

REPORT
OF THE
STATE GEOLOGIST

HENRY H. EAMES,

ON THE
METALLIFEROUS REGION BORDERING
ON LAKE SUPERIOR.

MADE IN PURSUANCE OF A RESOLUTION OF THE
SEVENTH LEGISLATURE OF MINNESOTA.

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1866.

To His Excellency, Stephen Miller, Governor of Minn.:

SIR:—In conformity with the act approved March 2d, 1865, and under your appointment bearing the date of April 18th, 1865, I have continued the prosecution of the geological survey of the State, and herewith submit my report; I have endeavored to carry out the spirit of my instructions, but owing to the limited means placed at my disposal, and the extent of country to be examined, most of it a wilderness, I have so far exceeded them as to expend more than the amount of funds appropriated, and for this unauthorized expenditure must throw myself upon the kind consideration of the Legislature.

The results of the geological survey are embodied in the following pages.

Very respectfully,
Your obedient Servant,
HENRY H. EAMES.

REPORT.

To His Excellency, Stephen Miller, Governor of Minnesota :

SIR :—The objects to be attained by a geological survey or reconnoissance of the State are so manifest that they need scarcely be enumerated.

Apart from the general interest felt by all classes of our citizens in such an enterprise, it is specially important *for the farmer* to be intormed by a correct analysis of the nature and ingredients of soil and subsoil, that he may be prepared in advance to save his lands from deterioration, by a judicious system of manuring ; *for the miner* to have mapped out the boundaries of the several geological formations, with a description of the sections in which minerals are to be found, and also to be provided with analysis and assays of the metals discovered, showing their respective value. Such a survey should also embrace a full examination of the stone and other material adapted to building purposes, including clay for brick, as well as for pottery.

Coal, the great desideratum of this State, in which prairie is the predominant feature, cannot be said yet to have been found in such quantities as to make it available for fuel or for manufacturing purposes, but I have good reason for the belief, that it will be discovered in place in different sections of the country. Indications of its existence in the region lately traversed by me, have not been wanting, but sufficient time could not be devoted to solve the problem. To effect this, to develop fully the extent of other minerals, and to make the assays requisite to determine their commercial value, will require a considerable outlay of money, but these objects are so vital to the prosperity of Minnesota, that no time should be lost in the endeavor to accomplish them. The other States of the Northwest are devoting their energies in this direction, and we should not

fall behind them. The judicious expenditure of a few thousand dollars in the prosecution of such researches, will, I am confident, add incalculably to the material resources of our State, and tend to encourage immigration.

The broad area from the British boundary to the lines of Wisconsin and Iowa, are practically a sealed book thus far, which, when opened, may unfold secrets, which will astonish non-residents not only, but ourselves as well. Already enough has been demonstrated by the very slight observations made in the region lying north of Lake Superior, to justify the expectation that copper, iron and the precious metals exist there in great profusion. If to these can be added coal, it would seem that nothing would remain to be desired for the rapid development of the State.

In my explorations during 1865, my time and the limited means at my disposal, compelled me to confine myself to that portion of the State lying on the shore of Lake Superior and north west of it. I have discovered gold and silver* in the quartz veins traversing the talcose and siliceous slates of Vermilion Lake, in the county of St. Louis. These veins are from an inch to several feet in width; it has not been possible as yet to ascertain the angle at which they occur, but my impression is, it will be found to be about 85° ; their extent and richness can only be determined by practical working; the formation is overlaid in many places by drift, and the talcose in some instances has a cap-rock of siliceous slate. The country is well supplied with timber. My examinations have been extended on the shore of Lake Superior as far as Temperance River, about eighty miles from Duluth, a description of which is given in another portion of this report.

The metalliferous district in this portion of the State, is on the Lake Shore of Superior, from two to ten miles in extent, until it reaches the parallel ranges of the dividing ridge, it then extends far to the westward. The hills are from four hundred to twelve hundred feet in height, and appear to be traversed by metal-bearing veins. The dividing ridge has a direction north east and south west, and many parallel ranges can be seen from the top of the Misabi Wasju, stretching out as far as the eye can reach.

