

"DELORO"

Presented by: R. G. Walsh  
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My talk for tonight could very well carry the title "Cobalt" instead of "Deloro." Cobalt-bearing products from Deloro are well-known in England and all English-speaking countries, in France - and in many European countries, because from 1907 through until 1948 we did a large business with these countries in Cobalt Oxide and Stellite products, all containing cobalt. Deloro could not operate without cobalt.

COBALT METAL

Cobalt metal is never found in nature. It is always associated with some other element such as arsenic, sulphur or oxygen. Most of the world's known reserves of Cobalt are associated with sulphur and contained in copper ores.

COBALT OXIDE  
FIRST COMMERCIAL  
PRODUCTION

There is no record of the first time Cobalt ores were mined. It is known however that cobalt was used for colouring clay vases and other ceramic articles long before the birth of Christ. The first commercial production of Cobalt was in the year 1470 -- when a very rich silver deposit was discovered near the town of Schneeberg, Saxony, Germany. This ore contained cobalt, some nickel, a high arsenic content, Bismuth, and small quantities of radio-active metals. The ore was not unlike the rich veins discovered at Cobalt, Ontario in 1904. The Ontario veins did not contain radio-active material.

The discoverer of Kobold Smalt was a Frenchman living in Schneeberg - by the name of Weindenhammer. He ground cobalt ore after the silver had been removed and mixed it with potassium carbonate (shell lime) and with quartz. He fused this mixture and the resultant glass was a deep blue colour. He poured the molten glass into water and a powder was formed. He found that by leaving a little arsenic with the ore, the arsenic associated itself with the nickel present and a better colour resulted. The smalt known now as cobalt colour was used to decorate pottery and vases and was also used as a decoration on linens and formed the colour part of the ink. You can be sure when you see ceramic table-ware coloured blue or decorated with blue, the colouring is cobalt colour or smalt.

By 1474, 176 mines were producing near Schneeberg. Prince Auguste of Saxony took a deep interest in the silver and smalt production, and also took a fair slice of the production. The Schneeberg deposits produced cobalt ores until the early 1900's.

HASTINGS COUNTY  
IRON AND GOLD

In 1820 iron was discovered in Hastings County. In 1868 gold was discovered in the County - which set off an exciting gold rush. Hundreds of tiny claims were staked at Eldorado and elsewhere through the country. Referring to the booklet issued by the Marmora Herald & Eastern Mining Journal - published in 1901, we find that the veins at Deloro which contained mispickel and iron arsenic combinations were the most profitable of the veins found in Hastings County, -- The Gatling vein being the richest of those at Deloro.

Cobalt Oxide of Deloro



Gatling was a brother of the inventor of the Gatling gun -- one of the first machine-guns. Property now held by Deloro embraces the Gatling vein and those held by the original French Company. British interests bought the property and in 1873 it was brought into production by the new Company - Canadian Consolidated Gold Mining Company. The operation failed because of poor recovery of gold. The gold was extremely fine and was not caught by the gravity mechanisms. Later a chlorination process was used - which also failed to make an economical recovery.

1896 - CHANGE OF OWNERSHIP The Canadian Gold Fields Company bought out the property and built a large concentrator plant at Marmora Station on the Central Ontario Railway. This mill was destroyed by fire prior to operation and on the day before Mr. S.B. Wright arrived to take charge.

BROMO CYANIDE A new mill was built near a point south of the old laboratories now standing on the Deloro property. The mill incorporated a new process and was the first plant in Canada to extract gold from ores by the use of cyanide. The new process was apparently a success, for in 1900, the plant capacity was doubled to twenty stamps. After leaching with cyanide, the concentrates were taken to where the existing arsenic chambers stand (these arsenic chambers are still in use) and were roasted for their arsenic content.

1902 Soon after the mill was enlarged, the grade of ore dropped off and water problems were encountered. The mine was closed in 1903.

From 1900 to 1903 arsenic production had become an important factor. The price for arsenic at that time was 5¢ per pound and is also the price for arsenic today.

SILVER DISCOVERER  
COBALT, ONTARIO.

