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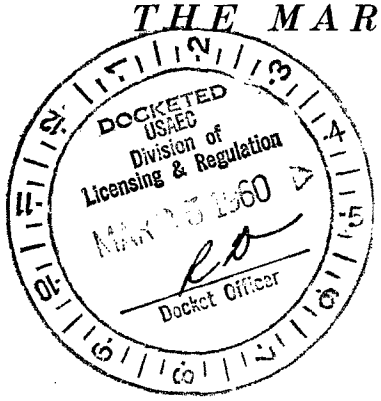
THE MARTIN COMPANY



Baltimore 3, Maryland

Nuclear Division
Mail Number W-722
March 23, 1960

Refer to: NMC-109

cy this request pert Inspection 3/30/60

Director
Division of Licensing and Regulation
United States Atomic Energy Commission
Washington 25, D. C.

Reference: Our letter NMC-5 dated February 9, 1960

Gentlemen:

In the referenced letter we applied for an additional amendment to our Special Nuclear Material License, SNM-53. Due to certain misunderstandings which have held up approval of this amendment we request that the referenced application be replaced by this letter.

We desire to amend License SNM-53 in order that we can (1) proceed to fabricate uranium-aluminum alloy fuel elements and (2) receive and use a Plutonium-Beryllium neutron source in connection with our critical facility experiments.

Since our License as it currently stands does not cover fabrication of uranium-aluminum alloy fuel elements, we are enclosing a report, MND-2330, which covers the Nuclear and Health Safety aspects of this fabrication.

The Plutonium-Beryllium source will be used to supply neutrons for starting the ERDL critical assembly and it is anticipated that it will be kept by The Martin Company for an indefinite period of time for use in other critical experiments. For details on the Martin Critical Facility see reports MND-1110, 1111, 1112 and MND-E-1157.

The source consists of Beryllium intimately mixed with Plutonium and seal welded in an inner tantalum capsule. This inner capsule is in turn welded in an outer capsule of stainless steel whose dimensions are 1.55 inch diameter by 3.4 inch length. The source contains 160 grams of Plutonium isotope 239. Reference the Mound Laboratory catalog of Polonium and Plutonium sources, November 1, 1959, pages 24 through 26.

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The source will be stored in the original shipping container and kept in a controlled area until it is installed in the source shield in the critical assembly tank. The source will be raised to operating position for start-up of the assembly. Swipe tests will be performed no less frequently than once every three months. The Martin Company has been using a Polonium-Beryllium Source as covered under License Number 19-1398-1.

I certify that the statements made in this letter and the referenced enclosures are true, complete and correct to the best of my knowledge and belief, and are made in good faith.

Very truly yours,

THE MARTIN COMPANY

J. V. Loppert
Licensing Officer
Nuclear Division

DOCKET NO. 70-58
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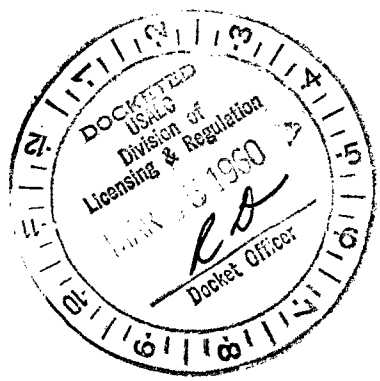
LICENSE REPORT
MND-2330

NUCLEAR AND HEALTH SAFETY CONTROLS FOR FABRICATION OF URANIUM-ALUMINUM FUEL PLATES

March 23, 1960



INTRODUCTION

This report outlines nuclear material control requirements for the fabrication of uranium-aluminum alloy fuel elements as described below. Two cores consisting of 48 fuel elements, 11 fuel plates each, are planned to be fabricated. The total feed requirement is approximately nine kilograms of 93% enriched uranium metal. The process involves alloying uranium and aluminum, hot rolling the ingots to one-quarter inch slabs and punching fuel core slugs. These core slugs are then pressed into aluminum picture frames and hot rolled. Cladding of 1100 aluminum will then be applied, followed by further hot and cold rolling to achieve bonding. Each fuel plate will contain 13.2 - 1.0 grams of U-235. The anticipated final scrap consists of uranium aluminum alloy and will include approximately 10% of the feed material.