Few as are the facts yet determined relative to the min-

*See end of report for assays.

eral resources of the region referred to, enough has been demonstrated to convince even the incredulous, of the vast deposits within its limits. The stimulus given by the discoveries made is already being felt, and the next season will doubtless witness the labors of hundreds of hardy explorers and miners along the Minnesota Shore of Lake Superior.

Not having visited the Cottonwood river during the present year, for the reasons stated, although directed so to do by the act of the Legislature of March 2, 1865, I am unable to give any further information of the probable existence of coal fields along its banks, but I have no hesitation in recording my conviction that large deposits of good coal will be found there; the stratum having a course southeast of the Big Cottonwood River, thence northwest to the Redwood River, crossing the Minnesota River at or near that point; also west of the Cottonwood, and having a bearing west of north. The outcrop of the formation can only be seen at a few points, as it has many local upheavals and corresponding depressions.

ST. LOUIS AND UPPER EMBARRAS RIVERS.

On the 31st of May I commenced the ascent of the St. Louis River. A short distance above Fon du Lac is an exposure of sandstone, on the top of this is a deposit of boulders, sand, red clay and marl, these latter generally constitute the drift covering of the formation in this section of the State; further up the river the rocks increase in thickness, and consist of sand-stone, shaly sand-stone, coarse and fine conglomerates. Some of these sandstones are very hard, and I have no doubt would make good building rock; a portion of them are fine enough for grindstones. The conglomerates have numerous veins of iron pyrites. From this point to the foot of the first falls, are found clay and boulders forming the banks of the river. The whole of the falls so far as examined consist of argillaceous slates, varying in color from blue to greenish-gray, some of them very finely laminated; those of the blue variety divide the most easily into very thin laminae. This would make very good roofing materials. Some of these slates have talc in their plain of lamination, having a soapy feel, and they are traversed by numerous veins of quartz.

One examined was twelve inches in width. These veins give indications of mineral, but as yet no assay has been made. I also saw some very fine specimens of plumbago taken from a vein near Knife Portage on the Indian Reservation.

The fall of water including the rapids, I measured by the Aneroid, three hundred and seventy feet, the falls I estimated to be about one hundred feet in height. The slates examined were some distance from the river. Several exposures occur on the Portage Trail, and these were followed and examined some distance in the woods. The roofing slates could be easily worked, and boated down the river from Fon du Lac. The timber consists of pine, tamerack, cedar, birch and maple, and as shown, there is an abundance of water-power.

The next exposure lying against the slate, is an out-crop of green stone. Beyond this point no rock was found in situ along the whole course of the river, to the mouth of the Upper Embarras. On the banks of the river are several exposures of stratified clays, some of them very much indurated. No fossils could be discovered to mark its geologic age. The banks vary in height from ten to sixty feet, and the soil as a general thing is very sandy, producing a growth of pine, cedar, and in some places elm. The rapids are numerous, but there are no falls above the one mentioned. A great portion of the timber in this district has been burned over, giving a desolate appearance to the country. The valley varies from five to a quarter of a mile in width, abounding in swamps of tamerack and spruce. There are numerous mineral springs on this stream.

The Upper Embarras River at its mouth, is as wide as the Saint Louis, about one hundred and fifty feet, and its general course is very tortuous, with low banks, about two feet high. The bottoms are deposits from the low ridge forming its boundary, composed mostly of sand. There is no timber here, except a growth of very small pine. High bush cranberries are abundant along the river. The upper part of this stream is connected with a chain of seven consecutive lakes. Fifth Lake passes through a synclinal of a part of the "Dividing Ridge," called by the Indians Missabi Wasju. This is a beautiful sheet of water, surrounded by hills, and its margin is fringed with a good

growth of yellow pine, reaching to the top. At the head of this lake the rock is first seen in place, after leaving the vicinity of the Falls of the Saint Louis River. It is composed of granite and gneiss, and rises to the height of about four hundred feet. From the top a splendid view of the surrounding country is obtained, and as far as the eye can reach are seen parallel ridges, some towering to a great height. They can be traced east and west, having a trend north east by south west. At the upper end of Seventh Lake there are low ridges granite.

DIVIDING RIDGE.

