70-1151

Westinghouse Electric Corporation
Commercial Nuclear Fuel Division

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(803) 776 2610

NRC-96-047

September 30, 1996

U.S. Nuclear Regulatory Commission
ATTN: Mr. Charles Gaskin
Licensing Section 1, Licensing Branch
FCS&S Division, NMSS
11555 Rockville Pike
Mail Stop T8D14
Rockville, MD 20852-2738

Dear Mr Gaskin:

SUBJECT: RESPONSE TO SNM-1107 LICENSE CONDITION REQUESTING SUMMARY CSE/CSA AND FAULT TREE INFORMATION

CSE/CSA summary and fault tree information is provided in this correspondence as attachments covering the remaining items scheduled for submittal September 1996 as follows:

- Incinerator System - Summary of CSE
- Ash Recovery System - Summary of CSE
- Liquid Honing System - Summary of CSE
- Ultrasonic Cleaning System - Summary of CSE
- Shredder System - Summary of CSE
- Hoods & Containment - Summary of CSA
- Laboratories - Summary of CSA

Also, a clarification of Criticality Safety Basis for the Pellet Stripping System Equipment (page 6.11) and Hoods & Containment (page 6.12) will be submitted in separate cover.

If you have any questions, please contact me at (803) 776-2610.

Sincerely,

WESTINGHOUSE ELECTRIC CORPORATION

C.F. Sanders

C.F. Sanders, Manager
Nuclear Materials Safety and Safeguards

NF044/1

Docket 70-1151 License SNM-1107

Attachment

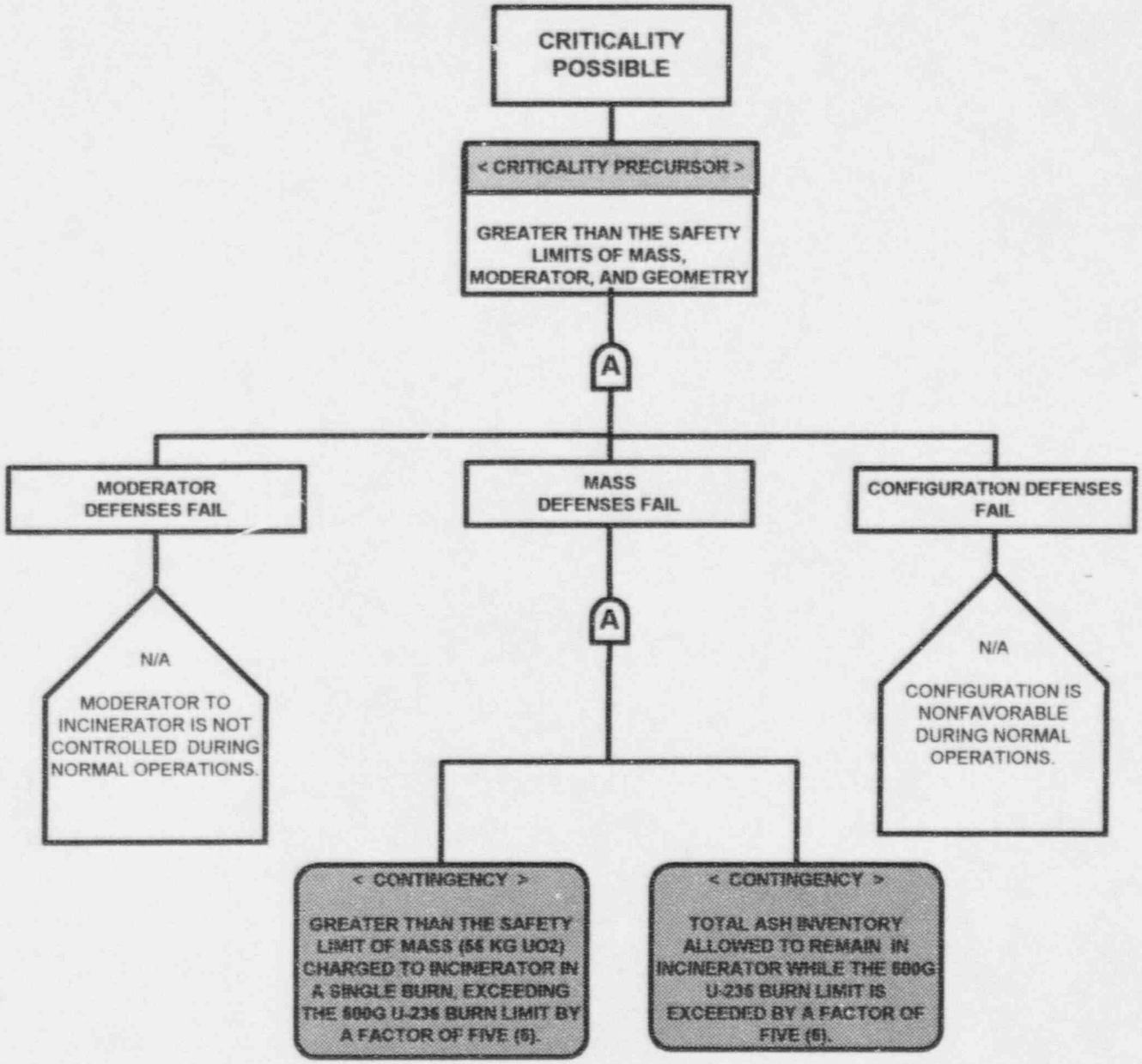
URRS INCINERATOR SYSTEM SUMMARY

The URRS incinerator is a controlled air, gas-fired two chamber unit. The upper (combustion) and lower (ignition) chambers are right horizontal nonfavorable geometry cylinders. There is an ash cooling chamber below the lower chamber, which measures 56 inches long by 22 inches wide by 9 inches high. During normal operations, operators batch-charge low gram" ^{235}U combustible scrap (typically < 12 g ^{235}U per 50 lb. drum) to the incinerator in burn campaigns, which end when 500 g ^{235}U total mass is charged. During the burn, the ash in the ignition chamber is frequently stirred, and ash is removed to the ash recovery system as needed to facilitate a comp lete burn. The ash removal system at the rear of the ignition chamber consists of a batch operation ash transfer elevator, which lifts the ash up to a favorable geometry hopper in a ventilated hood, where the ash is filtered, milled, and readied for eventual treatment for uranium recovery or solid waste disposal.

Double contingency protection for the incinerator consists of limiting the total gram ^{235}U charged to the incinerator during a burn campaign, and ensuring that the ash is removed well before the safety limit for mass is reached. The system relies on administrative and process controls applied to mass to ensure subcriticality and a large margin of safety.

Criticality in the Ash Recovery System is not credible, and is discused in the Incinerator CSE.

