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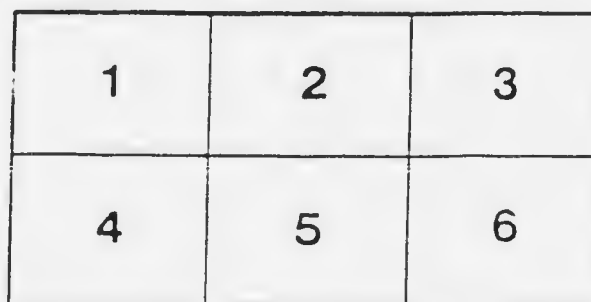
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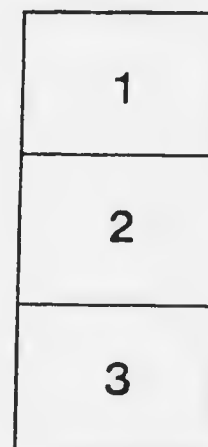
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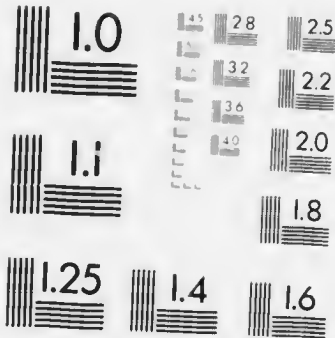
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MICROCOPY RESOLUTION TEST CHART

ANSI and ISO TEST CHART No. 2



APPLIED IMAGE Inc.

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Record of Ore-Treatment by the Lockwood Copper Recovery Process at Butte, Montana.
 Mine—Butte-Duluth. Mining Co.—H. A. F. & A. F. Co., Lessees Under Receivers.

| Date | Kind of Ore: | Percentage of Commercial Minerals: | | |
|------|---------------------------------|------------------------------------|-----------|-------------|
| July | Oxide Silicate of Copper, | Copper: 0.84% | Gold: oz. | Silver: oz. |
| 2 | Crysocolla, Malachite, Azurite. | Lead: " | Zinc: " | |
| 1918 | | | | |

Analysis: (No Analysis on File.)
 Assayed for Copper Only, Showing 0.84% Copper.

| Ore Not Roasted | Hours at | Fahr. |
|-----------------|--------------------|-------|
| Showing,— | Copper as Sulphide | 0.84% |
| Showing,— | Copper as Oxide | 0.84% |

Remarks: This test was taken with very incomplete equipment. Partial record only.

| | |
|--|-------------------------------|
| Amount of charge | 50 lbs. of ore |
| Amount of solution | 100 lbs. @ 60° Fahr. |
| Amount of acid | lbs. |
| Proportion of ore to solution, as | 1 to 2 by weight. |
| Percentage of acid, H ₂ SO ₄ , 66° Baume | 1 to 5.4 by volume. |
| Percentage of acid used | 0.80 % of solution |
| Proportion of acid regenerated | % |
| Duration of agitation before current on | % |
| Resulting solution | 00 hours. |
| Duration of deposition | % cu. |
| Total duration of agitation, including the time of deposition | 24 hours. |
| Direct current | 24 hours. |
| Direct current | 6.87 amperes. |
| Direct current | 2.19 volts. |
| Direct current | 422.89 amperes. |
| Amount of copper deposited on cathodes | lbs. |
| Total amount of current used | K.W.H. |
| Amount current used per lb. copper recovered. | K.W.H. |
| Amount of copper recovered per K.W.H. used | 0.80 lbs. |
| Percentage of recovery from solution | 88 % |
| Net recovery from ore | 78 % of entire assay content. |
| Copper remaining in tails, unextracted | 0.10 % |
| 66° B. acid used per lb. copper recovered | 1.28 lbs. |

Costs of treatment, based on treating 100 tons of copper ore per day of 24 hours:

| | | |
|--|---------------------|-----------------------------|
| Crushing, mesh | \$0. | per lb. of copper recovered |
| Roasting | \$0. | " " " " " |
| Leaching, acid 66 deg. H ₂ SO ₄ , @ \$ | \$0. | " " " " " |
| Recovery, current @ | per H.P. month plus | " " " " " |
| \$..... | per KWH used | " " " " " |
| Power | \$0. | " " " " " |
| Labor, men at \$ | \$0. | " " " " " |
| | per day | " " " " " |
| Total cost of treatment | \$0. | per lb. of copper recovered |

Mining costs, taxes, office—overhead, etc., extra.