In 1885 the Sudbury Nickel deposits were opened up by a cut being made for a railway going through that country. In 1904 the same thing happened at Cobalt. Fred LaRose discovered an extremely rich silver vein within a stone's throw of the railway right-of-way. His discovery started an important rush. The silver find was no ordinary one. Prospectors staked claims and were able to dig out large pieces of silver with a pick. Later, more orthodox mining methods were established by shaft-sinking and concentrating ores.

In 1949, 445,000,000 ounces of silver had been taken out of the Cobalt area. This amount is approximately one-half the total mined by all the other mines throughout Canada.

The silver ores always were associated with Cobalt and even today we can be sure of about 100 lbs of cobalt for every 3,000 ozs. of silver received from Cobalt, Ontario. Cobalt veins however did not always contain silver and today's activity at Cobalt, Ontario can be partly explained by the fact Cobalt veins opened by silver miners are being mined today for their cobalt content.

WHY DELORO WAS PICKED  
FOR SMELTER OPERATION

M. J. O'Brien was in on a big silver rush at Cobalt, Ontario, together with hundreds of others. He was able to secure a property near the main veins discovered by LaRose. Ten years later he secured a property in Gowganda, 80 miles from Cobalt. This property is still in operation.

Corporation of Deloro



1907

By 1907 there were four smelters in Canada ready to accept silver ores from Cobalt:

1. The Montreal Reduction Company of Canada - Trout Lake
2. Coniagas Reduction Company, Thorold, Niagara Falls
3. The Canadian Copper Company - now International Nickel
4. And the newly-formed Deloro Mining & Reduction Co. - Deloro.

The Board of Directors of our new Company were as follows:

Mr. M. J. O'Brien	- President
Mr. J. B. O'Brien	- Director
Mr. Kirkegaard	- Director
Prof. S.F. Kirkpatrick	- Director
S. B. Wright	- Director

The advantages of the Deloro location were:

1. Arsenic chambers could easily be adopted to recover arsenic from the silver-containing ores.
2. Several very useful buildings were on the property, including a few houses, a church, and a store.
3. Land was cheap and of little use for farming in the immediate area .
4. The owners were glad to sell. .
5. M. J. O'Brien wanted a smelter in order to avoid shipping concentrates to a more expensive establishment.

THE FIRST TARIFF - Under which silver cobalt ores were purchased by Deloro.

Silver - 94% recovery

Cobalt - Over 6% - 10% - \$10.00 per ton paid and over 10% \$20.00 per ton.

Arsenic- 1¢ per lb for over 10%. 1½¢ per lb for over 30%

The tariff proved attractive and business continued to grow, much ore being diverted from American Smelters because most of them did not pay for cobalt or arsenic and in some cases charged a penalty.

1912

By 1912, nine smelters were competing for silver ores from Cobalt, Ontario.

1. Coniagas Reduction Company
2. Deloro Mining & Reduction Company
3. Canada Refining & Smelting Co., Orillia
4. American Smelting & Refining, New York
5. Balbach Smelting & Refining, Newark
6. Pennsylvania Smelting & Refining, Pittsburgh
7. U.S. Metals Refining Co., New York
8. Beer-Sondheimer Co. - Frankfort, Germany
9. Government of Saxony, Saxony, Germany  
(The same group that originally started out in 1470)



Fortunately for Deloro, they could handle arsenic economically, for in the year 1912, the price had risen to 60¢ per lb.

COBALT OXIDE  
METALLURGY

The economically sound method of producing cobalt oxide had been worked out by Professor S. F. Kirkpatrick. It should be pointed out that all smelters competing for ores from Cobalt were chiefly interested in the silver content. Some of the plants produced cobalt-oxide and several extracted only the silver and sold the residues to German plants, who, in turn, made cobalt-oxide.

COBALT METAL

Until 1912, no cobalt was produced commercially. The little that was produced in laboratories was far more expensive than gold.

DR. KALMUS

In 1912, the Ontario Government appointed Dr. H.T. Kalmus, then working at Queen's University, to make cobalt metal. It is interesting that Mrs. Kalmus, "Dr. Natallie," was the inventor of color-photography and is well-known for her developments in technicolor motion pictures. She is now working in Hollywood. Dr. Kalmus worked out methods and in 1914, the first cobalt metal was made commercially at Deloro.

