

STATE OF OREGON
DEPARTMENT OF GEOLOGY & MINERAL INDUSTRIES
PORTLAND, OREGON

THE ORE.-BIN

VOL. 3 NO. 10

PORTLAND, OREGON

October 1941



Permission is granted to reprint information contained herein. Any credit given the Oregon State Department of Geology and Mineral Industries for compiling this information will be appreciated.

BUILDING BRICK

Historical Notes

Doubtless Neanderthal children made "mud pies" or their equivalents. They surely were fascinated by the velvety smoothness, the plastic qualities, of wet clay, and began moulding it in shapes just because of the sensation of working it with their hands. From such beginning the utility of dried clay shapes was discovered at a much later period, probably, when clay forms were baked by accident in a camp fire. Thus is indicated the antiquity, certain, if vague, of the ceramic arts. More ancient, more easily and widely applicable to early human needs than metallurgy, the working and moulding of clays for brick making, firing, manufacturing of pottery and use of glazes was very early discovered, developed and brought to a high state of perfection.

Bricks made by the Egyptians, Assyrians, and Romans were considerably larger than the modern brick and were commonly in the form of slabs. (Some Roman bricks were triangular in form). Some ancient Roman bricks had dimensions as great as 23.5" x 23.5" x 2.2".

Brick making goes far back beyond historical record. Fired bricks that must have been made over 10,000 years ago have been found in excavations in Egypt. All down through ancient times the use of brick and wall tilings in dwellings and ornamental work in other structures is shown by records and evidences left by the Egyptians, Chaldeans, Assyrians, Persians, Chinese, Indian races, Phoenicians, Greeks, Romans, Arabs and Moors.

The aborigines of America, notably in Mexico and Central America, made outstanding terra cottas, the origin of which dates back at least 1000 B.C.

In England probably more buildings have been built of brick than of any other material.

Building brick may have been introduced into England by the Romans, but claybaking had its origin there at a much earlier time. According to Nathaniel Lloyd in "A History of English Brickwork", baked clay spoons were made in Sussex a thousand years before Caesar landed. Among Celtic remains which date before 100 B.C., brick loom weights have been found. They were burnt brick, but softer than the well-burnt Roman brick.

Many old English structures, dating back to the 13th century, contain a large number of Roman wall bricks re-used from earlier buildings. These Roman bricks vary considerably in size. Some are square, but 18" x 12" x 1½" is a common size. Thickness ranges from 1" up to 3½".

The Roman Empire collapsed in the fifth century and during the following Dark Ages arts, crafts, and industries sank into obscurity. In England, the Saxons built few permanent buildings. There is no evidence that they made

either brick or tile; in fact, there is no record of brick-making between Roman and Mediaeval times.

Resumption of brick-making came in about the 12th-13th century. Buildings known to have been constructed in 1200-1220 contain bricks which are not Roman. In Sussex is the oldest brick dwelling house in England. It dates 1260-80 and contains bricks of Flemish or low country type, measuring 9" x 4 $\frac{1}{2}$ " x 2". The colors are cream and greenish yellow with some pinks and reds.

At the beginning of the 19th century the manufacture and use of building terracotta had progressed little since the Renaissance. It was still mainly influenced by the traditions of the Romans who used it, covered with glaze, in buildings subordinate to stone. Gradually but surely brick and tile began to replace stone, and finally buildings in the north of France, the Netherlands, England, and the United States were constructed wholly of brick.

Even though the quality of the modern brick is, other things being equal, not greatly different from those of ancient times, modern methods of manufacture are a far cry from the crude hand methods used up to fifty years ago. Machine moulding, drying in tunnel kilns, temperature control, and careful inspection all combine to make a uniform superior product. In ancient times bricks had the quality of indestructibility. Today they are beautifully indestructible.

Lloyd 1/ quotes an epitaph on a tablet in Iver Church commemorating the name of a bricklayer named Venturus Manday: "Below this place lies interred the body of Venturus Mandey, Bricklayer, and grandson to Venturus Mandey of this parish, Bricklayer, who had the honor of being Bricklayer to the Honbl. Society of Lincoln's Inn from the year of Our Lord 1667 to the day of his death. He was studious in mathematics and wrote and published three books for Public Good: one entitled Mellificium Mensionis or the Marrow of Measuring, another of Mechanical Powers or the Mystery of Nature and Art Unvayled; the third An Universal Mathematical Synopsis. He also translated into English Directorium Generale Uranometricum and Trigonometrica Plana Et Spherica, Linearis Et Logarithmica. . . and some other tracts which he designed to have printed if Death had not prevented him. He died the 26th day of July, 1701, aged 56 years and upwards. He also gave five pounds to the poor of the parish."