URRS INCINERATOR SYSTEM
CONTINGENCY PROTECTIONS



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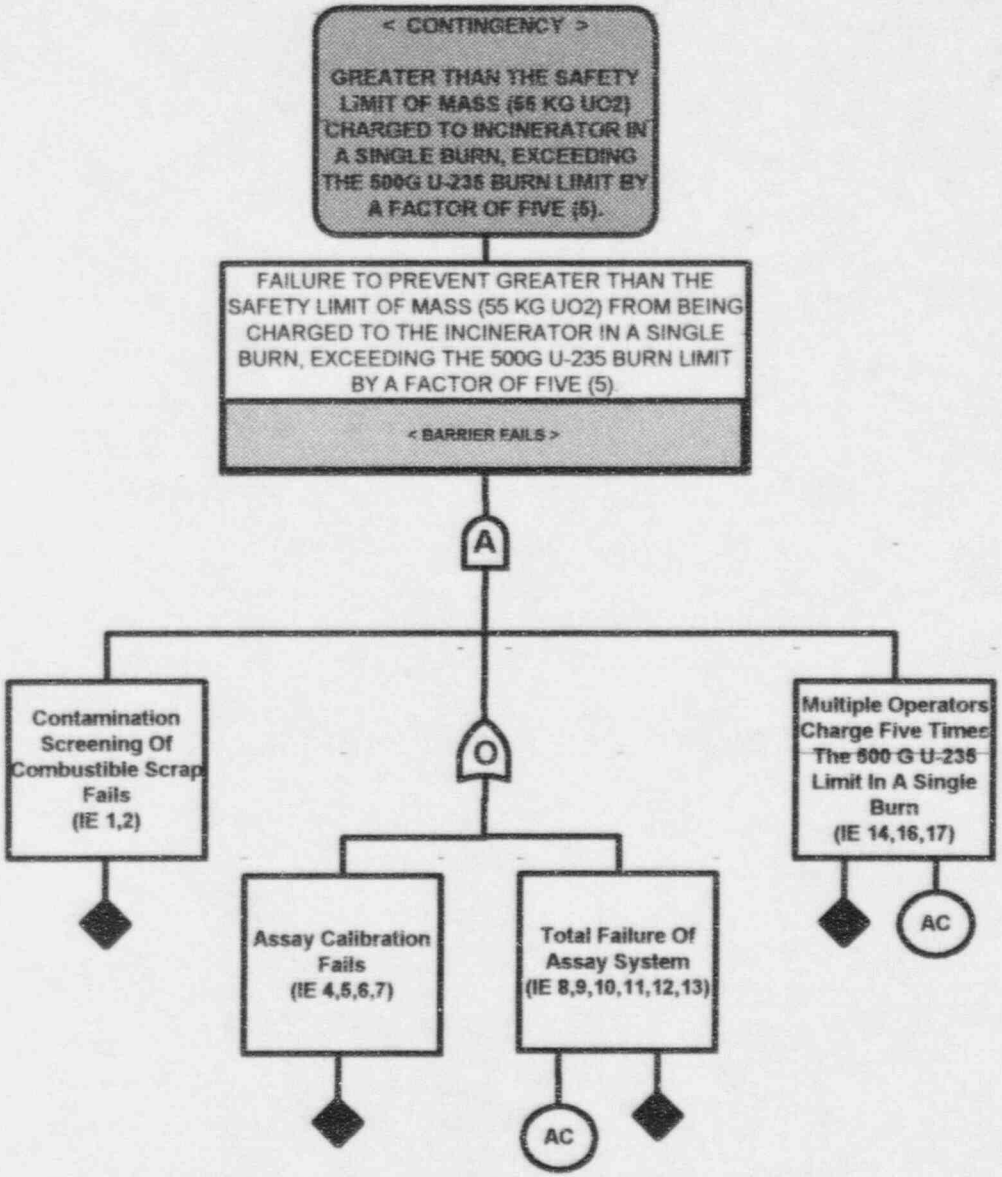
URRS INCINERATOR SYSTEM
CONTINGENCY PROTECTIONS



URRS INCINERATOR SYSTEM
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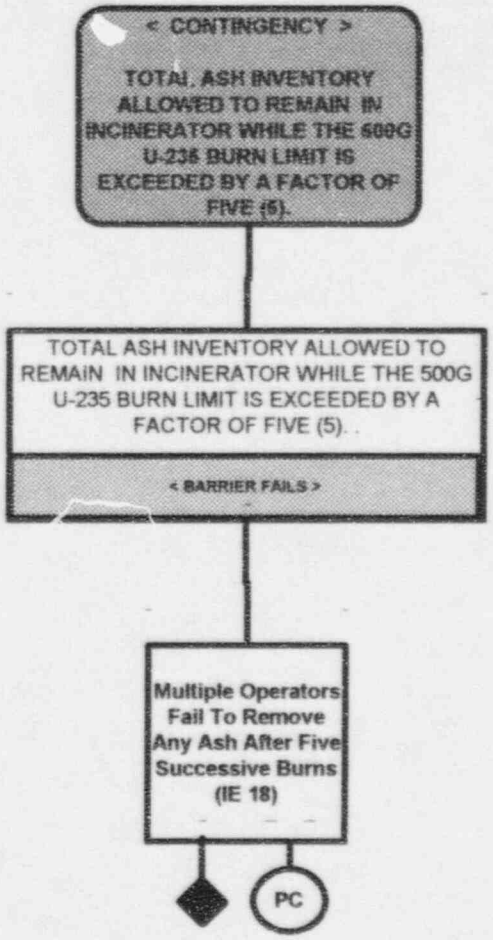


SUMMARY OF CRITICALITY SAFETY ASSESSMENT (CSA)

ASH RECOVERY SYSTEM

The Ash Recovery System was evaluated and reported on the Incinerator CSE.