The table below shows the forms of uranium to be utilized in the process and the allowable limits. These limits are based upon the theoretical limits for the forms calculated using the optimum mixture of water and fuel bearing aggregates and based on Appendix A of MND-1033. These limits are conservative with respect to recommendations presented in TID-7106 (Nuclear Safety Guide) and TID-7019 (Guide to Shipment of U-235 Enriched Uranium Materials).

Form	Limits U-235
(1) Uranium metal in fine cuttings, dust, etc.	500 gms
(2) uranium-al alloys in thin forms	700 gms
(3) uranium-al alloys clad shapes in thin forms	800 gms
(4) uranium in aqueous solution*	2 gms/liter

*Total quantities will be held under 350 grams.

The actual quantities of U-235 used in the process below fall well under the above theoretical limits.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] appropriate [illegible] samples will be [illegible] in order to determine [illegible] These samples will contain [illegible] will be identified by marking [illegible] approximately [illegible] cores [illegible] will be [illegible] the slab. The batch now consists of these [illegible] slugs, each containing approximately [illegible] grams of U 235 [illegible] grams of U 235. The scrap from this process, including [illegible] ladders, slivers, and cropping will be accumulated to a maximum of 500 grams returned to the Vault for storage and recycle.

For all remaining operations in the process including degreasing, heating in furnace, rolling, [illegible] blister annealing and final assembly, the batch will contain a maximum of 16 core slugs or assembled fuel plates.

Reject plates will be chemically milled (etched) in 170 liters caustic solution. A maximum of 24 plates will be etched at one time (equivalent of 336 grams U-235). The plates will be under-etched leaving about 2 mils of aluminum cladding on the core. However, samples of the caustic solution will be taken after each batch to determine uranium content. Should all the plates in one batch dissolve in the caustic solution the maximum concentration would be less than two grams per liter.

Storage and shipping of scrap and finished fuel elements will be covered in a forthcoming amendment.

HEALTH PHYSICS AND INDUSTRIAL HYGIENE

A. Health Physics

The entire manufacturing operation will be conducted under the surveillance of the Health Physics Section of the Employment and Personnel Department.

Specific health physics requirements for each operation are contained in the Nuclear Materials Control Manual issued for the program. All processes will be surveyed by Health Physics Section to insure compliance with standards of 10 CFR 20 or better in all aspects.

B. Industrial Hygiene

Safety and industrial hygiene services at The Martin Company are handled by the Safety Section of the Security Division of The Martin Baltimore Division. This Section provides various safety and industrial hygiene consulting services, specified equipment and approves processes for all operations not involving radioactive material. The following precautions will be taken throughout the process in order to maintain safe working conditions for personnel involved in the manufacturing of fuel elements:

1. Ventilation will be provided for all operations involving hazardous vapors if necessary.

2. Personnel protective equipment, including acid resistant rubber gauntlets, aprons, acid type goggles and approved respirators, will be worn during all cleaning and degreasing operations. Similar equipment, with the addition of heat resistant gloves, will be worn during aluminum melting operations.

3. Processes and equipment will be evaluated prior to being put into operation to insure the incorporation of necessary safety and health precautions.