About three quarters of a mile above the upper end of Seventh Lake the trail crosses the dividing ridge between Lake Superior and Hudson's Bay. About five miles in width, on this trail are numerous exposures of rock, consisting of syenite and a grey hornblendic rock, it is traversed by numerous quartzose veins, one of which was nine feet wide, containing very fine crystals. Upon a more thorough examination, I came to the conclusion that this ridge is highly metalliferous—there are some fine pine groves on this ridge, mostly of the yellow or Norway variety. The main range is composed of two or three parallel ridges, with swamps between them, after crossing the last one I reached

SOUTH VERMILION RIVER.

At the point where I struck this stream its direction is from the south west, and about seven miles distance is an exposure of granite, bearing a little north of east and south of west. There are several exposures of rock, all of which cross the river, having the same bearings, and consist of gneissoid and hornblendic rocks, with Argillaceous slate. These formations I did not have time to examine, but it is probable they will be found rich in minerals. The next outcrop of rock is at or near the falls of this stream, consisting of hornblendic and siliceous slates. These contain numerous veins of metalliferous quartz, varying from two to sixteen inches wide. The hills here rise to the height of one hundred and thirty feet. From the head of the rapids to the foot of the falls, the descent is about eighteen

feet. I did not thoroughly examine the quartz veins owing to a want of time. About half a mile below the falls is

VERMILION LAKE.

The formation surrounding this lake is composed of siliceous, coarse and fine talcose slates, and are traversed in their plain of lamination with very numerous veins of quartz, nearly all of them showing the presence of the precious metals—gold and silver. On the east shore of the first arm of the lake are several veins; also, on the west side, and on every point examined, in a distance of about seven miles east and west. The lake contains a great number of islands, and the points of land extend far into it, forming deep bays, constituting a perfect labyrinth. There is scarcely an island, point or any part of the main shore, that came under my notice, where veins could not be seen, and traced for some distance by removing the moss. Some of the covering is a drift deposit. The following will give an idea of the formation of this region, containing the veins bearing gold and silver. After leaving the siliceous slates at the falls of South Vermilion River, the talcose slate constitutes the prevailing rock. In this are found the auriferous and argentiferous quartz veins. The quartz is from a milky white to reddish brown in color, is very cellular, and has the appearance of being burnt.

Some of the slate is thinly laminated, fracture even, color dark green, with talc visible on the fracture, lying at about the angle of 85° , the veins being about the same, with a bearing of a few degrees north of east, and south of west. They vary from an inch to ten feet wide, and some were traced for upwards of half a mile. At their widest part the quartz has the appearance of an overflow, at other points thin portions of slate divide the veins, but the auriferous pyrites are disseminated through it. These veins are irregular in thickness, and at some points a little back from the lake have an over-capping rock.

The slate at many points is very massive, and rising to the height of about two hundred feet, undulating, and between depressions the land as a general rule consists of swamp. The height of land consists of a number of parallel ridges. The water of the lake is clear, and has considerable depth. The timber consists of white and yellow

pinces, cedar, birch, balsam and poplar. As far as examined, the auriferous rocks extend on the east and west of the first arm of the lake, and then north and south for a distance of seven or eight miles in the body of the lake, and I have no doubt also to the west and north, beyond the length named.

THE IRON RANGE OF LAKE VERMILION

Is on the east end, on the stream known as Two River, which is about sixty feet wide. There are two parallel ridges forming the boundary of this stream, and at the mouth on each side are extensive tamerack swamps. This range is about one mile in length, it then ceases, and after passing through a swamp, another uplift is reached, from two hundred and fifty to three hundred feet high. The iron is exposed at two or three points between fifty and sixty feet in thickness, at these points it presents quite a mural face, but below it is covered with detritus of the over-capping rock. On this account its exact thickness could not be correctly ascertained. The ore is of the variety known as hematite and white steely iron, and is associated with quartzose, jasperoid and serpentine rocks. It generally has a cap rock of from three to twenty feet thick. A little to the north of this is an exposure of magnetic iron of very good quality, forming a hill parallel with the one described.

The hematitic iron has a reddish appearance from exposure to atmospheric influence; its fracture is massive and granular, color a dark steel gray. The magnetic iron ore is strongly attracted by the magnet and has polarity, is granularly massive, color iron black.

The timber here is very abundant and good, of the same class as prevails elsewhere in this region.