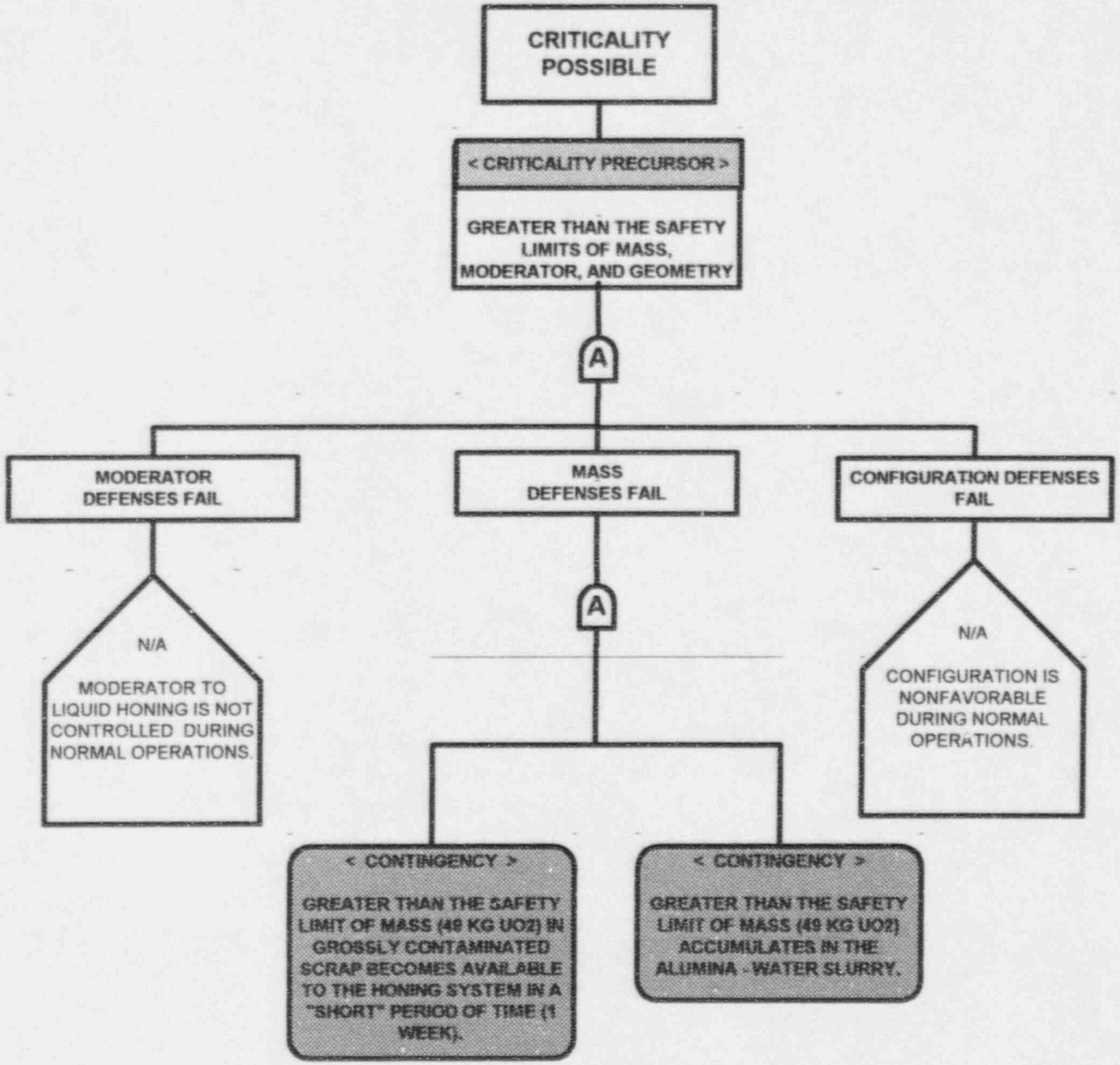
URRS LIQUID HONING SYSTEM

The liquid honing system consists of an enclosed work chamber (approximately 10'x10'x7.5'high) on top of an NFG sump. Operators clean large pieces of contaminated scrap material using either the outside work station, or standing inside the work chamber. The honing process uses a closed loop system to circulate an abrasive media slurry of alumina (60 mesh Al_2O_3) and water. The media slurry is pumped through a mixing chamber to the process decontamination guns. After removal of surface debris and contamination the slurry mixture is returned to the sump for recirculation and reuse.

