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STATE DEPARTMENT OF GEOLOGY & MINERAL INDUSTRIES
Head Office: 702 Woodlark Bldg., Portland, Oregon

State Governing Board

W. H. Strayer, Chairman, Baker
Albert Burch Medford
E. B. MacNaughton Portland

Earl K. Nixon Director
F. W. Libbey Mining Engineer
John Eliot Allen Geologist
H. C. Harrison Spectroscopist

State Assay Laboratories

400 E. I Street, Grants Pass
Ray C. Treasher Field Geologist
Robert G. Bassett Assayer

2102 Court Street, Baker
Norman S. Wagner Field Geologist
Hugh K. Lancaster Assayer

COCKEYEDEAS

Our premise may be simply stated:Well, never mind the premise. That can come later. Let's get on with the discussion.

Consider the following: We have been keeping records, in Washington and elsewhere, for the last 150 years, on almost every conceivable thing from the price of dried apples to the trend in halitosis among rats. From records, graphs are made, - or can be, if anyone is sufficiently curious.

Graphs are wonderful. One can prove almost anything by them. After one has proved something, the chances are good that someone else may come along and, using another set of official records, draw a graph that makes the first "grapher" look so silly it seems strange he hasn't been tucked away long ago.

By a graph, for example, you might discover some strange relation between the annual birth rate in a given country, and the date of that country's getting into a war. But after you had made the profound discovery, and were on the point of announcing it to a long-eared world, more than likely some simple-minded person with half your brains (but with a grain of common sense) would happen along and demonstrate that you could have figured it out without the bother of graphs, had you sat down a moment and reasoned from cause to effect.

"Graphitis" is the term we might use to describe this strange disorder; and its victims would then be known as "graphitics". How do they get that way? Oh, in several ways. For example.....

Every so often some adolescent, writing a bachelor's thesis or something, digs into the cobwebby scrolls, logs, and entrys pertaining to the decay of corpuscles or copper corporations, makes some graphs, and brings forth a new theory of medicine, economics, or what would you like? The boy is pardonably proud of himself. After further cogitation, he writes a book in which he enlarges on his theory, - usually making it apply to everything from the price of quicksilver to why girls leave home. He now has arrived; he is a 'name', an author. In the press, and to you and me - the common herd - he is a personage, - a scientist, an expert, a philosopher, a mineral economist, a genius, a thinker, a savant, or merely "the famous Mr. X".

The acclaim causes Mr. X. to expand a bit. He concludes that if THAT portion of the American people thinks he is pretty good, he MUST be pretty good. So, not to let his public down, he makes some more graphs, writes another book or two, and forthwith becomes THE man of the country in corpuscles, copper corporations, or what will it be this time? (The chances are that while making his graphs and writing his books, Mr. X has really done some thinking, probably some reasoning from cause to effect, too. In interpreting his

graphs in his writings, he makes a good, readable, and plausible story. He also becomes a sea-going bearcat on generalities.)

Now we have no aversion to graphitics or statisticians or thinkers of divers ilk. We love them. (Anyway they're interesting.) Some are great, burly fellows with shaggy heads,--remindful of bison at the zoo; others are little furtive chaps, bald-pated, with beady eyes behind thick-rimmed glasses, chipper as squirrels, and cute as a bug's ear. As a group they have a niche in the scheme: They help pay the taxes (some of them), and they give us something to smile, weep, or rant at. Each is a rara avis with a penchant for averages and a passion for ambiguity.

Let's remember, however, that statistics are abstract facts, usually without footnotes or explanations. In eighteen hundred thirty-seven, say, there were x-thousand boat loads of brass and solder shipped from the underground mines of Nebraska. In 1884, the number was something else. With all the figures from the records plotted up to 1942, Mr. X finds that it makes a pattern. The maestro waves his wand and the music begins. Bear in mind that the maestro may never have mucked ore or run a jackhammer underground a day in his life. But he's an expert at figures, statistics and graphs, and can reach a common denominator of prices through the years in half a shake; but a Swede shift boss with a stub pencil and the top of a powder box can come a damsite nearer telling the cost of turning out ore at his mine at any given time than could the famous Mr. X.