Bricklayer, mathematician, author, and philanthropist combined! Certainly that type has long since disappeared.

References: Nathaniel Lloyd, A History of English Brickwork; London, 1925;
New York agent, William Helburn, 418 Madison Ave., New York City.

USE BRICK

Are you thinking about building a home and wondering about shortages in lumber, labor, and nails? Why not consider brick construction in all or part of the walls? For appearance, for permanence, for overall economy, a brick house has everything to recommend it.

Did you ever stand on a hill and look off across an expanse of green lawns and rest your gaze on a brick house with white trim and green shrubbery? It's a picture that beckons; it holds the mind as well as the eyes. The neatness and color are striking, but you feel that behind these are substance and permanence.

In addition to use in the main structure of a house, brick and tile are being used more and more for beautification and for utilitarian purposes in grounds and yards. Bricks are attractively adaptable for steps, walks, garage runways and walls; they lend themselves easily to the forming of geometric designs and patterns which can add charm to the general plan. Terraces can be formed of brick; the garden spot can be an adjunct of an out-of-doors living room floored with brick in which the tea and card tables may be placed. The out-of-doors fireplace is especially useful not only for the family but also as a first aid to hospitality.

Out-of-doors entertaining makes for a successful hostess.

Incidentally there is no shortage in brick and tile; the price has advanced but moderately during the past two years as compared to lumber. Today brick construction compares more favorably with lumber construction in point of cost than at any time in many years. In addition, brick and tile are now made in many different colors and shapes so that the home builder has a wide variety from which to choose, either from the artistic or utilitarian viewpoint.

Following is a list of Oregon brick and tile dealers:

Columbia Brick Works
1320 SE Water St., Portland

Monmouth Brick Tile Co.
Monmouth, Oregon

Forest Grove Clay Products Co.
Forest Grove, Oregon

McMinnville Brick & Tile Co.
McMinnville, Oregon

Monroe Brick & Tile Co.
Monroe, Oregon

Needy Brick & Tile Co.
Needy, Oregon

Willamina Clay Products
0132 SW Mill St., Portland

Tillamook Clay Works
Tillamook, Oregon

O K Brick Yard
Sherwood, Oregon

Corvallis Brick & Tile Co.
Corvallis, Oregon

Molalla Brick & Tile Co.
Molalla, Oregon

F. E. McFarlane,
Grants Pass, Oregon

Klamath Falls Brick & Tile Co.
Klamath Falls, Oregon

Albany Brick & Tile Co.
Albany, Oregon

Donald Brick & Tile Co.
Donald, Oregon

Silica Brick & Tile Co.
Klamath Falls, Oregon

Klamath Concrete Pipe Co.
Klamath Falls, Oregon

METAL AND MINERAL SHORTAGES AND SUBSTITUTION IN NATIONAL DEFENSE 1/

According to Zay Jeffries, chairman of the OPM Advisory Committee, it is very difficult to get a picture of the exact requirements for defense. There are two inherent difficulties to overcome. One, the natural tendency of each man to overestimate metal requirements--based on the perfectly human assumption that it is better to be safe than sorry. This overestimate is pyramided within the departmental unit, within the department, and finally within the larger branch of national defense, viz: Army, Navy, or OPM itself. Two, the difficulty of discovering how large a tonnage of the scarce metals and minerals is hoarded as excess inventory. The metal inventories of thousands of companies are still not known and remain unreported, and the countrywide tendency for the past eight months has been toward further hoarding.

Steel

Bottlenecks in steel production are (1) shortages of scrap and pig iron, and (2) the multiplicity of specifications for steel and shapes. Blast furnaces are being built to increase pig iron production. The United States should and probably will, somewhat belatedly, follow Canada's example in reducing the number of structural shapes and so increase rolling mill capacity. Canada has reduced the number of standard structural shapes from 265 to 65.

Aluminum

The critical situation regarding aluminum is partly due to the Defense Commission's erroneous estimates last fall. The error in these estimates was due to two causes: (1) Defense requirements rose much faster than was anticipated a year ago, and (2) some branches of the Government greatly underestimated their needs.