There are two proposed routes to Vermilion Lake. One from Duluth at the head of Lake Superior, variously estimated at a distance of from sixty-five to eighty miles. A winter road is now being made from this point. The other from Beaver Bay fifty or sixty miles from Duluth, down Lake Superior, and distance estimated from Lake Vermilion between fifty-five and seventy miles.

NORTH SHORE OF LAKE SUPERIOR.

At the head of the Lake, and near the town of Duluth, are narrow bands of trap rock, constituting a number of trap dykes, with greenstone. Some of these formations are traversed by veins, but I could not discover that any of them were metal bearing. After traversing what is known as the Lake range, no other rocks were seen in place, until the falls of the Cloquet River were reached, a distance of about twenty miles, a little west of north from Duluth. These falls consist of an out-crop of greenstone, having the same bearing as that exposed at the falls of St. Louis River of which it appears to be a continuation. The whole fall of water, including the rapids above is about fifty feet; the country is for the most part swampy. Where the country is more elevated the pine is generally good. The timber is small on the banks of the Cloquet so far as examined.

JAMES RIVER

Passes through a portion of townships 50 and 51, range 11 and 13. I examined this stream for about three miles, and found the formation to be very regular, consisting of amygdaloidal beds bearing copper, though in small quantities.

The same formation was observed on both forks of the river. About three miles from this river, on the Lake shore in township 51, range 13, on the property of J. B. Landrey, is a small vein of quartz and spar, containing copper, which I judge might be worked with profit.

AT FRENCH RIVER,

In township 51 and range 12, I found the same formation of amygdaloidal beds; all of them showing indications of copper, but some much inferior to others. The Carlton company are now at work on their lands, at this point. I examined the shaft, which was forty-eight feet deep perpendicularly, passing through the drift and over-capping trap-rock, and then following the course of the vein or bed for seventy-two feet. Copper was found along the entire length, but not in sufficient quantities to pay for working.

The largest pieces are associated with laumonite, the angle of this deposit was found to be about 20° . This bed at the top was about sixteen feet, but at the bottom of the shaft it had decreased to about three feet six inches, assuming more the character of a vein. A little to the east of this shaft, the company's superintendent, Mr. Salisbury, had discovered a bed very rich in copper, some fragments weighing as much as twenty pounds.

I am of the opinion that this would prove more productive than their present shaft, as the formation is more regular, and the range is of wider extent.

This stream for three or four miles of its course, and nearly all those streams which are tributary to the Lake, have the same drift deposit, covering the rocks, but the latter appear at intervals.

SUCKER RIVER.

The same company are testing some of the beds and veins in this locality, but sufficient work had not been done, for arriving at any practical result. The amygdaloidal beds have the appearance of containing copper in fair quantity.

In the vicinity of Agate Bay, there are very fine exposures, some of the beds with the feeders are metalliferous, but in what proportion, can only be ascertained by actual experiment.

KNIFE RIVER.

In township 52, range 11. I examined this stream for about three miles. A company are now sinking a shaft near here, also under the direction of Mr. Salisbury. The rocks in this vicinity are very metalliferous, and the copper is found associated with spar and quartz. These in my judgment, will be found to be true veins. The formation is very regular, and there are numerous feeders running into these beds or veins. A few miles below this river are several small rivulets emptying into the Lake, but they are very shallow, and full of boulders and debris of the adjacent rocks. Among the former, were noticed limestone belonging to the lower silurians, but I conclude from their rounded and water-worn appearance that they

had been transported to this region by glacial or other forces from a distance, as they are the sole indications of that formation to be seen.

STEWARTS RIVER.

Township 53, range 10. I explored this river for about eleven miles. The formations are very massive and regular, the amygdaloidal beds nearly all contain copper. There are numerous veins of copper with matrix of quartz and spar, varying from nine to eighteen inches in width. These veins have numerous cross courses or threads of veins, called by the miner, feeders. I have no doubt that most of these veins will be found to contain copper in considerable quantities. Some pieces were obtained weighing from one and a half to three pounds. On the south branch of this river and about three quarters of a mile from the lake in section 30, there is a vein of copper of good quality. Its course is north 20° east, which is the bearing of most of the veins. The walls show an angle of about 35° . I traced this vein for one mile. There is also in section twenty-nine a bed of amygdaloid about eight feet wide containing copper of fair quality; the walls having an angle of about 75° . Small nuggets of copper occur in this bed associated with quartz, spar, and epidote. The whole of this region appears very favorable for mining, containing, as it does, so many veins and beds, and nearly all of them bearing metal.