What we are trying to get at is just this:

In the case, for example, of next year's quicksilver production (selected without malice, merely because it's easy) all the curves, graphs, trend lines, and block diagrams that a thousand statisticians could draw on the basis of all the quicksilver records since Columbus, wouldn't in the War emergency of 1942 be worth an empty gas ration book as against the considered and impersonal judgment of a half dozen honest to goodness, old head, quicksilver operators. Why? Because graphs and averages must be based on past records during decades of years, mainly peace-time years, when we never imagined spending a billion dollars a year. Now we are spending a billion dollars a week; we have a cockeyed combination of commodity prices; we have an undreamed-of combination of labor conditions, wages, supply of materials; and we have a tax situation (lack of future profit incentive); and an industrial outlook different from anything we have seen in the history of the country.

Add to that, the fact that quicksilver comes in small packages in the ground. There are no Mesabi quicksilver ranges, no "Bingham Canyons" among the quicksilver mines. Quicksilver isn't "big business" - although it is one of the most necessary of the purely war minerals. Only two sizable corporations bother with quicksilver; most of the operators are little fellows. At the present writing probably no single mine in the country grosses \$100,000 a month; mines are "going down" and new prospects are being found every month. Future production under such circumstances is extremely uncertain.

So what?

Well, we wind up with our premise (In Cockeyedideas you should conclude with a premise); "Laws of averages can be depended upon" or "if you want to determine a trend, plot a graph and project a line"; or "what is true in general, over a period of years, is apt to be true in particular."

In 1942 the answer to the above is - "Like Hell" - -

Some of us have been wondering why the "smart boys" and "brass hats" in Washington couldn't estimate requirements within a "row of apple trees". According to our "cockeyedidea", old Solomon couldn't, either - in 1942 or 1943. So, in fairness, let's give the Washington boys a break, - let's not criticize, too much, standard methods that would be OK in normal times.

Epilog.....In connection with the setting down of the above 'Cockeyedideas', two thoughts come

to the writer: First, if, in this hectic life of 1942, we lose our sense of humor, we are indeed licked; and second, we have always adhered strictly to Rule 7 of the Ancient Order of Owls, which reads "Don't take yourself too seriously." We recommend it highly.

Earl K. Nixon

COBALT

Introduction

The beautiful blue color imparted to glass by cobalt and known as "cobalt blue" has served to characterize the metal, cobalt, since ancient times. With the advent and phenomenal growth of the present age of metals cobalt has joined the growing list of metals which give valuable properties to alloys, and its use as a coloring agent has become definitely secondary.

Recorded history of the use of cobalt dates back to Egyptian and Babylonian times when the people used it as a constituent of blue glazes and blue glass in an attempt to imitate lapis lazuli. In the middle ages, Hartz Mountain miners mistook it for a copper ore, but when it was tested it gave no copper and was termed "false ore" or cobalt. In 1735 it was isolated by Georg Brandt and in time uses other than in ceramics were discovered. Cobalt is an essential war metal because of its use in certain alloys. The supply is critical since supplies must be imported.

Cobalt is a hard white metal, malleable, ductile, and feebly magnetic. It is very similar to nickel but is slightly more bluish in color and is harder. It is sometimes substituted for nickel in various alloys in order to obtain slightly different qualities than those which are given to alloys by nickel.

Cobalt minerals

The economically important minerals of cobalt are smaltite, (CoAs_2), cobalt arsenide, and cobaltite, (CoAsS), cobalt sulpharsenide, both of which usually contain nickel as an impurity. The latter crystallizes in the isometric system, usually forming euhedral crystals which are identical with those of pyrite in form, although sometimes it may be either granular or massive. The cleavage is cubic and the hardness is 5.5. Cobaltite, also known as cobalt glance, has a specific gravity of 6 and is a reddish silver-white mineral with a metallic luster. It is a mixed salt of cobalt arsenide and sulphide. Smaltite also crystallizes in the isometric system and although it is sometimes found as small cubic crystals it occurs more often in a massive state without cleavage. Its hardness is 5.5 and it has a tin-white to steel-gray color with a metallic luster. The specific gravity is 6.2 and the composition varies from CoAs_2 to CoNiAs_2 . Smaltite is the chief ore of cobalt. Smaltite and cobaltite commonly occur together and often with nickel arsenides and sulphides. Erythrite, "cobalt bloom" $\text{Co}_3(\text{AsO}_4)_2 \cdot 8\text{H}_2\text{O}$ is an oxidized cobalt mineral which may be present at or near the surface of cobalt mineral deposits. Its red color is distinctive. When its water of combination is driven off by gentle heat, the resultant powder is blue.

