WESTINGHOUSE ELECTRIC CORPORATION

ASTRONUCLEAR CORE OPERATIONS

NUCLEAR SAFETY MANUAL

MASTER

SECTION I	Nuclear Safety Control Procedures
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Section I
Revision 900-1

ASTRONUCLEAR CORE OPERATIONS

NUCLEAR SAFETY CONTROL PROCEDURES

SECTION I

I. INTRODUCTION

To maintain nuclear safety during the handling and fabrication of enriched uranium bearing materials in the Westinghouse Astronuclear Core Operations (WNCO), a control system has been established which meets the requirements of the Astronuclear Division Procedure 562 and the Astronuclear Laboratory Nuclear Safety Guide (WANL-TME-185). This document presents the nuclear safety procedures as required in the nuclear safety guidance document (TME-185).

These procedures will insure nuclear safety control by enforcing defined restrictions on the allowable amount of enriched uranium and the methods for handling it. For clarity, operational areas of WNCO have been divided into work areas, and the work areas subdivided into criticality zones. The basic control area is the criticality zone. The boundaries of these zones are designated by special floor markings where there is no wall or barrier to provide a physical separation. Where walls serve as boundaries of a criticality zone, a strip of the special tape is laid across the entrance or entrances of the walled areas. Within the crit zone both mass and/or geometry control criteria are used for material control. The limitations and restrictions are posted in each criticality zone. A description of the criticality zones and their respective limits are given in Sections II and III of this manual. These will be kept current by replacement of the pages affected by approved changes.

A member of Management must be in charge of the facility when people other than instructed guards are in areas where fuel is available. The line supervisor is responsible for maintaining nuclear safety within his area of responsibility, and he shall establish the techniques required to assure himself that all nuclear safety procedures are adhered to. Periodic documented audits will be conducted by personnel designated by the WNCO Plant Manager. If any violations are noted, immediate action will be taken to rectify the situation and a written report submitted to the WNCO Plant Manager.

The Nuclear Safety Engineer or his designated representative will make periodic inspections (approximately weekly) of WNCO. If any violations are noted, he will make an immediate oral report to the responsible supervisor. This will be followed by a written report to the Manager, NERVA Fuel and Materials, with copies to the Division General Manager, the WNCO Plant Manager, and the Chairman and Secretary of the Nuclear Safety Committee. The written report will define specific manual paragraphs that were violated and the manner in which it was violated. The WNCO Plant Manager will then make a written reply within five (5) working days to the Nuclear Safety Engineer defining the corrective action to be taken. If he is unsatisfied with the action taken by WNCO Management, the Nuclear Safety Engineer will immediately advise NERVA Project Management and the WNCO Plant Manager.

Additional control of nuclear safety is accomplished by requiring all uranium bearing material entering or leaving WNCO to be cleared through the Accountability personnel.

The details of this control system are specified in the ensuing sections of this manual.

II. CHANGE PROCEDURE

Changes to this manual must be initiated, reviewed and approved in accordance with WANL Division Procedure 562.

A file of documents supporting changes in this manual will be maintained by the WNCO Nuclear Safety representative.

III. DEFINITIONS

These definitions apply to WNCO:

- A. Facility - A building or a section of a building or complex of buildings in which the handling and processing of uranium materials is conducted.

- B. Work Area - A section or part of a facility where a single type of operation or a related series of operations involving enriched uranium material are performed. For example: Mixing and Extrusion Area, Machine Shop Area, and Inspection Area.
- C. Criticality Zone - A well defined approved zone within a work area where a specific or individual type of operation is performed. Boundaries of criticality zones are physically designated by yellow tape marked "Crit Zone" or by physical barriers (i.e., walls, rails, etc.). Used in conjunction with an appropriate "Crit Zone Limit," they provide a method for administrative control. Aisles and park areas will be marked with plain yellow tape.
- D. Mass Controlled Criticality Zone - A criticality zone within which nuclear safety is maintained solely by limiting the quantity of enriched uranium bearing materials permitted within the zone.
- E. Geometry Controlled Criticality Zone - A criticality zone in which nuclear safety is maintained by restricting the geometry of containers and/or equipment used for enriched uranium materials.
- F. Park or Hold Area - A specified area within a Criticality Zone in which the fixture, transfer cart, etc., used in that zone must be located.
- G. Approved - Approved, as used in this document, means that the referenced item has been reviewed and approved in accordance with WANL Division Procedure 562.
- H. Uranium Material - Any material containing uranium. This includes mixes, element, scrap, etc.
- J. Enriched Uranium - Uranium which is enriched in the Isotope U-235.
- K. Non-Fueled Material - Any materials which may physically resemble uranium materials but which contain no uranium.

- L. Fuel Element - See Classified Section V.
- M. Fuel - This word when used by itself means "enriched material."
- N. Fuel Beads - Pyrocoated uranium dicarbide particles. Unless specified to the contrary, they contain enriched uranium.
- O. Posting - The record of the amount of U-235 in the Crit Zone at the present time. The amount of U-235 may be indicated on a standard posting form, a batch record or a form specifically designed for a crit zone.

IV. RESPONSIBILITIES

- A. Manager, NERVA Fuel and Technology
 - 1. Approve this manual and changes thereto as per WANL Division Procedure 562.
- B. Plant Manager of WNCO
 - 1. Assure all operations are covered by approved procedures.
 - 2. Familiarize himself and comply with the latest revision of WANL Division Procedure 562, WANL-TME-185, and WANL-TME-621.
 - 3. Make certain that WNCO supervisors are properly indoctrinated, and they, in turn, indoctrinate their personnel in Nuclear Safety Procedures.
 - 4. Enforce discipline for non-compliance with procedures.
 - 5. Approve all requests for changes to the WNCO Nuclear Safety Manual.
- C. WNCO Line Management (all levels)
 - 1. Assure all operations are covered by approved procedures and that working copies are available.
 - 2. Assure that all personnel for whom they are responsible are thoroughly indoctrinated in their specific duties relative to nuclear safety and that they comply with all nuclear safety control rules. This includes temporary personnel and visitors.

3. Assure that all material after extrusion is handled and processed as if it were enriched uranium material except as noted in V.A. 4.
4. Assure by periodic inspection that the nuclear safety control procedures are effective, that all crit zone limits are not exceeded and that personnel are complying with the nuclear safety control procedures.
5. Assure that when an emergency such as a fire, explosion, or a water line break occurs in his building or area, immediate and proper action is taken in accordance with established Site Emergency Procedures.
6. Refer all situations not covered by this document to the Nuclear Safety Engineer and the WNCO Manager.
7. Familiarize themselves with and comply with all requirements of WANL-TME-621.
8. Insure that all personnel report to work in a physical and mental condition that does not impair their judgement or ability to effectively perform their duties.

D. Facility Technicians, Machinists, and Inspectors

1. Comply with all nuclear safety control rules as established in this document.
2. Refer all questions or special situations which are not covered by this procedure to his immediate supervisor.
3. Insure that his physical and mental condition while at work does not impair his judgment or ability to effectively perform his duties.
4. If required by assignment, move uranium material and/or identify, package, and store uranium materials in an approved manner and in approved containers, storage devices, and areas.

E. Substation Custodian, Vault Custodians, and Accountability Clerks

1. Comply with all nuclear safety control rules as established in this document.

2. Refer all questions or special situations which are not covered by this procedure to his immediate supervisor.
3. Insure that his physical and mental condition while at work does not impair his judgment or ability to effectively perform his duties.
4. Move and control or direct the movement of fuel beads into the process line.
5. Obtain the required agreement and instructions as to quantity, time, and place of delivery prior to moving or directing the movement of SS materials to another area under the control of another individual.
6. Receive or direct and control the receipt of SS materials from another area.
7. Properly identify, package, or store SS material by approved techniques and in approved storage containers, devices, or areas.
8. Confirm the identity and disposition material delivered to Accountability.

F. Nuclear Safety Engineer

1. Supply criticality calculations for WNCO.
2. Assist line management in assuring compliance with the latest revision of WANL Division Procedure 562, WANL-TME-185, and this manual WANL-TME-621.
3. Perform liaison with WNCO and with the Nuclear Safety Committee to interpret and recommend corrections or modifications to TME-621.

G. WNCO Nuclear Safety Representative

1. Provide approved Nuclear Safety Procedures to all WNCO line management.
2. Audit and maintain master copies up to date.
3. Perform and document periodic internal audits.

V. NUCLEAR SAFETY CONTROL RULES

A. Material Processing and Storage

1. Enriched Uranium Material - Enriched uranium material or material not positively identified as not being enriched uranium shall only be processed or stored within a criticality zone and within approved criticality limits.

2. Storage Requirement - All enriched uranium materials not in process shall be stored in an approved crit zone in an approved storage container or device or in an approved manner.
3. Alteration of Fuel Storage Devices or Areas - No enriched uranium material, storage device, or area shall be altered without prior approval.
4. Non-Fuel Material - All material which can positively be identified as being non-fueled can be stored without restriction in storage areas clearly marked "Non-Fueled - No Uranium Allowed. "
5. Stacking Restriction - No material shall be stacked or stored in other than an approved manner.
6. Approved Containers - Those containers which have been analyzed to be nuclearly safe under the worst postulated conditions. Only approved containers shall be used for handling or storing uranium materials, and only approved containers shall be permitted in a crit zone. Containers approved for WNCO use are described in C. 1. No. 2.

Note: Material shall always be placed within these containers. Material shall not extend outside or above the container.

7. Sections of Fuel Elements - Wafers, samples, tips and braze qualification samples are terms used to define sections of fuel elements. The sections may be contained in wafer trays, 5-inch diameter one-quart or 1/2-gallon containers, or may be placed end to end in a suitable tray or fixture that will hold the sections in a straight and plane position or in a capped aluminum tube (approximately 1-inch in diameter by approximately 56 inches long). A number of sections end to end in a tray or fixture or in the aluminum tube may be treated as a single element.
8. Locking of Enriched Uranium Material Storage Areas - Fuel bead storage areas, crit zones A-1 and A-2 and outside storage areas, Work Area I containing radioactive material shall be locked when unattended by Accountability personnel or cognizant supervisors. Vaults, Crit Zones A-5, K-6, and H-19 will be locked when the plant is unattended to prevent entry of unauthorized personnel in case of fire or flooding. At any time it is necessary to have persons work in the

operational areas who are not regular employees, they must be instructed not to move any material other than their own. Elements may be left in approved containers and in approved crit zones at any time the operations are stopped, provided the facility is secured to prevent other than regular employees and instructed guard patrol from entering.

9. Empty Containers - All approved containers for handling material, when empty and not placed in an approved array, shall be identified "EMPTY" by label or marking pen unless it is immediately obvious by visual determination that containers are empty.
10. Furnace Fixtures - All holes in the fixtures will be filled with either fuel or non-fuel elements. No void holes are allowed.

B. Material Identification

1. Container Marking - Handling containers for all uranium materials except fuel elements and in-process containers must be marked with the quantity of uranium contained.
2. Process Material Identification - All material after extrusion will be handled and processed as if it were enriched uranium material. Identification of material for disposition will be made by Accountability. Material going into the extrusion process is controlled by use of approved containers or is limited by mass control techniques.

C. Criticality Zones

1. Identification - All criticality zones are identified by yellow tape marked "Crit Zone" or by physical barriers (i.e., walls, rails, etc.). Exceptions may be taken to the identification of zones with tapes where a piece of equipment (furnace) or section of a piece of equipment (port or shelf) is in itself a criticality zone. Such criticality zones may be identified by a sign on or in the proximity of the piece or section of equipment.

Where walls serve as boundaries of a criticality zone, a strip of yellow tape marked "Crit Zone" must be laid across the entrance or entrances of the walled area. If the fixture, transfer cart, etc., must be kept in a specific area of the zone, then that area will be defined with plain yellow tape. All limits are to be prominently posted at a point that is easily visible to the normal access direction.

2. Establishment and Modification - Criticality zones may not be established or modified without written approval.
3. Combustible Materials - No combustible materials other than those considered necessary for processing purposes shall be in a criticality zone.
4. Liquids - May only be used or stored in crit zones which specifically allow their presence and then only in the quantity approved.

D. Use of Crit Zones for Working Non-Fueled Material

1. An operation may be performed in an established crit zone using only non-fueled material (even though the shape of the workpieces may classify the material as fuel bearing) if the operation cannot be done in accordance with the established crit zone restrictions. The zone may be used as a "Non-Fueled - No Uranium Allowed" zone if the following conditions are met:
 - a. The WANL Nuclear Safety Engineer is informed by the WNCO Laboratory Supervisor of the impending change and agrees that the work cannot be done in conformance with the existing crit zone description and that nuclear safety will be maintained if the proposed change is implemented. A letter shall be sent to the WANL Nuclear Safety Engineer by the WNCO Laboratory Supervisor documenting the agreement for this change.
 - b. The crit zone is purged completely of all uranium bearing material and the area posted "Non-Fueled - No Uranium Allowed."

- c. All material defined in the manual as fuel bearing that is brought into the zone is monitored by a gamma survey meter to clearly show that it does not contain fuel.
- d. Immediately after the operation is finished, the zone is purged of all non-fuel material and the zone reposted with the approved crit zone description.

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ASTRONUCLEAR CORE OPERATIONS

APPROVED CRITICALITY ZONES

Building 6 and Outside Storage Areas

SECTION II

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BUILDING 6 WORK AREAS
(EDSK 333665-E)

BUILDING 6, FIRST FLOOR - CRIT ZONES
(EDSK 333582-J)

BUILDING 6, SECOND FLOOR - CRIT ZONES
(EDSK 333591-D)

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BUILDING 6, INSPECTION AREA - CRIT ZONES
(EDSK 333403-E)

OUTSIDE STORAGE AREAS
(EDSK 333463-B)

WORK AREA G - INTRA-BUILDING TRANSFER

Crit Zone G-1, Panel Truck Mounted Element Tray Carrier

Limit: Five element trays, one tray per cubicle, each containing a maximum of twenty elements.

NOTE 1: Trays containing aluminum tubes may not be stored in the cubicles.

2: The panel truck transporter shall be used in accordance with C.I. No. 31.

3: Wafer trays may be substituted for fuel element trays at a rate of four wafer trays to one fuel element tray.

WORK AREA H - INSPECTION

Crit Zone H-1, Internal Eddy Current

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

Crit Zone H-2, External Eddy Current Test

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

Crit Zone H-3, Inspection and Weighing of Fuel Elements

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

Crit Zone H-4, Continuous E.R.

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

Crit Zone H-5, Internal Beta Backscatter

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

Crit Zone H-6, Leak Test

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

Crit Zone H-7, Gamma Count

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

Crit Zone H-8, In-Process Fuel Element Storage, Individual Cubicles Numbered 2000 Through 2031

Limit: Sixty-four (64) element trays, two trays per cubicle, containing a maximum of twenty fuel elements per tray.

NOTE: Wafer trays may be substituted for element trays at a ratio of 4 to 1.

Crit Zone H-9, Combined X-Ray and Developing Room

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

OR

Two wafer trays containing element wafers. Not more than nine wafers out of a tray at one time.

OR

Two approved five-inch diameter 1/2 gallon containers containing element tips. Not more than nine tips out of a bottle at one time.

NOTE: While preparing development solutions, all fuel material must be removed from this zone.

Crit Zone H-10, P.D.E.

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

Crit Zone H-11, Dimensional Inspection

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

Crit Zone H-12, Dimensional Inspection

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

Crit Zone H-13, Gamma Count

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

Crit Zone H-14, Surface Plate

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

Crit Zone H-15, Optical Comparator and Viewing

Limit: Thirty-two (32) wafer trays, eight trays per cubicle. Not more than two wafer trays out of a cubicle at one time, and not more than nine wafers out of a tray.

AND

Two approved five-inch diameter 1/2 gallon containers containing element tips.
Not more than nine tips out of a bottle at one time.

Crit Zone H-16, Beta Backscatter

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

Crit Zone H-17, Beta Backscatter

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

Crit Zone H-18, Engineering Review Board Inspection

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

Crit Zone H-19, Fuel Element Storage Vault, Individual Cubicles Numbered 2032 Through 2211

Limit: One hundred eighty (180) element trays, one tray per cubicle, each containing a maximum of twenty elements.

NOTE 1: Handling and movement of material within Crit Zone H-19 is accomplished by hand carriage or use of the fuel element transfer cart. Each move in the vault is restricted to two trays containing a maximum of twenty fuel elements per tray.

2: Fuel element storage trays must be fully inserted into each cubicle.

Crit Zone H-20, Beta Backscatter

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

Crit Zone H-21, Internal Beta Backscatter

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

Crit Zone H-22, Air Impedance

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

Crit Zone H-23, Air Leakage

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

Crit Zone H-24, Incremental Leak Test

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

Crit Zone H-25, Inspecting, Weighing, and Loading

Limit: Forty elements dispersed as follows:

- a. Up to twenty fuel elements in approved storage tray on a transfer cart.

AND

Up to twenty elements in approved storage tray and/or placed in a plane array on a table or loading fixture table.

OR

- b. Up to twenty fuel elements in approved storage tray on a transfer cart.

AND

One fuel element storage tray at the weigh station containing a maximum of twenty fuel elements, or a maximum of twenty fuel elements distributed in two trays. Not more than one element permitted out of approved trays at one time.

OR

- c. Up to forty fuel elements in approved storage trays on a transfer cart.

AND

One suitcase (Drawing 976D167 - short, or Drawing 976D212 - long) which will contain a maximum of nineteen elements in shipping tubes or plastic shipping inserts.

OR

(Crit Zone H-25, Continued)

- d. Two fuel element storage trays containing a maximum of twenty fuel elements per tray on the transfer cart.

NOTE: This zone will contain a maximum of 1/2 pint of acetone for cleaning suitcases and aluminum shipping tubes (remove labels and markings).

Crit Zone H-26, Cleaned Aerotec Filter Storage (Individual Cubicles Numbered 300 Through 326)

Limit: Twenty-seven (27) filters, each containing 200 grams or less of machining dust of which not more than 85 grams is contained U-235.

Crit Zone H-28, Vacuum Cleaner Storage

Limit: One approved five-inch diameter 1/2 gallon metal can. The can will be handled according to C.I. No. 9.

Crit Zone H-29, Gamma Counter

Limit: Two elements, both of which may be out of approved fuel element trays or racks.

Crit Zone H-30, Darkroom - POSTING REQUIRED

Limit: Three hundred fifty (350) grams of contained U-235 in any form.

NOTE 1: A maximum of seven gallons of photographic solutions may be stored in this zone at any time (this seven gallons does not include the solutions required for 8 x 10 print processing prescribed in Note 2).

2: In addition to the seven gallons described above, a maximum of fifteen gallons of photographic solutions and water may be used in this zone to process 8 x 10 prints. The fifteen gallons shall be contained in the following equipment:

(Crit Zone H-30, Continued)

- a. Fixer tray - Approximate dimensions are 2-5/8" high x 13-1/2" wide x 16-1/2" long
- b. Developer - Approximate dimensions are 2-5/8" high x 13-1/2" wide x 16-1/2" long
- c. Print washer - Approximate dimensions are 12" high x 14" wide x 20" long.

NOTE 3: The 8 x 10 print processing equipment shall be stored in a closed cupboard when not in use.

- 4: No fuel shall be transferred to or from this room while the 8 x 10 print processing equipment is in use.
- 5: This zone contains a sink with running water. At no time will the sink be stoppered while there is fuel in the zone.

Crit Zone H-31, MULE

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

WORK AREA I - OUTSIDE STORAGE AREA

Crit Zone I-1, Scrap Storage Pad

Limit: Six hundred eighty (680) 55-gallon drums in a single plane array, one drum high by two drums wide with a minimum aisle of 2-1/2 feet between rows, each containing not more than the amount and type of material specified in C.I. No. 2.

