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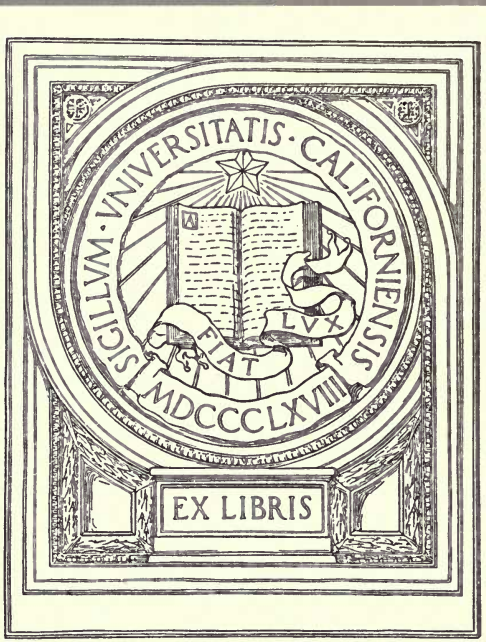
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# The Selling of Lead and Zinc

BY

H. J. STANDER



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# THE SELLING OF LEAD AND ZINC

BY H. J. STANDER.

## THE SELLING OF LEAD.

The lead industry in 1915 made good gains in output, both in mining and smelting. The lead content of ore mined in the United States was apparently over 600,000 short tons, compared with 522,864 tons in 1914, an increase of 78,000 tons, or 15 per cent. With the higher prices prevailing the percentage of increase in value of the 1915 output was even greater as compared with other years.

During 1915 construction was begun on one lead smelter and plans were completed for another, both to treat ore from the Coeur d'Alene district of Idaho. The Hercules Mining Co. purchased the copper smelter at Northport, Wash., and began the construction of two lead furnaces. This company is affiliated with the Pennsylvania Smelting Co. of Pittsburgh, Pa. The Bunker Hill & Sullivan Co. of the Coeur d'Alene district also completed plans for a smelter, but the site is yet in abeyance. The National refinery of the American Smelting & Refining Co. at Chicago, was dismantled, and the Balbach Smelting & Refining Co. abandoned its older lead plant at Newark, N. J.

The following estimates have been compiled by C. E. Siebenthal from reports to the United States Geological Survey by all the lead refineries and soft-lead smelters in operation during the year, except two smelters in the Joplin district, for which estimates have been made. These reports cover actual production for the first 10 or 11 months of the year, with an estimate for the remainder of the year, and from them the figures of production are made up without change. The statistics of imports, exports, and lead remaining in warehouse have been taken from the records of the Bureau of Foreign and Domestic Commerce for 10 months, the figures for November and December having been estimated.

### LARGEST PRODUCTION TO DATE.

The production of refined lead, desilverized and soft, from domestic and foreign ores in 1915 was approximately 565,000 short tons, worth at the average New York price $53,110,000, compared with 542,122 tons, worth $42,285,500, in 1914, and with 462,460 tons in 1913. The figures for 1915 do not include an estimated output of 20,550

tons of antimonial lead, worth $1,886,000, against 16,667 tons in 1914, and 16,665 tons in 1913. Of the total production, desilverized lead of domestic origin, exclusive of desilverized soft lead, is estimated at 306,682 tons, against 311,069 tons in 1914 and 250,578 tons in 1913; and desilverized lead of foreign origin at 48,318 tons, compared with 29,328 tons in 1914 and 50,582 tons in 1913. The production of soft lead, mainly from Mississippi Valley ores, is estimated at 210,000 tons, compared with 201,725 tons in 1914 and 161,300 tons in 1913. The total production of lead, desilverized and soft, from domestic ores, was thus about 516,682 tons, compared with 512,794 tons in 1914.

The final figures for the production of soft lead will show an increase of a few thousand tons over those here given, for the reason that the smelters and refiners of argentiferous lead undoubtedly treated more or less soft lead from the Mississippi Valley which is not distinguished from silver-lead ores in their preliminary estimates.

