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SRE Fuel Processing and Storage
TO: C. D. Watson
FROM: J. C. Suddath

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ABSTRACT

Results are presented of an evaluation of nuclear safety and radiation control related to the shipment, mechanical processing, and storage of SRE-1 fuel elements.

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1.0 Introduction

Nuclear and radiation hazards have been investigated for all phases of operation to be carried out in the mechanical decladding of SRE fuel elements. The SRE fuel is 2.8% enriched with a maximum burnup of 1,000 Mwd/ton and minimum cooling of 120 days. Each element contains 69 kg of uranium metal (~2 kg U-235) and is made up from 84 slugs (3/4" D x 6"), clad with (10 mil wall) stainless steel tubing. It is planned to ship the fuel from Santa Susana, California, to Oak Ridge in the modified PAR loop carriers, with a maximum of 10 elements being shipped in each carrier per trip.

2.0 Shipment Carrier

Boral sheet is employed in the carriers as a nuclear poison for a safety factor in the event the loaded carrier is submerged in water.¹ There is no nuclear hazard associated with this low enrichment fuel unless moderating materials (H, C, Be or compounds thereof) are present. There is a radiation hazard around the carrier and when elements are pushed from the carrier to the mechanical processing cell, but control of personnel access to this area during the unloading should be a satisfactory solution to this situation.

3.0 Mechanical Processing

Only one complete element at a time will be handled in the mechanical cell and there should be no difficulties from nuclear or radiation considerations. All of the slugs from one element may be canned and loaded into the transfer basket and transferred to the storage cell without any nuclear hazard existing,² but a radiation hazard will exist above the transfer tunnel. This area should also have controlled access during transfer operation.

4.0 Storage

Storage of fuel in baskets within the storage cell will not present a criticality hazard if the baskets are stacked a maximum of three baskets high in a single row along the north wall and a single row along the south wall.² Present plans include storage of scrap (cladding material) in the storage cell along with the uranium rods; this should be avoided if feasible, to give better control and housekeeping of the fissionable material.

¹Letter, A. D. Callihan to J. C. Suddath, "Critically Safe Shipment of SRE-1 Fuel Elements," dated April 29, 1959.

²Letter, A. D. Callihan to J. C. Suddath, "Storage of SRE Uranium Slugs," dated May 12, 1959.

Details of the procedure for transfer of fuel from the storage cell to the carrier for removal to Building 3019 are not complete to date, but it is planned to transfer only seven cans at a time (equivalent to one complete fuel element) and no criticality hazard can be foreseen.

In all operations and transfers only the equivalent of one fuel element is to be handled at a time. This should be a very satisfactory procedure considering nuclear and inventory aspects.

Any planned modification of carriers, baskets, or procedures should be reviewed and approved prior to incorporation into the program.



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