NOTE 1: Not more than one approved container is permitted out of a birdcage drum at one time.

2: Four drums (one pallet) may be out of the array within the pad at one time.

3: The pad will be locked when unattended.

Crit Zone I-2, Scrap Storage Pad

Limit: Eight hundred eighty (880) 55-gallon drums in a single plane array, one drum high by two drums wide with a minimum aisle of 2-1/2 feet between rows, each containing not more than the amount and type of material specified in C.I. No. 2.

NOTE 1: Not more than one approved container is permitted out of a birdcage drum at one time.

2: Four drums (one pallet) may be out of the array within the pad at one time.

3: The pad will be locked when unattended.

Crit Zone I-3, Scrap Storage Pad

Limit: Three hundred eighty-four (384) 55-gallon drums in a single plane array, one drum high by two drums wide with a minimum aisle of 2-1/2 feet between rows, each containing not more than the amount and type of material specified in C.I. No. 2.

NOTE 1: Not more than one approved container is permitted out of a birdcage drum at one time.

2: Four drums (one pallet) may be out of the array within the pad at one time.

3: The pad will be locked when unattended.

WORK AREA J - THERMAL OPERATIONS

Crit Zone J-1, "AD" Furnace

Limit: Twelve fuel elements in a plane array on work table or in fuel storage trays on a transfer cart. Fuel elements will be placed into key brazing furnace one at a time.

NOTE: All fuel material must be removed from this crit zone when the furnace cooling system is being serviced.

Crit Zone J-2, "X" Coating Blowdown and Weighing

Limit: Thirty-six (36) elements. Not more than three elements will be out of approved storage trays at one time. Fuel elements may be in the blowdown unit, on the scale or the work bench. Fuel element storage trays will be located on the transfer cart, the work bench, or on the blowdown unit.

NOTE: The dust collection and filter system in this zone has a one-quart plastic bottle which has a safe diameter. The filter may contain a maximum of 350 grams U-235. The bottle and filter are handled according to C.I. No. 1 and 10.

Crit Zone J-3, "AB" Oven

Limit: Thirty-six (36) elements in the oven fixture (Drawing E-M-59188), or in fuel storage trays on transfer carts.

NOTE 1: Elements are to be removed from the oven fixture and/or cart one at a time and then placed in the fixture and/or cart.

2: The cold trap water bath will be drained prior to removing the trap for cleaning per C.I. No. 22.

Crit Zone J-4, "AA" Oven

Limit: Thirty-six (36) elements in the oven fixture (Drawing E-M-59188), or in fuel storage trays on transfer carts.

NOTE 1: Elements are to be removed from the oven fixture and/or cart one at a time and then placed in the fixture and/or cart.

2: The cold trap water bath will be drained prior to removing the trap for cleaning per C.I. No. 22.

Crit Zone J-5, In-Process Fuel Element Storage, Individual Cubicles Numbered 2607 Through 2614

Limit: Sixteen trays, two trays per cubicle, containing a maximum of twenty fuel elements per tray. Fuel elements will be in approved trays and will be separated by either plastic or rubber spacers. A total of eight cubicles.

Crit Zone J-7, "A" Furnace - POSTING REQUIRED

Limit: Nine elements.

OR

One hundred (100) grams of contained U-235 in any form.

NOTE: If the furnace trap is used, it will be cleaned after each run in accordance with C.I. No. 20.

Crit Zone J-8, "B" Furnace - POSTING REQUIRED

Limit: Nine elements.

OR

One hundred (100) grams of contained U-235 in any form.

NOTE: If the furnace trap is used, it will be cleaned after each run in accordance with C.I. No. 20.

Crit Zone J-10, In-Process Fuel Element Storage, Individual Cubicles Numbered 2615 Through 2622

Limit: Sixteen trays, two trays per cubicle, containing a maximum of twenty fuel elements per tray. Fuel elements will be in approved trays and will be separated by either plastic or rubber spacers. A total of eight cubicles.

Crit Zone J-11, Dumbwaiter

Limit: Two trays containing a maximum of twenty fuel elements per tray. Handling and movement of trays will be by dumbwaiter between the first and second floor and either hand carried or moved by fuel element transfer cart between crit zones on the second floor area.

WORK AREA K - FINAL MACHINING AREA

Crit Zone K-1, Planer Mill

Limit: Twenty elements. Not more than nine out of their approved storage trays. Elements may be in machine fixture or fuel storage trays on transfer cart.

NOTE: The dust collection and filter system in this zone has a 1/2 gallon metal can which has a safe diameter. The filter may contain a maximum of 350 grams U-235. The can and the filter are handled according to C.I. No. 1 and 10.

Crit Zone K-2, Surface Plate

Limit: Twenty elements. Not more than nine elements out of the tray at one time on the surface plate.

AND

One wafer tray containing element wafers or samples. The wafer tray will be in an approved location.

AND

Two approved five-inch diameter 1/2-gallon bottles containing samples and waste. Bottles will be in approved locations.

NOTE: The dust collection and filter system in this zone has a 1/2-gallon metal can which has a safe diameter. The filter may contain a maximum of 350 grams U-235. The can and the filter are handled according to C.I. No. 1 and 10.

Crit Zone K-4, Final Machining (Cut-Off)

Limit: Twenty elements. Not more than nine out of their approved storage trays. Elements may be in machine fixture or fuel storage trays on transfer cart.

AND

Two approved five-inch diameter 1/2 gallon bottles containing samples and waste. Bottles will be in approved locations.

AND

One wafer tray containing wafers or samples. The wafer tray will be in an approved location.

NOTE: The dust collection and filter system in this zone has a 1/2 gallon metal can which has a safe diameter. The filter may contain a maximum of 350 grams U-235. The can and the filter are handled according to C.I. No. 1 and 10.

Crit Zone K-5, Final Machining

Limit: Twenty elements. Not more than nine out of their approved storage trays. Elements may be in machine fixture or fuel storage trays on transfer cart.

NOTE: The dust collection and filter system in this zone has a 1/2 gallon metal can which has a safe diameter. The filter may contain a maximum of 350 grams U-235. The can and the filter are handled according to C.I. No. 1 and 10.

Crit Zone K-6, Fuel Element Storage Vault, Individual Cubicles Numbered 2212 Through 2347 and 2377 Through 2546

Limit: Three hundred five (305) element trays, one tray per cubicle, each containing a maximum of twenty elements.

(Crit Zone K-6, Continued)

- NOTE 1: Handling and movement of material within Crit Zone K-6 is accomplished by hand carriage or use of the fuel transfer cart. Each move is restricted to two trays containing a maximum of twenty fuel elements per tray.
- 2: Fuel element storage trays must be fully inserted into the cubicles.

Crit Zone K-7, Sampling

Limit: Twenty elements. Not more than nine out of their approved storage trays. Elements may be in machine fixture or fuel storage trays on transfer cart.

AND

Two approved five-inch diameter 1/2 gallon bottles containing samples and waste. Bottles will be in approved locations.

AND

One wafer tray containing samples or wafers. The wafer tray will be in an approved location.

NOTE: The dust collection and filter system in this zone has a 1/2 gallon metal can which has a safe diameter. The filter may contain a maximum of 350 grams U-235. The can and filter are handled in accordance with C.I. No. 1 and 10.

WORK AREA L - ACCOUNTABILITY

Crit Zone L-1, Drum Storage Area

Limit: Six approved 55-gallon drums in an array one wide by six long and one high, each containing not more than the amount and type of material specified in C.I. No. 2.

NOTE: Not more than one fuel element, one Aerotec filter, or one 5-inch diameter container is allowed out of approved containers within the zone at one time.

Crit Zone L-2, Cleaned Aerotec Filter Storage, Individual Cubicles Numbered 2547 Through 2564

Limit: Eighteen filters, each containing 200 grams or less of machining dust, of which not more than 85 grams is contained U-235.

Crit Zone L-3, In-Process Fuel Element Storage, Individual Cubicles Numbered 2565 Through 2568

Limit: Eight element trays, two trays per cubicle, containing a maximum of twenty fuel elements per tray. Not more than two trays will be permitted out of the cubicles at any one time within the zone. Not more than one element will be permitted out of trays within the zone at any one time.

NOTE: Wafer trays may be substituted for element trays at a ratio of 4 to 1.

Crit Zone L-4, Suitcase Rack

Limit: Two suitcases, each containing a maximum of nineteen fuel elements or equivalent fuel samples in aluminum shipping tubes.

Crit Zone L-5, Hood

Limit: Two approved five-inch diameter one-quart or 1/2 gallon bottles containing process scrap.

OR

One leach filter for Accountability processing.

OR

One leach trap residue for Accountability processing.

OR

One coating run residue for Accountability processing.

OR

One Aerotec filter containing a maximum of 350 grams contained U-235 and one approved five-inch diameter 1/2 gallon container for collecting dust.

OR

Three hundred fifty (350) grams of contained uranium in any form for Accountability processing - POSTING REQUIRED.

OR

One wafer tray containing element wafers and one approved five-inch diameter 1/2 gallon bottle.

OR

One approved five-inch diameter 1/2 gallon container plus one fueled element or the equivalent in pieces in the process of being scrapped.

Crit Zone L-6, Loaded Filter Storage (Aerotec or Leach Filters), Individual Cubicles Numbered 2569 Through 2578

Limit: Ten filters, each containing a maximum of 350 grams contained U-235. Not more than one filter is permitted out of the cubicle within the zone at any one time.

Crit Zone L-7, Process Dust Storage, Individual Compartments Numbered 2579 Through 2606

Limit: One approved five-inch diameter container per compartment shelf containing process dust (28 compartments).

NOTE 1: Not more than two 1-quart containers or one 1/2 gallon container to be out of the compartments at any one time.

2: Only one cask door is to be open at one time.

3: Plastic bottles must be contained within metal shells when stored in the casks.

Crit Zone L-8, Work Bench and Weighing Table

Limit: Two approved containers (five-inch diameter 1/2 gallon containers or wafer trays) with not more than nine pieces out of the container at one time.

OR

Two element trays with not more than twenty elements dispersed between the trays. Not more than nine elements out of approved trays at one time.

OR

One Aerotec filter.

OR

Three hundred fifty (350) grams contained U-235 in any form for Accountability processing - POSTING REQUIRED.

OR

(Crit Zone L-8, Continued)

Four approved five-inch diameter 1/2 gallon containers.

AND

One wafer tray. Not more than nine wafers out of the tray at one time.

NOTE: All containers to be located in an approved manner.

Crit Zone L-9, Drum Storage Area

Limit: Twenty approved fuel scrap drums in two arrays; two drums wide by five long by one high, each containing not more than the type and amount of material specified in C.I. No. 2.

NOTE 1: A maximum of four drums may be out of either array for surveying or decontamination.

2: A maximum of one gallon of decontaminating solution may be in this area at any time.

WORK AREA M - LEACH AND COATING FURNACES

Crit Zone M-1, "L" Furnace

Limit: Thirty-five (35) elements in fixture body Drawing ED-SK-321015-F, Revision 7.

OR

Thirty-five (35) elements in fixture body Drawing ED-SK-321062-F, Revision 1.

OR

Eighteen elements in coating fixture body Drawing ED-SK-332940, Revision 9.

NOTE 1: When coating, the coating trap Drawing ED-SK-320830, Revision 3, or ED-SK-321118, Revision 3 (refrigerated), will be cleaned after each coating run in accordance with C.I. No. 20.

2: The leach furnace trap will be cleaned after each run in accordance with C.I. No. 15 for the water cooled trap, or C.I. No. 15b for the refrigerated cooled trap.

Crit Zone M-2, "M" Furnace

Limit: Thirty-five (35) elements in fixture body Drawing ED-SK-321015-F, Revision 7.

OR

Thirty-five (35) elements in fixture body Drawing ED-SK-321062-F, Revision 1.

OR

Eighteen elements in coating fixture body Drawing ED-SK-332940, Revision 9.

NOTE 1: When coating, the coating trap Drawing ED-SK-320830, Revision 3, or ED-SK-321118, Revision 3 (refrigerated), will be cleaned after each coating run in accordance with C.I. No. 20.

(Crit Zone M-2, Continued)

NOTE 2: The leach furnace trap will be cleaned after each run in accordance with C.I. No. 15 for the water cooled trap, or C.I. No. 15b for the refrigerated cooled trap.

Crit Zone M-3, "S" Furnace

Limit: Thirty-five (35) elements in fixture body Drawing ED-SK-321015-F, Revision 7.

OR

Thirty-five (35) elements in fixture body Drawing ED-SK-321062-F, Revision 1.

OR

Eighteen elements in coating fixture body Drawing ED-SK-332940, Revision 9.

NOTE 1: When coating, the coating trap Drawing ED-SK-320830, Revision 3, or ED-SK-321118, Revision 3 (refrigerated), will be cleaned after each coating run in accordance with C.I. No. 20.

2: The leach furnace trap will be cleaned after each run in accordance with C.I. No. 15 for the water cooled trap, or C.I. No. 15b for the refrigerated cooled trap.

Crit Zone M-4, "T" Furnace

Limit: Thirty-five (35) elements in fixture body Drawing ED-SK-321015-F, Revision 7.

OR

Thirty-five (35) elements in fixture body Drawing ED-SK-321062-F, Revision 1.

OR

(Crit Zone M-4, Continued)

Eighteen elements in coating fixture body Drawing ED-SK-332940, Revision 9.

NOTE: Coating trap ED-SK-320830-F, Revision 3, or ED-SK-321118-F, Revision 3 (refrigerated), will be cleaned after each coating run in accordance with C.I. No. 20.

Crit Zone M-5, "C" Furnace

Limit: Thirty-five (35) elements in fixture body Drawing ED-SK-321015-F, Revision 7.

OR

Thirty-five (35) elements in fixture body Drawing ED-SK-321062-F, Revision 1.

OR

Eighteen elements in coating fixture body Drawing ED-SK-332940, Revision 9.

NOTE: Coating trap ED-SK-320830-F, Revision 3, or ED-SK-321118-F, Revision 3 (refrigerated), will be cleaned after each coating run in accordance with C.I. No. 20.

Crit Zone M-6, "F" Furnace

Limit: Thirty-five (35) elements in fixture body Drawing ED-SK-321015-F, Revision 7.

OR

Thirty-five (35) elements in fixture body Drawing ED-SK-321062-F, Revision 1.

OR

Eighteen elements in coating fixture body Drawing ED-SK-332940, Revision 9.

(Crit Zone M-6, Continued)

NOTE: Coating trap ED-SK-320830-F, Revision 3, or ED-SK-321118-F, Revision 3 (refrigerated), will be cleaned after each coating run in accordance with C.I. No. 20.

Crit Zone M-7, "D" Furnace

Limit: Thirty-five (35) elements in fixture body Drawing ED-SK-321015-F, Revision 7.

OR

Thirty-five (35) elements in the furnace fixture body Drawing ED-SK-321062-F, Revision 1.

NOTE: The leach furnace trap will be cleaned after each run in accordance with C.I. No. 15 for the water cooled trap, or C.I. No. 15b for the refrigerated cooled trap.

Crit Zone M-8, Loading, Unloading, Weighing, and Checking Area

Limit: Maximum of forty elements dispersed between two fuel element storage trays on a transfer cart and one fuel element on the wall rack, and one of the following fixtures:

Thirty-five (35) element fixture body Drawing ED-SK-321015-F, Revision 7.

OR

Thirty-five (35) element fixture body Drawing ED-SK-321062-F, Revision 1.

OR

Eighteen element coating fixture body Drawing ED-SK-332940, Revision 9.

NOTE: Not more than two elements are permitted in transit between the fixture and the trays.

Crit Zone M-9, Weighing Station

Limit: Twenty elements in one tray or dispersed between two trays on a transfer cart.

NOTE: Not more than one element permitted out of approved trays at any one time.

Crit Zone M-10, Hold Area

Limit: Forty elements, in two fuel element storage trays on a transfer cart (twenty elements per tray).

Crit Zone M-11, Bore Cleaning

Limit: Twenty elements dispersed between two fuel element storage trays on a transfer cart.

NOTE 1: Not more than one element permitted out of approved trays at one time.

2: A dust collection and filter system in this zone has a one-quart plastic collection bottle which has a safe diameter. The filter may contain a maximum of 350 grams U-235. The bottle and filter are handled according to C.I. No. 1 and 10.

Crit Zone M-12, Loading, Unloading, Weighing, and Checking Area

Limit: Maximum of forty elements dispersed between two fuel element storage trays on a transfer cart and/or wall rack, and one of the following fixtures:

Thirty-five (35) element fixture body Drawing ED-SK-321015-F, Revision 7.

OR

Thirty-five (35) element fixture body Drawing ED-SK-321062-F, Revision 1.

OR

(Crit Zone M-12, Continued)

Eighteen element coating fixture body Drawing ED-SK-332940, Revision 9.

NOTE: Not more than two elements are permitted in transit between the fixture and the trays.

Crit Zone M-13, Loading, Unloading, Weighing, and Checking Area

Limit: Maximum of forty elements dispersed between two fuel element storage trays on a transfer cart and one fuel element tray on the wall rack, and one of the following fixtures:

Thirty-five (35) element fixture body Drawing ED-SK-321015-F, Revision 7.

OR

Thirty-five (35) element fixture body Drawing ED-SK-321062-F, Revision 1.

OR

Eighteen element coating fixture body Drawing ED-SK-332940, Revision 9.

NOTE: Not more than two elements are permitted in transit between the fixture and trays.

Crit Zone M-14, Loading and Unloading Area

Limit: Maximum of forty elements dispersed between two fuel element storage trays on a transfer cart and one of the following fixtures:

Thirty-five (35) element fixture body Drawing ED-SK-321015-F, Revision 7.

OR

Thirty-five (35) element fixture body Drawing ED-SK-321062-F, Revision 1.

OR

(Crit Zone M-14, Continued)

Eighteen element coating fixture body Drawing ED-SK-332940, Revision 9.

NOTE: Not more than two elements are permitted in transit between the fixture and the trays.

Crit Zone M-15, Low Temperature Oven

Limit: Three trays, 1-1/2 inches high, each tray may contain the residue from one leach trap cleaning operation or a leach trap filter (C.I. No. 15 or 15b).

NOTE: Trays to be in a plane array and placed on one shelf only. Stacking of trays is not permitted.

WORK AREA N - STORAGE AND SHIPPING

Crit Zone N-1, Suitcase Loading Area

Limit: Five suitcases, each containing a maximum of nineteen fuel elements or equivalent fuel samples in aluminum shipping tubes.

Crit Zone N-2, Loading and Unloading Area

Limit: One Oak Ridge ICC 5097 shipping container containing a maximum of 44 fuel elements.

OR

One Oak Ridge DOT Permit No. 5246 shipping container containing a maximum of nine fuel elements.

AND

One fuel element storage tray containing a maximum of twenty elements being loaded into or from the shipping containers.

NOTE: Not more than two elements are permitted out of the tray or shipping container within the zone at any one time.

Crit Zone N-3, Fuel Element Suitcase Storage, Individual Cubicles Numbered 1132 Through 1167

Limit: Thirty-six (36) suitcases each containing a maximum of nineteen fuel elements or equivalent fuel samples in aluminum shipping tubes.

NOTE: In-process suitcases may be stored in open condition.

Grit Zone N-4, Drum Storage Area

Limit: Sixteen approved 55-gallon drums in an array four wide by four long and one high, each containing not more than the amount and type of material specified in C.I. No. 2

- NOTE 1: Oak Ridge ICC 5097 shipping container, containing a maximum of 44 elements, may be stored in this zone at a substitution ratio of one to every three 55-gallon drums.
- 2: Oak Ridge DOT Special Permit 5246 shipping container, containing a maximum of nine elements, may be stored in this zone at a substitution ratio of one to one 55-gallon drum.
- 3: Not more than one fuel element or one approved five-inch diameter container to be out of approved containers in this zone at one time.