The sump is actually two separate sections consisting of a geometric configuration resembling a forged ingot bar, that is, an elongated trapezoid, each with a single slurry pump. Excess water from both sumps is collected in an overflow/settling tank and either filtered for discharge or reuse in rinsing operations following honing. This settling tank measures 15"x60"x18" high and is fitted with four baffles to remove the abrasive media prior to filtering.

Double contingency protection for the liquid honing system consists of preventing greater than the safety limit of mass as grossly contaminated scrap from becoming available to the honing system over a nominally short period of time, and preventing greater than the safety limit of mass from accumulating in the alumina-water slurry. The system relies on administrative and process controls applied to mass to ensure subcriticality and a large margin of safety.

URRS LIQUID HONING SYSTEM
CONTINGENCY PROTECTIONS



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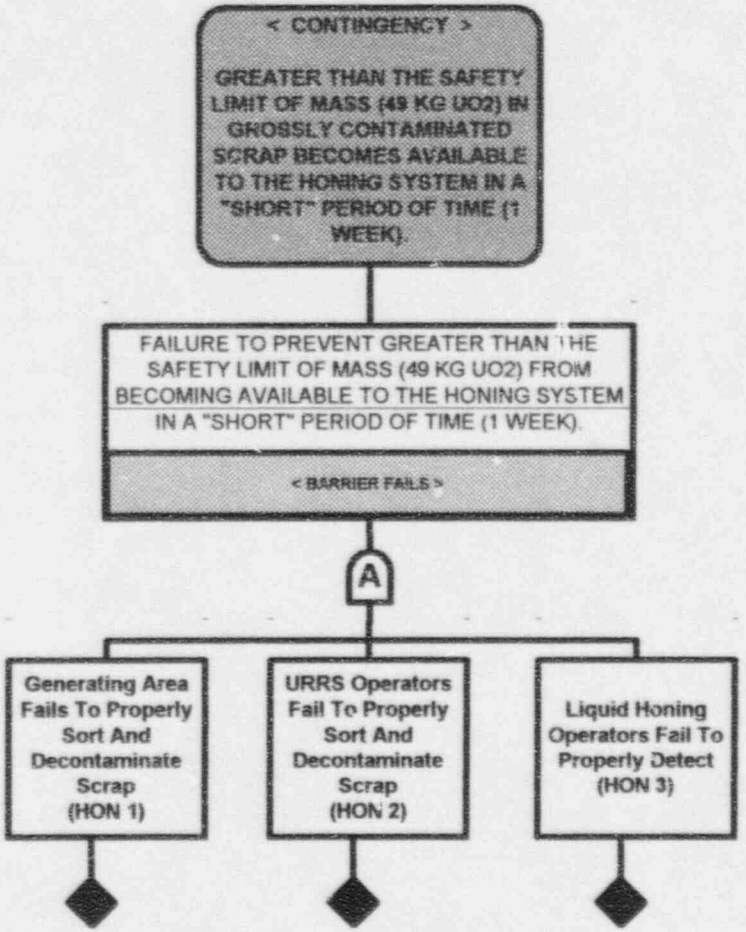