I also examined a small stream in the same township and range as Stewarts River for about three miles. I here found the veins of quartz, spar and epidote, containing copper, from most of which small nodules were obtained. In township 54, range 11, and section 35, and also some of the adjoining sections towards the head of Stewarts River, is a range containing magnetic iron ore, consisting of five or six layers, from two to eight inches in width, making in all about two feet six inches of the ore, being divided by the associated rock. The range rises abruptly to the height of about fifty feet, it then has a gradual slope to the top, about 120 feet the bearing of which is north east. There is an extensive swamp at the base. The ridge has a good growth of timber.

Three miles from Stewart's River, a stream empties into

the lake, and is in township 54, range 9, and in 21, 22 and other successive sections. This stream is about sixty feet wide, with falls a quarter of a mile from its mouth, the perpendicular height of which is about twenty feet. At the foot of these falls is exposed a large bed of amygdaloid containing copper, and on the upper part of the falls is a vein or feeder of quartz and spar, also carrying copper, and passing into the bed of amygdaloid. Both the vein and bed bear good nugget copper. In the northern portion of this section a good vein of copper is exposed five feet wide, with a bearing 40° east of north, and lying at the angle of about 43° .

ENCAMPMENT RIVER.

In township 53, range 10, I ascended this stream for about four miles. The veins have the same character as those of Stewart's River, and appear to be a continuation of the formation, though I could not discern any metal in the out-crop that came under my notice.

GOOSEBERRY RIVER.

In township 54, range 9. In examining this river I found the same vein as exposed on Split Rock, having the same gangue; and about four miles from its mouth another vein makes its appearance, about five feet in width, with quartz and spar. I could not perceive that these veins contained metals.

SPLIT ROCK RIVER.

In township 54, range 9, at the foot of the falls of the stream, is exposed a vein of copper bearing quartz and spar, eight feet wide, between the walls which are well defined; having an angle of about 35° , the vein has a bearing north 50° east. This can be traced on either side of the hills, which are about ninety feet in height, and covered with drift. The falls have a perpendicular height of about sixty feet, and are one hundred and fifty feet in length. Above and near this is another fall of forty feet. At the foot of which is exposed a bed of amygdaloid, eight feet in width containing copper. In both of these localities

the indications are that this metal will be found in abundance.

BEAVER RIVER.

In township 55, range 8. On the shore of the lake, and at the mouth of the river are found siliceous shale, basaltic trap, amygdaloid and greenstone, highly crystalline, and traversed by veins. I did not find any of them to be metalliferous. These rocks are exposed at many points on the river, until they abut against a trap range. For six miles away the country is very much broken, with swamps in the depressions. After passing this trap range, syenite and granitic uplifts occur, forming an undulating country, with a gradual rise to the dividing ridge. The swamps extend from one half of a mile to three miles. From Beaver Bay following a course 45° west of north about fifty-five or sixty-five miles, Vermilion Lake is reached, after passing the heads of Beaver, Cloquet, Big White Face, Saint Louis and Upper Embarras Rivers. Several lakes were seen that are not noted in the maps. Along the trail for some distance there are exposures of argillaceous slates, and in proximity to them magnetic iron. The exact locality could not, however, be ascertained. When within seven miles of South Vermilion River the ridges crossing that stream as previously described are perceptible. In these formations I did not discover any veins bearing metal, except iron, which is abundant in many of the rocks.

On the upper part of the north branch of Beaver River is a fine range of trap rock, with a vein containing spar and crystals of arsenical pyrites, about twelve inches wide; which connects with a bed of highly crystalline amygdaloid, with epidote, and containing the same character of pyrites. This bed is thirty or forty feet wide, and dips to the south west. I also saw on the opposite side of this stream, between the trap rocks some fine specimens of amethystic spar, with a slight admixture of copper. At the lower end of this stream are two veins of quartz and spar. I did not perceive any metal in either. I examined the country about here for several miles but did not discover any metalliferous rocks.