Section III
Revision 900-1

ASTRONUCLEAR CORE OPERATIONS

APPROVED CRITICALITY ZONES

BUILDINGS 5, 5A, and 5C

SECTION III

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BUILDING 5, 5A and 5C WORK AREAS (EDSK 333664-E)

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CRIT ZONE DWGS FOR BLDGS 5, 5A & 5C

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F	333315 F

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BUILDING 5 CRIT ZONES
(EDSK 333315-F)

BUILDING 5A & 5C CRIT ZONES
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WORK AREA A - FUEL STORAGE, FUEL ELEMENT VAULT, AND ACCOUNTABILITY CAGE

Crit Zone A-1, Fuel Bead, Process Dust and Hold Sample Storage, Individual Compartments
Numbered 1 through 756

Limit: One approved five-inch diameter container per compartment shelf containing coated fuel particles, process dust, or hold samples (756 compartments).

AND

One approved 55-gallon birdcage drum containing no more than ten kg if contained U-235 as coated fuel particles in unopened vendor containers or approved metal cans or plastic bottles.

NOTE 1: Not more than 2 one-quart containers, one vendor container, or one 1/2 gallon container to be out of the compartments of the birdcage drum within the zone at any one time.

2: Only one cask is to be open at one time.

3: Plastic bottles must be contained within metal shells when stored in the casks.

Crit Zone A-2, Split Bead Storage, Individual Compartments Numbered 757 through 972

Limit: One approved five-inch diameter container per shelf containing coated fuel particles (216 compartments).

NOTE 1: Not more than 2 one-quart containers, one vendor container, or one 1/2 gallon container to be out of the compartments at any one time.

2: Only one cask door is to be open at one time.

3: Plastic bottles must be contained within metal shells when stored in the casks.

Crit Zone A-3, Hood and Weighing Station

Limit: Six kg contained U-235 as coated fuel particles.

NOTE: This material will be split from vendor or approved five-inch diameter containers with a capacity of not more than 1/2 gallon. It will be split into approved five-inch diameter containers with a capacity of not more than one quart. When splitting small samples, the fuel particles may be further split into splitting trays 1-3/4 inches wide by 2-3/4 inches long by 1-1/2 inches high. This material is transferred back into one of the above five-inch diameter containers or into sample vials one inch in diameter by two inches high.

OR

Three hundred fifty (350) grams of contained U-235 in any form for Accountability processing - POSTING REQUIRED.

Crit Zone A-5, Fuel Element Storage Vault, Individual Cubicles Numbered 981 through 1251

Limit: Two hundred seventy-one (271) element trays, one tray per cubicle, each containing a maximum of twenty elements.

NOTE 1: Handling and movement of material within Crit Zone A-5 is accomplished by hand carriage or use of the fuel transfer cart. Each move is restricted to two trays containing a maximum of twenty fuel elements per tray.

2: Fuel element storage trays must be fully inserted into each cubicle.

Crit Zone A-6, Inspection, Sorting, Loading, and Unloading Area

Limit: Forty elements. The elements may be contained in or dispersed between two fuel element trays (twenty elements per tray) on a transfer cart and one fuel element tray on the work table.

OR

(Crit Zone A-6, Continued)

One approved Oak Ridge shipping container; either ICC 5097 shipping container with a capacity of 44 elements or DOT Permit No. 5246 shipping container with a maximum capacity of nine elements.

AND

Two fuel element trays on a transfer cart being loaded or unloaded from or into the shipping container.

AND

One 1/2 gallon metal safety can containing water or a cleaning solvent.

NOTE: Not more than one fuel element permitted out of an approved storage tray or the shipping container at one time.

Crit Zone A-7, Bottle Storage Area

Limit: 1 approved 5-inch diameter container per compartment shelf (28 compartments)

NOTE 1: Not more than one container to be "in transit" in the vault at any one time.

2: Only one cask door is to be open at any one time.

3: Plastic bottles must be contained within metal shells when stored in the casks.

WORK AREA B - POWDER PREPARATION, MIXING, EXTRUSION, AND CURING

Crit Zone B-1, Lab Hood - POSTING REQUIRED

Limit: Two kg of contained U-235 as coated fuel particles in an approved five-inch diameter container.

OR

Two kg of contained U-235 in green mix form in three trays, 1-1/2 inches high, or in a seven-liter can.

NOTE 1: Trays are to be placed in a plane array. Stacking of trays is not permitted.

2: Materials will be handled according to C.I. No. 1 or 6.

Crit Zone B-2, V-Blender Hood No. 1 - POSTING REQUIRED

Limit: Two kg contained U-235 in the blender or in the storage cubicle as coated fuel particles for mixing. The maximum allowable quantity of organic binder is 2.5 liters (maximum container volume).

NOTE 1: The raw materials will be monitored with a survey meter as a procedure to prevent double batching.

2: The eight-quart blender shall be used for batch loading 0 to 900 mg/cc of uranium, and the sixteen-quart blender for batch loading of 0 to 500 mg/cc of uranium. The two-quart blender may be used for non-fueled (0 mg/cc) loadings.

3: The blender to be used will be specified in writing by the Superintendent of Operations or the WNCO Plant Manager. The following combinations of blenders are permitted:

a. Four 8-quart blenders, one each in Crit Zones B-2, B-3, B-4, and B-5.

(Crit Zone B-2, Continued)

- b. Four 16-quart blenders, one each in Crit Zones B-2, B-3, B-4, and B-5.
- c. One 2-quart blender and three 8-quart blenders. Only one blender in each crit zone.
- d. One 2-quart blender and three 16-quart blenders. Only one blender in each crit zone.

Blenders that are not in the hoods shall be removed from the shop and stored. See C.I. No. 1 for specific instructions.

Crit Zone B-3, V-Blender Hood No. 2 - POSTING REQUIRED

Limit: Two kg contained U-235 in the blender or in the storage cubicle as coated fuel particles for mixing. The maximum allowable quantity of organic binder is 2.5 liters (maximum container volume).

- NOTE 1: The raw materials will be monitored with a survey meter as a procedure to prevent double batching.
- 2: The eight-quart blender shall be used for batch loading 0 to 900 mg/cc of uranium, and the sixteen-quart blender for batch loading of 0 to 500 mg/cc of uranium. The two-quart blender may be used for non-fueled (0 mg/cc) loadings.
 - 3: The blender to be used will be specified in writing by the Superintendent of Operations or the WNCO Plant Manager. The following combinations of blenders are permitted:
 - a. Four 8-quart blenders, one each in Crit Zones B-2, B-3, B-4, and B-5.
 - b. Four 16-quart blenders, one each in Crit Zones B-2, B-3, B-4, and B-5.

(Crit Zone B-3, Continued)

- c. One 2-quart blender and three 8-quart blenders. Only one blender in each crit zone.
- d. One 2-quart blender and three 16-quart blenders. Only one blender in each crit zone.

Blenders that are not in the hoods shall be removed from the shop and stored. See C.I. No. 1 for specific instructions.

Crit Zone B-4, V-Blender Hood No. 3 - POSTING REQUIRED

Limit: Two kg contained U-235 in the blender or in the storage cubicle as coated fuel particles for mixing. The maximum allowable quantity of organic binder is 2.5 liters (maximum container volume).

- NOTE 1: The raw materials will be monitored with a survey meter as a procedure to prevent double batching.
- 2: The eight-quart blender shall be used for batch loading 0 to 900 mg/cc of uranium, and the sixteen-quart blender for batch loading of 0 to 500 mg/cc of uranium. The two-quart blender may be used for non-fueled (0 mg/cc) loadings.
 - 3: The blender to be used will be specified in writing by the Superintendent of Operations or the WNCO Plant Manager. The following combinations of blenders are permitted:
 - a. Four 8-quart blenders, one each in Crit Zones B-2, B-3, B-4, and B-5.
 - b. Four 16-quart blenders, one each in Crit Zones B-2, B-3, B-4, and B-5.
 - c. One 2-quart blender and three 8-quart blenders. Only one blender in each crit zone.

(Crit Zone B-4, Continued)

- d. One 2-quart blender and three 16-quart blenders. Only one blender in each crit zone.

Blenders that are not in the hoods shall be removed from the shop and stored. See C.I. No. 1 for specific instructions.

Crit Zone B-5, V-Blender Hood No. 4 - POSTING REQUIRED

Limit: Two kg contained U-235 in the blender or in the storage cubicle as coated fuel particles for mixing. The maximum allowable quantity of organic binder is 2.5 liters (maximum container volume).

NOTE 1: The raw materials will be monitored with a survey meter as a procedure to prevent double batching.

- 2: The eight-quart blender shall be used for batch loading 0 to 900 mg/cc of uranium, and the sixteen-quart blender for batch loading of 0 to 500 mg/cc of uranium. The two-quart blender may be used for non-fueled (0 mg/cc) loadings.
- 3: The blender to be used will be specified in writing by the Superintendent of Operations or the WNCO Plant Manager. The following combinations of blenders are permitted:
 - a. Four 8-quart blenders, one each in Crit Zones B-2, B-3, B-4, and B-5.
 - b. Four 16-quart blenders, one each in Crit Zones B-2, B-3, B-4, and B-5.
 - c. One 2-quart blender and three 8-quart blenders. Only one blender in each crit zone.
 - d. One 2-quart blender and three 16-quart blenders. Only one blender in each crit zone.

Blenders that are not in the hoods shall be removed from the shop and stored. See C.I. No. 1 for specific instructions.

Crit Zone B-6, Lab Hood - POSTING REQUIRED

Limit: Two kg contained U-235 in green mix form in three trays, 1-1/2 inches high, or in a seven-liter can or in a 1/2-gallon plastic bottle.

NOTE 1: Material will be handled according to C.I. No. 6.

2: Trays are to be placed in a plane array. Stacking of trays is not permitted.

Crit Zone B-7, Lab Hood

Limit: Intensifier Bar

1. Three hundred fifty (350) grams U-235 in solution (acetone) held in two 4-inch diameter by 16-inch high containers (EDSK-320615-B) placed in a storage rack.

AND

Limit: Tray Storage - 700 Grams Contained U-235

1. Two trays, 1-1/2 inches high containing acetone from mixing and extrusion cleaning (C.I. No. 5). (Maximum contained U-235 content - 350 grams per tray.)

Trays are to be placed in a plane array. Stacking of trays is not permitted.

Crit Zone B-8, Extrusion Press and Runout Table

Limit: Two kg of U-235 in the form of extrusion mix.

AND

Nine elements on the runout table.

NOTE: One tray, 1-1/2 inches maximum height, is allowed under the extrusion press to retain the non-recycle extrusion trimmings (scrap) generated during extrusion. This material shall be handled in accordance with C.I. No. 6.

Crit Zone B-9, Tilt Fixture and Cure Fixture Storage Rack

Limit: Fifty-four (54) extruded elements. The distribution of elements will not exceed:

1. Nine elements in one tray of the cure fixture located on the tilt fixture. The tilt fixture will be placed in a designated park area within the zone while being loaded or unloaded.
2. Forty-five (45) elements in a cure fixture (long or short). Each cure fixture consists of five trays containing nine elements, or a total of 45 elements per fixture.

Crit Zone B-10, Cure Fixture Storage Rack

Limit: Ninety elements in two cure fixtures, a maximum of 45 elements per fixture.

Crit Zone B-11, Cure Fixture Storage Rack

Limit: Ninety elements in two cure fixtures, a maximum of 45 elements per fixture.

Crit Zone B-12, Refrigerator - POSTING REQUIRED

Limit: Two kg contained U-235 in green mix or extrusion recycle material in approved 1-1/2 inch high trays. No stacking of trays is allowed.

OR

Two kg contained U-235 in one compacted extrusion billet in a seven-liter can contained in a plastic bag.

Crit Zone B-13, Lab Hood, Miscellaneous Operation - POSTING REQUIRED

Limit: Two kg of contained U-235 in green mix form in three trays, 1-1/2 inches high, or in a seven-liter can or in a 1/2-gallon plastic bottle.

OR

Three hundred fifty (350) grams of contained U-235 for any miscellaneous operation.

AND

One 250 ml beaker containing wax.

Crit Zone B-14, Lab Ovens - POSTING REQUIRED

Limit: Three hundred fifty (350) grams of contained uranium in any form.

AND

One-half gallon of water or similar aqueous solution.

Crit Zone B-15, Balance Table

Limit: Two wafer trays containing element samples.

AND

One tray containing element samples.

- NOTE 1: The tray shall be less than 1-1/2 inches high and all of the samples shall be below the top of the tray.
- 2: Not more than nine samples shall be out of the approved containers at any one time.
- 3: One 250 ml beaker of water is allowed in this zone.

Crit Zone B-16, Oven - POSTING REQUIRED

Limit: Two kg contained U-235 in green mix for curing. Material must be stored in approved 1-1/2 inch high pans in an approved array. No stacking of pans is allowed.

OR

Two kg contained U-235 in one compacted extrusion billet in a seven-liter can contained in a plastic bag.

Crit Zone B-17, Hydrolysis Test

Limit: Fifteen elements. Not more than nine elements out of approved fuel element trays or the hydrolysis rig at any one time. A transfer cart is permitted in this zone but must be parked in the specified location.

AND

One gallon of water contained within safe geometry containers or within the hydrolysis rig.

OR

Crit Zone B-17, Cure Furnace (AH Furnace)

Limit: Ninety elements. Two cure fixtures (long or short) separated with a twelve-inch spacer and each fixture containing 45 elements.

Crit Zone B-18, Cure Furnace (AG Furnace)

Limit: Ninety elements. Two cure fixtures (long or short) separated with a twelve-inch spacer and each fixture containing 45 elements.

Crit Zone B-19, Cure Furnace ("N" Furnace)

Limit: Ninety elements. Two cure fixtures (long or short) separated with a twelve-inch spacer and each fixture containing 45 elements.

Crit Zone B-20, Cure Furnace ("G" Furnace)

Limit: Ninety elements. Two cure fixtures (long or short) separated with a twelve-inch spacer and each fixture containing 45 elements.

Crit Zone B-21, Cure Fixture Storage Rack

Limit: Ninety Elements.

1. Ninety elements in cure fixtures. There are two shelves spaced eighteen inches apart in the vertical direction. Each shelf to hold a maximum of 45 elements in long or short cure fixture.

Crit Zone B-22, Cure Fixture Storage Rack

Limit: Ninety elements.

1. Ninety elements in cure fixtures. There are two shelves spaced eighteen inches apart in the vertical direction. Each shelf to hold a maximum of 45 elements in long or short cure fixture.

Crit Zone B-23, Hold Area

Limit: Four element storage trays containing a maximum of twenty fuel elements per tray on two transfer carts. Carts to be parked in designated areas.

Crit Zone B-24, Unloading, Cutting, and Weighing

Limit: Forty-five (45) elements dispersed as follows:

1. Forty-five (45) elements in cure furnace fixture (Drawing 975D784). The fixture (45 elements) may be placed on top of vacuum table or cure fixture rack.
2. Two fuel element storage trays of twenty fuel elements each on a transfer cart.
3. Two fuel element storage trays at weighing station containing a maximum of twenty fuel elements in one tray or a maximum of twenty fuel elements distributed in two trays.
4. Up to twenty elements in fuel storage tray and/or placed in a plane array on the top surface of the vacuum table.

AND

Scrap material in a five-inch diameter by 6-3/4 inch high metal can mounted under the cutoff hood. Not more than one element permitted in the hood at one time. The container will be handled according to C.I. No. 1.

AND

(Crit Zone B-24, Continued)

One wafer tray containing wafers or samples. Not more than three wafers or samples out of the tray at any one time. The wafer tray will be in an approved location.

- NOTE 1: Only one element will be handled at a time in this zone.
- 2: The dust collection and filter system in this zone has a 1/2 gallon metal can which is a safe diameter. The filter may contain a maximum of 350 grams U-235. The can and filter are handled according to C.I. No. 1 and 10.

Crit Zone B-25, Optical Comparator and Viewing

Limit: Two wafer trays containing element wafers. No more than nine wafers out of a tray at one time.

OR

Two approved five-inch diameter 1/2 gallon containers containing element tips. No more than nine tips out of a bottle at one time.

Crit Zone B-26, Hold Area

Limit: Two element storage trays containing a maximum of twenty fuel elements per tray on a transfer cart.

Crit Zone B-27, AC Furnace, Component Joining and Proof Testing

Limit: Twenty fuel elements (not more than nine out of approved storage tray).

AND

One 1/2 gallon bottle containing tips. Not more than nine tips out of the bottle at one time.

AND

(Crit Zone B-27, Continued)

One 1/2 gallon bottle containing a maximum of six braze qualification samples, all of which may be out of the bottle at one time prior to brazing.

AND

One 250 ml beaker containing varcum.

Fuel element storage trays may be located on the work table, proof testing table, or on a transfer cart.

NOTE: All fuel material must be removed from this crit zone when the furnace cooling system is being serviced.

Crit Zone B-29, Dimensional Inspection (Surface Plate)

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

OR

Two 1/2 gallon bottles containing tips. Not more than nine tips out of the bottles at one time.

Crit Zone B-30, Hole Size

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

OR

Two 1/2 gallon bottles containing tips. Not more than nine tips out of the bottles at any time.

Crit Zone B-31, Bead Furnace - POSTING REQUIRED

Limit: Three hundred fifty (350) grams of contained uranium in any form.

Crit Zone B-32, Photography Equipment

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

OR

Twenty elements. Not more than ten elements out of approved fuel element trays or racks when the elements from the trays or racks are placed in the approved holding fixture.

Crit Zone B-33, Fuel Wafer Storage Area

Limit: Thirty-two (32) wafer trays, eight trays per cubicle. Not more than two wafer trays out of a cubicle at one time. Not more than nine wafers out of a tray at one time.

Crit Zone B-34, Bow and Twist Inspection

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

OR

Two 1/2 gallon bottles containing tips. Not more than nine tips out of the bottles at any time.

Crit Zone B-35, Batch Hold Storage

Limit: Sixteen approved seven-liter metal containers, each containing one blended batch with a maximum of two kg of contained U-235.

NOTE: Not more than one container will be out of the storage array at one time.

Crit Zone B-36, Scrapping Hood

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

Crit Zone B-37, Tilting Extrusion Press - POSTING REQUIRED

Limit: Three hundred fifty (350) grams U-235 in any form.

WORK AREA C - MACHINING AREA

Crit Zone C-1, Engraver

Limit: Twenty elements. Not more than nine elements out of approved fuel storage trays. Elements may be in machine fixture or fuel storage trays on transfer cart.

NOTE: The dust collection and filter system in this zone has a one-quart plastic collection bottle which has a safe diameter. The filter may contain a maximum of 350 grams U-235. The bottle and the filter are handled according to C.I. No. 1 and 10.

Crit Zone C-2, Engraver

Limit: Twenty elements. Not more than nine elements out of approved fuel element storage trays. Elements may be in machine fixture or fuel storage trays on transfer cart.

NOTE: The dust collection and filter system in this zone has a one-quart plastic collection bottle which has a safe diameter. The filter may contain a maximum of 350 grams U-235. The bottle and the filter are handled according to C.I. No. 1 and 10.

Crit Zone C-3, Diamond Mill and Surface Plate

Limit: Twenty elements. No more than nine elements out of their approved fuel element storage trays. Elements may be in the machine fixture on the surface plate, or in fuel storage trays on a transfer cart.

NOTE: Two Aerotec dust collection units are located in this crit zone. Each unit has a 1/2 gallon metal collection can which has a safe diameter. The filters may contain a maximum of 350 grams U-235. Only one can of machining dust or one air filter shall be removed and handled at one time. The cans and filters are handled according to C.I. No. 1 and 10.

