

8.0 PROCESS DESCRIPTION AND SAFETY ANALYSIS

This Section contains detailed descriptions of all manufacturing operations in the Hematite facility. Sufficient detail is provided to permit an independent verification of the adequacy of controls for the purpose of assuring safe operations.

Nuclear criticality limits are taken from Chapter I.4.0. However, the intricacies of the equipment in certain operations require further analysis, which is provided in Chapter II.9.0. Details of specific calculations used to support various aspects of this analysis are also provided in Chapter II.9.0.

Present arrangements of equipment are shown in the drawings provided in Chapter II.10.0. These arrangements may be changed in accordance with the procedures of Part I. Therefore, this is considered to be a typical analysis for operations conducted within the scope of this license.

8.1 UF₆ to UO₂ Conversion

This system is designed to convert uranium hexafluoride to UO₂ powder suitable for pressing into fuel pellets. The equipment is designed to handle a maximum enrichment of 4.1% U-235. The operation is depicted schematically in Figure II.8-1.

8.1.1 Receive and Store UF₆

UF₆ is received in standard 2-1/2 ton cylinders in approved shipping packages. Upon receipt, the cylinders are placed in the UF₆ cylinder storage area which holds up to 54 cylinders. Eighteen additional cylinders may be located adjacent to the vaporizers near the cylinder scale, or in shipping packages

9.0 NUCLEAR SAFETY ANALYSIS OF UF₆ - UO₂ CONVERSION

9.1 Reactor Vessel and Furnace

a. Description

Reactor vessels are constructed as shown in Figure 9-1, which is the elevation view of the conversion reactor line. Each reactor is surrounded by electric heating elements and insulation approximately 8 inches thick.

The three reactor vessels, R-1, R-2, and R-3, are identical with the exception of the internal filters that are not included in R-2 and R-3.

b. Nuclear Safety

Assumptions:

- 1) Maximum enrichment 4.1%.
- 2) Under process design (normal) conditions, SNM is only in the 10" diameter lower section of the vessel.
- 3) Reflection as provided by furnace insulation; other materials such as building steel and personnel add equivalent of one inch of water to outside of furnace jacket.

Reactor vessels are supported 30, 20, and 10 feet above the ground level; infinite water reflection is, therefore, not credible.

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10.0 DRAWINGS

The following drawings are included as part of this application:

D-5007-2001	Sheets 1 through 4 and 6 through 8	Oxide Building Equipment Design
D-5007-2001	Sheet 9	Building 255 Equipment Layout
D-5008-2003	Agglomeration Station Plan and Elevation	
D-5020-2019	240-4 Equipment Layout	
D-5009-1007	Recycle/Recovery Process Flow	
B-5009-1008	240-2 Wet Recovery System	
B-5009-1009	UF ₆ Cylinder Wash	
D-5009-1011	Recycle Recovery Equipment Flow Diagram	
D-5009-2012	240-2 Surface Density Exclusion Areas	
D-5009-2010	240-2 Equipment Layout	
D-5009-2015	240-3 Equipment Layout	
D-5009-1020	Incinerator/Scrubber Flow Diagram	