HANFORD WORKS

[redacted]

G.E. NUCLEONICS PROJECT

GENERAL ELECTRIC COMPANY

HW-18871

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Richland, Washington

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Atomic Energy Commission
Hanford Operations Office
Richland, Washington

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Attention: Mr. D. F. Shaw, Manager

Gentlemen:

HAN-33844

REQUEST FOR RECOVERED URANIUM SPECIFICATIONS

It is recognized that a decision has not yet been reached by the Atomic Energy Commission as to whether the Hanford Works will ship out recovered uranium from the Redox and TBP Plants as dried uranyl nitrate hydrate or as uranium trioxide (UO_3). It is our understanding, however, that all of the recovered uranium will be shipped, directly or via intermediate processing sites, to the K-25 plant at Oak Ridge for final processing. With this in view, it is the belief of the General Electric Technical Divisions that reasonably firm specifications for the final uranium product to be delivered from either the Redox and TBP Plants or an uranyl nitrate-oxide conversion plant at the Hanford Works should be formulated at an early date.

The reasons for this belief are as follows:

1. The process designs of the Redox and TBP Plants have been based on producing recovered uranium with gross beta and gamma, as well as plutonium, decontaminations sufficient to permit essentially direct physical handling of the final product in its last form at Hanford. Subsequent processing at other plants may result in fractionation or concentration of either certain fission products or of plutonium and cause more highly specific or greater decontamination to be required at Hanford than is currently planned.

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2. No attention has been devoted in process design, to date, to the problem of chemical purity, due to the lack of any specifications. Subsequent off-site processing of Hanford recovered uranium may well be complicated by Redox and TBP process impurities or, in turn, the Hanford processes might have to be modified or revised to fit the customer's minimum purity needs.

3. It is known that other sites have experienced difficulties with the fluorination of uranium oxides supposedly identical but prepared by different sites or methods.

Any or all of the above potential post-Hanford processing difficulties may be experienced unless early attention is given to the establishment of end-product requirements for Hanford and the determination of whether or not the presently designed Redox and TBP process can meet these requirements. If changes in chemical processing at either Hanford or the customer site are required, these should be evaluated now.

Accordingly, we wish to request that the Atomic Energy Commission arrange to furnish the General Electric Company with as firm a set of specifications for recovered uranium from the Redox and TBP Plants as can be established at the present time. The types of information which we believe may be important in the specifications are listed below.

I. Radioactivity Contamination (Uranyl Nitrate Hydrate or Uranium Oxide)

A. Beta-Activity

1. Gross - The permissible amount of gross beta radiation due to the sum of both natural uranium decay daughter elements and fission product contamination expressed in curies/gm. of uranium or counts/min./gm. of uranium.

2. Specific - The permissible amount of fission product beta radiation due to gross fission product content and to any specific fission product considered troublesome in subsequent processing, expressed in curies/gm. of uranium or count/min./gm. of uranium.

B. Gamma-Activity

1. Gross - The permissible amount of gross gamma radiation due to the sum of both natural uranium decay daughter elements and fission product contamination expressed in curies/gm. of uranium or counts/min./gm. of uranium.

2. Specific - The permissible amount of fission product gamma radiation due to gross fission product content and to any specific fission product considered troublesome in subsequent processing, expressed in curies/gm. of uranium or count/min./gm. of uranium.

C. Plutonium

1. Gross - The permissible gross amount of contamination by all plutonium isotopes expressed as micrograms/gm. of uranium or weight percentage.

2. Specific - The permissible amount of contamination by isotopes of plutonium other than Pu^{239} (such as Pu^{240}), if important, expressed as micrograms/gm. of uranium or weight percentage.

D. Measurement Techniques

All radioactivity measurements listed should specify the instruments and techniques used for counting, such as particularly:

1. Counter window thickness in mg./sq.cm. (for beta-counting).

2. Counter window shielding for Bremstrahlung reduction (gamma-counting).

3. Counter geometry factor.

4. Sample density limits in mg./sq.cm.

II. Chemical Purity

A. Uranyl Nitrate Hydrate or Uranium Oxide

1. Net purity in weight per cent.

2. Specific impurity element tolerances in weight per cent or ppm.

3. Tolerance limits for any specific impurity compounds to be avoided in ppm.

4. Water tolerance limit in weight per cent.

5. Adsorbed gas (such as NO_2) tolerance limit in ppm.

6. Acidity tolerance in weight per cent nitric acid.

B. Uranium Oxide

1. Oxide composition expressed in weight or mol per cent oxygen.

III. Physical Properties

A. Uranyl Nitrate or Uranium Oxide

1. Particle size distribution in mesh size range fractions.

2. Bulk density in gms./cc.

a. Loosely packed.
b. Settled and compressed.

B. Uranyl Nitrate

1. Melting point in range of degrees centigrade.

C. Uranium Oxide

1. Surface area per unit weight (by nitrogen adsorption).

2. Reactivity to hydrogen and/or fluorine.

3. Solubility and dissolution rates in water and nitric acid.

Very truly yours,

A. B. Greninger, Manager
Technical Divisions

ABG:RHB/jw