Crit Zone C-5, Cut-Off

Limit: Twenty Elements. Not more than nine elements out of approved fuel element storage trays. Elements may be in machine fixture or fuel storage trays on transfer cart.

AND

Two approved five-inch diameter 1/2 gallon bottles containing samples and waste. Bottles will be in approved locations.

AND

One wafer tray containing element wafers or samples. The wafer tray will be in an approved location.

NOTE: The dust collection and filter system in this zone has a 1/2 gallon metal can which has a safe diameter. The filter may contain a maximum of 350 grams U-235. The can and the filter are handled according to C.I. No. 1 and 10.

Crit Zone C-6, Undercut Machine

Limit: Twenty elements. Not more than nine elements out of approved fuel element storage trays. Elements may be in the machine fixture or fuel storage trays on transfer cart.

NOTE: The dust collection and filter system in this zone has a one-quart plastic collection bottle which has a safe diameter. The filter may contain a maximum of 350 grams U-235. The bottle and filter are handled according to C.I. No. 1 and 10.

Crit Zone C-7, Dimensional Inspection

Limit: Twenty elements. Not more than nine elements out of approved fuel element storage trays.

AND

Two approved five-inch diameter 1/2 gallon bottles containing samples and waste. Bottles will be in approved locations.

AND

One wafer tray containing wafers or samples. The wafer tray will be in an approved location.

NOTE: The dust collection and filter system in this zone has a 1/2 gallon metal can which has a safe diameter. The filter may contain a maximum of 350 grams U-235. The can and filter are handled according to C.I. No. 1 and 10.

Crit Zone C-8, Stoning

Limit: Twenty elements. Not more than nine elements out of approved fuel element storage trays. Elements may be in machine fixture or fuel storage trays on transfer cart.

NOTE: The dust collection and filter system in this zone has a one-quart plastic collection bottle which has a safe diameter. The filter may contain a maximum of 350 grams U-235. The bottle and filter are handled according to C.I. No. 1 and 10.

Crit Zone C-9, Stoning

Limit: Twenty elements. Not more than nine elements out of approved fuel element storage trays. Elements may be in machine fixture or fuel storage trays on transfer cart.

(Crit Zone C-9, Continued)

NOTE: The dust collection and filter system in this zone has a one-quart plastic collection bottle which has a safe diameter. The filter may contain a maximum of 350 grams U-235. The bottle and filter are handled according to C.I. No. 1 and 10.

Crit Zone C-10, Lathe

Limit: Twenty elements, which may be in the machining fixture or a fuel storage tray on a transfer cart. Not more than nine elements are permitted out of the approved storage tray at any one time.

AND

Two approved five-inch diameter 1/2 gallon bottles containing samples and waste. Bottles will be in approved locations.

AND

One wafer tray containing wafers or samples. The wafer tray will be in an approved location.

NOTE: The dust collection and filter system in this zone has a 1/2 gallon metal can which has a safe diameter. The filter may contain a maximum of 350 grams U-235. The can and filter are handled according to C.I. No. 1 and 10.

Crit Zone C-11, In-Process Fuel Elements Storage, Individual Cubicles Numbered 1577 Through 15932

Limit: Thirty-two (32) element trays, two trays per cubicle, containing a maximum of twenty fuel elements per tray.

NOTE: Wafer trays may be substituted for element trays at a ratio of 4 to 1.

Crit Zone C-12, Lathe

Limit: Twenty elements. Not more than nine out of approved fuel element storage trays. Elements may be in machine fixture or fuel storage trays on transfer cart.

AND

Two approved five-inch diameter 1/2 gallon bottles containing samples and waste. Bottles will be in approved locations.

AND

One wafer tray containing element wafers or samples. The wafer tray will be in an approved location.

NOTE: The dust collection and filter system in this zone has a 1/2 gallon metal can which has a safe diameter. The filter may contain a maximum of 350 grams U-235. The can and filter are handled according to C.I. No. 1 and 10.

Crit Zone C-13, Lathe

Limit: Twenty elements. Not more than nine out of approved fuel element storage trays. Elements may be in machine fixture or fuel storage trays on transfer cart.

AND

Two approved five-inch diameter 1/2 gallon bottles containing samples and waste. Bottles will be in approved locations.

AND

One wafer tray containing element wafers or samples. The wafer tray will be in an approved location.

NOTE: The dust collection and filter system in this zone has a 1/2 gallon metal can which has a safe diameter. The filter may contain a maximum of 350 grams U-235. The can and filter are handled according to C.I. No. 1 and 10.

Crit Zone C-14, Lathe

Limit: Twenty elements. Eighteen elements may be in the two reaming fixtures at one time. Only one element at a time will be in transit between the tray and the reaming fixtures. Elements may be in machine fixture or fuel storage trays on transfer cart.

NOTE: Two Aerotec dust collection units are located in this crit zone. Each unit has a 1/2 gallon metal collection can which has a safe diameter. The filters may contain a maximum of 350 grams U-235. Only one can of machining dust or one filter shall be removed and handled at one time. The cans and filters are handled according to C.I. No. 1 and 10.

Crit Zone C-15, Lathe

Limit: Twenty elements. Not more than nine out of approved fuel element storage trays. Elements may be in machine fixture or fuel storage trays on transfer cart.

AND

Two approved five-inch diameter 1/2 gallon bottles containing samples and waste. Bottles will be in approved locations.

AND

One wafer tray containing element wafers or samples. The wafer tray will be in an approved location.

NOTE: The dust collection and filter system in this zone has a 1/2 gallon metal can which has a safe diameter. The filter may contain a maximum of 350 grams U-235. The can and filter are handled according to C.I. No. 1 and 10.

Crit Zone C-16, Lathe

Limit: Twenty elements. Not more than nine out of approved fuel element storage trays. Elements may be in machine fixture or fuel storage trays on transfer cart.

AND

Two approved five-inch diameter 1/2 gallon bottles containing samples and waste. Bottles will be in approved locations.

AND

One wafer tray containing element wafers or samples. The wafer tray will be in an approved location.

NOTE: The dust collection and filter system in this zone has a 1/2 gallon metal can which has a safe diameter. The filter may contain a maximum of 350 grams U-235. The can and filter are handled according to C.I. No. 1 and 10.

Crit Zone C-17, Milling Machine

Limit: Twenty elements. Not more than nine out of approved fuel element storage trays. Elements may be in machine fixture or fuel storage trays on transfer cart.

NOTE: Machining dust is collected from this machine by a portable vacuum which has a safe diameter 1/2 gallon metal can. The can is handled according to C.I. No. 9.

Crit Zone C-18, Grinder

Limit: Twenty elements. Not more than nine out of approved fuel element storage trays. Elements may be in machine fixture or fuel storage trays on transfer cart.

AND

One wafer tray containing element sections not placed in envelopes.

(Crit Zone C-18, Continued)

NOTE: Machining dust is collected from this machine by a portable vacuum which has a safe diameter 1/2 gallon metal can. The can is handled to C.I. No. 9.

Crit Zone C-19, Broach

Limit: Twenty elements plus twenty element pieces approximately four inches long. The element pieces will be stacked at the end of the tray in line with the fuel elements. Elements may be in the machining fixture or in the fuel storage tray on the transfer cart with not more than a combination of nine elements or pieces out of their approved storage trays.

AND

Two approved five-inch diameter 1/2 gallon bottles containing samples and waste. Bottles will be in approved locations.

AND

One wafer tray containing wafers or samples. The wafer tray will be in an approved location.

NOTE: The dust collection and filter system in this zone has a 1/2 gallon metal can which has a safe diameter. The filter may contain a maximum of 350 grams U-235. The can and filter are handled according to C.I. No. 1 and 10.

Crit Zone C-20, Broach

Limit: Twenty elements plus twenty element pieces approximately four inches long. The element pieces will be stacked at the end of the tray in line with the fuel elements. Elements may be in the machining fixture or in the fuel storage tray on the transfer cart with not more than a combination of nine elements or pieces out of their approved storage trays.

AND

(Crit Zone C-20, Continued)

Two approved five-inch diameter 1/2 gallon bottles containing samples and waste. Bottles will be in approved locations.

AND

One wafer tray containing wafers or samples. The wafer tray will be in an approved location.

NOTE: The dust collection and filter system in this zone has a 1/2 gallon metal can which has a safe diameter. The filter may contain a maximum of 350 grams U-235. The can and the filter are handled according to C.I. No. 1 and 10.

Crit Zone C-21, Weigh, Sample, and Element Review Area

Limit: Twenty elements, including two aluminum tubes containing the equivalent of two elements in the form of samples. Not more than nine elements out of approved fuel element trays.

AND

One wafer tray containing element wafers or samples. The wafer tray will be in an approved location.

AND

Two approved five-inch diameter 1/2 gallon bottles containing samples and waste. Bottles will be in approved locations.

NOTE: The dust collection and filter system in this zone has a 1/2 gallon metal can which has a safe diameter. The filter may contain a maximum of 350 grams U-235. The can and filter are handled according to C.I. No. 1 and 10.

Grit Zone C-22, Slicing Saw

Limit: Twenty elements. Not more than nine elements out of approved fuel element storage trays. Elements may be in the machine fixture or fuel storage trays on a transfer cart.

AND

Two approved five-inch diameter 1/2 gallon bottles containing samples and waste. Bottles will be in approved locations.

AND

One wafer tray containing wafers or samples. The wafer tray will be in an approved location.

NOTE: The dust collection and filter system in this zone has a 1/2 gallon metal can which has a safe diameter. The filter may contain a maximum of 350 grams U-235. The bottle and filter are handled according to C.I. No. 1 and 10.

WORK AREA D - ENGINEERING DEVELOPMENT AREA

Crit Zone D-1, Sample Preparation Room - POSTING REQUIRED

Limit: Three hundred fifty (350) grams contained U-235 in any form. The use of water and other aqueous solutions is permitted in this room.

Crit Zone D-4, Hydrolysis Rig

Limit: Nine fuel elements, all of which may be out of an approved storage tray.

AND

Two thousand (2000) ml of water or similar aqueous solution.

Crit Zone D-5, Metallograph

Limit: Twenty elements. Not more than nine elements out of approved fuel element trays or racks.

OR

Two 1/2 gallon bottles containing samples. Not more than nine samples out of the bottles at any time.

WORK AREA E - ACCOUNTABILITY

Crit Zone E-1, Drum Storage Area

Limit: Eighteen approved 55 gallon drums in an array three drums wide by six drums long, one high, each containing not more than the amount and type of material specified in C.I. No. 2.

NOTE 1: Oak Ridge ICC 5097 shipping container, containing 44 elements, may be stored in this zone at a substitution ratio of one to every three 55 gallon drums.

2: Oak Ridge DOT Special Permit 5246 shipping container, containing nine elements, may be stored in this zone at substitution ratio of one to one 55 gallon drum.

3: Not more than one fuel element, one Aerotec filter, or one 5-inch diameter container is allowed out of approved containers within the zone at one time.

Crit Zone E-2, Loading, Unloading, and Weighing Zone

Limit: One approved five-inch diameter container containing fuel scrap or fuel beads.

OR

Twenty fuel elements in an approved element tray on the work bench.

AND

Three approved 55 gallon drums in an array one drum wide by three drums long, one high, each containing not more than the amount and type of material specified in C.I. No. 2.

(Crit Zone E-2, Continued)

- NOTE 1: Oak Ridge ICC 5097 shipping container, containing 44 elements, may be stored in this zone at a substitution ratio of one to every three 55 gallon drums.
- 2: Oak Ridge DOT Special Permit 5246 shipping container, containing nine elements, may be stored in this zone at a substitution ratio of one to one 55 gallon drum.
- 3: Not more than one fuel element, one Aerotec filter, or one 5-inch diameter container is allowed out of approved containers within the zone at one time.

Crit Zone E-3, Drum Storage Area

Limit: Fourteen approved 55 gallon drums in an array two drums wide by seven drums long, one high, each containing not more than the amount and type of material specified in C.I. No. 2.

- NOTE 1: Oak Ridge ICC 5097 shipping container, containing 44 elements, may be stored in this zone at a substitution ration of one to every three 55 gallon drums.
- 2: Oak Ridge DOT Special Permit 5246 shipping container, containing nine elements, may be stored in this zone at a substitution ratio of one to one 55 gallon drum.
- 3: Not more than one fuel element, one Aerotec filter, or one 5-inch diameter container is allowed out of approved containers within the zone at one time.

Crit Zone E-4, Fuel Bead, Process Dust, and Hold Sample Storage. Individual Compartments Numbered 1602 Through 1816

Limit: One approved five-inch diameter container per compartment shelf containing coated fuel particles, process dust, or hold samples (215 compartments).

(Crit Zone E-4, Continued)

- NOTE 1: Not more than two 1-quart containers, one vendor container, or one 1/2 gallon container to be out of the compartments at any one time.
- 2: Only one cask door is to be open at one time.
- 3: Plastic bottles must be contained within metal shells when stored in the casks.

Crit Zone E-5, Fuel Element Suitcase Storage. Individual Cubicles Numbered 1817 Through 1864

Limit: Forty-eight (48) suitcases, each containing a maximum of nineteen elements or aluminum tubes containing element sections.

- NOTE 1: Not more than one suitcase is permitted out of the array within the zone at any one time.
- 2: Not more than one element or one tube of sections is permitted out of a suitcase at any one time within the zone.
- 3: Handling and movement of material is accomplished by hand carriage or use of the fuel transfer cart. Each move is restricted to two trays containing twenty fuel elements per tray.

Crit Zone E-6, Work Table

Limit: Two approved containers (five-inch diameter 1/2 gallon containers or wafer trays) with not more than nine pieces out of the containers at one time.

OR

Two element trays with not more than twenty elements dispersed between the trays. Not more than nine elements out of approved trays at one time.

OR

(Crit Zone E-6, Continued)

One Aerotec Filter.

OR

Four approved five-inch diameter 1/2 gallon containers.

AND

One wafer tray. Not more than nine wafers out of the tray at one time.

NOTE: All containers to be located in an approved manner.

Crit Zone E-7, Drum Storage Area

Limit: Ten approved 55 gallon drums in an array one drum wide by ten drums long, one high, each containing not more than the amount and type of material specified in C.I. No. 2.

NOTE 1: Oak Ridge ICC 5097 shipping container, containing 44 elements, may be stored in this zone at a substitution ratio of one to every three 55 gallon drums.

2: Oak Ridge DOT Special Permit 5246 shipping container, containing nine elements, may be stored in this zone at a substitution ratio of one to one 55 gallon drum.

3: Not more than one fuel element, one Aerotec filter, or one 5-inch diameter container is allowed out of approved containers within the zone at one time.

Crit Zone E-8, Hood

Limit: Two approved five-inch diameter one quart or 1/2 gallon bottles of process scrap.

OR

One Aerotec filter containing a maximum of 350 grams contained U-235.

OR

Three hundred fifty (350) grams of contained uranium in any form for Accountability processing - POSTING REQUIRED.

OR

One wafer tray containing element wafers and one approved five-inch diameter 1/2 gallon bottle.

OR

One approved five-inch diameter 1/2 gallon container, plus one fuel element in the process of being scrapped.

Crit Zone E-9, Bead Retainer Sample Storage

Limit: Four hundred eighty (480) bead retainer vials, each containing a maximum of fifty grams of container U-235. Not more than two bead retainer vials to be out of trays within the zone at any one time.

Crit Zone E-10, Riffle Splitting Glove Box - POSTING REQUIRED

Limit: Three hundred fifty (350) grams of contained U-235 in any form.

Crit Zone E-11, Hold Area

Limit: Two element storage trays containing a maximum of twenty fuel elements per tray on a transfer cart. Not more than nine elements out of approved fuel element trays.

Crit Zone E-12, Hood

Limit: Two approved five-inch diameter one quart or 1/2 gallon bottles of process scrap.

OR

One Aerotec filter containing a maximum of 350 grams contained U-235.

OR

Three hundred fifty (350) grams of contained uranium in any form for Accountability processing - POSTING REQUIRED.

OR

One wafer tray containing element wafers and one approved five-inch diameter 1/2 gallon bottle.

OR

One approved five-inch diameter 1/2 gallon container, plus one fuel element in the process of being scrapped.

Crit Zone E-13, Process Dust Storage, Individual Compartments Numbered 1865 Through 1892

Limit: One approved five-inch diameter container per compartment shelf containing process dust (28 compartments).

NOTE 1: Not more than two 1 quart containers or one 1/2 gallon container to be out of the compartments at any one time.

2: Only one cask door is to be open at one time.

3: Plastic bottles must be contained within metal shells when stored in the casks.

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Crit Zone E-14, Weighing Table and Desk

Limit: One approved five-inch diameter one quart or 1/2 gallon container containing fuel scrap or fuel particles.

OR

One Aerotec filter containing a maximum of 350 grams contained U-235.

OR

Three hundred fifty (350) contained U-235 in any form for Accountability processing - POSTING REQUIRED.

Crit Zone E-15, Process Scrap Crusher and Pulverizer - POSTING REQUIRED

Limit: One thousand (1,000) grams of contained U-235 distributed in and between the following containers:

1. One approved five-inch diameter 1/2 gallon polyethylene scrap processing bottle.

AND

2. Two approved five-inch diameter 1/2 gallon polyethylene recovery processing bottles in an approved "safe distance" container.

NOTE: The dust collection and filter system in this zone has a 1/2 gallon metal can which is a safe diameter. The filter may contain a maximum of 350 grams of U-235. The can and the filter are handled according to C.I. No. 1 and 10.

Crit Zone E-16, Process Scrap Sampler - POSTING REQUIRED

Limit: Three thousand five hundred (3,500) grams of contained U-235 distributed in and between the following containers:

1. One approved five-inch diameter 1/2 gallon bottle containing no more than 1,000 grams U-235.

AND

2. One 80 cubic inch scrap sample tray (6 inches long by 4-1/4 inches wide by 4-3/4 inches high) containing no more than 350 grams of U-235.

AND

3. One approved five-inch diameter 2.2 gallon polyethylene scrap storage bottle containing no more than 3,500 grams of U-235.

Crit Zone E-18, "Chipmunk Crusher" - POSTING REQUIRED

Limit: One thousand (1,000) grams contained U-235 dispersed as follows:

One approved five-inch diameter 1/2 gallon container.

AND

One fuel element or equivalent element section in a shipping tube.

AND

One approved five-inch diameter 1/2 gallon container for catching the crushed scrap.

NOTE 1: The bottle full of crushed scrap will be removed from the crit zone prior to the start of refilling the next bottle.

(Crit Zone E-18, Continued)

NOTE 2: The dust collection and filter system in this zone has a 1/2 gallon metal can which has a safe diameter. The filter may contain a maximum of 350 grams U-235. The can and the filter are handled according to C.I. No. 1 and 10.

Crit Zone E-19, Work Table

Limit: Two approved containers (five-inch diameter 1/2 gallon containers or wafer trays) with not more than nine pieces out of the containers at one time.

OR

Two element trays with not more than twenty elements dispersed between the trays. Not more than nine elements out of approved trays at one time.

OR

One Aerotec filter.

OR

Four approved five-inch diameter 1/2 gallon containers.

AND

One wafer tray. Not more than nine wafers out of the tray at one time.

NOTE: All containers to be located in an approved manner.

Crit Zone E-20, Vacuum Cleaner Storage

Limit: One approved five-inch diameter 1/2 gallon metal can. The can will be handled according to C.I. No. 9.

Crit Zone E-21, Loaded Aerotec Filter Storage, Individual Cubicles Numbered 1893 Through 1902

Limit: Ten filters, each containing a maximum of 350 grams contained U-235. Not more than one filter is permitted out of the cubicles within the zone at any one time.