ELWOOD HAYNES - 1912

In 1912 cobalt oxide production exceeded consumption and the Directors were trying to develop new uses. Elwood Haynes was invited by our then Vice-President, Mr. Thomas Southworth, to visit Deloro. Haynes was an inventor, and it is said that he invented the first automobile. Evidence to this effect is established, as his first car is in the Smithsonian Institute in Washington.

Haynes was experimenting -- attempting to make cutlery, and had made some very nice-looking pieces which, however, lacked resilience. He added tungsten to a cobalt chromium mixture and the knives made were plenty stiff. In fact, they were brittle. This discovery became "Stellite" after Haynes had developed and patented the process. Stellite proved to be the best cutting metal known for lathe work at that time and for a long period to follow.

Haynes came to Canada again to arrange for supplies. A deal was made and Deloro received exclusive rights to market Stellite in the British Empire, France, Switzerland and other countries in return for supplies of cobalt metal.

By 1915 Deloro was busily engaged in the manufacture of Stellite. In 1915 the name Deloro Mining and Reduction Company was changed to Deloro Smelting & Refining Company.

WAR

The development of Stellite came at a very important time, as superior cutting metal was in critical demand for war uses.

1920 - DELORO BRANCHES OUT

Stellite had become so well-known in England that a Sales Office and small plant was established in London. The cobalt business was expanded and a salts plant was established to  
BO:Manufacture

Cobalt Sulphate

Acetate

Nitrate

Chloride

Hydrate

Carbonate

and, in addition, the production of insecticides was instituted, but this latter project did not do very well and was closed soon eight years later.



1924

All cobalt smelters in Canada had discontinued cobalt operations with the exception of Deloro.

1925 - COBALT PRODUCTION DEVELOPMENT

The Belgium African copper cobalt deposit owned by Katanga was brought into production, cobalt being a by-product to copper. Their process yielded cobalt metal directly from the ores without going through the long and expensive leaching process used at Deloro.

We had been selling cobalt metal for \$2.35 per lb at this time and our main customer was Haynes-Stellite -- which, incidentally, had changed hands and was owned by Union Carbide.

One dreary day we were advised that Haynes-Stellite had contracted for its full requirements of cobalt metal at a price of \$1.25 per lb. That was the end of the Cobalt metal business until 1940, except the amount required for our own production of Stellite. Times were indeed difficult and another producer came into being -- Rhokana, located in Rhodesia, began producing in 1934 and sent their product for treatment to Oolon, Belgium - a new plant erected by Katanga.

COBALT, ONTARIO

To make matters worse, mining at Cobalt, Ontario, had almost ceased. The smelting and cobalt part of the Deloro plant was almost closed.

1937

Stellite sales throughout Europe had grown to important proportions in 1937. Deloro established a new plant in Birmingham, which operates today with the help of some 300 employees.

1939

Germany had invaded Poland, and Rhokana contacted Deloro Smelting & Refining Company to treat their product which had been going to Oolon, Belgium. Again Deloro supplied the allied side with cobalt metal and did so for the first two years of the war.

Then a plant was built at Niagara Falls by Katanga and the plant at Delaware which treated concentrates from Bethlehem Iron Mines at Cornwall changed their process and produced metal instead of cobalt hydrate.

AMERICAN GOVERNMENT BUYS ORES

All mines in the Cobalt area were closed. The American Government offered a good price for Cobalt and the waste dumps were picked over. 4,000 tons of cobalt ore were purchased by the U.S. Government and stored at Deloro. This stock pile, which might have provided work for Deloro employees from 1945 to 1947 was moved away to Kenilworth, New Jersey. We are pleased to report that the ore is now back in our yards.

1949 - MONEY COMPLICATIONS

Two thirds of the Stellite business was lost overnight when complications arose which made it impossible to remove our money out of England. This was a very serious blow. Not a single pound of ore was on hand and only 1/3 of the Stellite business was available. This is where I came in - and sometimes I have wondered why. In discussion with the Directors of Deloro they expressed faith in the district, and were hopeful that some plan might be thought of which would bring the company back into profitable operations.

INDUSTRIAL REFINING CORPORATION OF DELORO



LEAD SMELTER

The treasury was in good shape. We thought of a lead smelter but on checking the cost we found it would require more money than was in the treasury. Besides, our opposition would be consolidated Mining & Smelting of Trail, B.C.

