate will improve as hauling schedules become more efficient.

Exploration Geology

Diamond Drilling Summary

Area		Footage
Beaver Creek	DMEA Contract	631
James-Woodruff	" "	1,303
Williams Property (Galena)	" "	425
	TOTAL	2,359

Diamond Drilling

Beaver Creek

Hole No.	Footage	Results
BC-16	631	2' Est. 2% Zn - Bottomed at 631 feet in Copper Ridge Formation.

James-Woodruff Area

JW-16	906	Barren; bottomed at 906' in Ribbon limestone.
JW-17	397	Barren; bottomed at 397' in Rome below Sugar Grove Fault.

Williams Property (Galena)

GW-1	425	Incomplete; in Austinville member.

Competitors Activities

The U. S. Steel Company continues to operate the drills in the Beaver Creek area.

At least two of the four U. S. Steel geologists in Marion are being transferred out of the community.

Virginia Piedmont

Drilling was begun on Bondurant (DMEA) project in Buckingham County on July 26.

In the Mineral District, the auger drilling program to test gravity anomalies was completed. Underground mapping indicated the Arminius hanging wall crosscut on the 1200 level was on the west limb of an overturned anticline.

Further work was recommended on the Stoney Point Copper prospect after an examination showed over half a mile of moderate to strong gossan.

Geochemical sampling and geophysical reconnaissance was done over the site of six airborne anomalies. Four of the six showed weak to good anomalous response. Anomalous results were also noted in the soil analysis of three other air anomalies and detailing was planned for them. Detailing was done on the site of an anomaly found by water sampling and reconnaissance soil sampling.

Signature of the Georgia Harris agreement in Louisa County was completed.

Competitive activity included intensive ground work by Beers crews over the sites of at least five airborne anomalies as well as a helicopter survey over a large portion of the Piedmont flown for an unidentified competitor.

W L Albers/gm

WLAlbers:rjl

cc: Mr. A. R. Flinn, N. Y.
Mr. S. S. Goodwin, N. Y.
Mr. E. J. Flynn, N. Y.
Austinville -3- ✓ WSH

Status of Capital Expenditures - Austinville, Virginia - July, 1957

Project & Job No.	Amount Authorized	Current Exp.	Spent to Date	Unexpended Balance
Ivanhoe Development Approp. 7593	$3,250,000	$34,945	$3,072,945	$ 177,055
Arminius Mine Dev. Approp. 7790	465,000	10,065	407,150	57,850
Vent Fan & Power - Brown Ore Body Approp. 7925	28,000	--	19,730	8,270
Addl. Mine Pumping Approp. 7980	47,000	810	810	46,190

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Mr. E. J. Flynn, N. Y.
Austinville -3- ✓ WSH

MILL NOTES - July, 1957

MISCELLANEOUS DATA

Shifts Worked	41
Mill Feed - % Moisture	1.56

METEROLOGICAL OBSERVATIONS

Outside Air Temp. °F @ 7:00 AM -	Average	67
	Maximum	75
	Minimum	56
Precipitation, Inches	Total	3.48
	Maximum (7/29/57)	1.16

INDUSTRIAL WATER SUPPLY (Mine Water)

	Average	Maximum	Minimum
Turbidity, LaMotte Std. @ 9:00 AM	43	60	- 5
pH @ 9:00 A.M.	7.7	7.8	7.4

POWER FOR GRINDING

	KWH Per Ton
Symons Crusher	.168
Gyrasphere Crusher	.203
8x12 Marcy Rod Mills	4.497
Tricone Ball Mills	2.030
4x10 Marcy Regrind Mill	.140
Total	7.038

COMPOSITE SCREEN ANALYSIS OF FLOTATION FEED

Mesh	Cumulative % Retained
48	3.1
65	11.4
100	25.7
150	37.9
200	48.5
270	54.2
Minus 270	45.8

x 1086 Mr. A R Flinn - Eastern Mgr of Mines - N Y
Monthly Report - July 1957 - Austv Va

MAINTENANCE DIARY

Mill

7/15/57 - Routine repair of the east and west units. Repaired hole and installed rubber faced wear plate in bottom of lead rougher cell #22AE. Replaced bottom of west Gyrasphere conveyor belt cleaner sump. Patched west Weightometer belt cleaner sump.

Patched zinc thickener tank at dryer plant.

Replaced the mantle, concave ring, and the Jalloy wear ring on the east Gyrasphere crusher. This mantle had been used and remounted. It was in use from 2/14/55 to 9/27/55 and crushed 197,511 tons, during that period. It was reinstalled 1/14/57. Upon removal 7/15/57, it had crushed a total of 369,375 tons. The concave ring was installed 4/7/56 and when removed had crushed 459,410 tons of ore.

Installed Flexco No. 500X hinged belt fastener on the east Weightometer conveyor belt.

7/17/57 - Repaired dryer plant stoker feed screw.

7/19/57 - Replaced diaphragm on zinc ODS pump.