Crit Zone E-22, Filter Shaking Hood

Limit: One Aerotec filter containing a maximum of 350 grams contained U-235, and one approved five-inch diameter 1/2 gallon container for collecting dust.

Crit Zone E-23, Cleaned Aerotec Filter Storage, Individual Cubicles Numbered 1903 Through 1938

Limit: Thirty-six (36) filters, each containing 200 grams or less of machining dust, of which not more than 85 grams is contained U-235.

Crit Zone E-24, In-Process Fuel Element Storage, Individual Cubicles Numbered 1939 Through 1946

Limit: Sixteen element trays, two trays per cubicle, containing a maximum of twenty fuel elements per tray. Not more than two trays will be permitted out of the cubicles at any one time within the zone. Not more than one element will be permitted out of trays within the zone at any one time.

NOTE: Wafer trays may be substituted for element trays at a ratio of 4 to 1.

Crit Zone E-25, Dust Sample Retainer Storage

Limit: Five hundred ten (510) dust retainer bottles, 170 per cabinet, each containing a maximum of thirty grams contained U-235. Not more than two dust retainer bottles are permitted out of the trays within the zone at any one time.

Crit Zone E-26, Drum Survey Area

Limit: Twenty 55 gallon ICC-Spec. 17H drums, each containing a maximum of 350 grams of contained U-235.

Crit Zone E-27, Shipping Container Storage Area

Limit: Ten approved fuel element or scrap containers in a "one-high" array. The containers may be in any desired combination provided all containers are within the crit zone boundaries.

The following containers are permitted in this zone:

- a) DOT-SP-5246 (nine-element container)
- b) DOT-SP-5097 (44-element container)
- c) DOT-6L scrap drum
- d) B of E 1489 scrap drum
- e) DOT 17 H scrap drum (blue waste drum).

AND

One 1/2 gallon metal safety can containing water or a cleaning solvent.

WORK AREA F - FURNACE AREA

Crit Zone F-1, Retort Storage

Limit: Ninety elements in an approved bake furnace fixture (Drawing 928F158, Rev. 2).

Crit Zone F-2, Bake Furnace

Limit: Ninety elements in an approved bake furnace fixture (Drawing 928F158, Rev. 2).

Crit Zone F-3, Bake Furnace

Limit: Ninety elements in an approved bake furnace fixture (Drawing 928F158, Rev. 2).

Crit Zone F-4, Retort Storage

Limit: Ninety elements in an approved bake furnace fixture (Drawing 928F158, Rev. 2).

Crit Zone F-5, Fixture Loading and Unloading and Miscellaneous Operations

Limit: Ninety elements dispersed as follows:

1. Ninety elements in bake fixture (Drawing 928F158, Rev. 2).

OR

2. Two element storage trays of twenty fuel elements each on transfer carts with the balance remaining in the bake fixture.

OR

3. Two element storage trays at weighing station containing a maximum of twenty fuel elements in one tray, or a maximum of twenty fuel elements distributed in two trays with the balance remaining in the bake fixture.

OR

(Crit Zone F-5, Continued)

4. Up to twenty elements in fuel element storage tray and/or placed in a plane array on the top surface of the table with the balance remaining in the bake fixture.

NOTE: The dust collection and filter system in this zone has a one quart plastic bottle which has a safe diameter. The filter may contain a maximum of 350 grams U-235. The bottle and filter are handled according to C.I. No. 1 and 10.

Crit Zone F-6, Hold Area

Limit: Ninety elements in a bake fixture (Drawing 928F158, Rev. 2).

Crit Zone F-7, In-Process Fuel Element Storage, Individual Cubicles Numbered 1594 Through 1597

Limit: Eight element trays, two trays per cubicle, containing a maximum of twenty fuel elements per tray.

Crit Zone F-8, In-Process Fuel Element Storage, Individual Cubicles Numbered 1598 Through 1601

Limit: Eight element trays, two trays per cubicle, containing a maximum of twenty fuel elements per tray.

Crit Zone F-9, Hold Area

Limit: Four element trays, two trays per cart, containing a maximum of twenty fuel elements per tray. A total of eighty elements. Carts to be parked in designated areas.

Crit Zone F-10, Hold Area

Limit: Four element trays, two trays per cart, containing a maximum of twenty fuel elements per tray. A total of eighty elements. Carts to be parked in designated areas.

Crit Zone F-11, "E" Furnace (Graphitizing)

Limit: Thirty-five (35) elements in an approved furnace fixture (Drawing 957D703, Rev. 4), or in fuel storage trays on transfer carts. Fuel storage trays will be in the zone only during loading or unloading the furnace.

Crit Zone F-12, "EA" Furnace (Graphitizing)

Limit: Ninety fuel elements in the furnace fixture (Drawing EDSK-321114-F, Rev. 5), or a maximum of forty fuel elements in two fuel storage trays on the transfer cart. Fuel storage trays will be in the zone only during loading or unloading the furnace.

Crit Zone F-13, Hold Area

Limit: Six element trays, two trays per cart, containing a maximum of twenty fuel elements per tray. Total of 120 fuel elements. Carts to be parked at designated areas.

Section IV
Revision 900-1

ASTRONUCLEAR CORE OPERATIONS
APPROVED CRITICALITY INSTRUCTIONS

SECTION IV

SECTION IV

<u>Number</u>	<u>Description</u>
C. I. No. 1	Physical Movement of Fuel and Fuel Bearing Materials
C. I. No. 2	Approved Containers
C. I. No. 3	Transfer of Fuel Elements
C. I. No. 5	Processing of Solvent Residues Generated During Cleaning of Mixing, Chopping, and Extrusion Tooling
C. I. No. 6	Handling of Green Recycle Material and Dry Scrap
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C. I. No. 20	Processing of Coating Furnace Residues
C. I. No. 22	Processing of "AA" and "AB" Furnace Residues
C. I. No. 23	Flushing of Coating and Leach Furnace Exhaust Stacks
C. I. No. 30	Processing of Low-Level Scrap and Waste
C. I. No. 31	Intra-Building Transportation of Fuel Elements
C. I. No. 32	Scrubbing of Shop Floors - Building 5
C. I. No. 33	Handling of Liquids

PHYSICAL MOVEMENT OF FUEL AND FUEL BEARING MATERIALS

1.0 Scope

- 1.1 This instruction covers the movement of fuel and fuel bearing materials in the various WNCO areas.

2.0 General

- 2.1 Special instructions and procedures for the release of fuel particles from the split bead storage area to the "V" blenders work area.
- 2.2 Standard procedures covering transfer of fuel material between criticality zones and the posting of such transfers.
- 2.3 Methods used for physical transfer of fuel particles and fuel bearing materials.

3.0 Fuel Particle Release and Mixing

- 3.1 The blender size, two-quart, eight-quart, or sixteen-quart, for the intended mixing will be specified in writing by the Superintendent of Operations or the WNCO Plant Manager. Eight-quart blenders shall be used for batch loading 0 to 900 mg/cc of uranium. Sixteen-quart blenders shall be used for batch loading 0 to 500 mg/cc of uranium. Two-quart blenders shall be used for non-fueled extrusions only. The blenders specified will be placed in the blending hoods and the other size blenders placed in storage boxes, Drawing EDSK - 333471C, and removed from the area. Only one size blender, either eight-quart or sixteen-quart, will be in any of the four blending hoods at one time, except that one hood may contain the two-quart blender while using the larger blenders in the other hoods.
- 3.2 Before bringing any new materials into Crit Zones B-2, B-3, B-4, or B-5 ("V" blender hoods), the Operations technician will check the hood proper, the blender, and the varcum dispenser in these areas to assure that the equipment is empty and does not contain more than trace residues from the previous batch.

- 3.3 The Operations technician will transfer the pre-weighed dry carbon ingredients and pre-weighed varcum for the next extrusion batch from the materials preparation room to the storage shelf located above the "V" blenders in Crit Zones B-2, B-3, B-4, or B-5.
- 3.4 The Accountability Clerk will be notified by the Operations technician to transfer fuel particles to the weighing hood (Crit Zone B-1). Before the transfer is made, the Accountability Clerk will check to determine that the "V" blender hoods (Crit Zones B-2, B-3, B-4, or B-5) and the weighing hood (Crit Zone B-1) do not contain any fuel material from the previous extrusion batch. This will include a visual inspection of the "V" blenders and the varcum dispenser as well as a survey of the dry carbon ingredients on the shelf with a portable gamma survey meter. When the survey is complete and conditions satisfied, the Laboratory Supervisor will be notified and requested to sign the fuel particle transfer sheet for the release of the next batch of fuel. The fuel particles will then be transferred by the Accountability Clerk from the split bead storage area to the weighing hood (Crit Zone B-1). The Accountability Clerk will then initial the fuel particle transfer sheet.
- 3.5 The Operations technician will check-weigh the beads in the weighing hood (Crit Zone B-1) and will then charge the dry carbon ingredients and fuel particles into the "V" blender and initiate the dry blending cycle.

Note: The "V" blenders are not to be left unattended with the lids off unless completely empty. Also, never make additions to the blenders until it has been ascertained that the materials to be added are part of the intended batch.

4.0 Standard Procedures Covering Transfer of Fuel Materials Between Criticality Zones

- 4.1 Before the fuel material is moved into a crit zone, the employee will:
- 4.1.1 Determine from the crit zone limit the amount of uranium or quantity of fuel elements allowed in the crit zone.

- 4. 1. 2 Determine the amount of uranium or quantity of fuel elements presently in the zone by a physical check.
- 4. 1. 3 Determine that the addition of the proposed fuel movement will not exceed the limits for this crit zone.
- 4. 1. 4 If the present quantity and the proposed movement does not exceed the crit zone limit, the employe may proceed with the fuel movement.

Note: Certain crit zones with mass limits require the amount of contained U-235 in the zone be posted. In POSTING REQUIRED zones, the amount of uranium in the zone will be determined from the posting card and verified by a physical check prior to the fuel movement. The posting card will be changed to show the new crit zone content. If there is no material in the zone, it shall be posted in a manner that clearly indicates it is empty.

5.0 The Following Methods Will Be Used for the Physical Transfer of Fuel Particles and Fuel Bearing Materials

- 5. 1 Fuel elements in storage trays will be moved either one tray at a time (maximum of 20 elements) by hand carrying, or two trays at a time (maximum of 40 elements) through the use of the approved fuel transfer cart. Single elements (one only) may be hand carried without being placed in a handling or storage device.
- 5. 2 Furnace fixtures containing fuel will be moved with the appropriate transfer fixture.
- 5. 3 Wet mix fuel material is transferred between crit zones in a plastic bag, sample bottles, or approved metal cans or trays for storage. When in a plastic bag, the bag will be inserted in an approved metal can.
- 5. 4 Extrusion billets are hand carried.

- 5.5 Fuel beads and finely divided fuel bearing materials are hand carried in closed plastic or metal containers.
- 5.6 Effort should be exercised when movements pass in approved aisles to keep the maximum distance between the containers being moved.
- 5.7 No material in transit is to be left unattended in an aisle.

APPROVED CONTAINERS

1.0 Scope

- 1.1 This instruction describes containers approved for fuel or fuel bearing material at WNCO.

2.0 General

- 2.1 Strict compliance to containment of fuel or fuel bearing materials will be enforced to ensure criticality and accountability procedures are not violated.
- 2.2 Material identification and content weight shall be affixed to the container or must be readily available.

3.0 Approved Containers

- 3.1 Fuel beads may be stored in the following containers in accordance with limits prescribed in Crit Zones:
- 3.1.1 Single metal or plastic containers five inches or less in diameter. Plastic bottles containing fuel beads may be stored in the storage casks (drawing WT-500188) providing the bottle is contained in a metal shell.
- 3.2 Process scrap may be stored in the following containers within limits specified. These containers are referred to in the manual as "5-inch" diameter containers.
- 3.2.1 Plastic one-quart bottle, 4-5/8 inches in diameter and 4-3/4 inches high. Limited to 500 grams of contained U-235.
- 3.2.2 Plastic one-half gallon bottle, 4-5/8 inches in diameter and 9 inches high. Limited to 1000 grams of contained U-235.
- 3.2.3 Plastic 2.2 gallon bottle, 4-7/8 inches in diameter and 31-5/8 inches high. Limited to 3500 grams contained U-235.
- 3.3 The fuel element storage tray (drawing EDSK 307915-C) is an aluminum container with inside dimensions of 4-3/4 inches wide, 62 inches long, and 3-9/16 inches deep. The tray will hold and is limited to:

- a) Five fuel elements in a row, four rows high (total of twenty elements with each row of five elements separated by either three rectangular 3/16 inch thick plastic spacers or three rectangular closed cell foam rubber spacers (2-3/4 x 4-7/8 inches).

OR

- b) Four fuel elements in a row, four rows high (total of sixteen elements) separated by full length closed cell rubber cushions (drawing EDSK-333027-D).

Each end of the tray has a 1/2-inch thick closed cell rubber pad. Drain holes are provided in the bottom and sides of the trays. Use of the aluminum lid on the storage tray is optional except when the tray is used to transport elements between buildings at the Cheswick Site. When the tray is used in the transporter, the lid must be taped to the tray as specified in Criticality Instruction No. 31.

- 3.4 The fuel element storage tray transfer cart (drawing NT-500047, Revision C) will hold two trays of fuel elements on top of the cart with 5.6 inches edge to edge spacing of trays. Some transfer carts have been modified in accordance with drawing WT-500239.
- 3.5 The wafer storage tray is an aluminum container with inside dimensions of 4-3/4 inches wide, 15-1/2 inches long and 3-9/16 inches deep. The tray is used to hold element wafers or samples in envelopes. Drain holes are provided in the bottom and sides of the tray. This tray may be stored in the In Process storage bins at a substitution ratio of 4 wafer trays to one fuel element tray. Wafer trays will not be stored in the vaults.
- 3.6 Trays used for storage of green mix and certain waste residues must not exceed a maximum depth of 1-1/2 inches.

- 3.7 Collection containers on dust collection and filter system or on portable vacuums may be:
- 3.7.1 One-half gallon stainless steel can, five inches O.D. by 6-3/4 inches high with a limit of 1000 grams of contained U-235.
 - 3.7.2 One quart plastic bottle, 4-5/8 inches O.D. by 4-3/4 inches high with a limit of 500 grams of contained U-235.
- 3.8 Blended batches or re-cycle green mix containing not more than 2 Kg of contained U-235 may be stored in certain hoods or the refrigerator in a safe volume 7-liter metal can.
- 3.9 55-gallon birdcage drums used to store and ship fuel and process scrap are:
- 3.9.1 DOT 6L Drum (with a five-inch internal pipe). Any combination of quarts or half gallon containers may be placed in the pipe provided they do not project above the top of the pipe.

Note: Mounted metallography samples, leach waste or leach filters may not be placed in DOT 6L drums.
 - 3.9.2 Birdcage drums may contain:
 - 3.9.2.1 3500 grams contained U-235 per drum as NERVA fuel element scrap resulting from machining, sampling and rejected or damaged fuel elements.
 - 3.9.2.2 3500 grams contained U-235 per drum as green (cured) fuel mixture.
 - 3.9.2.3 10 kg contained U-235 per drum in the form of fuel particles.
 - 3.9.2.4 3500 grams of contained U-235 per drum in the form of mixed U-235 and fuel particles.

3.9.2.5 3500 grams of contained U-235 per drum in the form of element sections in polyethylene sleeves.

- 3.10 Fuel particles are received in vendor 55-gallon birdcage type drums.
- 3.11 Combustible waste and low level contaminated uranium waste is stored and shipped in 55-gallon ICC 17-E drums. This drum is limited to 350 grams of contained U-235 and handled in accordance with C. I. No. 30.
- 3.12 Fuel elements or sections of fuel elements are shipped in suitcase containers, drawing 976D212-Long or drawing 976D167-Short. Nineteen elements in shipping tubes or twelve or fourteen elements in a molded plastic insert assembly.
- 3.13 The Oak Ridge fuel element shipping container, DOT Special Permit No. 5246 may be used to ship 9 elements with fuel loadings not exceeding 900 mg/cc.
- 3.14 The Oak Ridge fuel element shipping container, DOT-SP-5097, may be used to ship 44 elements with fuel loadings not exceeding 900 mg/cc.
- 3.15 Uranium containing samples are stored in vials not exceeding 2 inches by 2 inches square by 4 inches high. The loaded vials are stored in the containers defined in 3.2.1 and 3.2.2, or in a special rack designed for their retention.
- 3.16 Bead sample vials one inch in diameter by two inches high containing a maximum of 50 grams of contained U-235 are stored in the containers defined in 3.2.1 and 3.2.2, or in a special rack designed for their retention.
- 3.17 Fuel element sections, two inches or less in length, may be placed in vials one inch in diameter and two inches long and stored in the containers defined in 3.2.1 and 3.2.2.

TRANSFER OF FUEL ELEMENTS

1.0 Scope

- 1.1 This instruction is to ensure that movement of fuel elements to or from WNCO is within the approved loading limit.

2.0 General

- 2.1 High loaded elements are defined as those with loadings greater than 500 mg U/cc and less than 900 mg U/cc. High loaded elements may be transferred to any material balance area except Reactor Assembly or WANEF. Fuel elements of load codes 39 through 99 and 11 through 27 contain loadings less than 500 mg U/cc. All elements with less than 500 mg U/cc may be transferred to any material balance area without exception.
- 2.2 This instruction supplements existing Shipping and Receiving procedures in the SS Accountability Procedures Manual.
- 2.3 Only approved containers will be used for transferring material.

3.0 Incoming Shipments

- 3.1 Accountability personnel will review the paperwork accompanying the shipment and will verify that the loading for each element is within limit specified in 2.1 and can be received at WNCO.
- 3.2 Verification will be documented on the attached form.

4.0 Outgoing Shipments

- 4.1 Accountability personnel will review the paperwork to accompany the shipment and will verify that the loading for each element is within limit specified in 2.1 and can be shipped to the Material Balance Area designated.
- 4.2 Verification will be documented on the attached form.

Prepare in duplicate. Original to Accountability; copy to Operations.

SHIPMENT REVIEW

Date _____

Material Transfer Ticket No. _____

Container Number _____

Incoming ☐ from _____

Outgoing ☐ to _____

I certify that the paperwork accompanying this shipment has been reviewed and according to the listed loading for each element, the shipment may be received at _____
_____ (designate MBA, i.e., WNCO, WANL, Shipping and Receiving, etc.).

Signed: _____
Accountability

Incoming Shipments Only:

Shipment accepted by Operations.

Signed: _____
Operations Foreman

PROCESSING OF SOLVENT RESIDUES GENERATED DURING
CLEANING OF MIXING, CHOPPING, AND EXTRUSION TOOLING

1.0 Scope

- 1.1 This instruction covers the handling of fuel bearing solvents generated during the cleaning of mixing, chopping, and extrusion tooling.

2.0 General

- 2.1 This procedure shall be performed on each piece of equipment immediately after the last batch of the day has been passed through final extrusion.
- 2.2 Technicians shall not transport more than one pan or container at one time during any of the transfer procedures cited in this instruction.
- 2.3 Intensifier bar containers or graduated cylinders shall be filled with acetone by taking them one at a time to the oil drum storage area and not by transporting acetone into the work area.

3.0 Cleaning of Tooling (Technicians)

- 3.1 After the last mixing charge of the day has been "dumped," the intensifier bar from each mixer used shall be thoroughly cleaned and then immersed in acetone in approved containers (4-inch diameter by 16 inches high per EDSK-320615-B), and covers shall be placed on the containers.
- 3.1.1 The containers containing acetone shall be stored in Crit Zone B-7 in approved holding brackets per EDSK-320616-C.
- 3.1.2 At one week intervals as denoted by the date affixed to the outside of the container, the contents of each shall be transferred to a 1-1/2 inch high tray. Each tray shall be lined with a pre-weighed layer of aluminum foil. (Note: If a change in loading or fuel type is made between weekly cleanings, this procedure shall be accomplished prior to the change.)
- 3.1.3 The tray shall be placed in an approved array one layer high in the Crit Zone B-7 hood.

