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September 3, 1964

IMPROVED NEPTUNIUM ACCUMULATION FLOWSHEET

By

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Redox Process Engineering
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CHEMICAL PROCESSING DEPARTMENT

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L. R. Michels, Manager
Separations Process Design
Engineering
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IMPROVED NEPTUNIUM ACCUMULATION FLOWSHEET

The Redox acid precycle flowsheet which has been in use since November of 1959 was adopted to provide neptunium recovery. Although neptunium recovery on this flowsheet has been satisfactory, several problems have been encountered. Among these are: marginal uranium decontamination, increased hexone degradation and increased corrosion of precycle piping and equipment. To circumvent these problems an acid-deficient precycle flowsheet was proposed.

In August, 1964, following replacement of the 1A Column and the D-14 backcycle concentrator, the Redox plant was started up on this flowsheet. Neptunium, which left the 1A Column in the waste stream, was recovered by processing the waste stream through the 1S Column on an acid flowsheet. The neptunium, extracted in the 1S Column, was stripped in the 1O Column and routed to the D-14 backcycle concentrator in the 1OW stream. Using this flow pattern it was planned to accumulate neptunium in the D-14 and F-8 vessels and the 1A, 1S and 1O Columns. This flow pattern is shown on the attached sketch.

Inadequate stripping of neptunium in the 1O Column with resultant neptunium losses to the waste stream necessitated abandoning this flow pattern and the neptunium stream from the 1S Column has been routed to the 2E Column with the 1A Column product stream. Neptunium is presently being recovered in both the 1A and 2D Columns and accumulated in F-2, D-14 and F-8 vessels.

Another deficiency of this acid deficient flowsheet was the increased load on the D-14 backcycle concentrator. The increased flow of the 1OX stream (required for neptunium stripping in the 1O Column) coupled with routing of the 1AW stream to D-14 limited the Redox plant throughput rate to about 80 percent of the nominal rate.

To regain all of the advantages of the acid-deficient precycle flowsheet, it is now planned to route the neptunium-bearing hexone stream from the 1S Column directly to the D-14 backcycle concentrator. In this plan, the hexone would be

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vaporized overhead in the stripping tower leaving the neptunium in the aqueous stream entering the pot. The hexone would be condensed in the D-11 waste concentrator condenser and recovered from the condensate in the D-5 hexone decanter and stripper. The neptunium would be accumulated in the D-14 and F-8 vessels and the 1A and 1S Columns. The precycle flowsheet for this proposed flow pattern is attached.

The proposed routing of the 1SP stream to D-14 is as follows:

1. Use existing routing to the 1C Column.
2. Replace jumper 1C-U3 (H-2-45645) with a jumper which routes the 1CW stream to 1C-U3 and the 1SP stream to 1C-U4. The 1SP stream would use the spare organic header to the 10 Column.
3. Install a new jumper from 10-U12 to 10-I2.
4. Install a new jumper from F-T-40 to F-T-41.
5. Use existing jumper D-T-71-T-72 to D-14 (H-2-45670) to route the organic stream to the third bubble cap tray of the D-14 tower.

Will you please review the proposed flowsheet and routings and provide the following:

1. Design of the required jumpers.
2. Estimated capacity of the D-14 backcycle concentrator.
3. Review adequacy of organic header vent system for 12 to 15 T/day rate.

Benefits from increased production rates, improved product quality and slightly better acid control provide incentives to adopt the proposed changes at the earliest possible opportunity. Therefore, your early and expeditious support will be greatly appreciated.

R. E. Isaacson
Manager
Redox Process Engineering
Research and Engineering

RE Isaacson:ODE:jas

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PROPOSED PRECYCLE FLOWSHEET

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