The present program calls for $3\frac{1}{2}$ times the 1940 production of 200,000 tons per year. Critical factors in the program are the availability of satisfactory ore and availability of power. Most^{of} our high grade bauxite now comes from Surinam. A small amount of Arkansas' high-grade ore is being exploited, but the most likely domestic source for the additional ore needed for the enormous expansion program is the low-grade Arkansas bauxite. A method for using this material must be developed or the aluminum shortage may remain critical even after all the proposed plant-expansion programs are completed. At the moment, the power situation is satisfactory; defense officials, however, expect a shortage within the next year, even in the Tennessee Valley, and in the Northwest.

1/ Abstracted from F.T.Sisco's report in Mining and Metallurgy, October 1941.

Asbestos

Canada is the world's principal producer of asbestos; therefore no immediate shortage is likely, with the exception of three special varieties which have been imported. These three are: a low-iron asbestos used for insulating tape, a fluffy variety valuable for light insulation, and a so-called blue fibre used in gas masks. Substitutions for these special varieties are possible.

Magnesium

In June, 1940, the productive capacity for magnesium was about 3500 tons a year. Requirements are now 200,000 tons, or approximately 60 times the 1940 rate, an increase that will require a half-million kilowatt hours of power, indicating a shortage of power capacity at least until 1944.

Chromium

Chromium is one of the danger spots of national defense. Ore now being imported comes from East Africa, Portuguese Africa, the Philippines, and New Caledonia. Stocks of ore on hand are enough for a year, but if present sea lanes are blocked the steel industry would feel the shortage relatively soon. Consumption in 1941 will be about 750,000 tons, increasing probably to 900,000 tons in 1942. No appreciable increase in imports can be expected from the Philippines, New Caledonia, or the Transvaal.

Copper

The domestic annual production of copper is about 1,000,000 tons. An additional 600,000 tons will be imported this year. Approximately 1,200,000 tons per annum will be absorbed by defense industries. Drastic sacrifices in use of copper by the civilian population are likely in the near future. One of the greatest mysteries of the war is how Germany carries on without any supply of new copper.

Manganese

A manganese shortage was one of the vital problems of the first World War; this time the problem of securing sufficient manganese to produce high grade steels is serious but not vital.

Intermediate manganese steels are being replaced to some extent by molybdenum steels. No great reduction in the amount used for the deoxidation of plain carbon steels has yet been made. Foreign sources are available but shipping is scarce. Imports just about equal present consumption. Most processes for the development of a manganese producing industry in this country are in the test-tube stage; a few have reached the pilot plant stage; but the domestic production of an appreciable, consistent production delivered at a reasonable price is still relatively far in the future.

Mercury

Mercury production is approximately double the pre-war rate. The supply of mercury will be ample for all needs unless the price goes down. Present consumption is at the rate of 40,000 to 45,000 flasks a year.

Nickel

In general the picture for nickel is not a reassuring one. The total world production in normal times is about 125,000 tons annually. The consumption in the United States may rise to 90,000 tons in 1941. Next year it should be more than normal world production. At present the current demand exceeds the supply by 2500 tons per month. Considerable nickel is being replaced by other alloying elements. About 60 percent of the nickel available is used as an alloy in steel.

Apparently there is little nickel on hand. The amount on hand is decreasing as inventories are being used up. Conservation is difficult. Specifications have been revised so that low-alloy steels can contain less nickel; and a material saving has been made by reducing the amount used for plating, for table wear, for domestic heating appliances, and other non-defense uses.

Platinum-Group Metals

No shortage of platinum may be feared. Canada produces a large amount (Sudbury nickel ores) and large stocks are on hand in the United States. The only metal in the platinum group causing concern is iridium, most of which formerly came from Russia. Only a small amount is produced in the United States and Canada. However, a sizeable deposit of iridium ores exists in Canada, and production will be increased there.

Tin

All tin is imported. The original estimate for a satisfactory stockpile was 75,000 tons. A large part of this amount has been accumulated, and imports are steadily coming in. Trouble in the Far East could cut off the supply. There is about 18 months' supply on hand in the Government stockpile and in consumers' inventories. The first tin smelter in the United States, now under construction in Texas, will be in operation early in 1942, but will have a capacity of only 20,000 tons a year, all to come from imported ores.

Tungsten

Not enough tungsten is in sight to satisfy the demand. Molybdenum is being substituted for considerable tungsten especially in high speed steel. Next year approximately 25,000 tons of tungsten will probably be needed, with potential supplies of 8,000 tons from domestic sources, 6,000 tons from South American ores, not more than 1,000 tons from Portuguese ores, and none to speak of from China and Burma.