3. 1. 4 After the solvent has evaporated, a pre-weighed 4-5/8 inch O. D.
x 4-3/4 inch or 9-inch high polyethylene bottle bearing the following
information shall be obtained from the Accountability Clerk:
 3. 1. 4. 1 Intensifier Bar Residue
 3. 1. 4. 2 Type of Fuel
 3. 1. 4. 3 Load Code Number
 3. 1. 4. 4 Tare Weight of Bottle
 3. 1. 4. 5 Extrusion Run Number or Numbers
3. 1. 5 The tare weight of the two pieces of foil shall be recorded on the bottle.
3. 1. 6 Place the bottle in the Crit Zone B-13 hood. Carefully remove the foil
from the trays and transfer it to the bottle taking care to avoid spilling
any residue.
3. 1. 7 The bottle shall then be re-weighed, the weight of residue added shall
be recorded on the bottle, and the bottle shall be returned to the Ac-
countability Clerk.
3. 2 A 1-1/2 inch high tray shall be lined with a pre-weighed layer of aluminum foil
and placed in the Crit Zone B-6 chopper hood. (Note: If this chopper has not
been used, proceed directly to Paragraph 3. 4.)
3. 3 1000 ml. of acetone shall be added to a 2000 ml. polyethylene graduated
cylinder, (see paragraph 2. 3) and transferred to the 1-1/2 inch high tray. All
chopper parts requiring cleaning shall be immersed in the acetone followed by
a thorough cleaning and rinsing.
3. 4 The tray shall then be transferred to Crit Zone B-2, B-3, B-4, or B-5 and placed
under the opening in the blender.

- 3.5 1500 ml. of acetone shall be added to a 2000 ml. graduated cylinder (paragraph 2.3) and transferred to the Varcum dispenser on one blender. (Outlet valve on dispenser shall be in closed position prior to transfer.)
- 3.6 The interior of the blender shall be cleaned by directing a stream of acetone from the dispenser against the surfaces and allowing the solvent to drain into the tray.
- 3.7 After one blender has been cleaned, the tray shall be removed from the hood and placed under the second blender.
- 3.8 The graduated cylinder shall again be filled with acetone (paragraph 3.5) and this material transferred to the Varcum dispenser on the second blender.
Note: No more than two blenders shall be cleaned using acetone from paragraphs 3.3 and 3.5.
- 3.9 The second blender shall be cleaned in a manner identical to that described in paragraph 3.6.
- 3.10 The numbers of the batches from which the scrap was generated and the weight of the foil shall be recorded on the tray.
- 3.11 The tray containing the residue shall then be transferred to Crit Zone B-7 and placed into the hood for evaporation. If the residue is wet or moist after the acetone has evaporated, transfer the tray containing the residue to Crit Zone B-16 (low temperature oven) for complete drying.
- 3.12 While the solvent in the pan referenced in paragraphs 3.2 through 3.11 is evaporating, a second tray 1-1/2 inches high is lined with a pre-weighed layer of aluminum foil and placed on the extrusion work table Crit Zone B-8.
- 3.13 The extrusion parts requiring cleaning shall be transferred to the tray. Care should be taken to avoid tearing the foil.

3. 14 2000 ml. of acetone shall be added to a 2000 ml. graduated cylinder (paragraph 2. 3).
3. 15 Any portion of the 2000 ml. may be added to the tray to clean and rinse the parts provided no additional quantities are subsequently used to clean extrusion tooling or chopper parts as described in paragraph 3. 16.
3. 16 Immerse the extrusion parts requiring cleaning into the solvent. Clean and rinse the parts in the tray using whatever quantity of acetone that remains in the graduated cylinder for rinsing. Unless specifically approved for extraordinary circumstances by the Nuclear Safety Engineer, no more than 2000 ml. of acetone may be used in the combined cleaning of extrusion and chopper tooling.
3. 17 The numbers of the batches from which the scrap was generated and the weight of the foil shall be recorded on the tray.
3. 18 The tray containing the residue shall then be transferred to Crit Zone B-7 and placed into the hood for evaporation. If the residue is wet or moist after the acetone has evaporated, transfer the tray containing the residue of Crit Zone B-16 (low temperature oven) for complete drying.
3. 19 After evaporation of the solvent in the tray (paragraphs 3. 11 and 3. 18) is complete, a pre-weighed 4-5/8 inch O. D. x 4-3/4 inch or 9 inch high polyethylene bottle bearing the following information shall be obtained from Accountability.
 3. 19. 1 "Cleaning Solvent Residue"
 3. 19. 2 Type of Fuel
 3. 19. 3 Load Code Number
 3. 19. 4 Tare Weight of Bottle
 3. 19. 5 Extrusion Run Number

- 3.20 The tare weight of the pieces of foil shall be recorded on the bottle and the bottle placed in the B-13 hood.
- 3.21 The foil shall be removed from the trays and placed in the bottle taking care that none of the residue is spilled.
- 3.22 The bottle shall then be re-weighed, the weight of the residue added, the batch numbers represented therein shall be recorded on the outside of the bottle, and the bottle shall be returned to Accountability.

4.0 Vault Storage and Accountability

- 4.1 Bottles shall be issued from Accountability bearing the information cited in Section 3. 1. 4 or Section 3. 19 depending upon application. ("Intensifier Bar Residue" or "Cleaning Solvent Residue").
- 4.2 A bottle previously used for the same application, fuel loading and fuel type, shall be issued if available. (Re-use of bottles is permitted until the weight of residue in the bottle reaches 2000 grams or until volume limitations restrict further use.) If a bottle of the "proper" type is unavailable, a new bottle shall be properly identified and issued to the technician. Partially filled bottles shall be stored in approved bottle storage racks.
- 4.3 After a bottle is full, as determined by the 2000 gram weight limit or the volume limit, calculate the uranium content of the bottle, and affix a completed numbered bottle label to the bottle.
- 4.4 Completed bottles will be stored and shipped in an approved shipping drum.
- 4.5 Examine the batching record on the outside of the approved drum to determine if addition of the bottle will exceed the limits set for this material. If the addition will exceed the limits, start a new drum.

- 4.6 Record the addition on the batching record on the drum.
- 4.7 Complete Accountability documents as required to record the transfer.
- 4.8 When the drum is fully loaded, close and seal it.

HANDLING OF GREEN RECYCLE MATERIAL AND DRY SCRAP

1.0 Scope

- 1.1 This procedure covers the handling of green recycle material and mixing, chopping, and extrusion scrap.

2.0 General

- 2.1 This procedure shall apply to handling of all fuel bearing material to be recycled through the extrusion operation and to fuel bearing materials processed through mixing, chopping, and extrusion operations which are judged to be scrap and not suitable for recycle through any of the above mentioned process steps.
- 2.2 This procedure shall apply to recycle or scrap material generated during each day of mixing, chopping, and extrusion operation.

3.0 Extrusion Recycle Material

- 3.1 Extrusion scrap generated by trimming elements to length shall be collected and weighed upon completion of each batch. The scrap is collected in a plastic bag contained in a 7-liter can.
- 3.2 Calculate the weight of U-235 by multiplying the weight of the extrusion scrap by the weight fraction of U-235 per gram of wet mix as shown on the batch blending sheet.
- 3.3 Continue to collect the extrusion scrap from each batch up to an amount which will result in a total U-235 content of 2000 grams or less. This batch is extruded as a Tailing batch.

Note: COLLECT ONLY THE AMOUNT OF EXTRUSION SCRAP FOR THE TAILING BATCH WHICH WILL RESULT IN A TOTAL U-235 CONTENT OF 2000 GRAMS OR LESS.

- 3.4 If recycle scrap cannot be used in the Tailing batch, it shall be chopped, weighed, placed in a seven liter can in a plastic bag and stored in the refrigerator. Crit Zone B-12. Bagged material must be identified as follows:

- 3.4.1 Material code
- 3.4.2 Net weight
- 3.4.3 Weight of U-235
- 3.4.4 Tailing batch number

The total U-235 content of all recycle scrap stored in the refrigerator, Crit Zone B-12, shall be posted.

Note: Total U-235 content of all recycle scrap stored in Crit Zone B-12 shall not exceed 2000 grams.

4.0 Dry Mixing, Chopping, and Extrusion Scrap (Not for Recycle)

- 4.1 All mixing, chopping, and extrusion scrap classified as "no recycle" scrap shall be handled as follows:
- 4.1.1 Weigh dry mixing scrap and determine U-235 content by multiplying scrap weight by weight of U-235 per gram of wet mix as shown on batch blending data sheet.
 - 4.1.2 Weigh chopping scrap and determine U-235 content by multiplying scrap weight by weight of U-235 per gram of wet mix as shown on batch blending data sheet.
 - 4.1.3 Chop and weigh extrusion scrap and determine U-235 content by multiplying scrap weight by weight of U-235 per gram of wet mix as shown on batch blending data sheet.

Note: All extrusion scrap must be run through the chopper to reduce the size of the material.

- 4.1.4 Load code and extrusion run number identification must be maintained until material is actually scrapped.
- 4.2 Mixing, chopping, and extrusion scrap may be combined provided the total U-235 content of the combined scrap DOES NOT EXCEED 2000 GRAMS.
- 4.3 Place the combined mixing, chopping, and extrusion scrap in three 1-1/2 inch high trays. Identify on glass tape the following:
 - 4.3.1 Material code
 - 4.3.2 Net weight
 - 4.3.3 Weight of U-235
 - 4.3.4 Extrusion run number
- 4.4 Place the trays containing scrap material in the oven (Crit Zone B-16) and heat for eight (8) hours at $250^{\circ} \pm 25^{\circ}\text{C}$.

Note: DO NOT EXCEED CRITICALITY LIMITS FOR TOTAL ALLOWABLE U-235 CONTENT IN CRIT ZONE B-16.
- 4.5 Upon completion of heating cycle, remove trays from oven (Crit Zone B-16) and weigh scrap.
- 4.6 Place scrap in a polyethylene bottle 4-5/8 inch O. D. x 9 inch high and record the following information on the bottle:
 - 4.6.1 Extrusion run number
 - 4.6.2 Total scrap weight
 - 4.6.3 Total U-235 weight as determined by adding 4.1.1, 4.1.2, and 4.1.3
- 4.7 Submit to Accountability for disposal.

SCRUBBING OF SHOP FLOORS - BUILDING 6

1.0 Scope

- 1.1 This instruction covers the scrubbing of floors in or around Criticality Work Areas and in adjacent areas where scrubbing is required for cleanliness or decontamination purposes. Special care must be employed to avoid washing any recoverable quantities of enriched material into the drains.

2.0 General

- 2.1 Water is supplied for the purpose of scrubbing floors from hose reels or faucets which are mounted on the walls and from one sink located in Group "A" and one sink in Group "C." Unauthorized use of this equipment is deterred by a locked cap over each supply valve to the hose reels and faucets and a locked door to each sink. Only supervisory personnel shall have keys to these locks, and use is permitted only after all preliminary procedures as indicated in this instruction have been completed.

- 2.2 In addition to electric scrubbing machines, the only permissible scrubbing equipment is as follows:

- 2.2.1 Conventional scrubbing buckets
- 2.2.2 Mops
- 2.2.3 Squeegees
- 2.2.4 Liquid soap in 5-gallon containers with small necked pour spouts

- 2.3 With respect to the scrubbing of floors, the shop area shall be divided into six groups.

- 2.3.1 Group "A" -- this includes the following Work Areas and connecting aisles and stairwells:

- 2.3.1.1 Work Area "H"
- 2.3.1.2 Work Area "N"

- 2.3.2 Group "B" -- this includes the following Work Areas and connecting aisles and stairwells:
 - 2.3.2.1 Work Area "J"
- 2.3.3 Group "C" -- this includes the following Work Areas and connecting aisles and stairwells:
 - 2.3.3.1 Work Area "M"
- 2.3.4 Group "D" -- this includes the following areas and connecting aisles and stairwells requiring periodic floor scrubbing:
 - 2.3.4.1 Work Area "K"
 - 2.3.4.2 Equipment Room
 - 2.3.4.3 Boiler Room
 - 2.3.4.4 Contaminated Change Room
 - 2.3.4.5 Building Service Room (Rotoclone)
- 2.3.5 Group "E" -- this includes the following areas and connecting aisles and stairwells requiring periodic floor scrubbing:
 - 2.3.5.1 Work Area "L"
- 2.3.6 Group "F" -- this includes the following Work Area, connecting aisles, offices, and stairwells requiring periodic floor scrubbing:
 - 2.3.6.1 Shop 1, Mezzanine
- 2.4 In the event that any floor scrubbing is required in or around a given work area, all fuel bearing materials must be removed from the entire Scrubbing Group (Group A, B, C, D, or Group E as defined in paragraph 2.3) of which it is

a part and placed in proper storage array in the vault, vault storage area, or wall racks prior to use of water. Retaining fuel bearing materials in furnace fixtures is also permissible. Group "F" may not be scrubbed without removal of fuel bearing material from Group "A."

- 2.5 Paragraph 2.4 does not apply to Group "D," but strict adherence to procedures cited below (paragraph 6.0) for this area is required.

3.0 Scrubbing Group "A"

- 3.1 The following work areas, floors, and adjacent aisles shall be scrubbed using buckets, mops, scrubbing machines, and squeegees ONLY:

3.1.1 Work Area "N"

- 3.2 The remaining work areas and aisles in Group "A" may be scrubbed using hose reels in addition to the equipment cited in paragraph 3.1 provided that paragraph 2.4 requirements are fulfilled prior to use, and care is exercised to prevent any contact of water with fuel or fuel bearing materials in their proper storage arrays.

- 3.3 All contaminated water generated in the scrubbing shall be poured or washed down the trough drains or round drains labeled "monitor."

- 3.4 After completion of scrubbing, the hose reels and access doors to the sinks shall be immediately re-locked by the supervisor.

4.0 Scrubbing Group "B"

- 4.1 The following work area, floors, and adjacent aisles shall be scrubbed using buckets, mops, scrubbing machines, and squeegees ONLY:

4.1.1 Work Area "J"

5.0 Scrubbing Group "C"

- 5.1 The work areas and aisles in Group "C" may be scrubbed using water supplied from hose reels, mops, buckets, scrubbing machines, and squeegees provided

that paragraph 2.4 requirements are fulfilled prior to use, and care is exercised to prevent any contact of the water with fuel or fuel bearing materials in their proper storage arrays.

- 5.2 All contaminated water generated in scrubbing shall be poured or washed down the trough drains or round drains labeled "monitor. "
- 5.3 After completion of scrubbing, the hose reels and access doors to the sinks shall be immediately re-locked by the supervisor.

6.0 Scrubbing Group "D"

- 6.1 All rooms grouped in Scrubbing Group "D" may be cleaned at one time or separately as required.
- 6.2 Removal of fuel or fuel bearing materials from Scrubbing Group A, B, C, or E is not required while Scrubbing Group D provided that: (1) all doors connecting the Group D room (or rooms) being scrubbed to Group A or Group C are closed and (2) care is exercised to prevent water entering Group A or Group C.
- 6.3 Buckets, mops, scrubbing machines, and squeegees ONLY shall be used to scrub floors in Work Area "K. " The remaining work areas and aisles in Group D may be scrubbed using water supplied from hose reels in addition to the equipment cited above provided that paragraph 2.4 requirements are fulfilled prior to use, and care is exercised to prevent any contact of the water with fuel or fuel bearing materials in their proper storage arrays.
- 6.4 All contaminated water generated in scrubbing shall be poured or washed down trough drains or round drains labeled "monitor. "
- 6.5 After completion of scrubbing, any hose reels used shall be re-locked by the supervisor.

7.0 Scrubbing Group "E"

The following work area and adjacent aisles in Group E shall be scrubbed using buckets, mops, scrubbing machines, and squeegees only.

7.1 Work Area "L" (except L-9). Crit Zone L-9 may be scrubbed using hose reels in addition to the equipment cited in paragraph 3. 1.

8.0 Scrubbing Group "F"

8.1 The following work area, floors, offices and aisle shall be scrubbed using buckets, mops, scrubbing machines and squeegees ONLY. Group F shall not be scrubbed without removal of fuel bearing material from Group A.

8.1.1 Shop 1, Mezzanine

CLEAN UP OF SPILLED FUEL MATERIAL

1.0 Scope

- 1.1 This instruction covers the procedures to be followed when fuel or fuel bearing material is inadvertently spilled on the floor.

2.0 General

- 2.1 The area surrounding the spilled material shall be immediately roped off to prevent spreading of contamination.
- 2.2 Shift Foreman and Health Physics Technician shall be notified of the spill and shall determine if any special precautions are required and recommend decontamination procedure.
- 2.3 The Superintendent of Operations shall also be notified of the spill.

3.0 Processing

3.1 Fueled Beads

- 3.1.1 Perform the duties prescribed in paragraph 2.0.
- 3.1.2 Remove original bottle from area.
- 3.1.3 Weigh original bottle and determine the quantity of material spilled. Record on the bottle the weight spilled and the weight remaining in the bottle.
- 3.1.4 Brush the spilled beads into a dust pan (1-1/2" high, maximum) and transfer them into a 4-5/8" O.D. x 9" high polyethylene bottle.
- 3.1.5 Seal bottle and record the following information:
- 3.1.5.1 Label as "FUEL BEAD SCRAP"
- 3.1.5.2 Weight of beads in bottle
- 3.1.5.3 Lot number
- 3.1.6 Transfer the bottle to Accountability personnel.

3.2 Green Mix

- 3.2.1 Perform the duties prescribed in paragraph 2.0.
- 3.2.2 Remove original container and any material remaining in it out of the area.
- 3.2.3 Brush the green mix into a dust pan (1-1/2" high, maximum).
- 3.2.4 Transfer the green mix from the dust pan into a 1-1/2" high tray and process per C. I. No. 6.

3.3 Fuel Elements (From Trays or Fixtures)

- 3.3.1 Perform the duties prescribed in paragraph 2.0.
- 3.3.2 Place the larger element sections in trays.
- 3.3.3 Cut the longer sections into 7-inch lengths and place them in 4-5/8" O.D. x 9" high polyethylene bottles. All sections must be identified with serial number and load. U-235 content of the bottle must not exceed 1000 grams.
- 3.3.4 Label the bottle with the following information:
 - 3.3.4.1 "ELEMENT SCRAP"
 - 3.3.4.2 Batch numbers and element serial numbers represented.
 - 3.3.4.3 Last operation before spill (cure, bake, etc.).
 - 3.3.4.4 Contained U-235
 - 3.3.4.5 If element scrap material HAS NOT been completely cured, place element sections into cure fixture and heat to 250°C $\pm$ 25°C for eight hours. Other scrap pieces must be processed per C. I. No. 6.

- 3.3.5 Brush any small pieces or dust into a dust pan (1-1/2" high, maximum).
- 3.3.6 Transfer the material from the dust pan into a 4-5/8" O.D. x 9" high polyethylene bottle.
- 3.3.7 Label bottle as in paragraph 3.3.4.
- 3.3.8 Transfer bottles to Accountability personnel.
- 3.4 Absolute Filters, Bottles, Pans, etc.
 - 3.4.1 Perform the duties prescribed in paragraph 2.0.
 - 3.4.2 Brush spilled material into a dust pan (1-1/2" high, maximum).
 - 3.4.3 Transfer material into original container and process per applicable Criticality Instruction (C. I. No.'s 5, 6, 10, 15, or 20).