Occurrence

Cobalt minerals are found in several different geological environments. Residual deposits of asbolite, an indefinite mixture of hydrous cobalt and manganous oxides, may be found where nickel and cobalt-bearing peridotitic and pyroxenic rocks, and the serpentines derived from them, have been deeply weathered. The silicates of cobalt and nickel are chemically altered to hydrated nickel silicates and asbolite. Deposits are superficial because concentration is by means of surface waters.

Smaltite, and ^{sometimes} cobaltite, are found in veins of nickel-cobalt-bismuth ores (sulphides) which may also contain silver, either native or in combined form. These deposits are mesothermal; that is, they were formed at intermediate temperatures by hot waters ascending from an intrusion.

Cobalt minerals are also found in high temperature, or hypothermal, environments. A deposit in San Juan, Chile, where cobalt minerals occur with tourmaline, and a deposit in British Columbia where magnetite is an associate mineral, are representative of this type of occurrence.

Probably the most famous cobalt occurrences of all time were those at Cobalt, Ontario. They were, however, famous for their very high silver content rather than for cobalt. The veins were mainly small - a few inches wide - consisting generally of smaltite, sometimes containing also cobaltite, niccolite and other cobalt-nickel minerals, but especially characterized by native silver. All the vein minerals were intimately intergrown. Veins assaying several thousand ounces of silver to the ton were common. The gangue mineral was calcite. The veins generally had sharp walls but a network of branching veins was not uncommon. In places, native silver was shot through the wall rock. In the early days of mining at Cobalt, only the rich ore was extracted and shipped. Later concentrating mills and cyanide plants were installed so that a large tonnage of low-grade silver ore was treated. Cobalt minerals and residues were a by-product of these plants and such materials were shipped to custom smelters at Deloro, and at Thorold, Ontario.

After the silver ore reserves were in great part depleted, most of the mills at Cobalt closed down, so that custom plants for treatment of cobalt material could not operate continuously. It is reported that the importance of cobalt in the war program has caused the custom plant at Deloro to resume continuous operations on material to be obtained from the Cobalt district.

The country rock at Cobalt consists of Huronian conglomerates and arkosic sandstones, called the Cobalt formation, which overlie Keewatin greenstones, basic volcanic rocks and schists. The veins are found at the base of the Cobalt, of which a 300 foot thickness is exposed in this area. Diabase sills have been intruded into the old sediments and are probably genetically related to the veins. After emplacement of the diabase in Keewenawan time, fracturing occurred and the fissures formed were filled with metalliferous sulphides and arsenides under mesothermal conditions.

The asbolite deposit in New Caledonia is representative of the residual type of deposit. Nickel in the form of a hydrous silicate is the chief product but small amounts of the cobalt ore are also recovered. The ores occur under a deep mantle of weathered rock ("variegated clay") and overlie serpentine and peridotite which they penetrate along fissures. The cobalt as well as the nickel is exported.

Ore deposits of the Belgian Congo contain cobalt associated with copper. The Katanga district produces "blister copper" which commonly contains a small percentage (less than 2%) of cobalt. The ore is mined from rich copper ore-bodies which impregnate folded sediments. They are tabular masses in schistose and highly metamorphosed Paleozoic sediments, and the ore masses are usually parallel to the bedding. The copper ores are generally oxidized and carry cobalt. The origin of the deposits is unknown but is probably related to granitic intrusions into the schist. In Northern Rhodesia, also, cobalt is produced as a by-product of copper smelting.

Production

World production: Approximately 4,500 to 5,000 metric tons of cobalt were produced per year for 1938 and 1939. These figures are not accurate because government restrictions do not allow the actual quantities to become known. However, the Belgian Congo, French Morocco, and Northern Rhodesia contributed 75% - 80% of the total. Cobalt is known to be produced in 14 countries.