4. All operations will be surveyed routinely and any corrective action taken as needed.

S. MATERIAL & MANUFACTURING FLOW CHART

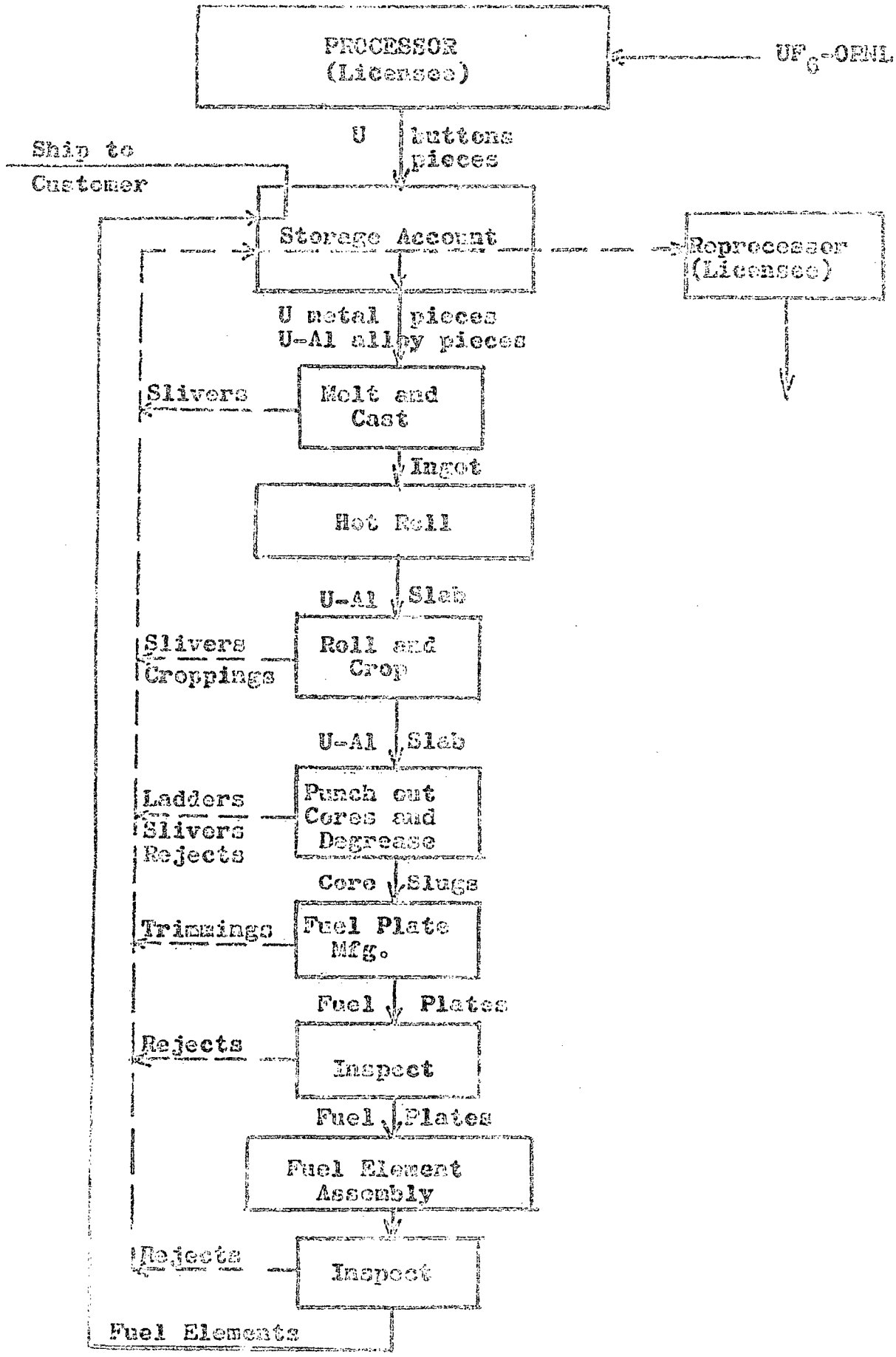


Figure 1 -- Process Flow

STORAGE BIRD CAGE

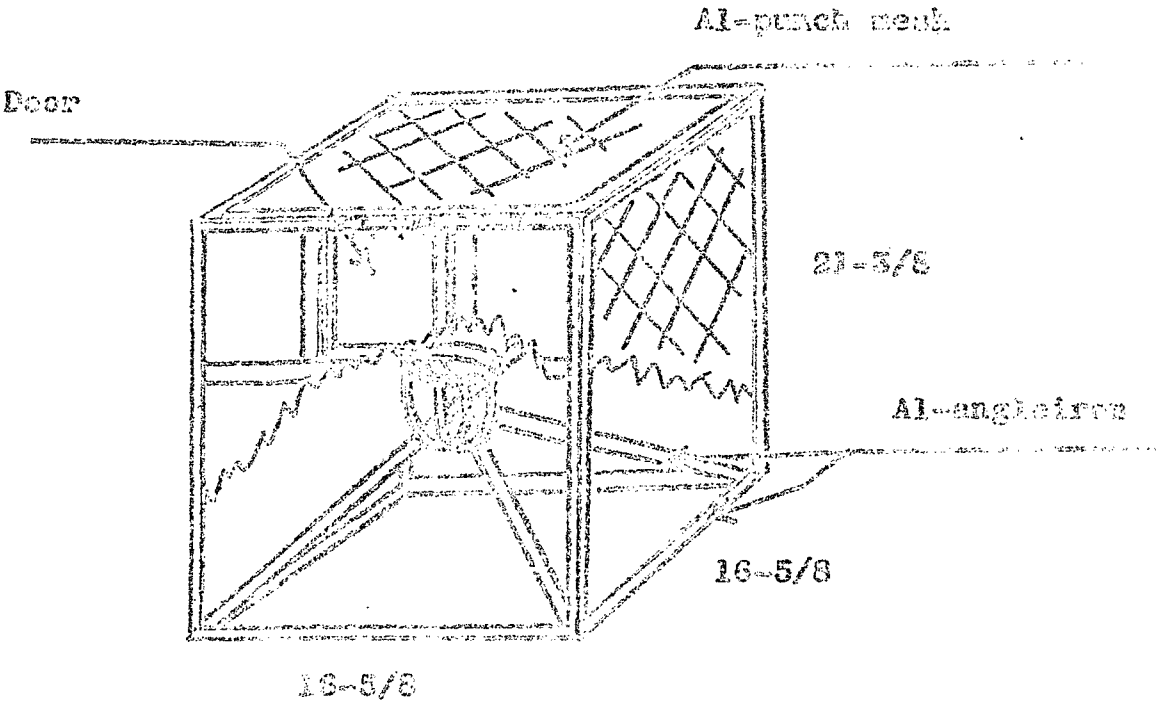


Figure 2

The birdcage for storing and transporting uranium powders, powder blends and broken buttons is a skeletal box-like device enclosing a cavity for holding the SS material. The birdcage is of welded aluminum construction. The birdcage is 16-5/8 inches by 16-5/8 inches by 21-3/8 inches high. The cavity is 4-1/4 inches in diameter by 4-3/4 inches deep and so situated as to provide 6 inches from its outer dimension to the sides, front, back and bottom of the birdcage and 10-1/2 inches to the top of the birdcage.

The containers for powders, powder blends and broken buttons are constructed of 1/16 inch stainless steel and are smooth, spherical-bottomed cylinders with firm screw type stainless steel covers capable of affecting an airtight seal. The smaller cylindrical container is 3-7/16 inches inside depth by 2 inches inside diameter with a 1 inch inside spherical radius bottom. The larger cylindrical container is 5-15/16 inches inside depth by 3-15/16 inches inside diameter with a 2.035 outside spherical radius bottom.

Birdcages for holding fuel tubes, fuel plates and other SS feed material are 12 inches by 12 inches or 15 inches by 15 inches and vary in length from 30 inches to 54 inches. These are of welded aluminum construction to facilitate handling. Wooden cradles of various designs are used to hold the SS feed material, work-in-process and finished product.