BAPTISM RIVER.

In township 56, range 7. The trap and metamorphic rocks here are highly crystalized, and are intersected by numerous veins of spar, some of them showing some metals, but not in my opinion in sufficient quantities to pay for working.

LITTLE MARAIS.

In township 57, range 6. On this stream are exposed numerous beds of amygdaloid. I did not see any veins intersecting them, neither do these beds contain any metal as far as noticed. In a distance of nine miles north west from the lake, after leaving the trap rock, there are many out-crops of greenstone, syenite and metamorphosed slates. Many of these rocks contain iron enough to affect the needle. Time did not permit a thorough exploration of the ridges.

TWO ISLAND RIVER.

In township 58, range 5, intersects beds of amygdaloid, with veins of spar. No metals was seen in the three or four miles examined.

TEMPERANCE RIVER.

In township 59, range 4, was ascended about four miles. It passes through beds of amygdaloid, in which some small specimens of copper were found. In the fissures of the bed there are veins varying from two to eight inches wide, having a jasperoid appearance. The upper part of this stream makes its way through hills of red clay and marl; and the bed of the river is filled with boulders of granite and other igneous rocks.

The whole of the north shore of Lake Superior is well timbered with pine, birch, balsam, and a little back from the Lake are some good groves of sugar maple.

The land is well adapted for mining purposes, and nearly every tributary could be made available for water power, the falls varying from ten to sixty feet.

The water is very clear, but as a general rule, the steams are not long. Still some of them drain a large surface, and have quite a number of tributaries.

In giving the distance from the lake shore, up the water courses, a direct line at right angles with the shore is intended, but the bed of the streams were in most instances examined, making the space traversed much greater. Most of these vallies merit a more thorough exploration.

In the foregoing description of the region of country lying on the north shore of Lake Superior, I have purposely refrained from using technical expressions, as far as practicable, and from advancing any theories of my own. When the facts shall have been more accurately deduced, from the surveys now being made, and also from individuals who have spent years in exploring this very interesting geological section, and are generalized, the result will not only be interesting in a scientific point of view, but will tend to the development of the mineral wealth of Minnesota, which I believe to be without limit. What now appears confused will then be rendered plain and easy to the comprehension of every one; and no reasonable expense should be spared to expedite a full and satisfactory solution of the problem.

In closing my report I should be remiss did I not express my sense of obligation for the uniform kindness received from those with whom I have been brought in contact during my official labors.

APPENDIX.

ASSAYS.

The gold bearing quartz from Vermilion Lake assayed by Professor E. Kent, of New York City.

2,000 pounds quartz yield in gold	-	-	\$31 01
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By professor J. R. Eckfeldt, Assayer of the Philadelphia Mint.

2,000 pounds quartz,	{	Yield in gold,	-	\$25 63
		Yield in silver,	-	4 42
				30 05

No. 1. By Henry H. Eames.			
2,000 pounds quartz yield in gold,	-	-	\$28 35

No. 2. By Henry H. Eames. Humid manner of assay.			
2,000 pounds quartz yield in gold,	-	-	\$32 35

ASSAYS OF IRON ORE FROM VERMILION LAKE.

Specimen No. 1 in 100 parts of ore.

Iron,	-	-	-	-	-	76
Silica and loss,	-	-	-	-	-	24
						100

Specimen No. 2, in 100 parts of ore.

Iron,	-	-	-	-	-	65
Silica and loss,	-	-	-	-	-	35
						100

Specimen No. 3 in 100 parts of ore.

Iron,	-	-	-	-	-	80
Silica and loss,	-	-	-	-	-	20
						100

EXECUTIVE DEPARTMENT, Aug. 28th, 1865.

Hon. James Pollock, Sup't U. S. Mint, Philadelphia, Pa. :

SIR :—I enclose you receipt for a specimen of what is said to be gold bearing quartz, forwarded to you this day by the American Express Company.

It is important that I should know its value as early as practicable, and you will confer a great favor by having it analyzed immediately.

Please let me have a brief account of the result by telegram, and a more lengthy report by mail.

I will pay for the telegrams here, and remit any other expenses of which you advise me.