HANDLING OF VACUUM CLEANER RESIDUE

1.0 Scope

This instruction covers the handling of residue accumulated during the use of vacuum cleaners in processing and inspection areas.

2.0 General

- 2.1 Respirators shall be worn when removing fuel bearing containers and filters from the Aerotec filter assemblies and vacuum cleaners.
- 2.2 Filters and containers shall be replaced when changing from one enrichment to another as well as when changing from another type of element (i.e., enriched or non-fuel).
- 2.3 Containers used on vacuum cleaners are: a one quart 4-5/8" diameter by 4-3/4" high polyethylene bottle, or a 1/2-gallon stainless steel can, 5" in diameter by 6-3/4" high. The one quart bottle is limited to 500 grams of contained U-235 and the 1/2-gallon can to 1000 grams of contained U-235.

3.0 Processing and Inspection Area Procedures

- 3.1 A pre-weighed Aerotec filter and pre-weighed approved container shall be obtained. These shall be identified by the Accountability Clerk as follows:
 - 3.1.1 Type of fuel
 - 3.1.2 Code number
 - 3.1.3 Tare weight of bottle only
 - 3.1.4 Label "Vacuum Cleaner Residue"
- 3.2 Filter changes shall be made as required to maintain vacuum cleaner efficiency unless the restrictions cited in Section 2.2 are applicable.
- 3.3 After the container is approximately three-quarters full it shall be replaced with a new pre-weighed container. A cover will be placed on the container before it is transported.

4.0 Vault Storage and Accountability

4.1 Container Processing

4.1.1 After receipt, the metal can will be emptied into a one-half gallon pre-weighed polyethylene bottle. The bottle shall be weighed, calculations made, and the following information recorded on the outside of the bottle:

4.1.1.1 Gross weight of bottle

4.1.1.2 Net weight of bottle contents

4.1.1.3 Estimated weight of U-235 in bottle

4.1.2 Close the bottle, seal and place in an approved storage port to await further processing.

4.2 Filter Processing

4.2.1 After receipt of the filter, it is installed on vibrator assembly.

4.2.2 A bottle labeled with proper loading and type of fuel shall be installed beneath the vibrator assembly.

4.2.3 The filter is vibrated until further collection has ceased. An approved vacuum cleaner may be used to aid in removing dust from the filter.

4.2.4 The filter is re-weighed to determine if further use is possible. If filter dust content weight cannot be reduced to less than 200 grams without damaging the filter, the filter will be scrapped. If deemed usable, it may be stored in a clean filter crit zone or resubmitted to the machining area when a batch of the proper loading and fuel type is to be processed. Any filter having a dust content weight of 200 or more grams may not be stored in a clean filter crit zone.

- 4.2.5 If the filter is deemed unfit for further use, it will be scrapped using applicable accountability scrapping procedures as follows:
- 4.2.5.1 Continue to shake filter using vacuum cleaner and rubber mallet to remove a maximum amount of uranium bearing material. When removal operations are completed, the filter must contain less than 50 grams of uranium bearing material as determined by deducting the tare weight of the filter from the gross loaded weight.
 - 4.2.5.2 Determine the uranium content of the filter by multiplying the weight of the uranium bearing material by the appropriate accountability factor for the loading of the dust contained in the filter.
 - 4.2.5.3 Determine the U-235 content of the filter by multiplying the uranium content determined in 4.2.5.2 by .9315.
 - 4.2.5.4 Complete a bottle label and affix it to the filter.
 - 4.2.5.5 Double bag the filter using polyethylene bags. Heat seal or tape the closures to insure against dust leakage.
 - 4.2.5.6 These filters will be stored and shipped in ICC 17E drums. Check the batching record on the drum to insure that addition of the filter will not exceed the drum limit of 350 grams of contained U-235. If addition of the filter exceeds the drum limit, seal the old drum, and start a new one. A polyethylene drum liner should be placed in new drum before starting to make additions.
 - 4.2.5.7 Post the addition of the filter to the drum batching record. Place the filter in the drum.

4.2.5.8 Complete applicable accountability paper work
to record the transfer.

4.2.6 When the bottles used to collect the filter dust (see Section 4.2.2) are
full, they are sealed and treated in a manner similar to that cited in
Section 4.1.

PROCESSING OF MACHINING RESIDUES

1.0 Scope

- 1.1 This instruction covers the handling of residues accumulated in the Aerotec dust collecting units throughout WNCO.

2.0 General

- 2.1 Respirators shall be worn when removing fuel-bearing containers and filters from the Aerotec filter assemblies and vacuum cleaners.
- 2.2 Filters and containers shall be replaced when changing from one loading to another on the reaming, diamond milling, and broaching operations, or when the container of filter is loaded. On the other operations, changes will be made only when switching from fueled to non-fuel or vice versa or when the containers or filters are loaded.
- 2.3 Machines shall be thoroughly cleaned when a change in loading is made.
- 2.4 Containers used to collect machining residues are: one quart 4-5/8" diameter by 4-3/4" high polyethylene bottle, or a one-half gallon stainless steel can, 5" in diameter by 6-3/4" high. The one quart bottle will be used on operations which generate small quantities of residues. The one quart bottle is limited to 500 grams of contained U-235 and does not require external protection. The one-half gallon metal can is limited to 1000 grams of contained U-235. The type of container to be used is specified in each crit zone description which utilizes a dust collection and filter system.

3.0 Procedure

- 3.1 All fuel material will be transferred out of the zone while the filter is being changed. In crit zones which have two Aerotec dust collection units, only one container or one filter will be handled at one time.
- 3.2 A pre-weighed Aerotec filter and pre-weighed container specified for the crit zone shall be obtained. These shall be identified by the Accountability personnel as follows:

- 3.2.1 Type of fuel
- 3.2.2 Load Code number
- 3.2.3 Tare weight
- 3.2.4 Crit Zone in which container is to be used
- 3.3 After the container and filter have been installed, the date and time of filter installation shall be recorded in the machine log book.
- 3.4 After the container is approximately three-quarters full, it is replaced with a new pre-weighed container. Past experience must be used to judge the level in a metal can. A cover will be placed on the container before it is transported.
- 3.5 The filter shall be replaced and the loaded filter returned to Accountability personnel in the Accountability work area after 72 hours of reaming operations unless the restrictions cited in Section 2.2 are applicable. (Note: Filter change requirements on other machines shall be standardized similarly based on experience factors.)

4.0 Storage and Accountability

4.1 Container Processing

- 4.1.1 After receipt from the machining area, the metal can will be emptied into a one-half gallon pre-weighed polyethylene bottle. The bottle shall be weighed, calculations made, and the following information recorded on the outside of the bottle:
 - 4.1.1.1 Gross weight of container
 - 4.1.1.2 Net weight of container contents
 - 4.1.1.3 Weight of U-235 in container

- 4.1.2 The bottle shall be placed in an approved storage area and held for pulverizing and sampling as per established accountability procedures.

4.2 Filter Processing

- 4.2.1 After receipt of filter from the machining area, it is installed on vibrator assembly. Storage of loaded filters containing 350 grams or less of contained U-235 is allowed in Crit Zone E-21.
- 4.2.2 A bottle labeled with proper loading and type of fuel shall be installed beneath the vibrator assembly.
- 4.2.3 The filter is vibrated until further collection has ceased. An approved vacuum cleaner may be used to aid in removing dust from the filter.
- 4.2.4 The filter is re-weighed to determine if further use is possible. If filter dust content weight cannot be reduced to less than 200 grams without damaging the filter, the filter will be scrapped. If deemed usable, it may be stored in a clean filter crit zone and resubmitted to the machining area when a batch of the proper loading and fuel type is to be processed. Any filter having a dust content weight of 200 or more grams may not be stored in Crit Zone H-26, E-23, or L-2.
- 4.2.5 If the filter is deemed unfit for further use, it will be scrapped using applicable accountability scrapping procedures as follows:
 - 4.2.5.1 Continue to shake filter using vacuum cleaner and rubber mallet to remove a maximum amount of uranium bearing material. When removal operations are completed, the filter must contain less than 50 grams of uranium bearing material as determined by deducting the tare weight of the filter from the gross loaded weight.

- 4.2.5.2 Determine the uranium content of the filter by multiplying the weight of the uranium bearing material by the appropriate accountability factor for the loading of the dust contained in the filter.
 - 4.2.5.3 Determine the U-235 content of the filter by multiplying the uranium content determined in 4.2.5.2 by .9315.
 - 4.2.5.4 Complete a bottle label and affix it to the filter.
 - 4.2.5.5 Double bag the filter using polyethylene bags. Heat seal or tape the closures to insure against dust leakage.
 - 4.2.5.6 These filters will be stored and shipped in B. of E. 2016 drums. Check the batching record on the drum to insure that addition of the filter will not exceed the drum limit of 350 grams of contained U-235. If addition of the filter exceeds the drum limit, seal the old drum, and start a new one. A polyethylene drum liner should be placed in new drums before starting to make additions.
 - 4.2.5.7 Post the addition of the filter to the drum batching record. Place the filter in the drum.
 - 4.2.5.8 Complete applicable accountability paper work to record the transfer.
- 4.2.6 When the bottles used to collect the filter dust (see Section 4.2.2) are full, they are sealed and treated in a manner similar to that cited in Section 4.1.

CHANGING OF VACUUM PUMP OIL

1.0 Scope

This instruction describes the procedures to be followed when draining the oil in any vacuum pump in the Facility.

2.0 General

All movements of oil containers must be made through designated aisles--no movements are to be made through marked crit zones.

3.0 Handling of All Vacuum Pump Oil Changes

- 3.1 Obtain an empty five-gallon container with a resealable type lid and a five-gallon container of new vacuum pump oil.
- 3.2 Transfer the above containers to the vacuum pump requiring an oil change. Caution shall be taken so as not to enter any crit zone. USE AISLE ONLY.
- 3.3 Drain the used vacuum pump oil into the empty five-gallon container.
- 3.4 Continue to drain oil until vacuum pump has been completely drained.
Note: Vacuum pump contains approximately 4.5 gallons of oil.
- 3.5 Flush the vacuum pump with two quarts of new oil. Collect this oil as described in 3.3 and 3.4 above.
- 3.6 Seal the five-gallon container of used oil and transfer to the outside oil storage area. Transfer the oil to a 55-gallon drum and return the five-gallon container to the locked storage area. Caution shall be taken so as not to enter any crit zone. USE AISLE ONLY.
- 3.7 Fill the vacuum pump with new oil.
- 3.8 Reseal the new oil container and transfer to locked storage area. Caution shall be taken so as not to enter any crit zone. USE AISLE ONLY.

PROCESSING OF LEACH FURNACE RESIDUES
(Water Cooled Trap)

1.0 General

- 1.1 This procedure shall be performed immediately after EACH leach furnace cool-down cycle.
- 1.2 Effort shall be made to minimize the exposure time of all leach residues to the atmosphere.
- 1.3 Protective respirators shall be worn at all times when residue is open to the atmosphere.
- 1.4 Before opening the furnace trap for cleaning, weigh each element in the furnace load to determine its weight loss. Obtain a total furnace load weight loss by adding the individual element weight losses. If the total furnace load weight loss is 500 grams or more, do not open the furnace trap for cleaning. Notify the Manager of WNCO or the Superintendent of Operations.
- 1.5 Washing of leach trap baffle assembly or inner tube with water is not permitted.
- 1.6 Drying of leach trap baffle assembly and/or inner tube in drying oven is permitted only after thorough cleaning with Freon MF.
- 1.7 Acetone must not be used for trap cleaning under any circumstances.

2.0 Trap Cleaning

- 2.1 Lay a six-foot section of white blotter paper on the floor east of the leach furnace but within the criticality zone. Obtain a spatula.
- 2.2 Disconnect the trap from the downstream piping by disengaging the flange.
- 2.3 If required, disconnect the trap cooling water lines. Then remove the flange bolts from the end of the water-cooled section of the trap and carefully lower the trap.

- 2.4 If required, remove the inner tube from the water-cooled jacket and place it upright in a 1-1/2" high tray lined with tare weighed aluminum foil.
- 2.5 Fill a 2000 ml. polyethylene graduated cylinder with Freon MF and transfer it to the leach furnace criticality zone.

MANDATORY: While the leach trap is being cleaned, no other liquids shall be permitted in the leach furnace criticality zone and no additional quantities of Freon MF shall be used to clean the trap.
- 2.6 A small quantity of Freon MF shall be poured into the top of the inner tube, thoroughly wetting all residue in order to decrease airborne contamination.
- 2.7 Remove the baffle plate assembly from the inner tube and place it in the tray.
- 2.8 Using a combination of spatula, brush, and the Freon MF remaining in the graduated cylinder, remove the residue from the inner tube (if removed) and baffle plate assembly. (All residue and used Freon MF shall be collected in the 1-1/2" high tray.)
- 2.9 Inspect the interior of the water-cooled jacket and downstream piping. If any residue is observed, repeat operations per Section 2.8 and collect all Freon MF and residue in the same tray. Do not combine the residues from more than one run in the same tray.
- 2.10 To determine the estimated U-235 contained in the tray, multiply the total furnace load weight loss (see 1.4) by .70. Identify the tray with the furnace run and mark with estimated U-235.
- 2.11 Transfer the tray containing the Freon MF and leach residue to Crit Zone M-15 (low temperature oven). Dry for a minimum of eight hours at 120°C.

2. 12 Reassemble the leach trap.
2. 13 Periodically inspect the graphite exhaust extension elbow and polyvinyl chloride pipe for leach waste buildup. Remove and clean as required.
2. 14 After the Freon MF has evaporated and the residue dried, transfer the residue to a pre-weighed plastic bag and place into a pre-weighed 4-5/8" O.D. x 9" or 4-3/4" high polyethylene bottle.
2. 15 Tightly screw the pre-weighed bottle lid on the bottle.
2. 16 Gross weigh the bottle (including lid) and contents. Mark the gross weight on the bottle. Separately list on the bottle the tare weight of the bottle, lid, aluminum foil, and plastic bag and total. Deduct the total tare from the gross weight and mark the resulting net weight of residue on the bottle. Identify the bottle as "leach trap residue" and with the furnace run number. Mark the estimated U-235 content as determined in 2. 10 above. These weighing operations must be performed as soon as possible after removal from the oven as the leach waste is hygroscopic and will pick up weight from moisture absorption rapidly after removal from the furnace.
2. 17 Place the bottle in plastic bag and transfer it to the Accountability processing area for scrapping.
2. 18 Affix a properly completed bottle label to the bottle. The bottle label will contain in addition to other information the U-235 content of the bottle calculated using current accountability procedures.
2. 19 Transfer the loaded bottle to an approved storage rack or an approved birdcage drum. If the transfer is to a drum, enter the required data including cumulative U-235 on a drum batching record affixed to the drum.

3.0 Filter Disposal

- 3.1 Carefully remove the filter from its housing and transfer it to a tray. To determine the U-235 content of the filter for transfer purposes, multiply the total furnace load weight loss (see 1.4) by .30. Identify the filter with the furnace run and mark with estimated U-235.
- 3.2 Transfer the tray and filter to Crit Zone M-15, (low temperature oven). Dry for a minimum of eight hours at 120°C.
- 3.3 After the filter has dried, remove it from the oven and place into a pre-weighed plastic bag. Weigh the loaded bag. This weighing must be performed as soon as possible after removal from the oven as the leach waste in the filter will absorb moisture from the air and gain weight rapidly. Subtract the initial filter weight (recorded on the filter frame) and the tare weight of the bag from the total obtained on the weighing just completed. Record this weight difference on the bag identified as "factor net." Determine the estimated U-235 content of the filter for transfer purpose by multiplying the "factor net" by .60. Mark the bag with the leach run identification and the estimated U-235 content.
- 3.4 Transfer the bag and its contents to the accountability processing area for scrapping.
- 3.5 Obtain a new filter, weigh, and record its weight on the frame and reassemble the filter in its housing. Install the filter just prior to making the leach run in order to minimize filter moisture absorption.
- 3.6 In the hood remove the filter from the bag and remove the corrugated filtering section from the frame by sawing next to the frame. Remove samples as required.
- 3.7 Place the two ends containing no attached filter media or waste into a plastic bag, seal with tape, and discard in a contaminated waste drum. See 4.2.

- 3.8 Collapse or section the remaining portions of the filter and place into the bag in which the material was originally received. Place the loaded bag into an approved 1/2-gallon bottle, affix a bottle label properly completed to the bottle. The bottle label will contain in addition to other information the U-235 content of the bottle calculated using current accountability procedures.
- 3.9 Transfer the bottle to an approved storage rack or an approved birdcage drum. If the transfer is to a drum, enter the required data including cumulative U-235 on the drum batching record affixed to the drum.

4.0 Low Level Contamination Waste Disposal

- 4.1 Place all combustible low level contaminated cleaning and handling materials such as gloves, blotter paper, and rags relating to a given run into one or more plastic bags.
- 4.2 Identify the bag or bags with the run number and transfer to Accountability.
- 4.3 Accountability will add any low level combustible contaminated waste generated in their packing and handling activities to the bag or bags.
- 4.4 Place loaded bag or bags into a drum labeled "Contaminated Waste - Leach Operation." No other types of material will be added to this drum.
- 4.5 Record the run numbers on a drum batching record affixed to the drum.

PROCESSING OF LEACH FURNACE RESIDUES
(Refrigerated)

1.0 General

- 1.1 This procedure shall be performed immediately after EACH completed leach furnace cycle.
- 1.2 Effort shall be made to minimize the exposure time of all leach residues to the atmosphere.
- 1.3 Protective respirators shall be worn at all times when residue is open to the atmosphere.
- 1.4 Before opening the furnace trap for cleaning, weigh each element in the furnace load to determine its weight loss. Obtain a total furnace load weight loss by adding the individual element weight losses. If the total furnace load weight loss is 500 grams or more, do not open the furnace trap for cleaning. Notify the Manager of WNCO or the Superintendent of Operations.
- 1.5 Washing of leach trap baffle assembly with water is not permitted.
- 1.6 Drying of leach trap baffle assembly in drying oven is permitted only after thorough cleaning with Freon MF.
- 1.7 Acetone must not be used for trap cleaning under any circumstances.

2.0 Trap Cleaning

- 2.1 Lay a six foot section of white blotter paper on the floor under the leach furnace trap but within the criticality zone. Obtain a spatula.
- 2.2 Disconnect the trap from the downstream piping by disengaging the flange.
- 2.3 Remove the flange bolts from the end of the trap shell.

- 2.4 Fill a 2000 ml. polyethylene graduated cylinder with Freon MF and transfer it to the leach furnace criticality zone.

MANDATORY: While the leach trap is being cleaned, no other liquids shall be permitted in the leach furnace criticality zone and no additional quantities of Freon MF shall be used to clean the trap.

- 2.5 Slide the baffle plate assembly from the trap shell and scrape all residue into the tray placed under the baffle assembly.
- 2.6 Using a combination of spatula, brush, and the Freon MF remaining in the graduated cylinder, remove the residue. (All residue and used Freon MF shall be collected in the 1-1/2" high tray.)
- 2.7 Remove completely the cleaned baffle assembly and set aside. Inspect the interior of the trap shell and downstream piping. If any residue is observed, repeat operations per Section 2.6 and collect all Freon MF and residue in the same tray. Do not combine the residues from more than one run in the same tray.
- 2.8 To determine the estimated U-235 contained in the tray, multiply the total furnace load weight loss (see 1.4) by .70. Identify the tray with the furnace run and mark with estimated U-235.
- 2.9 Transfer the tray containing the Freon MF and leach residue to the low temperature oven. Dry for a minimum of eight hours at 120°C.
- 2.10 Reassembly the leach trap.
- 2.11 Periodically inspect the graphite exhaust extension elbow and polyvinyl chloride for leach waste build-up. Remove and clean as required.
- 2.12 After the Freon MF has evaporated and the residue dried, transfer the residue to a pre-weighed plastic bag and place into a pre-weighed 4-5/8" O. D. x 9" or 4-3/4" high polyethylene bottle.