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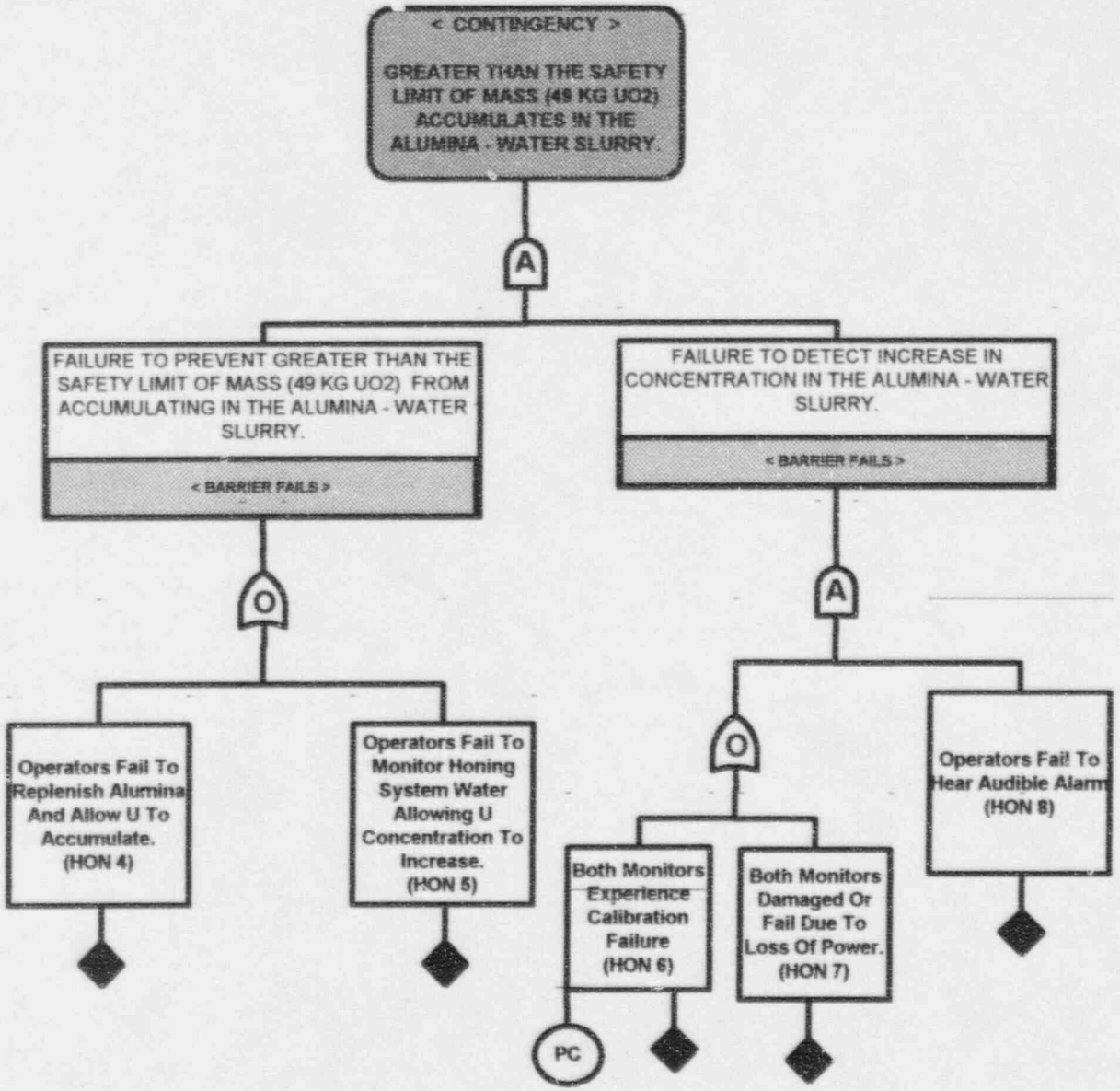
CONTINGENCY PROTECTIONS



URRS ULTRASONIC CLEANING SYSTEM

The ultrasonic cleaning system essentially consists of two deep basin nonfavorable geometry tanks and a filter press, through which the water from either tank is circulated as needed. During normal conditions, using a metal mesh cleaning basket, operators first clean the metal parts in the wash tank (T-984), and then soak them in the rinse tank (T-985). The basins are filled to level with city water. Nitric acid is added to the wash tank per engineer's instructions. There are no hidden reservoirs where uranium concentration can build up unknown to the operator. Operators continuously monitor water clarity in both tanks. If the water in either tank is dirty or discolored, it is recirculated through the filter press until clear and void of particles. If the water cannot be cleaned, it is pumped to the fluoride stripping system feed tank, and fresh city water is added.

Given the bounding assumptions as stated in the License, and the nature of the operation surrounding the ultrasonic cleaner, a criticality in the system is not credible. Calculations show that upwards of 200 kg uranium must get into either tank in order for a criticality to be possible, either to form a critical uranyl ntirate concentration or oxide mixture. See CALCNOTE CRI-96-043. Nevertheless, controls are in place to guard against getting gross amounts of fissile material in either tank.

