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Report A-2905

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TECHNICAL INFORMATION REPORT

For the Period
1 July -----31 July 1945

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by authority of AEC Form 381

by Carl Spadlock ESOR, date 9/22/55

MADISON SQUARE AREA
MANHATTAN DISTRICT
CORPS OF ENGINEERS

15 August 1945

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Report A-2905
Section A

PRODUCTION OF BLACK OXIDE, SODA SALT, ETC.

The following note, referring to Table II and Figure I of the article appearing in Section A of Report A-2904, has been received from Dr. N.H. Furman, Princeton Analytical Group, Princeton, N.J.

NOTE ON SOLUBILITY OF
TRICARBONATE

"The solubility of 3.46 at 0.68 molar sodium bicarbonate has been omitted in plotting the curve for the solubility of tricarbonate in sodium bicarbonate solution at 60°C. The curve as plotted runs between a preliminary value of 3.44 at 1.0 normal sodium bicarbonate and the value given in Table II."

It can thus be seen that the curve as drawn in Figure I cannot be constructed exactly from the data in Table II.

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Report A-2905
Section E

PRODUCTION OF FINISHED METAL

The following report has been received from Dr. J.G. Thompson, Metallurgical Laboratory, National Bureau of Standards, Washington, D. C.

Casting of single bars in the bottom-pour furnace and of twin bars in the top-pour, tilting furnace was continued throughout the month (of July).

The seamless steel tubing, nominally one-half inch I.D., supplied for mold material, is not satisfactory as received for use, under our conditions. The inner surface is rough, non-uniform, and difficult to smoke properly. The life of the molds is short and the castings are removed from it with difficulty, even when there is no attack of the metal on the mold. Running an 1-1/2 inch reamer through the tubing removes the high spots, but does not eliminate all of the roughness and irregularity. Although molds thus treated are an improvement over the as-received molds, they are not entirely satisfactory. Molds which have been reamed or turned until all of the irregularities are removed, and the surface is clean, round, and of uniform diameter from end to end, produce better castings and last longer than the as-received or partially cleaned tubing.

Satisfactory molds have been obtained by reaming or turning to about 1-9/16 inch I.D. These produce bars about 1.52 inch in diameter which, according to machining tests, clean up satisfactorily when the diameter is reduced by 0.075 to 0.1 inch, i.e., the diameter after machining is 1.42 inches or larger. If the diameter of the mold is 1.5 inches, the resulting bar is 1.46 inches in diameter leaving a maximum of 0.1 inch for machining to final size. Machining tests on bars cast in steel molds reamed to 1-1/2 inches (i.e., only partially cleaned) show that this is barely enough. Some of these bars cleaned up satisfactorily at 1.36 inches, but others contained surface defects which might or might not pass inspection. It is believed that bars which would pass inspection after machining to 1.36 inches could be produced as consistently and reliably in clean, uniform molds 1.5 inches in diameter, as is now done in molds of 1-9/16 inches diameter, but this would require a better and more uniform mold surface than is obtainable in the molds on hand.

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Section E
page 2

As reported last month, the burner method of smoking molds was satisfactorily used in connection with the bottom-pour furnace but was not so successful in the top-pour furnace. Further experiments have shown that burner smoking for a longer time, eight minutes instead of four, produces a heavier coating which furnishes adequate protection for the mold and results in very good surfaces on the casting.

In the matter of life of the metal, a cast iron mold has been used for forty-six castings and is still in use.

Most of the attempts to form investment molds, to produce bars 18 to 20 inches long, have encountered difficulty in removing the mandrel. Two molds have been good enough to warrant castings being made but even in these two there were some breakouts and roughnesses in the mold which produced corresponding roughness in the surface of the cast bars. Although the surfaces of the bars were less uniform, i.e. rougher, they appeared to contain fewer pinholes and other surface defects than the bars cast in metal molds. Further experiments with investment molds are scheduled, and the products will be examined for surface and subsurface defects.

Attempts to prepare molds from some available ground flint, instead of the Vitallium investment, have not been successful, apparently because the flint is uniformly finely ground whereas the investment material contains a range of particle sizes, including larger particles. Flint would be decidedly cheaper than investment material and attempts to prepare a usable flint will be continued.

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