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NICKEL PLATING OF URANIUM CYLINDERS

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At a recent visit to the Bayonne Laboratories of International Nickel, I discussed the status of the work on ductile nickel plating of uranium metal. Dr. Wesley had prepared another sample which was plated with approximately 4 mil coating of nickel in the following manner:

The uranium cylinder, 3/4" D x 8" long was sand blasted, degreased in trichloroethylene and immersed for 15 seconds in 1:1 concentration of HCl at room temperature. Following this, the sample was given a cathodic treatment using a platinum anode at 25 amperes per square foot. After the cathodic treatment the sample was water rinsed and plated to approximately 1/4 mil using a high sulfate nickel bath at room temperature with vigorous agitation and at 12-1/2 amps per square foot. This primer coat required approximately 15 minutes in the plating bath. After this, the sample was transferred to a watts bath which is a combination of sulfates and chlorides of nickel. The bath operates at approximately 140 F with a ph of 2 and current density of 50 amperes per square foot. Hydrogen peroxide is used as an anti-pitting agent. This latter coating was approximately 3 mils and took 90 minutes to deposit. The sample was plated 1/2 length at a time. After the first half was plated, the second half of the sample was recleaned and plated. Hence, there was an overlap in the center portion. Following this, the entire piece was then replated to an additional one mil thickness. Dr. Bobriski reported that there was a vigorous attack on the uranium during the cleaning in the hydrochloric acid solution of the unplated half of the cylinder. This was attributed to the possible strong galvanic action between the Ni plating of the first half of the uranium which was being cleaned.

Dr. Wesley gave an approximate plating cost for this type of plate - \$1.00 per square foot of 3 mil thickness.

The International Nickel Company believes it would be wise to pursue further work with various types of primer coating on the uranium before nickel plating. One possibility is a tin coat. If an aluminum primer coat was used, zinc and calcium would have to be plated first, followed by the nickel plate. If a commercial purity

OFFICE →					
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DATE →	1/7	RS			

January 7, 1952

aluminum were used as an undercoat, a simple anodic phosphoric anodic treatment can be used and the nickel deposited directly. If a high silicon aluminum primer coat can be used, then the nickel can be plated directly without pretreatment.

Dr. Wesley reported that he had attended the semi-centennial celebration at the National Bureau of Standards in which there was a symposium on the electro-deposition researches in progress. This meeting was on December 4, 5 and 6, 1951. W. Blum, Chief, Electro-Deposition Section, National Bureau of Standards, was in charge of the event. Dr. Wesley reported that at this meeting a Mr. G.E. Gardom associated with the Design and Research Center for Gold, Silver and Jewelry Industry, at Goldsmith's Hall, in London, England, mentioned that the British were using plating to produce protective cladding for uranium. No further information was given.