Vanadium

Vanadium is an almost vital element in high speed steel, and substitution or elimination of the material will be difficult and perhaps impossible. Four and a half million pounds will be available in 1942. Present demand is much greater than this. No vanadium will be available for civilian use.

Zinc

Annual zinc production at present is about 900,000 tons, of which 730,000 tons is from domestic ores. There is no shortage at present, but new brass mill

requirements will probably develop a shortage in 1942. Conservation is under way, especially in die castings; the average amount of zinc in an automobile has dropped from 50 to about 16 pounds. A considerable saving can be effected by using black sheet instead of galvanized low-carbon steel.

SOME HIGHLIGHTS FROM PAPERS
Presented at the Annual
AMERICAN MINING CONGRESS CONVENTION
(October 1941)

Taxes--An Operating Problem: by Louis S. Gates (President, Phelps Dodge Corporation)

To write an Excess Profits tax law that will equitably treat all the vast and varied businesses of the country so as to avoid serious and unintended economic harm in individual cases, is no small undertaking, if not impossible.

Earlier this year, the Ways and Means Committee of the House with the latter aspect in mind said:

"Experience with excess-profits taxes...has demonstrated...that relief in abnormal cases cannot be predicated on specific instances foreseeable at any time. The unusual cases that are certain to arise are so diverse...and unpredictable that relief provisions couched in other than general terms are certain to prove inadequate."

In spite of the acknowledgment no such provisions are now in the excess profits tax law.

The excess profits taxes for the five years 1917-1921 contained the kind of relief provisions which cannot be found in the present law.

Reports from Washington indicate there has been some doubt on the part of persons concerned with taxation policy as to whether there is a general demand for such provision.

Every business subject to excess profits tax needs to make sure right now that the members of Congress understand that there is a demand for enactment of broad relief provisions such as the other excess profits tax laws have contained.

Only by immediate and intelligent interest on the part of everyone of us can proper legislation be expected.

Effect of Present Federal Tax Policy on Mine Valuations:

The following was abstracted from an address presented by Herbert C. Jackson at the Annual Metal Mining Convention, Western Division, The American Mining Congress (October 1941):

The present and prospective heavy taxation of earnings by the Federal Government operates to decrease the value of practically all capital assets,

especially those assets which possess worth chiefly because they may be expected to yield future income, as for example, mines.

There are relatively few sales of active and producing mines, therefore for assessing purposes a theoretical formula is used for evaluation. "Generally speaking, I would say the actual sale price of the mines (iron ore mines in the Lake Superior district) was about 50% of the value used as the basis of assessment by the States". Valuations computed on a theoretical basis are apt to be excessive, and where insufficient allowance is made for the present and prospective high Federal taxes, the valuations are becoming increasingly excessive.

When mines are assessed on a formula basis of discounting estimated future profits, mine owners should insist on the inclusion of Federal taxes as an item of cost. The inclusion of Federal taxes at the present rate would decrease mine valuations 15% to 25% under those computed without reference to Federal taxes.

NON-METALLICS NEEDED FOR DEFENSE 1/

Nitrates

Chemical nitrogen is a vital factor in agriculture and in the national defense programs, since it plays an important part in the production of food and explosives.

There are three primary sources of chemical nitrogen for this country: (1) imports from foreign nations; (2) fixation of atmospheric nitrogen by synthesis of ammonia, and (3) by-products of the coke manufacturing industry. From 1936 to 1939 approximately one-half of the chemical nitrogen consumed in the United States was produced synthetically, about one-third imported, and the remainder obtained as a by-product of coke manufacture.

In 1939 (the latest year for which accurate figures are available) the production of "air" nitrogen in the United States was about 280,000 tons of fixed nitrogen or about 74% of plant capacity. New plants under construction will bring the combined production capacity up to about 600,000 tons a year.

By-product chemical nitrogen depends largely on the production of iron and steel rather than the demand for nitrates. By-product nitrogen will increase approximately 140,000 to 190,000 due to increases made recently in the capacity of coke oven plants. Therefore total potential capacity of both synthetic and by-product nitrogen soon will reach 800,000 tons a year.

1/ Condensed from U.S. Bureau of Mines Information Circular 7170.

TABLE 1: - Sources of chemical nitrogen for the United States, 1936-1939.