Assay of product, pure electrolytic copper

99 % cu. GLC

Record of Ore-Treatment by the Lockwood Copper Recovery Process at Butte, Montana.
 Mine—Butte-Duluth. Mining Co.—H. A. F. & A. F. Co., Lessees Under Receivers.

| Date | Kind of Ore: | Percentage of Commercial Minerals: | | |
|------|---------------------------------|------------------------------------|-----------|-------------|
| Aug. | Oxide Silicate of Copper, | Copper: 1.97% | Gold: oz. | Silver: oz. |
| 8 | Crysocolla, Azurite, Malachite. | Lead: % | Zinc: % | |
| 1918 | | | | |

Analysis: (Analysis Not on File.)
 Assayed for Copper Only, Showing 1.97% Copper.

| Ore Not Roasted | Hours at ° Fahr. |
|------------------------------|------------------|
| Showing,— Copper as Sulphide | % |
| Showing,— Copper as Oxide | 1.97% |

Remarks:

| | |
|---|--|
| Amount of charge | 2,000 lbs. of ore. |
| Amount of solution | 3,000 lbs. @ 60° Fahr. |
| Amount of acid | lbs. |
| Proportion of ore to solution, as | 1 to 1.49 by weight. |
| Percentage of acid, H ₂ SO ₄ 66° Baume | 1 to 3.03 by volume. |
| Percentage of acid used | % |
| Amount of acid regenerated per lb. of copper recovered | 0.79 lbs. |
| Proportion of acid regenerated | % |
| Duration of agitation before current on | 00 hours. |
| Resulting solution | % cu. |
| Duration of deposition | 81 hours. |
| Total duration of agitation, including the time of deposition | 81 hours. |
| Direct current Average amperage | 2.70 amperes. |
| Direct current Average voltage | 1.81 volts. |
| Direct current Total amperes used | amperes. |
| Amount of copper deposited on cathodes | lbs. |
| Total amount of current used | 39,584 K.W.H. |
| Amount current used per lb. copper recovered | K.W.H. |
| Amount of copper recovered per K.W.H. used | 0.80 lbs. |
| Percentage of recovery from solution | 90.30 % |
| Net recovery from ore | 81. % of entire as- |
| Copper remaining in tails, unextracted | 0.19 % say content. |
| | Net 1.95 lbs. |
| 66° B. acid used per lb. copper recovered | 2.74 lbs. (assuming that all is lost). |

Costs of treatment, based on treating 100 tons of copper ore per day of 24 hours:

| | | |
|--|-----------|-----------------------------|
| Crushing, 20 mesh | \$0.01250 | per lb. of copper recovered |
| Roasting | \$0. | " " " " |
| Leaching, acid 66 deg. H ₂ SO ₄ @ \$30 ton | \$0.03360 | " " " " |
| Recovery, current @ \$1 per H.P. month, plus \$0.0061 per KWH used | \$0.01225 | " " " " |
| Power (Conn. HP. 300) (KWH \$0.0098) | \$0.00750 | " " " " |
| Labor, 5 men at \$7.00 per day | \$0.02000 | " " " " |
| Total cost of treatment | \$0.08585 | per lb. of copper recovered |

Mining costs, taxes, office—overhead, etc., extra.

Assay of product, pure electrolytic copper 99.76 % cu. GLC

Mining costs, \$0.030 per lb. of copper recovered.

Above etc., \$0.006 per lb. of copper recovered.

N. B.—All above figures based on 1918 war-time costs.

Record of Ore-Treatment by the Lockwood Copper Recovery Process at Butte, Montana.
 Mine—Butte-Duluth. Mining Co.—H. A. F. & A. F., Lessees Under Receivers.

| Date | Kind of Ore: | Percentage of Commercial Minerals: | | |
|------|---------------------------------|------------------------------------|-----------|-------------|
| Aug. | Oxide Silicate of Copper, | Copper: 1.5% | Gold: oz. | Silver: oz. |
| 18 | Crysocolla, Azurite, Malachite. | Lead: " | Zinc: " | |
| 1918 | | | | |

Analysis: (Analysis Not on File.)
 Assayed for Copper Only, Showing 1.5% Copper.

| Ore Not Roasted | Hours at | Fahr. |
|-----------------|--------------------|-------------|
| Showing,— | Copper as Sulphide |% |
| Showing,— | Copper as Oxide |1.5% |

Remarks: Outside Engineer took this test, furnished us only part of his record.

| | |
|--|--------------------------------|
| Amount of charge | 2,000 lbs. of ore. |
| Amount of solution | 3,000 lbs. |
| Amount of acid | lbs. |
| Proportion of ore to solution, as | to |
| Percentage of acid, H ₂ SO ₄ , 66° Baume | % |
| Percentage of acid used | % |
| Proportion of acid regenerated | % |
| Duration of agitation before current on | hours. |
| Resulting solution | % cu. |
| Duration of deposition | hours. |
| Total duration of agitation, including the time of deposition | hours. |
| Direct current | Amperes. |
| Direct current | Average amperage |
| Direct current | Average voltage |
| Direct current | Total amperes used |
| Amount of copper deposited on cathodes | lbs. |
| Total amount of current used | K.W.H. |
| Amount current used per lb. copper recovered | K.W.H. |
| Amount of copper recovered per K.W.H. used | 0.70 lbs. |
| Percentage of recovery from solution | % |
| Net recovery from ore | 85 % of entire as-say content. |
| Copper remaining in tails, unextracted | % |
| 66° B. acid used per lb. copper recovered | 2.5 lbs. |

Energy Efficiency, 35%.
 Current Density, Average 2.25 Amperes per sq. ft.