Very respectfully,

Your obedient servant,

STEPHEN MILLER,

Governor of Minnesota.

This specimen weighs about three pounds, and is done up in brown paper. Please telegraph how many dollars it will produce to the ton of 2,000 lbs.

UNITED STATES MINT, }
PHILADELPHIA, PA., September 13th, 1865. }

*His Excellency Stephen Miller, Governor of Minnesota,
Saint Paul, Minn. :*

SIR :—Enclosed please find report of Assayer U. S. Mint on the mineral forwarded by you for assay.

The charges you can remit by mail. I received your pamphlet relating to Minnesota as a Home, &c., for which please accept my thanks.

Very respectfully,

JAMES POLLOCK,

Superintendent.

U. S. MINT, }
 PHILADELPHIA, PA., September 13th, 1865. }

Assay of quartz containing copper pyrites, with gold and silver, from Minnesota, brought by Hon. Stephen Miller.

The proportions of gold per ton of 2,000 lbs., is \$25.63 (twenty-five dollars 63 cents.) The proportions of silver per ton is \$4.42 (four dollars 42 cents).

J. R. ECKFELT,
 Assayer.

EXECUTIVE DEPARTMENT, }
 ST. PAUL, MINN., Sept. 18th, 1865. }

Hon. James Pollock, Sup't U. S. Mint, Philadelphia, Pa. :

SIR:—Many thanks for the assay of Minnesota quartz just received. The discovery promises to prove of great importance to our State, and we are gratified to have the value confirmed by so good authority.

I remit herewith \$5 for the payment of the assayer.

Very respectfully,

Your obedient servant,

STEPHEN MILLER,

Governor of Minnesota.

EXECUTIVE DEPARTMENT, Sept., 25th, 1865.

Hon. James Pollock, Sup't U. S. Mint, Philadelphia, Pa. :

SIR:—I enclose an express receipt for a second specimen of quartz taken from the Minnesota vein.

Please have the same assayed as early as practicable, and telegraph the value per 2,000 lbs., as in the former case, and send me assayers certificate by mail with bill of charges, and I will remit the amount.

Very respectfully,

Your obedient servant,

STEPHEN MILLER,

Governor of Minnesota.

UNITED STATES MINT, }
 PHILADELPHIA, PA., Oct. 6th, 1865. }

Governor Stephen Miller, Saint Paul, Minn.:

SIR:—Ore per ton gold, twenty-one dollars seventy cents, (\$21.70). Silver, one dollar.

JAMES POLLOCK,
 Superintendent.

UNITED STATES MINT, }
 PHILADELPHIA, PA., October 6th, 1865. }

Governor Stephen Miller, St. Paul, Minn.:

SIR:—Enclosed please find report of Assayer on the ore sent by you for examination. The result is very satisfactory and encouraging.

Very respectfully,

Your obedient servant,

JAMES POLLOCK,
 Superintendent.

UNITED STATES MINT, }
 PHILADELPHIA, PA., October 6th, 1865. }

The ore sent by Governor Stephen Miller from Saint Paul, Minnesota, contains per ton of 2,000 lbs :

Gold,	-	-	-	-	\$21 70
Silver,	-	-	-	-	1 00
					<hr/>
					\$22 70

Twenty-two dollars 70 cents.

J. R. ECKFELT,
 Assayer.

EXECUTIVE DEPARTMENT, Oct. 12th, 1865.

Hon. James Pollock, Sup't U. S. Mint, Philadelphia, Pa.:

SIR:—I am just in receipt of your favor of the 6th inst., enclosing assay of last specimen of quartz forwarded for that purpose.

With many thanks for punctuality, I send herewith the fees of the Assayer, \$5.

Very respectfully

Your obedient servant,

STEPHEN MILLER.

SAINT PAUL, MINN., November 23d, 1865.

*His Excellency, Stephen Miller, Governor of Minnesota,
Saint Paul, Minn.:*

SIR:—According to your instructions, I have assayed the quartz collected by me during my recent examinations of the formations contiguous to Vermilion Lake, Saint Louis county, and find it contains gold to the amount of twenty-eight dollars and thirty-five cents (\$28.35) to the ton of 2,000 lbs.

Your obedient servant,

HENRY H. EAMES,

State Geologist.

