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Iron ores and associates at Buckland's Bank, Sec. 20. T. 37. R 8, W, Phelps Co. Missouri

Oscar Garvens

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19.

THESIS

Iron Ores, Phelps Co., Mo.

GARVENS

1876

MISSOURI SCHOOL OF MINES AND METALLURGY.

**IRON ORES
AND
ASSOCIATES
AT
BUCKLAND'S BANK**

Sec. 20. T. 37. R. 8. W.

Phelps Co. Missouri.



THESIS

for the degree of

7537

M.E.

By

OSCAR GARVENS.

MISSOURI SCHOOL OF MINES AND METALLURGY

IRON ORES
AND
ASSOCIATES
AT
BUCKLAND'S BANK
Sec 20. T. 37. R 8, W.
Phelps Co. Missouri

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The Iron deposit locally known as "Bucklands Bank" is situated in the south half of Sec. 20. T. 37 R. 8 west Phelps County Missouri, about four (4) and a half ($\frac{1}{2}$) miles west of Rolla and on the line of the Atlantic and Pacific R. R.

It was opened by Sen. T. C. Buckland of St. Louis in 18-- but subsequently was leased to Mr. Wm. James of St. James, who shipped the ore for treatment at the Ozark Furnace five and a half ($5\frac{1}{2}$) miles further westward on the railroad.

The deposit is classified by Schmidt* as a disturbed specular ore deposit, that is, it is an aggregation of ores, which in their former state lay parallel to the enclosing rock and consequently forming a layer between any stratified or foliated rock, but which has since been disturbed by various causes.

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*Geo. survey of Mo.

This Bank lies at the foot of a sandstone hill in the crossing of two ravines. The mining cut made in it presents a very plane instance of a disturbed specular ore bank. This deposit seems to be actually overturned the ore which in regular deposits lies above the clay and chert, is here covered by the detritus of these materials.

In the south and middle part of the cut (mining) we find a mass of black tenacious clay, mixed with fragments of a half-triturated, dark-grey clay-slate and with pieces of pyrites and impregnated with sulphate of Iron.

It is probable that this sulphurous mass lay between the clay and chert and ore formerly, but that the ore deposit was under-washed with the erosions of the ravine in which it situated and broken and overturned.

The proximity of the regular sandstone on all sides shows that this deposit (ore) can not extend horizontally

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The proximity of the regular sandstone on all sides shows that this deposit (ore) can not extend horizontally

much over the limits of the present cut, but it may extend somewhat in depth.

The probable size of deposit is estimated as less than 20000 tons.

The sandstone in which this deposit occurs is known as the second sandstone (Swallow) belonging to the Calciferous epoch.

That in close proximity to the ore deposit gives the following on analysis;

Silica	97.109 %
Ferric Oxide	2.638 "
Alumina	Trace
Calcic Carbonate	.457 "
Magnesian Carbonate	.254 "
Water	.356 "
Total	100.814 %

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The cut or excavation is 140 ft. and 70 ft. in the longest and widest parts respectively, and 25 ft. in depth.

The amount of excavation is about 230000 cu.ft.

Running into the northern part of the cut and leading down from the top of the hill is a small stream, below the bottom of which the blue specular ore is found mixed with considerable calcite and Flint.

The Ore gives the following on analysis;

Ferric Oxide	33.52538%
Ferrous di-Sulphide	4.17208%
Alumina	2.13563"
Lime	24.75441"
Magnesia	4.23274"
Silica	.53390"
Phosphoric Anhydride	.18811"
Carbonic Acid	26.52115"
Water	4.24600"
	<u>100.30940%</u>
Metallic Iron	24.41410%
Sulphur	2.22511"
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In the southern or south-eastern part is a nearly solid mass of red Hematite over which also a small stream of water runs in rainy seasons, near this mass of ore we find large quantities of the black sulphurous mass spoken off above.

The ore yields on analysis

Ferric Oxide	60.040 %
Ferrous di-sulphide	3.457 "
Alumina	6.615 "
Ferrous Carbonate	12.103 "
Calcic Carbonate	.375 "
Magnesic Carbonate	.329 "
Manganic Carbonate	.033 "
Silica	8.583 "
Phosphoric Anhydride	.100 "
Water	8.849 "
Total	100.484 %

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In the western part of the cut the ore is more mixed, being blue specular and red hematite mixed with clay and chert.

Limonite Ore is also found here in this part of the cut, and also the black sulphurous mass, but not in such large quantities as in the southern part.

The Ore from the western part gives the following;

Ferric Oxide	62.29559%
Ferrous di-Sulphide	8.37226 "
Alumina	7.26258 "
Lime	6.40394 "
Magnesia	4.6303 "
Silica	3.60335 "
Phosphoric Anhydride	.63392 "
Water	11.34774 "
Total	<u>99.98241%</u>

Metallic Iron	47.51396%
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Ferric Oxide	42.937%
Ferrous di-sulphide	3.533 "
Alumina	5.749 "
Ferrous Carbonate	10.150 "
Magnesian "	.941 "
Calcic "	.580 "
Calcic Sulphate	.452 "
Silica	22.067 "
Water	11.721 "
Phosphoric Anhydride	.105 "
Organic Matter	not est.

Metallic Iron	36.604%
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The overlying rock is common sandstone.

For shipping and carrying the ore up to the track of the Atlantic & Pacific R. R. a narrow gauge railway three feet, eight inches wide and 1000 feet long has been ^{laid} and the ordinary "Dump" cars are used upon it, which are pulled up by mules or horses.

The railway is divided into two branches one being nearly level, probably the one first laid as at the excavation or mining cut it is about 20 ft above the place where the ore was first taken out; the other branch which runs into the bottom of the excavation, through a "Cut" has a slope of two feet in one hundred, also divides into two branches which run into different parts of the excavation.

There is also a branch running about S.S.E. and 200 feet long along which the clay and refuse material was deposited into the ravine.

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I have ^{also} analysed the following

Ankerite.

Ferrous Carbonate	7.258%
Magnesian "	7.251 "
Calcic "	79.891 "
Alumina	4.291 "
Silica	.751 "
Total	<u>99.442%</u>

Amethystine Quartz.

Ferric Oxide	2.9645%
Alumina	.7643 "
Manganous Oxide	.1130 "
Calcic Sulphate	.4134 "
Magnesia	.2059 "
Silica	95.7062 "
Total	<u>100.1673%</u>

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