Costs of treatment, based on treating 100 tons of copper ore per day of 24 hours:

| | | |
|---|----------|-----------------------------|
| Crushing, 35 mesh | \$0.0125 | per lb. of copper recovered |
| Roasting | \$0. | " " " " " |
| Leaching, acid 66 deg. H ₂ SO ₄ , @ \$28.00 ton | \$0.0350 | " " " " " |
| Recovery, current @ \$1 per H.P. month, plus \$0.061 per KWH used | \$0.0140 | " " " " " |
| Power | \$0.0100 | " " " " " |
| Labor, 9 men at \$5 & \$6 per day | \$0.0200 | " " " " " |
| Total cost of treatment | \$0.0915 | per lb. of copper recovered |

Mining costs, taxes, office—overhead, etc., extra.
 Assay of product, pure electrolytic copper 99.76% cu.
 Mining costs \$0.030 per lb. copper recovered.
 Above etc. 0.006 per lb. copper recovered.

N.B.—All above figures based on war-time costs GHD

Record of Ore-Treatment by the Lockwood Copper Recovery Process at Vancouver, B. C.

Mine—Texada Island, B. C.

Mining Co.—N. Explor. Co.

| | | | | |
|------|-----------------------------------|------------------------------------|-----------|-------------|
| Date | Kind of Ore: | Percentage of Commercial Minerals: | | |
| May | Sulphide, Chalcopyrite, Pyrite in | Copper: 2.88% | Gold: oz. | Silver: oz. |
| 17 | Gangue of Calcium Iron Garnet. | Lead: % | Zinc: % | |
| 1919 | | | | |

| | | | | | | |
|-----------|-----------|--------|---------|--------|------------------|--------|
| Analysis: | Insoluble | 58.51% | Iron | 14.04% | Magnesia | 0.00% |
| | Alumina | 0.31% | Lime | 10.02% | Oxygen, Loss and | |
| | Copper | 2.88% | Sulphur | 3.97% | Undetermined | 10.27% |

Ore Roasted 9 Hours at 1200° Fahr.

Showing,— Copper as Sulphide 0.11%

Showing,— Copper as Oxide 2.60%

Remarks: Total copper present in assay after roast: 2.71%

| | |
|---|---|
| Amount of charge | 1,000 lbs. of ore. |
| Amount of solution | 3,000 lbs. |
| Amount of acid | 60 lbs. |
| Proportion of ore to solution, as | 1 to 3 |
| Percentage of acid, H ₂ SO ₄ 66° Baume | 2.0 % of solution. |
| Percentage of acid used | % |
| Proportion of acid regenerated | % |
| Duration of agitation before current on | 4 hours. |
| Resulting solution | 1.44 % H ₂ SO ₄ . |
| Duration of deposition | 0.431 % cu. |
| Total duration of agitation, including the time of deposition | 61 hours. |
| Direct current | 65 hours. |
| Average amperage | amperes. |
| Direct current | 2.1 volts. |
| Average voltage | |
| Direct current | Total amperes used |
| | 5428.9 amperes. |
| Amount of copper deposited on cathodes | 24.22 lbs. |
| Total amount of current used | 11.617 K.W.H. |
| Amount current used per lb. copper recovered | 0.479 K.W.H. |
| Amount of copper recovered per K.W.H. used | 2.08 lbs. |
| Percentage of recovery from solution | 96.77 % |
| Net recovery from ore | 89.39 % of entire assay content. |
| Copper remaining in tails, unextracted | 0.097018 % |
| 66° B. acid used per lb. copper recovered | 1.56 lbs. |

Costs of treatment, based on treating 100 tons of copper ore per day of 24 hours:

| | | |
|--|-----------|-----------------------------|
| Crushing, 20 mesh | \$0.00700 | per lb. of copper recovered |
| Roasting | \$0.00700 | " " " " |
| Leaching, acid 66 deg. H ₂ SO ₄ @ \$30 ton | \$0.02340 | " " " " |
| Recovery, current @ \$0.01 per KWH used | \$0.00479 | " " " " |
| Power | \$0.00700 | " " " " |
| Labor, 5 men at \$6.00 per day | \$0.00625 | " " " " |

| | | |
|-------------------------|-----------|-----------------------------|
| Total cost of treatment | \$0.05544 | per lb. of copper recovered |
|-------------------------|-----------|-----------------------------|

Mining costs, taxes, office—overhead, etc., extra.

| | | | |
|-------------------|--------------------------|---------|-----|
| Assay of product, | pure electrolytic copper | 99.76 % | PWT |
|-------------------|--------------------------|---------|-----|

Record of Ore-Treatment by the Lockwood Copper Recovery Process at Vancouver, B. C.

Mine—Vancouver Island.