7/22/57 - Routine repair of the east unit.

Rebuilt pressure reducing valve under zinc thickener tank.

Replaced 6" plug valve in middlings regrind discharge line.

Tightened apron feeder 7/8".

Installed one section of the E 8x12 Marcy Mill gear splash guard.

Replaced the 10' section of flexible pipe in the Bunker Hill tailing line with standard iron pipe.

7/26/57 - Extended 3/4" air line to the zinc and lead flotation floors.

Dismantled chem lab unit heater for repairs.

7/29 - Routine repair of the west unit.

Turned 6" rubber hose in west classifier discharge pipe line 180°.

Removed W 8x12 Marcy Mill drive motor for cleaning and bearing inspection. Replaced with a spare motor.

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Replaced propeller, wear plate and channel supports on #2W zinc conditioner.

The mantle, concave, Jalloy ring wear plate and frame arm shields were replaced in the west Gyrasphere crusher.

The mantle and concave removed had been in use since 7/26/56 and had crushed 368,621 tons of ore.

7/31 - Installed platform to dryer plant rotoclone drive.

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MAINTENANCE DIARY

Electric Shop

6/27/57 - W. T. Arnold worked routine weekly inspection of all mine pumps, river pumps, sewage pumps, and Clear Branch pumps. All electrical equipment at the Flatwoods, Ivanhoe and Austinville hoists was inspected.

6/28 - L. B. Mabry replaced street lights.

7/1/57 - L. B. Mabry and C. E. Poole checked Lidgerwood hoist grid bank for loose connection and broken grids.

D. E. Spraker did monthly meter reading, routine job.

7/3 - S. F. Arnold did weekly inspection job. All electrical hoists, all mine pumping, electrical equipment.

7/10 - S. F. Arnold did weekly inspection job. All electrical hoists, all mine pumps, electrical equipment.

7/11 - Mr. W. T. Newland and Mr. White, EC&M representative, checked Lidgerwood hoist controls. Readjusted OSR to drop out at approximately 910 rpm, controller 4th point; also replaced 30 MFD condenser for 20 MFD on OSR.

7/12 - C. E. Poole went to Ivanhoe and checked electric hoist OSR. Adjusted OSR to drop out at approximately 920 rpm, control on 4th point.

7/14 - Recharged cap lamps (12 hrs. charge) 11 Edison locomotive batteries (15 hrs. charge).

7/15 - Checked 350 HP, 8x12 Marcy Mill motor bearings, added grease to bearing west and east units of mill.

Repaired burned wiring on #1 Atlas 4-ton locomotive. Repaired 15 HP slusher motor 4th level Flatwoods Shaft. Reassembled 125 HP 2A second level pump motor. New shaft and new ball bearings.

7/16 - Replaced street lights and set time clock.

Repaired light circuit at Austin Meadows scales.

7/17 - Checked air compressor at Flatwoods Shaft. Cleaned and adjusted flow switch.

7/18 - Removed old signal conduit line on 4th level auxiliary underground shaft.

7/19 - Repaired cap lamp charging panel at Ivanhoe shaft.

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7/20, 22 - Installed radio cage phones on Ivanhoe hoist and cage for signal communication cager and hoistman.

Checked Ivanhoe hoist motors and control panel, rearranged grid wiring to #2 motor; also set overspeed relay to drop out at 900 rpm.

7/23 - Repaired light circuit in 7th level battery charging station.

7/24 - Replaced contact fingers on ZF-30-A frequency relay Ivanhoe hoist control.

7/25 - Replaced damaged wiring to 15 HP slusher at Flatwoods shaft 4th level.

7/26 - Repaired telephones 8 and 12th levels Van Mater Shaft.

7/29 - Removed 8x12 Marcy Mill motor Serial #2S10N2729 to be overhauled. Replaced ball bearings.

7/30 - Removed No. 11A1 125 HP pump motor from Ivanhoe Shaft; to be overhauled. End bell bearing housing worn. Also replace bearings.

7/31 - Traced down ground on feeder line to spiral classifier motor in mill.

Machine Shop Maintenance - July, 1957

7/4/57 - Because of bearing failure, the shaft assembly in #7B pump was removed and a rebuilt assembly installed. The defective assembly was in service a total of 554 hours and was rebuilt at a cost of $20.72 for labor and $15.92 for parts, making a total cost of $36.62.

7/15/57 - Eimco air shovel #4628, model 21, was delivered to shop for repairs. The digging motor main bearing had cracked and had to be replaced.

7/17 - Installed a rebuilt transmission in the Mancha locomotive 7th level. The main journal boxes had burned out on the assembly which was removed. This assembly was repaired and will be kept as a spare.

7/18 - Repaired 2 Granby mine cars. One of the cars had hung in a bulkhead door and was badly bent. Both ends and the gate had to be made new. The gate straps and coupler rigging were broken on the other car.