	<u>1936</u>	<u>1937</u>	<u>1938</u>	<u>1939</u>
<u>Imports:</u>				
Gross weight, short tons <u>1/</u>	1,034,537	1,190,090	1,133,653	1,174,892
Nitrogen content: <u>2/</u>				
Short tons	182,600	204,200	196,400	202,000
Percent of total United States supply	33.73	32.79	33.93	32.28
<u>Domestic Production:</u>				
<u>Synthetic:</u>				
Gross Weight, short tons <u>3/</u>	257,500	314,700	331,500	340,700
Nitrogen content				
Short tons	211,800	258,900	272,700	280,300
Percent of total United States supply	39.12	50.54	47.11	44.79
<u>Byproduct:</u>				
Gross weight, short tons <u>4/</u>	694,341	753,216	518,383	676,802
Nitrogen content:				
Short tons	147,000	159,600	109,800	143,500
Percent of total United States supply	27.15	16.67	18.96	22.93
<u>Apparent New Supply:</u>				
Gross weight, short tons	1,986,400	2,258,000	1,983,500	2,192,400
Nitrogen content, short tons	541,400	622,700	578,900	625,800

1/ Compiled from records of the Bureau of Foreign and Domestic Commerce.

2/ Based upon estimated average nitrogen content of the various compounds as imported.

3/ In terms of NH_3 (since this is the primary form in which all synthetic chemical nitrogen is produced in this country).

4/ Bureau of Mines data; ammonium sulfate equivalent of all forms.

The chief chemical nitrogen imported into the United States is sodium nitrate which comes from Chile. Other chemical nitrogen products imported, in order of importance, are calcium cyanamide, ammonium sulphate, ammonium nitrate fertilizer mixtures, and sodium-potassium nitrate. The five materials named make up more than 92 percent of chemical nitrogen imports. While Chile supplies the greatest quantity, appreciable amounts come from Canada.

In 1937 about $6\frac{1}{2}$ percent of the total domestic supply of chemical nitrogen was exported to various nations. Relatively large quantities went to Canada, the Philippines, and the Netherlands Indies.

In 1937 fertilizers consumed nearly three-fourths of the domestic supply of chemical nitrogen and more than one-third of the remainder was used in the manufacture of explosives. Especially during 1940 the use of chemical nitrogen in the manufacture of explosives has increased substantially.

Ammonia is the principal raw material for chemical nitrogen in this country. Adequate capacity for production of ammonia is in sight, but until plants now under construction are completed, a considerable part of domestic requirements will need to be imported. The sodium nitrate used in industry is derived from ammonia because of the greater purity of the synthetic product. The imported Chilean nitrate is used in fertilizers, for which the contained impurities are beneficial.

NOTICES

John R. Suman, president of the American Institute of Mining & Metallurgical Engineers, will be in Portland Monday, October 27th. He will be the speaker at a meeting of the Oregon Section at the Multnomah Hotel Monday evening on certain phases of national defense. Mr. Suman is vice-president in charge of operations of the Humble Oil and Refining Co., chief producing subsidiary of the Standard Oil Company of New Jersey.

Professor George W. Gleeson, head of the Chemical Engineering Department of Oregon State College, will be speaker at the meeting of the Geological Society of the Oregon Country at the Public Service Building, Portland, Friday, October 24th, at 8:00 p.m. His subject will be on the technique and chemistry of processes at the plant of the Portland Gas & Coke Company. This company has been a pioneer in research on production of commercial products from oil refinery residues and many of these products are of great importance in this time of emergency. Professor Gleeson has acted in a consulting capacity for the gas company and is thoroughly conversant with the subject.

In Chemical and Metallurgical Engineering for September, practically the entire issue is devoted to processing industries in the West. Among the articles featured are: Aromatics, Gas and Coke from Heavy Petroleum Residues, by E. L. Hall, vice-president of Portland Gas & Coke Co.; Western Wastes as Materials for Alcohol Production, by William C. McIndoe, chemical engineer for the Bonneville Administration; Products from Diatoms, by Paul V. D. Manning (describes deposits and processes at the diatomite deposit of the Oromite Company at Terrebonne, Oregon). In addition there are articles of great interest to northwestern readers on production of aluminum and magnesium. An editorial statement in this issue is as follows: "Portland, unless we miss our guess, is shortly to become the chemical and metallurgical capital of the West—certainly of the Pacific Northwest."

The ORE.-BIN
State of Oregon
DEPARTMENT OF GEOLOGY & MINERAL INDUSTRIES
702 Woodlark Bldg., Portland 5, Oregon
POSTMASTER: Return Postage Guaranteed

Sec. 562, P. L. & R.