Mining Co.—L. A. S. Co., Victoria, B. C.

| Date | Kind of Ore: | Percentage of Commercial Minerals: | | |
|---------------|--------------|------------------------------------|-----------|-------------|
| Sept. 13 1919 | Sulphide | Copper 1.12% | Gold: oz. | Silver: oz. |
| | | Lead: " | Zinc: " | |

| | | | | | | |
|-----------|-----------|--------|------------|--------|------------------|-------|
| Analysis: | Insoluble | 49.15% | Iron (FeO) | 21.20% | Magnesia | Trace |
| | Alumina | 4.08% | Lime (CaO) | 14.55% | Oxygen, Loss and | |
| | Copper | 1.12% | Sulphur | 2.05% | Undetermined | 7.85% |

Ore Roasted 8 Hours at 1200° Fahr.

| | | |
|-----------|--------------------|-------|
| Showing,— | Copper as Sulphide | 0.10% |
| Showing,— | Copper as Oxide | 1.02% |
| Showing,— | Copper in Tails | 0.02% |

Remarks:

| | |
|--|-----------------------------------|
| Amount of charge | 50 lbs. of ore. |
| Amount of solution | 300 lbs. |
| Amount of acid | 0.75 lbs. |
| Proportion of ore to solution, as | 1 to 6 |
| Percentage of acid, H ₂ SO ₄ , 66° Baume | 0.25 % of solution. |
| Percentage of acid used | 64.8 % |
| Proportion of acid regenerated | 35.2 % |
| Duration of agitation before current on | 2 hours. |
| Resulting solution | % cu. |
| Duration of deposition | 26 hours. |
| Total duration of agitation, including the time of deposition | 28 hours. |
| Direct current.....Average amperage | 6 amperes. |
| Direct current.....Average voltage | 2.1 volts. |
| Direct current.....Total amperes used | amperes. |
| Amount of copper deposited on cathodes | 0.56 lbs. |
| Total amount of current used | 0.327 K.W.H. |
| Amount current used per lb. copper recovered | 0.654 K.W.H. |
| Amount of copper recovered per K.W.H. used | 1.52 lbs. |
| Percentage of recovery from solution | 100. % |
| Net recovery from ore | 89.28 % of entire as-say content. |
| Copper remaining in tails, unextracted | 0.02 % |
| 66° B. acid used per lb. copper recovered | 1.5 lbs. |

Costs of treatment, based on treating 100 tons of copper ore per day of 24 hours:

| | | |
|---|-----------|-----------------------------|
| Crushing, 20 mesh | \$0.00705 | per lb. of copper recovered |
| Roasting | \$0.01700 | " " " " " |
| Leaching, acid 66 deg. H ₂ SO ₄ @ \$30.00 ton | \$0.02250 | " " " " " |
| Recovery, current @ \$0.01 per KWH used | \$0.00654 | " " " " " |
| Power | \$0.00750 | " " " " " |
| Labor, 5 men at \$6.00 per day | \$0.01500 | " " " " " |

Total cost of treatment.....\$0.07559 per lb. of copper recovered

Mining costs, taxes, office—overhead, etc., extra.

Assay of product, pure electrolytic copper..... 99.76 % cu. GLC

Record of Ore-Treatment by the Lockwood Copper Recovery Process at Vancouver, B. C.

Mine—Contact, Nevada. Mining Co.—W. H. S. & Co., Seattle, Washington.

| Date | Kind of Ore: | Percentage of Commercial Minerals: | | |
|-------|----------------------|------------------------------------|-----------|-------------|
| Sept. | Carbonate, Oxide and | Copper 6.43% | Gold: oz. | Silver: oz. |
| 27 | Sulphide. | Lead: % | Zinc: % | |
| 1919 | Complex Ore. | | | |

| | | | | | | |
|-----------|-----------|--------|---------|-------|------------------|-------|
| Analysis: | Insoluble | 79.10% | Iron | 3.73% | Magnesia | Trace |
| | Alumina | 0.56% | Lime | 0.82% | Oxygen, Loss and | |
| | Copper | 6.43% | Sulphur | 0.31% | Undetermined | 9.05% |

Ore Roasted 2 Hours at 1400° Fahr.

Showing,— Copper as Sulphide 0.15%

Showing,— Copper as Oxide 6.28%

Remarks: N. B.—Trial run only, treatment formula not worked out for best results.

| | |
|--|----------------------------------|
| Amount of charge | 50 lbs. of ore. |
| Amount of solution | 300 lbs. |
| Amount of acid | 5 lbs. |
| Proportion of ore to solution, as | 1 to 6 |
| Percentage of acid, H ₂ SO ₄ , 66° Baume | 1.6 % of solution. |
| Percentage of acid used | 0.77 % per 1% Cu. |
| Proportion of acid regenerated | 48. % |
| Duration of agitation before current on | 4 hours. |
| Resulting solution | % cu. |
| Duration of deposition | 48 hours. |
| Total duration of agitation, including the time of deposition | 52 hours. |
| Direct current—Average amperage | 28 amperes. |
| Direct current—Average voltage | 2.18 volts. |
| Direct current—Total amperes used | amperes. |
| Amount of copper deposited on cathodes | 2.955 lbs. |
| Total amount of current used | 2.929 K.W.H. |
| Amount current used per lb. copper recovered | 0.99 K.W.H. |
| Amount of copper recovered per K.W.H. used | 1.02 lbs. |
| Percentage of recovery from solution | 100. % |
| Net recovery from ore | 91.91 % of entire assay content. |
| Copper remaining in tails, unextracted | 0.52 % |
| 66° B. acid used per lb. copper recovered | 1.69 lbs. |