7/19 - Cleaned Clear Branch sump and flume. Completed repairs to a transmission unit for a 4-ton Atlas locomotive which had been held up awaiting parts.

7/23 - Cut Flatwoods hoist cables 5 feet.

7/24 - Overhauled traction motor and rebolted dipper on Eimco rocker shovel #4529, model 21, from Ivanhoe.

7/26 - Adjusted brakes on Greensburg locomotive 7th level. Installed new brake shoes, reinforced cracked frame and welded ends for bumper on 2-1/2 ton Atlas locomotive.

7/29 - Installed 3 new rollers on north skip V.M. Shaft. The skip was out of service for 1-3/4 hours for the job.

7/30 - Welded gate and hooks on a Granby mine car. The shaft assembly in #7A pump was removed and a rebuilt assembly installed. This assembly had been in service a total of 3309 hours and was rebuilt at a cost of $116.85 for parts and a labor cost of $27.04, making a total cost of $143.89.

General Plant Maintenance

In an effort to determine the cause of recent flashovers between the slip rings of the Lidgerwood hoist motor, Mr. W. T. Newland and Mr. Paul White of the Electric Controller and Mfg. Co., visited Austinville on July 11. They examined the hoist control and hoist motors. Upon testing the operation of the control, they discovered that the overspeed relay was not dropping

out at the proper motor rpm under overhauling conditions. Under test, this relay operated at approximately 980 motor rpm's. Under this condition, operation of the counter-torque button would cause one motor to be plugged when it was in an overspeeded condition and cause unnecessarily high voltage between the rings. The operation of the overspeed relay was adjusted so that it operated at approximately 900 rpm, which is the synchronous speed of the motor. This adjustment was made by replacing the previously installed 30 MFD capacitor with a 20 MFD capacitor.

In discussing the operation of the hoist at this time, it was decided to take the following steps in an effort to reduce the possibility of future motor failures:

1) To replace the Velos belts on both the man and ore hoist induction generator with roller chain drives.

2) To replace the 1CR relay on the man hoist with an EC&M type ZCR relay.

3) To convert the overload relays on both the man and ore hoist from automatic reset to hand reset.

4) To ship the three Lidgerwood hoist motors to the National Electric Coil Company for replacement and respacing of the collector rings so as to achieve maximum possible clearance between the rings and to reduce the clearance between the rings and the brush holders to approximately 1/8".

5) To abandon the use of grade D1 brushes with type P shunts and replace them with brushes with riveted shunts and grade MBE or similar with a low contact drop.

6) Reconnect the frequency relays on the Lidgerwood hoist for single phase operation in the same manner that the frequency relays are connected on the ore hoist.

In accordance with the above decisions, one motor was shipped to the National Electric Coil Co. on July 18, and replacement brushes were ordered from the Ohio Carbon Co. The balance of the proposed changes will be made as time permits.

On July 20, a complete check was made of the grid to controller wiring on the Ivanhoe hoist control. It was discovered that the wiring between the grids and the No. 23A and No. 25A acceleration contactors was reversed. This reversal was the result of incorrect stenciling of the panel back by the manufacturer. The incorrect wiring was corrected and the hoist operated normally.

Mobile Equipment Maintenance

On July 22, the flywheel clutch on No. 1 D-7 bulldozer stuck in the engaged position, causing a near accident. Since this was

the third time in recent months that the clutch on this machine had stuck, the machine was parked and a mechanic was called in from the Carter Machinery Co. to disassemble the machine and determine the cause of the malfunction. The Carter Machinery Co. mechanic disassembled the machine on the following day and discovered that the cause of the failure was a burned clutch plate bearing which had failed because of lack of lubrication. A change of lubrication procedure has been instituted which calls for the lubrication of this particular bearing on No. 1 and No. 2 bulldozers at 10-hour intervals instead of at 50-hour intervals as had been the previous practice.

Real Estate Maintenance

A small amount of work was performed on Houses 409 and 410 in generally repairing the exterior. This work will be continued for Houses 406 thru 412 in an effort to maintain them in good condition.

This work is necessitated by paint failure and subsequent rotting of poor quality lumber which was used in the original construction of these houses.

Two floors were repaired and sanded and four floors were refinished in House No. 231 in preparation for occupancy by a new tenant.

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CONCENTRATE LOADING COSTS

	JULY 1957		1st 6 Mos. 1957 Average	
Tons	1957	Per Ton	3538	Per Ton
Labor	$ 208.74	$ .107		$ .111
Supplies	1.07	.000		.001
Tractor	13.50	.007		.008
Payloader	10.50	.005		.011
Total	$ 233.81	$ .119		$ .131
Maintenance	13.56	.007		.011
Total on Cars	$ 247.37	$ .126		$ .142

SHIPMENTS

	TONS		TONS	
	Zinc	Lead	Zinc	Lead
Dried & Filtered	1801	156	3112	426
Wet	--	--	--	--
Total	1801	156	3112	426
Total Tonnage	1957		3538	