### IMPORTS AND EXPORTS.

The imports of lead are estimated at 9,625 short tons of lead in ore, valued at $653,000; 50,825 tons of lead in base bullion, valued at $3,496,000; and 400 tons of refined and old lead, valued at $28,000—a total of 60,850 tons, valued at $4,177,000, compared with 28,338 tons in 1914. Of the imports in 1915 about 58,000 tons came from Mexico, against 23,141 tons in 1914. These imports from Mexico are to be compared with an average of over 100,000 tons before the civil strife in that country. The remaining imports of lead came mostly from Chile.

The exports of lead of foreign origin smelted or refined in the United States again show an increase, being estimated at 43,000 tons, against 31,051 tons in 1914 and 54,301 tons in 1913. For the last two years, on the other hand, notable quantities of domestic lead have been exported to Europe, and the total for 1915 is estimated at 76,000 short tons, valued at $6,650,000, compared to 58,722 tons, valued at $4,501,674, in 1914.

### LEAD AVAILABLE FOR CONSUMPTION.

The amount of lead available for consumption during 1915 may be estimated by adding to the stock of foreign lead (domestic stocks are not known) in bonded warehouses at the beginning of the year (7,668 short tons) the imports (about 60,850 tons), the additions by liquidation (1,795 tons), and the domestic production (516,682 tons, making an apparent supply of 587,000 tons. From this are to be subtracted the exports of foreign lead (about 43,000 tons), the exports of domestic lead (76,000 tons), and the stock in bonded warehouses

at the close of the year (assumed to be the same as at the close of October, 16,000 tons), leaving as available for consumption 452,000 tons, compared with 449,052 tons in 1914.

HIGH PRICES.

Lead began the year at New York with a price of 3.8 cents a pound, nearly the minimum price of the year, and remained practically stationary until the middle of February. A gradual rise brought the price to 4.2 cents in April, and it remained there until the later part of May. A rapid rise next followed, and lead reached the maximum for the year at 7.56 on June 14. A sharp decline, followed by partial recovery and then by a more general decline, brought the price to 4.4 cents in the later part of August. After a slight recovery and another decline to 4.45 cents in September, the price gradually rose and closed the year at about 5.4 cents. The average New York price for the year was 4.7 cents a pound, compared with 3.9 cents in 1914 and 4.4 cents in 1913.

The London price of lead started at £19 a long ton (4.1 cents a pound) and rose until the latter part of March, when it reached £23 2s. 6d. a long ton (5 cents a pound). From this point the price fell to £20 1s. 3d. a long ton (4.3 cents a pound), after which there was a sharp ascent to £28 2s. 6d. (6.1 cents a pound) at the middle of June. After several ups and downs the price dropped to £20 6s. 3d. (4.4 cents a pound) by the middle of August, and then a gradual rise carried it to £29 5s. a long ton (6.3 cents a pound), and it closed the year at about that figure. The London market was fairly parallel to the New York market and, except for the period of high prices in the United States during July and August, was uniformly higher than the American market.

There are three forms of commercial lead:

1. The ordinary refined lead.
2. Corroding lead. This is especially pure.
3. Antimonial lead. This last kind of lead contains about 17 per cent of antimony, and is largely used in type metal.

The two lead markets in the United States are New York and St. Louis, and the difference in the prices quoted from these two places will, of course, be the freight rate, i. e., about 15 cents per hundred pounds.

PENALTIES.

As in the case of copper ores, there is a penalty for each of the following substances found in excess in a lead ore: zinc, arsenic and antimony; but besides this there is also a penalty on sulphur content greater than 3 per cent, and the penalty is usually 20 cents per unit

above 3 per cent of sulphur content. The reason for this is that while sulphur is necessary for the smelting of copper, it is not at all necessary in lead smelting. When there is a large amount of sulphur in a lead ore, it becomes necessary to first roast the ore before it can be smelted, and this, of course, costs considerably. Thus a smelter will allow usually only 3% of sulphur in a lead ore, as such a small quantity of copper can be gotten rid of in the smelting process, without going to the expense of first roasting the ore.