1950

Port Hope Uranium Works offered us a small but steady supply of cobalt in the form of speiss which was produced from the ore of Eldorado Mines at Great Bear Lake. (Incidentally, their smelting process was figured out by Deloro staff.) We bought this speiss and immediately the cobalt business started to open up, the Korean war had started.

WORLD PRODUCTION AND USES  
1470-1912

The peak production was about 300 metric tons per year - nearly all of which was used in the ceramic trade.

1940- WORLD PRODUCTION ----

of cobalt in all forms was 4,000 metric tons.

1950 - WORLD PRODUCTION ----

of cobalt was 7,000 metric tons and has increased considerably since then. Magnets take approximately 35% of world production. Cobalt chromium tungsten

(stellite type) take 27%.

cobalt is used.

You may be interested in a few descriptions of how

ANIMAL FOODS  
TRACE ELEMENTS

Cobalt sulphate is mixed with animal foods and is included in salt-licks for animals. Several areas have dusted cobalt sulphate into the soil with much success. An article in "Readers' Digest" described the cattle industry of Florida. Prior to the use of trace elements including cobalt, cattle could not be finished for market in Florida. Now Florida imports feeders and they have no difficulty in fattening their cattle. The same applies to sheep in Australia.

NYLON

Four pounds of cobalt are used for each ton of nylon produced. The cobalt does not actually turn up in nylon hose but forms a part of the chemical process used in their production.

HEAT RESISTANT ALLOYS

Stellite will retain its strength at white heat. It is said that a jet plane will fly 100 miles per hour faster if a metal can be obtained which will stand 100 degrees more temperature.

WEAR RESISTANT ALLOYS

This quality is well-known in Stellite. Where excessive wear occurs on expensive parts, Stellite can be used to advantage to give three times the life of steel. This is a common and a modest statement - according to our Sales Manager.

PAINT DRYERS

Almost all paints contain about 1% of a substance called cobalt naphthanate - a colourless product. Paint would not dry, were it not for this material. All inks are dried by the addition of cobalt dryers.

CANCER RESEARCH

You have all heard of the cobalt bomb made to treat cancer - which contains a piece of cobalt metal about the size of a 50¢ piece. Cobalt has the ability to retain radio-active energy.

FRIT

All white enamel-ware, such as frigidaires, stoves, etc. would easily chip if it were not for the fact that a coating of cobalt has been first sprayed on the steel, to act as a binder for the enamel.







ORE STOCK

Ores have been arranged for and purchased until now our yards are stocked with 3 years' supplies.

F I N A L

Deloro is not a large plant. It is, we believe, outstanding because of its diversified nature. In looking up data and tracing the histories of so many companies who entered the cobalt business, and the few that held on, one can only come to the conclusion that fine leadership has been provided by the owners and Directors of the Company.

Certainly great credit must come to those at the plant who head the various departments, such as Mr. C. H. Buskard, Manager of Cobalt Operations, Mr. J. A. Paquet, Manager of Stellite Operations, Mr. Carl Whittemore, Chief of Research and many others -- including many fine work-men.

In tribute to the past and present owners of the Plant, I would like to point out that Mr. M. J. O'Brien poured money into the Deloro operation from 1907 to 1918 before he was able to recover a single dollar. Since that time there have been many very difficult years in which no profit was made, but the Directors held the plant together because they had not emptied the treasury as so many public companies are prone to do.

The uses for cobalt have sky-rocketed, but I must say that it is entirely unlikely that the price will rise. We have, for example, recently been forced to reduce our price from \$2.52 per lb. to \$2.40 per lb. for the metal. There are many new producers coming into operation who will bring about new high records of cobalt production. Unfortunately, we do not own any of them, but operate as a custom smelter, buying ores whenever they are available. Strong competition must be met in the very near future.

Deloro is not subsidized by the Canadian or any other government.

The price today for cobalt metal is \$2.40 per pound -- it was \$2.35 per lb. in 1925. Wages have increased by 250%; supplies by 200% since that time. We have a big job ahead of us. New buildings and machinery have been provided.

We hope to deliver the goods.

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OFFICE OF THE CHIEF  
PUBLIC UTILITIES  
CORPORATION OF DELORO

RGW/FS