World production of cobalt, 1937-39, in metric tons from U. S. Bureau of Mines Minerals Yearbook, Review of 1939:

| Country* | Cobalt-bearing material | 1937 | | 1938 | | 1939 | |
|-------------------|-------------------------|--------------|----------------|--------------|----------------|--------------|----------------|
| | | Gross Weight | Cobalt Content | Gross Weight | Cobalt Content | Gross Weight | Cobalt Content |
| Belgian Congo | Cobaltiferous cu ore | a | 1,500 | a | a | a | a |
| Burma | Cobaltiferous ni speiss | 4,389 | 298 | 3,399 | 238 | 3,322 | 229 |
| Ontario, Canada | Ores, oxide, and metal | a | 230 | a | 208 | a | 332 |
| Morocco, French | Ore | 5,280 | 581 | 6,541 | 720 | a | a |
| Northern Rhodesia | Cobaltiferous cu ore | a | 884 | a | 1,461 | a | 3,581 |

a - data not available.

*In addition to the countries listed, Chile, China, Finland, Germany, Italy, Japan, and Mexico produce cobalt, but production data are not available.

It is interesting to note that no cobalt deposit is sufficiently rich to enable it to be mined for cobalt alone. It is usually a by-product of the smelting of other ores.

The Belgian Congo is one of the largest producers of cobalt but exact figures of production are not available. The ore was sent to Belgium for refining previous to the invasion by Germany but since that time it has been sent to the United States. High-grade reserves of cobalt minerals have been found in Belgian Congo and in 1939 production was probably increased because of the installation of additional electric furnace capacity for treatment of the ore.

Burma produces considerable cobalt as a by-product of lead-zinc mining at the Bawdwin mines. Italian production is mainly from nickel-cobalt ores in the Piedmont district of northwest Italy. Cobalt occurs in the Atlas Mountains in French Morocco where erythrite, a hydrous cobalt arsenate (cobalt bloom), is found on the surface and smaltite is found at depth. This is an interesting occurrence in the light of recent world events.

U. S. Production

Due to the present emergency, domestic production of cobalt is on the upswing. Although the U. S. is a large consumer of cobalt, it has no important sources of the ore and depends almost entirely upon imports. However, small potential sources are being developed.

Cobalt has been recovered from iron pyrite concentrates produced at Lebanon, Pa., from iron ore mined at Cornwall, Pa. At Kellogg, Idaho, the residue from electrolysis of zinc contained cobalt but no cobalt was shipped in 1940. A concentrate of nickel and cobalt was recovered as a by-product of the froth flotation of talc at Burlington, Vermont, and cobalt minerals are found in various concentrations and with various ores at Tombstone, Arizona; Gold Hill, Colorado; Salmon, Idaho; and the Goodsprings district, Nevada.

U. S. Consumption

In 1940 imports of cobalt into the U. S. exceeded any previously known figure. In 1939 the imports consisted chiefly of the metal which had been refined in Belgium. In 1940, however, imports of ore and alloy totalled 10,497,719 pounds, a great increase over the total of former years. This was largely due to the invasion of Belgium, resulting in the Belgian Congo ore being sent to the U. S. for refining. In 1940 the price of 97% - 99% metal was \$1.50 per lb. in 100-lb. lots, and the price of 70% - 71% grade black oxide was \$1.84 per lb. in 350-lb. lots.

Treatment of ore

A generalized outline of one of the processes used for treatment of cobalt ores is as follows: The ore is first roasted to remove both arsenic and sulphur. Then it is fused in a blast furnace, the iron passing into the slag and the arsenide and antimonide of nickel and cobalt settling out. This is ground and roasted to drive off most of the arsenic and antimony, if present. Silver when present may be extracted with cyanide. The residue is treated with hot sulphuric acid. Iron, arsenic and antimony are precipitated with limestone. Copper is precipitated from the filtrate with soda ash. The cobalt and nickel are then precipitated by sodium hypochloride and sodium carbonate respectively. In this process both metals are sold as oxides.

Uses

One of the first uses of cobalt, when in oxide or silicate form, was as a blue pigment in glass, pottery glazes, etc. Combinations of cobalt oxide and different aluminum and zinc salts produce variations in shade of blue or green. Smalt, a glass made by fusing cobalt oxide and silica, may be used when ground to impart a beautiful and permanent blue color. The oxide is sometimes used in the ceramics industry to counteract the yellowish tinge produced by iron compounds. Cobalt salts, the oleate, acetate, and linoleate, etc., find their place in the paint industry. They are used in the preparation of dryers for use in paint, varnish and linoleum.