Costs of treatment, based on treating 100 tons of copper ore per day of 24 hours:

| | | |
|--|-----------|-----------------------------|
| Crushing, 20 mesh | \$0.00700 | per lb. of copper recovered |
| Roasting | \$0.00560 | " " " " |
| Leaching, acid 66 deg. H ₂ SO ₄ , @ \$30 ton | \$0.02535 | " " " " |
| Recovery, current @ \$0.01 per KWH used | \$0.00991 | " " " " |
| Power | \$0.00750 | " " " " |
| Labor, 5 men at \$6.00 per day | \$0.00394 | " " " " |

Total cost of treatment \$0.05930 per lb. of copper recovered

Mining costs, taxes, office—overhead, etc., extra.

Assay of product, pure electrolytic copper 99.76 % cu. GLC

Record of Ore-Treatment by the Lockwood Copper Recovery Process at Vancouver, B. C.

Mine—Regal, Princeton, B. C.

Mining Co.—W. C. M. & Co.

| | | | | |
|----------|--------------|------------------------------------|-----------|-----------------|
| Date | Kind of Ore: | Percentage of Commercial Minerals: | | |
| Sept. 12 | Sulphide | Copper 1.92% | Gold: Tr. | Silver: 0.31oz. |
| 1919 | | Lead: " | Zinc: " | |

| | | | | | | |
|-----------|-----------|--------|---------|-------|------------------|-------|
| Analysis: | Insoluble | 77.72% | Iron | 6.30% | Magnesia | 3.71% |
| | Alumina | 2.10% | Lime | 2.65% | Oxygen, Loss and | |
| | Copper | 1.92% | Sulphur | 1.44% | Undetermined | 4.16% |

Ore Roasted 8 Hours at 1250 Fahr.

| | | |
|-----------|--------------------|-------|
| Showing,— | Copper as Sulphide | 0.09% |
| Showing,— | Copper as Oxide | 1.83% |

Remarks:

| | |
|---|----------------------------------|
| Amount of charge | 1,000 lbs. of ore. |
| Amount of solution | 3,000 lbs. |
| Amount of acid | 30 lbs. |
| Proportion of ore to solution, as | 1 to 3 |
| Percentage of acid, H ₂ SO ₄ , 66 Baume | 1.0 % of solution. |
| Percentage of acid used | 65.0 % |
| Proportion of acid regenerated | 35.0 % |
| Duration of agitation before current on | 3 hours. |
| Stock | 1.005 % cu. |
| Resulting solution | 1.588 % cu. |
| Duration of deposition | 26 hours. |
| Total duration of agitation, including the time of deposition | 29 hours. |
| Direct current Average amperage | 242.0 amperes. |
| Direct current Average voltage | 2.07 volts. |
| Direct current Total amperes used | amperes. |
| Amount of copper deposited on cathodes | 18.3 lbs. |
| Total amount of current used | 13.04 K.W.H. |
| Amount current used per lb. copper recovered | 0.712 K.W.H. |
| Amount of copper recovered per K.W.H. used | 1.40 lbs. |
| Percentage of recovery from solution | 99.9 % |
| Net recovery from ore | 94.26 % of entire assay content. |
| Copper remaining in tails, unextracted | 0.11 % |
| 66° B. acid used per lb. copper recovered | 1.63 lbs. |

Costs of treatment, based on treating 100 tons of copper ore per day of 24 hours:

| | | |
|---|-----------|-----------------------------|
| Crushing, 20 mesh | \$0.00700 | per lb. of copper recovered |
| Roasting | \$0.00750 | " " " " " |
| Leaching, acid 66 deg. H ₂ SO ₄ @ \$30.00 ton | \$0.02245 | " " " " " |
| Recovery, current @ \$0.01 per KWH used | \$0.00712 | " " " " " |
| Power | \$0.00750 | " " " " " |
| Labor, 5 men at \$6.00 per day | \$0.00819 | " " " " " |

| | | |
|-------------------------|-----------|-----------------------------|
| Total cost of treatment | \$0.05976 | per lb. of copper recovered |
|-------------------------|-----------|-----------------------------|

Mining costs, taxes, office—overhead, etc., extra.

| | | | |
|-------------------|--------------------------|-------------|-----|
| Assay of product, | pure electrolytic copper | 99.76 % cu. | PWT |
|-------------------|--------------------------|-------------|-----|

Record of Ore-Treatment by the Lockwood Copper Recovery Process at Vancouver, B. C.
 Mine—Regal, Princeton, B. C. Mining Co.—W. C. M. & Co.

