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O T T A W A

December 17, 1945.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1980.

Resistance of Two Types of Stellite to Corrosion
by Molten Salt and Aqueous Salt Solution.

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Background:

An investigation of the corrosion resistance properties of six materials, cast iron, nickel, inconel, Ni-Resist (copper-containing), Ni-Resist (copper-free) and stainless steel, in contact with molten salt and a saturated aqueous solution of salt (sodium chloride), had been commenced when two types of stellite, designated B and D, were obtained and the tests were completed with all eight samples. The results upon the first six have been given in Report of Investigation No. 1972, dated November 30, 1945.

A verbal request was received from Mr. C. M. Boulton, representative of the Deloro Smelting and Refining Company, Deloro, Ontario, for the results of this work.

Tests Performed:

A. Molten Salt Test.

After weighing, the two Stellite samples were placed in a cast iron pan and molten salt, obtained from the plant referred to in the Report of Investigation No. 1972, was poured on them. The solid chloride was removed and the molten material was again poured on the samples. This procedure was repeated until six pourings had taken place. The samples were reweighed. Then the molten salt was poured on them fourteen more times and they were weighed again. The results are given in Table I. No attempt was made to remove the adherent scale before the corroded samples were weighed.

TABLE I.

Average Penetration Per Pouring (inches)

<u>Metal</u>	<u>After 6 Pourings</u>	<u>After 20 Pourings</u>
Stellite B -	0.000,0023	0.000,000,8
Stellite D -	0.000,0016	0.000,000,5

B. Intermittent Immersion Test.

After the Stellite samples had been exposed to the twenty pourings of molten salt they were placed in the Rapid Intermittent Immersion corrosion test for 7 days. The corroding liquid was a saturated aqueous salt solution and the temperature was maintained at about 95° F. Any adhering scale from the former test was allowed to remain on the samples during this test. The results are given in Table II.

TABLE II.

<u>Metal</u>	<u>Average Penetration Per Day (inches)</u>
Stellite B -	0.000,000,3
Stellite D -	0.000,000,3

Conclusions:

From the results of the above tests and those given in Report of Investigation No. 1972, the average penetration of the two types of Stellite after twenty pourings was greater than that of the nickel, inconel, and probably Ni-Resist (copper-free) and Ni-Resist (copper-containing), after thirty pourings, but less than that of the cast iron and the stainless steel.

From the results of the Intermittent Immersion Test on the samples that had been exposed to the molten salt, the two Stellites had greater average penetration per day than the nickel and inconel, but less than that of the cast iron, stainless steel, Ni-Resist (copper-containing) and Ni-Resist (copper-free).

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