Cobalt metal, unlike iron, is not attacked by air and water at ordinary temperatures. It may be electroplated and produces a coating superior to that of nickel. An alloy of cobalt, iron, and chromium is used for cutlery. A cobalt amalgam is used in dentistry. Cochrome, an alloy similar to nichrome, is used in the place of the latter for electrical heating units because it melts at a high temperature and is more resistant to corrosion than nichrome. Surgical instruments are made of an alloy called "stellite" composed of chromium, tungsten and cobalt because of its hardness and durability, and cobalt is used as a bonding material for superhard cutting materials such as tungsten carbide. An alloy of cobalt, nickel, and aluminum produces the powerful Alnico magnets. Various tools and dies are manufactured of steel alloyed with cobalt, and the metal also has uses as a catalyst. Recent investigations show that cobalt compounds are needed to counteract pasture deficiencies which cause various sicknesses of animals.

Qualitative tests for cobalt

1. Specific: The powdered mineral is fused with sodium hypophosphite. If the elements cobalt, titanium, and tungsten, either singly or grouped, are present the melt is blue. If cobalt is present the blue-colored melt turns pink on cooling, and this color change is reversible on reheating the melt.

2. The powdered mineral is decomposed by treatment with nitric and hydrochloric acids. The resulting solution is adjusted to slight acidity. One or two drops of this solution are mixed with a few mgs. of ammonium fluoride on a spot plate, then five drops of ammonium thiocyanate in acetone (10% solution) are added. A blue color shows the presence of cobalt. This test shows presence of one part of cobalt in 50,000 parts of solution and enables the detection of cobalt in the presence of 1,000 times the amount of iron.

3. Ignited ore when fused with borax bead gives a distinctive blue colored bead.

References: "Mineral Deposits" by Lindgren; U. S. Bureau of Mines Minerals Yearbook, Reviews of 1939 and 1940; "Economic Aspects" by Leith; and "Mineral Deposits" by Lilley.

NOTICE TO HOLDERS OF MINE SERIAL NUMBERS

The Mining Division of the War Production Board has notified state emergency coordinators of mines and regional technical advisors that holders of mine serial numbers need not make monthly reports of rated purchases made on form PD-119 after October, 1942.

A. M. Dixon, mining engineer, with operating experience in various parts of the world has been appointed regional technical advisor to the War Production Board. Mr. Dixon's headquarters at present are at Room 815, Bedell Building, Portland, Oregon. His duties will be concerned principally with mine priority matters.

SALE OF LOW-GRADE CHROMITE

From time to time inquiries are received concerning marketing chromite of lower grade than that purchased by Metals Reserve Co. Since the War Production Board exercises complete control over use of chrome, it had been supposed that this control extended to the marketing of chromite ore. Such is not the case. Dr. Andrew Leith, Chief of the Ferroalloys Branch of the War Production Board, states that there are no W.P.B. restrictions on the sale or transfer of chromite ores, either high-grade or low-grade. The W.P.B. priority control is on the use of such ores by consumer.

It follows that a chrome producer may sell his ore to any purchaser without regard to permission from the War Production Board.

The question of use of the ore purchased is a matter between the purchaser and the War Production Board and does not concern the shipper.

Consumers of low grade chromite and possible purchasers of such ore, according to U.S. Bureau of Mines records as supplied to Senator Charles L. McNary, are as follows:

General Refractories Co., Broad & Chestnut St., Philadelphia, Pa.
E. J. Lavino & Co., Philadelphia, Pa.
Botfield Refractories, 777 S. Swanson St., Philadelphia, Pa.
Harbison-Walker Refractories Co., Pittsburgh, Pa.
American Locomotive Co., New York, N. Y.
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Pollansbee Steel Co., Third & Liberty Ave., Pittsburgh, Pa.
Foote Mineral Company, Inc., 1607 Summer St., Philadelphia, Pa.
Jones & Laughlin Steel Corp., 3rd Ave. & Ross St., Pittsburgh, Pa.
Joslyn Mfg. & Supply Co., 3700 S. Morgan St., Chicago, Ill.
Midvale Company, Nicetown, Pittsburgh, Pa.
National Steel Company, 2800 Grant Building, Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