The proportion of lead in an ore or concentrate can be determined in one of two ways:

1. Wet analysis. By this means one gets what is commonly called the "wet lead," and the results of a wet analysis on a lead ore usually represents the actual amount of lead present.

2. Fire assay. This is the older of the two methods, and really gives the amount of lead in the ore as will be obtained in the actual smelting process.

One will usually find that the results obtained from a wet analysis are about 0.7 per cent higher than those obtained from a fire assay determination, when the ore does not contain any appreciable amounts of easily reducible metals, such as copper, antimony, bismuth, arsenic and zinc. When, however, the ore is fairly "impure," i. e. it contains an appreciable amount of the above-mentioned metals, some of these metals are reduced with the lead, in the case of a fire assay. The quantity of lead then obtained will be too high, as it will have in it whatever amount of these metals that has been reduced, so that the results may be fairly incorrect. Thus when a smelter buys lead ore that contains a large amount of such easily reducible metals, it always wishes to do so on the basis of the wet analysis, because the amount of lead present, as given by this method, will then be less than that obtained by a fire assay. But in the case of a "pure" ore, the fire assay gives the lower figures for the percentage of lead in the ore, and in the case of the "pure" lead ores, one can see that the smelter will always be desirous of buying the ore on the fire assay basis, whereas the seller's attitude in this matter, will, of course, be just the opposite from that of the smelter.

The following method for determining the percentage of lead in the ore is the one in common use now, in order to overcome the difficulties arising from the different results as obtained from wet analysis and fire assay determinations in the case of different kinds of lead ores.

1. Pure Lead Ores. The fire assay method, although both buyer and seller can get checks on the fire assay figures from wet analyses.

2. Other Lead Ores. (a) Fire assay, but the lead in the button is determined by wet analysis. (b) Wet analysis, with a deduction of from 1 to 1.5 per cent.

The smelter usually pays only for 90 per cent of the lead content, determined either by the fire assay or wet analysis, less about 1.5 per cent, which is usually called "the dry analysis basis." The smelter pays only for 90 per cent of the lead content because of such a great amount of smelter losses that always take place in the case of lead smelting. These losses amount to from 5 to 15 per cent of the lead smelted, and the losses in the case of a high grade ore are always relatively less than those in the case of a low grade lead ore.

NEUTRAL SCHEDULE ON LEAD IN LEAD ORES AND LEAD-COPPER ORES.

| Lead Content | Value per Unit | Smelter Charge per Ton |
|---|---|---|
| 5 to 10% | 40 cents | $6.00 |
| 10 to 15% | 43 cents | 5.00 |
| 15 to 20% | 45 cents | 4.00 |
| 20 to 25% | 47 cents | 3.00 |
| 25 to 30% | 49 cents | 3.00 |
| 30 to 35% | 51 cents | 2.00 |
| 35 to 40% | 52 cents | 1.50 |
| 40 to 45% | 52 cents | 1.00 |
| 45 to 50% | 53 cents | 1.00 |
| 50 to 55% | 54 cents | 1.00 |
| Over 55% | 55 cents | 1.00 |

FLAT SCHEDULE ON LEAD IN LEAD ORES AND LEAD-COPPER ORES.

| Lead Content | Value per Unit | Smelter Charge per Ton |
|---|---|---|
| 5 to 10% | 40 cents | $10.00 |
| 10 to 15% | 43 cents | 8.50 |
| 15 to 20% | 45 cents | 7.00 |
| 20 to 25% | 47 cents | 5.50 |
| 25 to 30% | 49 cents | 4.50 |
| 30 to 35% | 51 cents | 3.50 |
| 35 to 40% | 52 cents | 2.00 |
| 40 to 45% | 52 cents | 1.00 |
| 45 to 50% | 53 cents | 1.00 |
| 50 to 55% | 54 cents | 1.00 |
| Over 55% | 55 cents | 1.00 |