Date Kind of Ore: Percentage of Commercial Minerals:
 Sept. Sulphide Copper 1.92% Gold: oz. Silver: oz.
 1 Lead: % Zinc: %
 1919

Analysis: Insoluble 77.72% Iron 6.30% Magnesia 3.71%
 Alumina 2.10% Lin 2.65% Oxygen, Loss and
 Copper 1.92% Sulphur 1.44% Undetermined 4.16%

Ore Roasted 8 Hours at 1200° Fahr.
 Showing,— Copper as Sulphide 0.15%
 Showing,— Copper as Oxide 1.77%

Remarks:

Amount of charge 1,000 lbs. of ore.
 Amount of solution 3,000 lbs.
 Amount of acid 35 lbs.
 Proportion of ore to solution, as 1 to 3
 Percentage of acid, H₂SO₄, 66° Baume 1.16 % of solution.
 Percentage of acid used 65.0 %
 Proportion of acid regenerated 35.0 %
 Duration of agitation before current on 2 hours.
 Stock 1.056 % cu.
 Resulting solution 1.632 % cu.
 Duration of deposition 24 hours.
 Total duration of agitation, including the time of deposition 26 hours.
 Direct current Average amperage 225.4 amperes.
 Direct current Average voltage 2.08 volts.
 Direct current Total amperes used 5409.6 amperes.
 Amount of copper deposited on cathodes 17.2 lbs.
 Total amount of current used 11.25 K.W.H.
 Amount current used per lb. copper recovered 0.654 K.W.H.
 Amount of copper recovered per K.W.H. used 1.53 lbs.
 Percentage of recovery from solution 98.24 %
 Net recovery from ore 89.58 % of entire assay content.
 Copper remaining in tails, unextracted 0.20 %
 66° B. acid used per lb. copper recovered 2.3 lbs.

Costs of treatment, based on treating 100 tons of copper ore per day of 24 hours:

Crushing, 20 mesh \$0.00750 per lb. of copper recovered
 Roasting \$0.00750 " " " "
 Leaching, acid 66 deg. H₂SO₄ @ \$30 ton \$0.03450 " " " "
 Recovery, current @ \$0.01 per KWH used \$0.00654 " " " "
 Power \$0.00700 " " " "
 Labor, 5 men at \$6.00 per day \$0.00630 " " " "

Total cost of treatment \$0.06934 per lb. of copper recovered

Mining costs, taxes, office—overhead, etc., extra.

Assay of product, pure electrolytic copper 99.76 % cu. PWT

Record of Ore-Treatment by the Lockwood Copper Recovery Process at Vancouver, B. C.

Mine—Regal, Princeton, B. C.

Mining Co.—W. C. M. & Co.

Date Kind of Ore:

Sept. Sulphide

23

1919

Percentage of Commercial Minerals:

Copper 1.9% Gold: oz. Silver: oz.

Lead: % Zinc: %

| | | | | | |
|---------------------|--------|---------|-------|------------------|-------|
| Analysis: Insoluble | 77.72% | Iron | 6.30% | Magnesia | 3.71% |
| Alumina | 2.10% | Lime | 2.65% | Oxygen, Loss and | |
| Copper | 1.92% | Sulphur | 1.44% | Undetermined | 4.16% |

Ore Roasted 8 Hours at 1200° Fahr.

Showing,— Copper as Sulphide 0.09%

Showing,— Copper as Oxide 1.83%

Remarks:

| | |
|--|-----------------------------------|
| Amount of charge | 1,000 lbs of ore. |
| Amount of solution | 3,000 lbs. |
| Amount of acid | 30 lbs. |
| Proportion of ore to solution, as | 1 to 3 |
| Percentage of acid, H ₂ SO ₄ , 66° Baume | 1.0 % of solution. |
| Percentage of acid used | 70.0 % |
| Proportion of acid regenerated | 30.0 % |
| Duration of agitation before current on | 2 hours. |
| Resulting solution | 1.92 % cu. |
| Duration of deposition | 24 hours. |
| Total duration of agitation, including the time of deposition | 26 hours. |
| Direct current. Average amperage | 242 amperes. |
| Direct current. Average voltage | 2.08 volts. |
| Direct current. Total amperes used | 5808 amperes. |
| Amount of copper deposited on cathodes | 18.3 lbs. |
| Total amount of current used | 13.04 K.W.H. |
| Amount current used per lb. copper recovered | 0.712 K.W.H. |
| Amount of copper recovered per K.W.H. used | 1.40 lbs. |
| Percentage of recovery from solution | 100. % |
| Net recovery from ore | 94.26 % of entire as-say content. |
| Copper remaining in tails, unextracted | 0.11 % |
| 66° B. acid used per lb. copper recovered | 1.63 lbs. |

Costs of treatment, based on treating 100 tons of copper ore per day of 24 hours:

| | | |
|--|-----------|-----------------------------|
| Crushing, 20 mesh | \$0.00700 | per lb. of copper recovered |
| Roasting | \$0.00750 | " " " " |
| Leaching, acid 66 deg. H ₂ SO ₄ @ \$30 ton | \$0.02245 | " " " " |
| Recovery, current @ \$0.01 per KWH used | \$0.00712 | " " " " |
| Power | \$0.00750 | " " " " |
| Labor, 5 men at \$6.00 per day | \$0.00819 | " " " " |

Total cost of treatment \$0.05976 per lb. of copper recovered

Mining costs, taxes, office—overhead, etc., extra.