Since scrap is generated at The Martin Company, Nuclear Division in many sizes, shapes and forms, birdcages (as described above), appropriate in the circumstances, are used for storage.

STORAGE VAULT

As discussed in MND-1063, the storage vault is a fully enclosed room, 22 feet 8 inches long by 15 feet 9 inches wide and 11 feet high. Walls are nine inches thick and made of reinforced concrete. Ceiling and floor will be of the same construction. Sole entrance to the vault is through a 1/2 inch solid stainless steel door equipped with an approved combination lock. There are no water conduits or other service piping or drains within the vault

The storage birdcages will be stored along three walls of the vault in a plane array. The lowest rows are placed on platforms about 17 inches above the floor to decrease the probability of flooding. Storage racks for fuel elements are located in the center of the vault. An isle with a minimum width of 3' inches separates these racks from birdcage array along the walls.

CORE SLAB SAMPLING PROCEDURE

SAMPLING PROCEDURE

Each slab will have 9 specimens, (numbered 1 to 9) punched in the areas shown on the attached, "Slab Sampling Plan".

Specimens 1, 2, 3, 4, 5 and 9 will be chemically analyzed individually for uranium content.

Specimens 6, 7 and 8 from the crop area will be chemically analyzed together.

A permanent record of each slab or melt based on above information will be maintained.

Figure 3