SCHEDULE ON LEAD CONCENTRATES.

| Lead Content | Value per Unit | Smelter Charge per Ton |
|---|---|---|
| 5 to 10% | 40 cents | $3.75 |
| 10 to 15% | 43 cents | 3.00 |
| 15 to 20% | 45 cents | 2.50 |
| 20 to 25% | 47 cents | 2.25 |
| 25 to 30% | 49 cents | 2.75 |

In all cases, the following is usually the schedule on which payment for gold, silver and copper in the lead ores:

Gold, $19.50 per ounce, if 0.05 ounce or over per ton.

Silver, 95% of contents at New York quotation, date of assay.

Copper, for dry copper (1.5% off wet) and 6 cents off per pound on Western Union quotation for casting copper.

The payment for the amount of lead in the ore is made in one of three different methods: They are:

1. By the unit and at quotation.
2. For 90% of lead content at the sales price, with a deduction per pound.
3. For 90% of lead content at 90 or 95% of the sale price.

The price per unit is based on a quotation of $4 per 100 pounds of lead. For every rise of 5 cents in the quotation, 1 cent is added to the price per unit, and in the same way, 1 cent is deducted from the price per unit for every fall of 5 cents in the quotation.

One must remember that the quotation is not the sales price in New York, but is 90% of this price. So that when the New York sales price is $4 per 100 pounds, the quotation is 90% of $4, i.e. $3.60. When, however, the sales price is below $4.50 and over $4.00, the quotation is obtained by taking 90% of the $4 sales price, and adding to it one-half of the excess of the sales price over $4. Again, when the sales price is above $4.50, the quotation is 90% of $4, i. e. $3.60, plus one-half the excess of the sales price between $4 and $4.50, plus the excess above $4.50.

Usually no payment is made for a lead content of less than 5% in an ore. Sometimes, however, a bonus of 15 cents per unit is given for lead in an ore, if the lead content is below 5%. Since the losses are comparatively greater in smelting low grade ores than in smelting high grade ores, the smelter usually pays a lower price per unit for the lead in low-grade lead ores than for the lead in high grade ores.

SELLING OF ZINC.

The common term for commercial zinc is spelter. All the great zinc fields and a great number of the zinc smelters are situated in Missouri and not far from St. Louis; for this reason, St. Louis, Mo.,

is the main zinc market. It is, however, also sold in New York, but on a St. Louis basis.

It is essential in the case of zinc that the ore be of a high grade character, because too low grade zinc ores cannot be treated at the zinc smelter directly. In the United States zinc is chiefly produced in Missouri, Wisconsin, Colorado and Montana. Bids are always made in the open market, and smelters usually have representatives who offer prices for given lots of ore. There are two standard zinc ores:

1. The 60% ore, which is commonly zinc sulphide, or what is called "blende."
2. The 30% ore, which is zinc silicate, or calomine.

PENALTIES.

Lead is sometimes penalized when present in a proportion above 0.5%; iron, when present over 1%, is penalized at the rate of $1 for each one per cent above this figure.

The New York price for zinc is the price quoted at St. Louis, plus 15 cents per hundred pounds, which is the freight rate on spelter from St. Louis to New York. Spelter is protected by an import duty of 15 per cent ad valorem, and the zinc ore by a duty of 10 per cent ad valorem.

The Engineering & Mining Journal, Jan. 10, 1915, published the accompanying table, giving the names and capacity of the zinc smelters in the United States. Their capacity is calculated from the number of retorts at the end of 1914.