Assay of product, pure electrolytic copper 99.76 % cu. GLC

r, B. C.

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4.16%

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Record of Ore-Treatment by the Lockwood Copper Recovery Process at Vancouver, B. C.
Mine—Regal, Princeton, B. C. Mining Co.—W. C. M. & Co.

| | | | | |
|-------|--------------|------------------------------------|-----------|-----------------|
| Date | Kind of Ore: | Percentage of Commercial Minerals: | | |
| Sept. | Sulphide | Copper 2.39% | Gold: Tr. | Silver: 0.31oz. |
| | | Lead: % | Zinc: % | |

1919

| | | | | | |
|---------------------|--------|---------|-------|------------------|-------|
| Analysis: Insoluble | 77.72% | Iron | 6.30% | Magnesia | 3.71% |
| Alumina | 2.10% | Lime | 2.65% | Oxygen, Loss and | |
| Copper | 2.39% | Sulphur | 1.44% | Undetermined | 3.69% |

Ore Roasted 8 Hours at 1200° Fahr.

Showing,— Copper as Sulphide 0.21%

Showing,— Copper as Oxide 2.18%

(or Sulphate)

Remarks:

| | |
|---|---------------------------------------|
| Amount of charge | 1,000 lbs. of ore. |
| Amount of solution | 3,000 lbs. |
| Amount of acid | 40 lbs. |
| Proportion of ore to solution, as | 1 to 3 |
| Percentage of acid, H ₂ SO ₄ 66° Baume | 1.3 % of solution. |
| Percentage of acid used | 70.0 % |
| Proportion of acid regenerated | 30.0 % |
| Duration of agitation before current on | 1½ hours. |
| Resulting solution | 1.44 % cu. |
| Duration of deposition | 25 hours. |
| Total duration of agitation, including the time of deposition | 26½ hours. |
| Direct current—Average amperage | 284 amperes. |
| Direct current—Average voltage | 2.1 volts. |
| Direct current—Total amperes used | 7100 amperes. |
| Amount of copper deposited on cathodes | 21.8 lbs. |
| Total amount of current used | 15.1 K.W.H. |
| Amount current used per lb. copper recovered | 0.675 K.W.H. |
| Amount of copper recovered per K.W.H. used | 1.54 lbs. |
| Percentage of recovery from solution | 100. % |
| Net recovery from ore | 95.05 % of entire as- say content. |
| Copper remaining in tails, unextracted | 0.1183 % |
| 66° B. acid used per lb. copper recovered | 1.8 lbs. |

Costs of treatment, based on treating 100 tons of copper ore per day of 24 hours:

| | | |
|--|-----------|-----------------------------|
| Crushing, 20 mesh | \$0.00750 | per lb. of copper recovered |
| Roasting | \$0.00750 | " " " " |
| Leaching, acid 66 deg. H ₂ SO ₄ @ \$30 ton | \$0.02700 | " " " " |
| Recovery, current @ \$0.01 per KWH used | \$0.00675 | " " " " |
| Power | \$0.00700 | " " " " |
| Labor, 5 men at \$6.00 per day | \$0.00627 | " " " " |

| | | |
|-------------------------|-----------|-----------------------------|
| Total cost of treatment | \$0.06202 | per lb. of copper recovered |
|-------------------------|-----------|-----------------------------|

Mining costs, taxes, office—overhead, etc., extra.

| | | | |
|-------------------|--------------------------|-------------|-----|
| Assay of product, | pure electrolytic copper | 99.76 % cu. | GLC |
|-------------------|--------------------------|-------------|-----|

Record of Ore-Treatment by the Lockwood Copper Recovery Process at Vancouver, B. C.
 Mine—Parsons Mine. Mining Co.—P. M. Co., near Capitan, New Mexico, U. S. A.

| | | | |
|------------|--|------------------------------------|-------------------------------|
| Date | Kind of Ore: | Percentage of Commercial Minerals: | |
| March 1920 | Quartzite, Heavily Stained by Ferric Oxide, and Showing Azurite, Malachite, Tenorite and Some Sulphides. | Copper: 10.75% | Gold: oz. Silver: oz. Zinc: % |

| | | | |
|-----------|------------------|---------------|--------------------------------------|
| Analysis: | Insoluble 46.55% | Iron 13.05% | Magnesium Carbonate 5.01% |
| | Alumina 0.35% | Lime— | Calcium Carbonate 6.79% |
| | Copper 10.75% | Sulphur 4.14% | Oxygen, Loss and Undetermined 13.36% |

Ore Roasted 4 Hours at 1200 Fahr.