RHODOCHROSITE NEEDED

The following letter has been received from the Foote Mineral Company, 1609 Summer St., Philadelphia, Pa.:

"For the welding of ships, planes, and tanks we are desperately in need of very high-grade Rhodochrosite, similar to the following typical analysis:

| | |
|----------------------------------|--------|
| Manganese Metal | 30.52% |
| Calcium Oxide | 6.00% |
| Silica | 8.00% |
| Iron | 4.70% |
| Magnesium Oxide | 0.42% |
| Phosphorus | 0.02% |
| Ignition Loss (CO ₂) | 27.01% |

You will see from this that the Silica content is roughly one-fourth of the Manganese Metal content. In other words, we cannot use a product in which the Silica is 75% or in some cases nearly equal to the Manganese Metal content.

We are interested in this ore in carload lots, and if you could put us in touch with any producers or prospective suppliers of this item, your help would be greatly appreciated."

Rhodo-chrosite is manganese carbonate. It resembles rhodonite, manganese silicate, but is somewhat softer than rhodonite, and has rhombohedral cleavage (like calcite). Rhodo-chrosite is soluble in warm hydrochloric (muriatic) acid giving off bubbles (effervescing) of carbon dioxide (carbonic acid gas).

GOLD MINING MACHINERY FROZEN

War Production Board order L-208 defined non-essential mines and closed those gold mines which could not qualify for a mine serial number. An amendment to order L-208 froze the machinery at these mines, that is, prohibited the sale or disposal of any equipment of the types listed in Schedule (A) of Preference Rating order P-56. Schedule (A) includes most types of mining machinery. The amendment required owners of the gold mines closed down by order L-208 to file with the War Production Board an itemized list of machinery and equipment within 60 days.

Under terms of a third amendment to L-208 owners of gold mine machinery are required to file their machinery lists with WPB on or before January 18, 1943.

Under date of December 11, 1942 the Weekly Information Service of the American Mining Congress states that, according to a WPB interpretation of order L-208, the "freezing" of machinery in "non-essential" gold mines applies only to mines which were operating on or subsequent to September 17, 1941.

Further the A.M.C. states that the Appeals Board of WPB had given permission to some few mines to continue to operate for a limited time in order to remove broken ore from stopes and to fill the stopes with waste.

The Appeals Board has announced that it would entertain appeals from closed gold mines "when substantial amounts of critical materials are not used, and when: (1) All work is performed by elderly or infirm miners not useful in critical metal mining; and (2) Ore is broken and needs only to be removed from the mine, and the stopes refilled with waste; and (3) In the case of placer mines where the equipment is not now in a place of safety, the appeal is for the purpose of permitting operation until equipment can be moved to the nearest place of safety."

Appeals may be addressed to War Production Board, Reference L-208, Washington, D.C.

The American Mining Congress also reports that mines of the Cripple Creek district of Colorado and the Golden Cycle mill at Colorado Springs have been granted permission to continue limited operation for a six-month period while changing the mill to recover zinc as well as gold. Several mines on the Comstock Lode in Nevada having a high ratio of silver to gold have been granted temporary serial numbers under order P-56 in order to permit continued production of silver for war use.

PACIFIC COMPANY TO RESUME SHIPPING CHROME

The Pacific Co. of Medford, John Day, President, which has been doing extensive construction work on Federal War Projects, principally airports, throughout the State, has started to mine chromite in Southern Oregon. Late in 1941, this company started prospecting the chromite sands in the Bandon-Marshfield area. More recently the Pacific Company leased the well-known chromite property owned by Harry Sordy in the Briggs Creek area, a few miles southwest of Galice. Machinery was installed, and mining and shipping of chromite was started in October. Shipments of chrome were made to the Metals Reserve Company, Grants Pass, but road conditions forced a suspension of shipping until weather conditions improve. Mr. Day is a well-known cattle rancher of Medford. It is the plan of the company to resume active operations in a few months, as soon as road conditions improve. Meantime an effort is being made to recruit a nucleus of an experienced mining crew for the job.

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