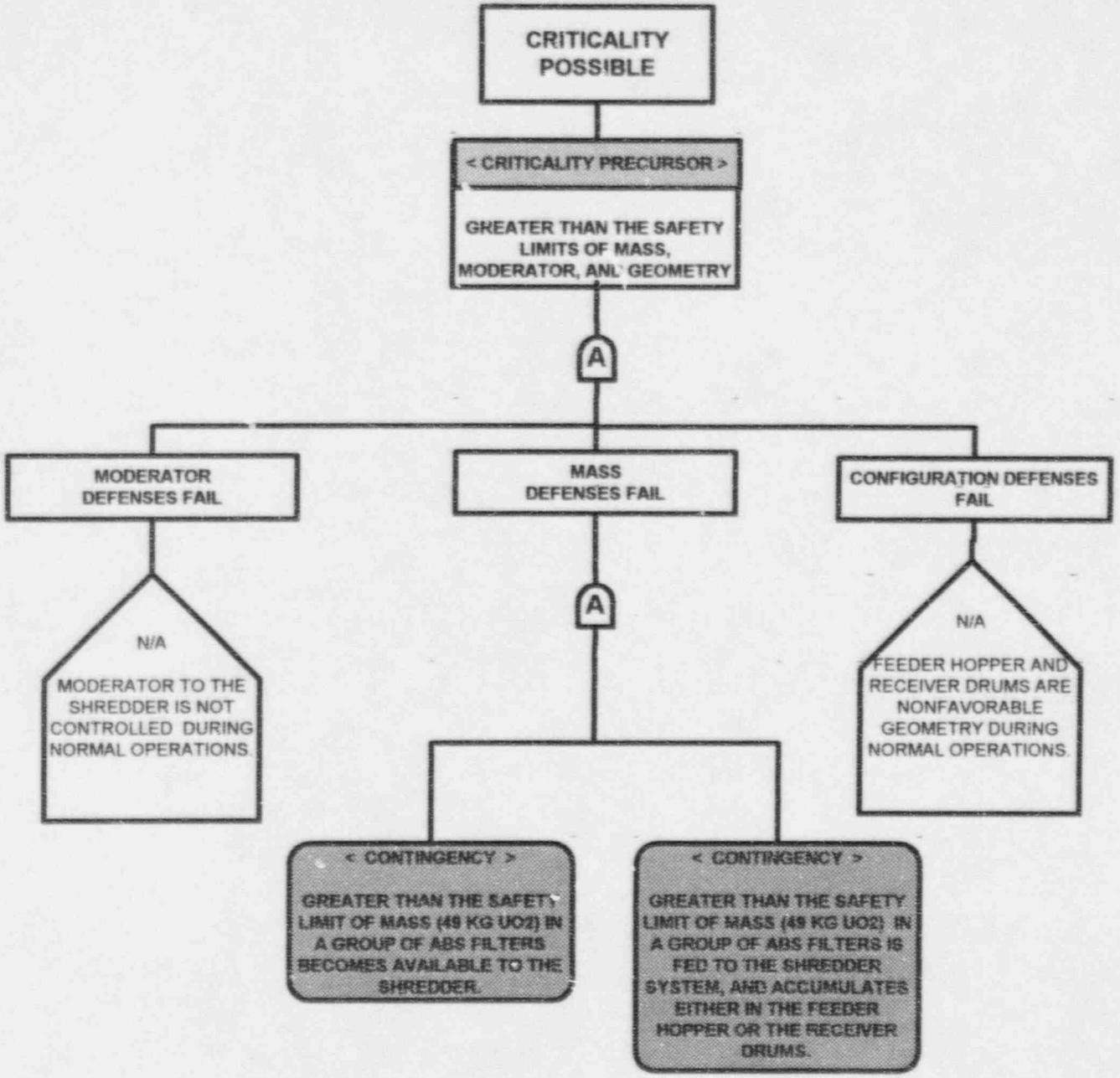
Because a criticality is not credible, no fault tree has been generated.

URRS SHREDDING SYSTEM

The Rotary Shear shredder system consists of a large, 1800 liter capacity, feed-hopper, a lift with which to take the drums up to the hopper opening, a heavy duty, shear-type shredder with an electric drive components and controls, and two 55 gallon receiver drums below. The feed hopper is an inverted rectangular cone, measuring 72 inches by 42 inches at the top, and 32 inches by 42 inches at the bottom. It is 50 inches high. It has a cover, which is opened by the operator when filling. The shredder is used for two basic operations: noncumbustible scrap volume reduction prior to shipping to SEG and eventual burial; and HEPA filter (also absolute filters, ABS filters) shredding prior to incineration. Operators manually feed properly screened and sorted non-combustible scrap material, or dirty HEPA filters, into the shredder, and remove the full receiver drums.