Showing,— Copper as Sulphide 0.00%

Showing,— Copper as Oxide 10.75%

(or Sulphate)

Remarks:

| | |
|---|----------------------------------|
| Amount of charge | 50 lbs. of ore. |
| Amount of solution | 200 lbs. |
| Amount of acid | 6.25 lbs. |
| Proportion of ore to solution, as | 1 to 4 |
| Percentage of acid, H_2SO_4 , 66° Baume | 3.125 % of solution. |
| Percentage of acid used | 65.0 % |
| Proportion of acid regenerated | 35.0 % |
| Duration of agitation before current on | 3 hours. |
| Resulting solution | 5.5 % cu. |
| Duration of deposition | 99 hours. |
| Total duration of agitation, including the time of deposition | 102 hours. |
| Direct current—Average amperage | 18 amperes. |
| Direct current—Average voltage | 2.2 volts. |
| Direct current—Total amperes used | 1782.0 amperes. |
| Amount of copper deposited on cathodes | 5.25 lbs. |
| Total amount of current used | 3.92 K.W.H. |
| Amount current used per lb. copper recovered | 0.746 K.W.H. |
| Amount of copper recovered per K.W.H. used | 1.34 lbs. |
| Percentage of recovery from solution | 100.0 % |
| Net recovery from ore | 97.66 % of entire assay content. |
| Copper remaining in tails, unextracted | 0.25 % |
| 66° B. acid used per lb. copper recovered | 1.19 % |

Costs of treatment, based on treating 100 tons of copper ore per day of 24 hours:

| | | |
|---|-----------|-----------------------------|
| Crushing, 20 mesh | \$0.00650 | per lb. of copper recovered |
| Roasting | \$0.00650 | " " " " |
| Leaching, acid 66 deg. H_2SO_4 @ \$30 ton | \$0.01785 | " " " " |
| Recovery, current @ \$0.01 per KWH used | \$0.00746 | " " " " |
| Power | \$0.00750 | " " " " |
| Labor, 5 men at \$6.00 per day | \$0.00142 | " " " " |
| Total cost of treatment | \$0.04723 | per lb. of copper recovered |

Mining costs, taxes, office—overhead, etc., extra.

Assay of product, pure electrolytic copper 99.76 % cu. GLC

Record of Ore-Treatment by the Lockwood Copper Recovery Process at Vancouver, B. C.
 Mine—Anaconda. Mining Co.—A. M. Co., Whitehorse, Yukon T.

| | | | | | |
|------|--------------|------------------------------------|-----------|-------------|--|
| Date | Kind of Ore: | Percentage of Commercial Minerals: | | | |
| July | Sulphide | Copper: 8.92' | Gold: oz. | Silver: oz. | |
| 26 | | Lead: ' | Zinc: ' | | |
| 1919 | | | | | |

| | | | | | | |
|-----------|-----------|--------|---------|--------|------------------|-------|
| Analysis: | Insoluble | 63.22' | Iron | 9.14' | Magnesia | Trace |
| | Alumina | 0.71' | Lime | 12.03' | Oxygen, Loss and | |
| | Copper | 8.92' | Sulphur | 2.71' | Undetermined | 3.27' |

Ore Roasted 8 Hours at 1100 Fahr.

| | | |
|-----------|--------------------|-------|
| Showing,— | Copper as Sulphide | 0.12' |
| Showing,— | Copper as Oxide | 8.41' |
| Showing,— | Copper in Tails | 0.51' |

Remarks:

| | |
|--|-----------------------|
| Amount of charge | 2,000 lbs. of ore. |
| Amount of solution | 3,000 lbs. |
| Amount of acid | 180 lbs. |
| Proportion of ore to solution, as | 2 to 3 |
| Percentage of acid, H ₂ SO ₄ , 66° Baume | 6 % of solution. |
| Percentage of acid used | 1 % per 1% cu. |
| Proportion of acid regenerated | 40 % |
| Duration of agitation before current on | 3 hours. |
| Resulting solution | % cu. |
| Duration of deposition | 94 hours. |
| Total duration of agitation, including the time of deposition | 97 hours. |
| Direct current Average amperage | 560 amperes. |
| Direct current Average voltage | 2.2 volts. |
| Direct current Total amperes used | amperes. |
| Amount of copper deposited on cathodes | 167.91 lbs. |
| Total amount of current used | 115.8 K.W.H. |
| Amount current used per lb. copper recovered | 0.689 K.W.H. |
| Amount of copper recovered per K.W.H. used | 1.45 lbs. |
| Percentage of recovery from solution | % |
| Net recovery from ore | 94.28 % of entire as- |
| | say content. |
| Copper remaining in tails, unextracted | 0.51 % |
| 66° B. acid used per lb. copper recovered | 1.06 lbs. |

Costs of treatment, based on treating 100 tons of copper ore per day of 24 hours:

| | | |
|--|-----------|-----------------------------|
| Crushing, 20 mesh | \$0.00700 | per lb. of copper recovered |
| Roasting | \$0.00750 | " " " " |
| Leaching, acid 66 deg. H ₂ SO ₄ , @ \$30 ton | \$0.01590 | " " " " |
| Recovery, current @ \$0.01 per KWH used | \$0.00689 | " " " " |
| Power | \$0.00750 | " " " " |
| Labor, 5 men at \$6.00 per day | \$0.00178 | " " " " |

Total cost of treatment \$0.04657 per lb. of copper recovered

Mining costs, taxes, office—overhead, etc., extra.

Assay of product, pure electrolytic copper 99.76 % cu. GLC

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