Title: PREPARATION OF A GLOVEBOX FOR CASTING ENRICHED PLUTONIUM

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Objectives

Prepare existing glovebox for casting, heat treating and storing enriched plutonium

Upgrade seismic systems to reduce dispersion hazard

Upgrade atmospheric systems to reduce oxidation of plutonium

Upgrade vacuum system to prevent oxidation

Install/upgrade induction heating systems to melt plutonium and heat mold
Glovebox for Casting Enriched Plutonium

- Glovebox exhaust
- Leaded walls
- Leaded windows
- Leaded gloves
- Vacuum chamber
Cooling Water Schematic

KEY:
- Positive Pressure Chilled Water
- Negative Pressure Chilled Water
- Limited Volume Water Supply

Water-cooled cables

Glovebox
Bell jar lid
Crucible coil
Chamber lid

Inductotherm
Solid State

2 Coaxial tubes
Pass-thru

4 Water-cooled cables
Pass-thru
Pass-thru

Coaxial tube

Limited Volume

Westinghouse Motor Generator

Capacitor Bank
Vacuum System Schematic

Glovebox

4" Dia Copper Pipe

Filter

New Valve

Main Floor

House Vacuum

Blower

Roughing Pump
Addition of Braces to Glovebox to Provide Seismic Integrity
New Penetration in Laboratory Floor for Water-cooled Cables to Inductotherm

4” Diameter Hole

Templates for GPR and Radiography

Needed to avoid cutting rebar in floor during drilling of hole.
Inductotherm Solid-state Power Supply

Provides 2000 amperes at 400 volts DC to mold coil.
Inside of Inductotherm Power Supply

Cu Bus Bars

Top of Water-cooled Cables

Top of Al Sleeve
Induction Heating Cables Suspended from Basement Ceiling

- Basement Ceiling
- Al Sleeve
- Water-cooled Cables
- Cable Tray
Mold Coil Inside Casting Furnace Vacuum Chamber

- Cu Coil
- Terminals
- Ta Catch Pan
- MACOR Spacers
- Vacuum Port
Westinghouse Motor Generator Power Supply and Cooling System

- Water Cooling System
- Motor Generator
- Bottom of Scaffold
Inside of Capacitor Bank Suspended from Basement Ceiling

Coaxial Conductor (to Crucible)

Capacitors
Coaxial Conductor from Capacitor Bank to Coaxial Pass-through

Coaxial Pass-through (to Crucible)

Coaxial Conductor (from Capacitors)

Door to Capacitor Bank
Coaxial Conductor Connections to Crucible Coil

- Coaxial Conductor (to Crucible)
- Coaxial Pass-through (From Capacitor Bank in Basement)
- Plexiglas Insulator Box
Induction Heated Crucible Containing Enriched Plutonium

Water-cooled Lid
Quartz Bell Jar
Tantalum Crucible
Water-cooled Coil
Mold Chamber
Vacuum Equipment for Casting Furnace

4" Diameter Copper Vacuum Line to Furnace

Ruvac Blower

Leybold Heraeus Roughing Pump
Vacuum System Isolation Valve

- 4" Diameter Cu Vacuum Line to Furnace
- Lockable Isolation Valve
- 2" Diameter Cu Vacuum Line to "House" Vacuum Pump
- Contamination Control Tent
- 4" Diameter Cu Vacuum Line to L-H Vacuum Pump

Prevents migration of $^{238}\text{Pu}$ to house vacuum.
Addition of Pressure Relief Device (Bubbler) to Exhaust System

Allows glovebox to be filled with inert gas yet still maintain negativity.
Bypass Line from Casting Glovebox to Trunkline

Allows air to enter casting glovebox when vacuum pump is running.