2. 13 *Tightly screw the pre-weighed bottle lid on the bottle.*
2. 14 *Gross weigh the bottle (including lid) and contents. Mark the gross weight on the bottle. Separately list on the bottle the tare weight of the bottle, lid, aluminum foil, and plastic bag and total. Deduct the total tare from the gross weight and mark the resulting net weight of residue on the bottle. Identify the bottle as "leach trap residue" and with the furnace run number. Mark the estimated U-235 content as determined in 2.8 above. These weighing operations must be performed as soon as possible after removal from the oven as the leach waste is hygroscopic and will pick up weight from moisture absorption rapidly after removal from the furnace.*
2. 15 *Place the bottle in a plastic bag and transfer it to the Accountability processing area for scrapping.*
2. 16 *Affix a properly completed bottle label to the bottle. The bottle label will contain in addition to other information the U-235 content of the bottle calculated using current Accountability procedures.*
2. 17 *Transfer the loaded bottle to an approved storage rack or an approved birdcage drum. If the transfer is to a drum, enter the required data including cumulative U-235 on a drum batching record affixed to the drum.*

3.0 Filter Disposal

3. 1 *Carefully remove the filter from its housing and transfer it to a tray. To determine the U-235 content of the filter for transfer purposes, multiply the total furnace load weight loss (see 1.4) by .30. Identify the filter with the furnace run and mark with estimated U-235.*
3. 2 *Transfer the tray and filter to the low temperature oven. Dry for a minimum of eight hours at 120°C.*

- 3.3 After the filter has dried, remove it from the oven and place into a pre-weighed plastic bag. Weigh the loaded bag. This weighing must be performed as soon as possible after removal from the oven as the leach waste in the filter will absorb moisture from the air and gain weight rapidly. Subtract the initial filter weight (recorded on the filter frame) and the tare weight of the bag from the total obtained on the weighing just completed. Record this weight difference on the bag identified as "factor net." Determine the estimated U-235 content of the filter for transfer purpose by multiplying the "factor net" by .60. Mark the bag with the leach run identification and the estimated U-235 content.
- 3.4 Transfer the bag and its contents to the Accountability processing area for scrapping.
- 3.5 Obtain a new filter, weigh, and record its weight on the frame and reassembly the filter in its housing. Install the filter just prior to making the leach run in order to minimize filter moisture absorption.
- 3.6 In the hood remove the filter from the bag and remove the corrugated filtering section from the frame by sawing next to the frame. Remove samples as required.
- 3.7 Place the two ends containing no attached filter media or waste into a plastic bag, seal with tape, and discard in a contaminated waste drum. (See 4.2.)
- 3.8 Collapse or section the remaining portions of the filter and place into the bag in which the material was originally received. Place the loaded bag into an approved 1/2-gallon bottle, affix a bottle label properly completed to the bottle. The bottle label will contain in addition to other information the U-235 content of the bottle calculated using current Accountability procedures.

- 3.9 Transfer the bottle to an approved storage rack or an approved birdcage drum.
If the transfer is to a drum, enter the required data including cumulative U-235 on the drum batching record affixed to the drum.

4.0 Low Level Contaminated Waste Disposal

- 4.1 Place all combustible low level contaminated cleaning and handling materials such as gloves, blotter paper, and rags relating to a given run into one or more plastic bags.
- 4.2 Identify the bag or bags with the run number and transfer to Accountability.
- 4.3 Accountability will add any low level combustible contaminated waste generated in their packing and handling activities to the bag or bags.
- 4.4 Place loaded bag or bags into a drum labeled "Contaminated Waste - Leach Operation." No other types of material will be added to this drum.
- 4.5 Record the run numbers on a drum batching record affixed to the drum.

PROCESSING OF COATING FURNACE RESIDUES

1.0 General

- 1.1 This procedure shall be performed during the cool-down cycle of EACH coating furnace run.
- 1.2 This procedure applies to the cleaning of traps from coating furnaces only when the load or any portion of the load contains fuel.
- 1.3 Effort shall be made to minimize the exposure of all coating residues to the atmosphere.
- 1.4 Protective respirators shall be worn at all times when the residue is open to the atmosphere.
- 1.5 All outside doors shall be closed and exhaust fans shall be turned off during the cleaning operations.

2.0 Trap Cleaning

- 2.1 Obtain the bag containing the sheet metal scraper (aluminum spacer plate).
- 2.2 Lay a six-foot section of white blotter paper on the floor in front of the trap flanges.
- 2.3 Open trap cover of Trap No. 1. Remove the spacer plate from its bag, and place it inside the trap.
- 2.4 Place plastic bag over the trap opening and seal it to the trap with tape.
- 2.5 Grasping the tantalum wire through the bag, vigorously shake it to remove the residue.
- 2.6 Placing the wire in an "out-of-the-way" location in the trap, scrape all of the residue from the trap into the bag using the spacer plate.

- 2.7 After the residue is in the bag, remove the bag from the trap and seal its opening with tape.
- 2.8 Remove the spacer plate from the trap and replace the plate in its bag.
- 2.9 Replace the tantalum wire in its proper position in the trap and re-attach the flange to the trap.
- 2.10 Proceed in like manner on the remaining traps. (Note: Make certain that the exhaust line and all piping between traps is free of residue. Clean connecting piping if required.) Residues from external exhaust lines should be combined with the trap material. Residues from internal piping contains a higher concentration of uranium and will be separately bagged and labeled.
- 2.11 After all traps have been cleaned, seal bags with tape and record the following information:
 - 2.11.1 Coating Residue - Trap and External Exhaust
OR
Internal Exhaust
 - 2.11.2 Coating Run Number
- 2.12 Transfer the loaded bags to Accountability.

3.0 Vault Storage and Accountability

- 3.1 Remove samples as required.
- 3.2 Accountability personnel will transfer the material to a pre-weighed polyethylene bag contained in a pre-weighed approved 1/2-gallon or one-quart container. Affix a label to the bottle. This label will include, in addition to other information, the U-235 content of the bottle calculated in accordance with current Accountability procedures.

- 3.3 Place the lid on the bottle and seal with vinyl tape. Place the loaded bottle into a polyethylene bag to which approximately two handfuls of desiccant material has been added. Seal the bag with vinyl tape.
- 3.4 Residue identified as Coating Residue - Trap and External Exhaust will be transferred to an approved 55-gallon drum - I C C Spec 17E containing a polyethylene insert. Coating residue - Internal Exhaust may be combined in the same drum, but not in the same bottle. Additions to the drum will be recorded on a drum batching record affixed to the drum. In addition to other data, this record will show the cumulative U-235 contained in the drum and the total U-235 permitted in the drum.

PROCESSING OF "AA" AND "AB" FURNACE RESIDUES

1.0 General

- 1.1 This procedure shall be performed after the cool-down cycle of every coating furnace run.
- 1.2 Effort shall be made to minimize the exposure of all coating residues to the atmosphere.
- 1.3 All outside doors shall be closed and exhaust fans shall be turned off during the cleaning operations.
- 1.4 Personnel performing this operation must wear respirators and safety goggles.

2.0 Trap Cleaning

- 2.1 Drain water from trap water jacket.
- 2.2 Remove trap lid.
- 2.3 Remove copper turnings from trap and place in plastic bag.
- 2.4 Shake bag to remove waste from copper.
- 2.5 Scrape inside of trap with metal scraper.
- 2.6 Clean inside of trap with vacuum cleaner.
- 2.7 Replace copper turnings (trap must contain enough copper turnings to eliminate all gap between turnings and baffle on trap lid).
- 2.8 Install trap lid.
- 2.9 Seal the plastic bag with tape. Place all material in ICC 17E drums.

FLUSHING OF COATING AND LEACH FURNACE EXHAUST STACKS

1.0 Scope

- 1.1 This instruction covers the flushing of roof exhaust stacks from the coating and leaching furnaces.

2.0 General

- 2.1 This operation shall be performed after completion of furnace cool-down cycle or during cool-down cycle with exhaust lines connected to temporary exhaust stack.
- 2.2 Water is supplied on the roof of Shop 2 for the purpose of flushing stacks. The requirements of Criticality Instruction No. 7 must be adhered to and met prior to starting this operation.
- 2.3 Safety goggles and respirators must be worn while disconnecting the exhaust lines prior to flushing. Safety glasses only are required after connections are completed.

3.0 Stack Flushing

- 3.1 Disconnect exhaust line from furnace coating waste traps to exhaust line roof riser.
Note: In the case of leach stack flush, remove leach exhaust filter box.
- 3.2 Connect by means of flexible rubber coupling the required lengths of 2-inch P. V. C. piping to reach Shop 2 trough drains from the exhaust stack riser. Make sure connections are firm and will not leak.
- 3.3 Proceed to the roof of Shop 2 and connect water hose to feed line.
- 3.4 Remove plug from roof manifold exhaust system over stack to be flushed and insert special hose spray nozzle completely down furnace exhaust line until flush with top of tee. Secure in place.

- 3.5 Turn on water supply and flush exhaust stack for the necessary time it takes for the flush water to run clear. (Approximately .5 to 1.0 hour.)
- 3.6 Secure water and lock out water supply valve.
- 3.7 Remove hose adaptor and plug flush hole.
- 3.8 Remove drain assembly and store. Rig and attach blower to flushed line and dry assembly trap and stack exhaust system.

PROCESSING OF LOW LEVEL SCRAP AND WASTE

1.0 Scope

- 1.1 This instruction covers the handling of shop generated uranium contaminated scrap and waste.

2.0 Containers

- 2.1 All contaminated material for disposal will be collected in modified 55-gallon ICC 17-E drums. A plastic liner will be inserted into each drum before the addition of contaminated materials. Drums will be enclosed in plastic bags before being introduced into a contaminated area in order to reduce decontamination efforts. Each drum will be serially numbered and will be labeled on the side as follows:

"RADIOACTIVE MATERIALS"

Empty drums in the storage area awaiting use will have an "EMPTY" label or tag affixed. This label or tag will be removed at the time the drum is moved into the use area. These drums will not be used for other than contaminated and low-level materials.

3.0 Material Restrictions

- 3.1 These drums will be used to accumulate, store, and ship only contaminated materials and dry low density materials such as floor sweepings, filters, and coating waste. All highly contaminated or noxious materials such as residues from coating operations will be transferred to the Accountability Section for packaging prior to placement in a drum. All highly contaminated material such as the above will be double wrapped in plastic or placed in plastic bottles before introduction into a drum. Uranium content of a drum is limited to 350 grams of U-235.

4.0 Localization of Losses

- 4.1 A record of the location in which each drum is used will be maintained by the Accountability Section to permit tracing of drums with abnormally high uranium contents.

5.0 Decontamination

- 5.1 After a drum has been filled it will be closed, decontaminated if necessary, and transferred to an outside storage pad. Those drums protected by undamaged plastic bags will not require decontamination. The bag must be removed before moving the drum into a clean area in such a manner as to prevent contamination of the exterior surfaces of the drum.

6.0 Uranium Content Determination

- 6.1 Uranium content of the drums will be determined by a radiation survey or by application of appropriate accountability uranium factors dependent upon the nature of the contents of the drum. Radiation survey procedures are defined in the Accountability Procedures Manual (WANL-IL-009). After the uranium content of the drums has been determined, the drums will be sealed using a serial numbered seal and stored in Crit Zones 1-1, 1-2, or 1-3, pending disposition. Any drum containing over 100 grams of U-235 will be labeled on the top and side as follows:

"NO INTERNAL BIRDCAGE - 350 GRAMS U-235 LIMIT"

7.0 Disposition

- 7.1 When an economical shipping quantity of drums has been accumulated, a listing will be prepared and submitted to the SS Representative requesting disposition. Upon receipt of the disposition from the SS Representative, the drums will be shipped for recovery or burial as determined by the SS Representative. Areas to be used in shipping must be approved by the Nuclear Safety Engineer prior to loading of the shipping vehicle.

INTRA-BUILDING TRANSPORTATION OF FUEL ELEMENTS

1.0 Scope

- 1.1 This instruction describes methods to be used in the panel truck transportation of fuel elements or wafers between buildings at the Cheswick complex of the Westinghouse Astronuclear Core Operations using the transfer box assembly (drawing 321164-D).

2.0 General

- 2.1 Standard procedures for the transfer of fuel elements between criticality zones and the posting of such transfers shall be followed.
- 2.2 Any one tray containing fuel elements or wafers shall not be handled unless a strip of tuck tape encircles the lid and body of the tray to keep the lid secure. Fuel elements shall be handled in fuel element trays. Wafers shall be handled in standard wafer trays.
- 2.3 This procedure shall not apply to fuel elements in other than trays.
- 2.4 All movements of trays to and from the panel truck shall be made through passageways. No movements are to be made through criticality zones.

3.0 Fuel Tray Movement

- 3.1 Trays containing fuel elements or wafers shall be covered not only with their mating metal lid, but encircled with a strip of tuck tape to keep the lid secure.
- 3.2 Transfer of the tray shall be made from the contaminated areas as follows:
- 3.2.1 In unloading the panel truck the driver opens the doors of the truck and secures the doors open, then backs up a few feet so the rear of the truck is over in the contaminated area. A strip of blotter paper shall be placed along the floor of the truck under the container. Proceed to unscrew the lid and unload the container.

- 3.2.2 In loading the panel truck, a strip of blotter paper shall be placed on the rear bed of the truck and then carefully insert the tray into the specialized container in the panel truck. The lid shall then be secured on the specialized container by tightening the screws. Remove the blotter paper and discard in the proper contaminated waste receptacle. The driver shall move the panel truck a few feet so he can get behind the truck in a non-contaminated area and secure the panel truck doors closed and proceed to the other building.

4.0 Restrictions

- 4.1 The panel truck may only be used off site when the specialized container is empty and secured.
- 4.2 The panel truck must be released by Industrial Hygiene before it is used off site.

SCRUBBING OF SHOP FLOORS - BUILDING 5

1.0 Scope

- 1.1 This instruction covers the scrubbing of floors in or around criticality zones in Building 5, 5A, 5C, and in adjacent areas where scrubbing is required for cleanliness or decontamination purposes:

2.0 General

- 2.1 Water is supplied for the purpose of scrubbing floors from one slop sink located in the contaminated locker room in Building 5. All waste water from scrubbing operations shall be poured into this slop sink or floor drains in Building 5 which is connected to the monitor drain tanks.
- 2.2 The only permissible scrubbing equipment is as follows:
- 2.2.1 Conventional scrubbing buckets
 - 2.2.2 Mops
 - 2.2.3 Electric scrubbing machines
 - 2.2.4 Liquid soap in 5-gallon containers with small necked pour spouts
- 2.3 All scrubbing equipment is to be stored in approved lockers in approved locations. Since this equipment is usually contaminated it is not to be used in clean areas such as the Building 4 offices or the Clean Locker Room.

3.0 Scrubbing Procedures - Crit Zone Areas

- 3.1 With respect to the scrubbing of floors, the shop area shall be divided into five scrubbing groups as follows:
- 3.1.1 Group "1" -- this includes the following crit zones and connecting aisles:

- 3.1.1.1 Crit Zones A-1, A-2, A-3, and all "B" crit zones
(such as B-1, etc.).
 - 3.1.2 Group "2" -- this includes the following crit zones and connecting
aisles:
 - 3.1.2.1 All "C" crit zones
 - 3.1.3 Group "3" -- this includes the following crit zones and connecting
aisles:
 - 3.1.3.1 All "D" crit zones
 - 3.1.4 Group "4" -- this includes the following crit zones and connecting
aisles:
 - 3.1.4.1 All "E" crit zones
 - 3.1.5 Group "5" -- this includes the following crit zones and connecting
aisles:
 - 3.1.5.1 Crit zones A-5 and A-6
- 3.2 In the event that any floor scrubbing is required in or around a given scrubbing
group, the floor supervisor will be responsible for seeing that all fuel bearing
materials in that scrubbing group must be either removed from the area or placed
in the proper storage container within the area (vault, vault storage area, wall
rack or storage cask, etc.) prior to use of water. Retaining fuel bearing materials
in furnace fixtures is also permissible.
- 3.3 Only four mop buckets containing water are allowed in any scrubbing group at one
time.
- 3.4 Mop buckets containing water shall be adequately covered with a plastic bag
when transporting the buckets from the contaminated locker room through Scrubbing
Group 1 if Scrubbing Group 1 has not been cleared for scrubbing. Plastic bags
are to cover the buckets in such a manner that material cannot fall into the water
in the bucket.

- 3.5 Mop buckets containing water shall be transported through the main aisle only in moving through scrubbing areas.

4.0 Scrubbing Procedure - Non-Fueled Areas

- 4.1 The remaining work areas and aisles in Building 5 may be scrubbed with mops, buckets, and scrubbing machines provided that care is exercised to prevent any contact of the water with fuel or fuel bearing materials and that the requirements of 3.2, 3.3, 3.4, and 3.5 are met.
- 4.2 All water generated in scrubbing shall be poured into the slop sink in the contaminated locker room, or the floor drain in Building 5.

HANDLING OF LIQUIDS

1.0 Scope

- 1.1 This instruction covers the handling and movement of liquids (water, acids, cutting oils, etc.) within the shop areas of WNCO. Shop areas for the purpose of this instruction refers to the areas of Building 5 and Building 6 that are controlled by criticality rules (crit zones).

2.0 General

- 2.1 The use of liquids in the shop areas at WNCO presents a potential nuclear hazard and the use of liquids must therefore be controlled. Liquids may only be used or stored in crit zones which specifically allow their presence and then only in the quantity approved for that crit zone.
- 2.2 The transportation of liquids also presents a potential nuclear hazard due to the fact that a critical configuration could result if sufficient uranium bearing material was spilled into the proper amount of liquid. The purpose of this instruction is to regulate the type of container and handling methods so that nuclear safety is ensured at all times.

3.0 Approved Containers for Liquids

- 3.1 The volume of liquid contained in any of the containers approved for use in the shop areas of WNCO shall not exceed one gallon.
- 3.2 Where practical, containers shall be five inches or less in diameter.
- 3.3 Where practical, containers shall have a small diameter, screw cap pouring spout. Containers that do not have a small pouring spout should have a spring-loaded (normally closed) cap.

- 3.4 Containers shall preferably be made of unbreakable material such as polyethylene or metal.
- 3.5 The use of liquids in containers that do not meet the general requirements of this paragraph shall be covered in specific crit instructions. Examples of this type of crit instruction are the scrubbing of floors and the changing of vacuum pump oil.
- 3.6 Use of any containers not listed in C. I. No. 2, Revision 900-1, is not permitted. Approval from the WANL Nuclear Safety Engineer, in writing, must be obtained prior to using any new or modified containers.

4.0 Handling of Liquids

- 4.1 Liquids shall be prepared (such as dilute acids) outside of the crit zone areas. They shall also be filled into approved containers outside of the crit zone areas. Exceptions to this rule shall be specifically approved for each crit zone and made a part of the crit zone description.
- 4.2 Liquids shall be hand carried in approved containers through aiseways only into the crit zone in which they are to be used or stored. They shall not be carried through crit zones. Only one approved container is to be transported at any one time.
- 4.3 When practical, there shall be no movement of fuel or fuel bearing material in the same aisleway being used to transport liquids.
- 4.4 Only sufficient liquid shall be stored in a crit zone to allow for operations to be conducted over a reasonable period of time. The intent of this instruction is to store as small a quantity of liquid in a crit zone as practical from an operational standpoint---"dead" or "long" storage of liquids should be done outside of the shop area.