| Name of Plant. | Situation | No. of Retorts |
|---|---|---|
| Altoona Zinc Smelting Co. | Altoona, Kans. | 3,845 |
| American Zinc & Chemical Co. | Longcloth, Pa. | 864 |
| American Zinc Co. of Illinois | Hillsboro, Ill. | 400 |
| American Zinc, Lead & Smelting Co. | Dearing, Kans. | 3,840 |
| American Zinc, Lead & Smelting Co. | Caney, Kans. | 3,648 |
| Barblesville Zinc Co. | Barblesville, Okla. | 5,184 |
| Barblesville Zinc Co. | Collinsville, Okla. | 8,064 |
| Channbe Zinc Co. | Channbe, Kans. | 1,780 |
| Clarksburg Zinc Co. | Clarksburg, W. Va. | 2,712 |
| Collinsville Zinc Smelting Co. | Collinsville, Ill. | 1,536 |
| Edger Zinc Co. | St. Louis, Mo. | 1,180 |
| Edger Zinc Co. | Cherryville, Kans. | 4,800 |
| Granby Mining & Smelting Co. | Neodeska, Kans. | 3,840 |
| Granby Mining & Smelting Co. | E. St. Louis, Ill. | 3,240 |

| | | |
|---|---|---|
| Grasselli Chemical Co. | Clarksburg, W. Va. | 12,672 |
| Grasselli Chemical Co. | Meadowbrook, W. Va. | |
| Hegeler Bros. | Danville, Ill. | 1,800 |
| Illinois Zinc Co. | Peru, Ill. | 4,640 |
| La Harpe Spelter Co. | Le Harpe, Kans. | 1,856 |
| Robert Lanyon Zinc & Acid Co. | Hillsboro, Ill. | 1,840 |
| Layone Starr Smelting Co. | Barblesville, Okla. | 3,456 |
| Matthiesen & Hegler Zinc Co. | La Salle, Ill. | 5,256 |
| Mineral Point Zinc Co. | Depue, Ill | 9,080 |
| National Zinc Co. | Barblesville, Okla. | 4,260 |
| National Zinc Co. | Springfield, Ill. | 3,200 |
| Nevada Zinc Co. | Nevada, Mo. | 3,648 |
| New Jersey Zinc Co. | Palmerton, Pa. | 5,760 |
| Pittsburg Zinc Co. | Pittsburg, Kans. | 910 |
| Prime Wesborn Spelter Co. | Gas City, Kans. | 4,768 |
| Sandoval Zinc Co. | Sandoval, Ill. | 6,896 |
| Tulsa Fuel & Manufacturing Co. | Collinsville, Okla. | 4,232 |
| Tulsa Spelter Co. | Sand Springs, Okla. | 4,000 |
| United States Zinc Co. | Pueblo, Colo. | 1,920 |
| Total | | 120,994 |

There are four kinds of spelter on the market:

| | | % Lead | %. Iron | % Cu | % Impurities |
|---|---|---|---|---|---|
| I. | High grade or A | 0.07 | 0.03 | 0.05 | 0.10 |
| II. | Intermediate or B | 0.70 | 0.03 | 0.05 | 0.50 |
| III. | Brass Special or C | 0.75 | 0.04 | 0.07 | 1.20 |
| IV. | Prime Western or D | 1.50 | 0.08 | .... | .... |

The high grade spelter is usually from 2 to 4 cents per pound more than that of the prime Western; intermediate spelter is from 1 to 2 cents more per pound than prime Western. The prime Western is used chiefly for galvanizing iron, steel wire and iron flake.

The total production of spelter by ore smelters in 1914 was 362,361 tons, and there was a larger exportation of spelter than ever before in the history of the United States, the total being 70,242 tons, including 5,580 tons of spelter smelted in bond. These figures are from the "Mineral Industry" of 1914.

In conclusion, it may be worth while to give an example of a schedule of smelter charges for treatment of all classes of ore. The following schedule is typical of some of those in force in the western sections of the United States:

| Gross Value Per Ton of Ore | Treatment Charges Per Dry Ton |
|---|---|
| Under $14 | $ 5.00 |
| $14 to $20 | 6.00 |
| $20 to $25 | 6.50 |
| $25 to $30 | 7.00 |
| $30 to $35 | 7.50 |
| $35 to $40 | 8.00 |
| $40 to $45 | 8.50 |
| $45 to $50 | 9.00 |
| $50 or over | 10.00 |