Criticality while shredding non-combustible scrap is not credible. Double contingency protection for the shredder when processing HEPA filters consists of preventing greater than the safety limit of mass from becoming available to the shredder, and preventing greater than the safety limit of mass from accumulating in the shredder during processing, either in the feeder-hopper or a receiver drum. The system relies on administrative and process controls applied to mass to ensure subcriticality and a large margin of safety.

URRS SHREDDER SYSTEM
CONTINGENCY PROTECTIONS



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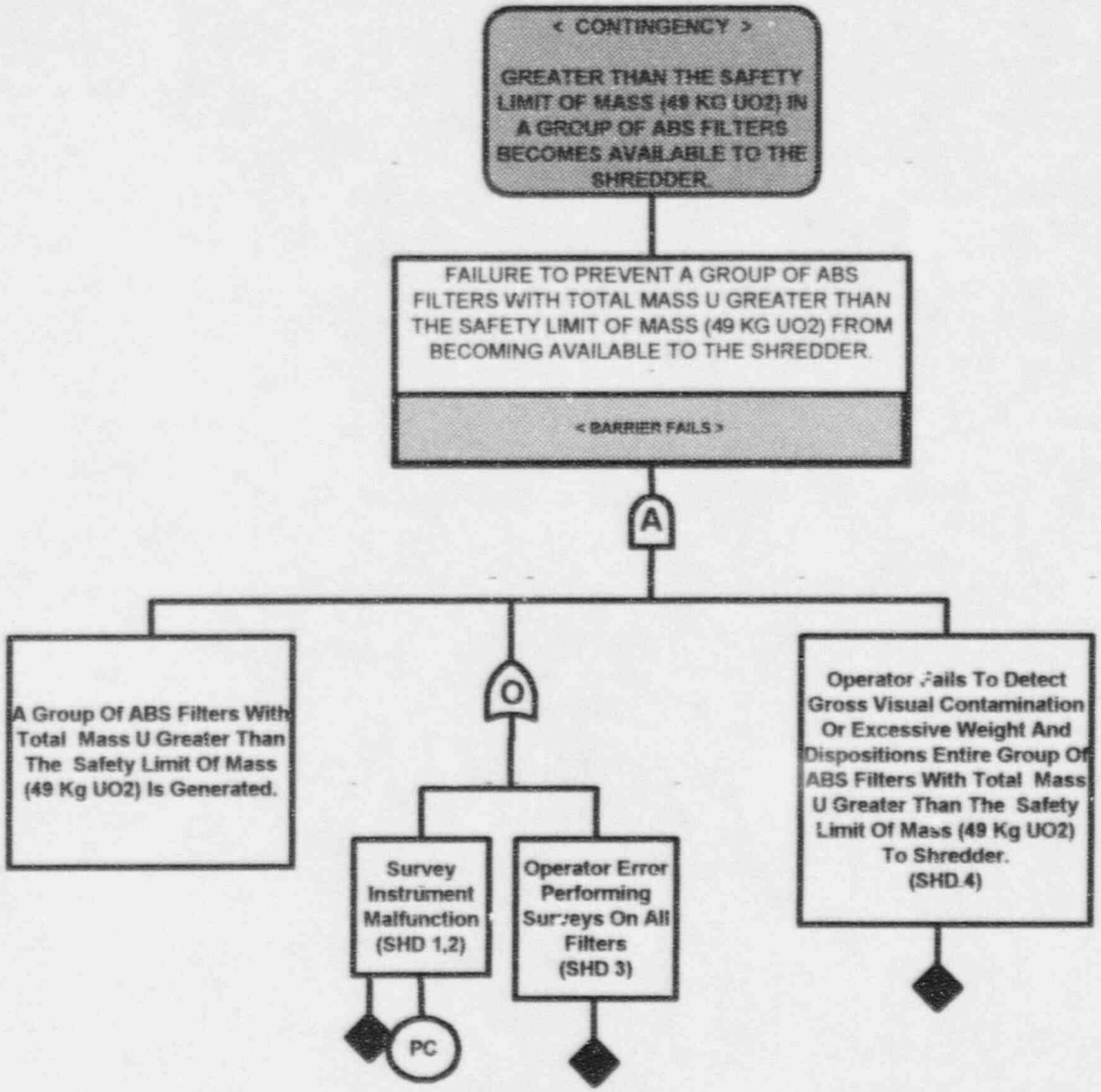

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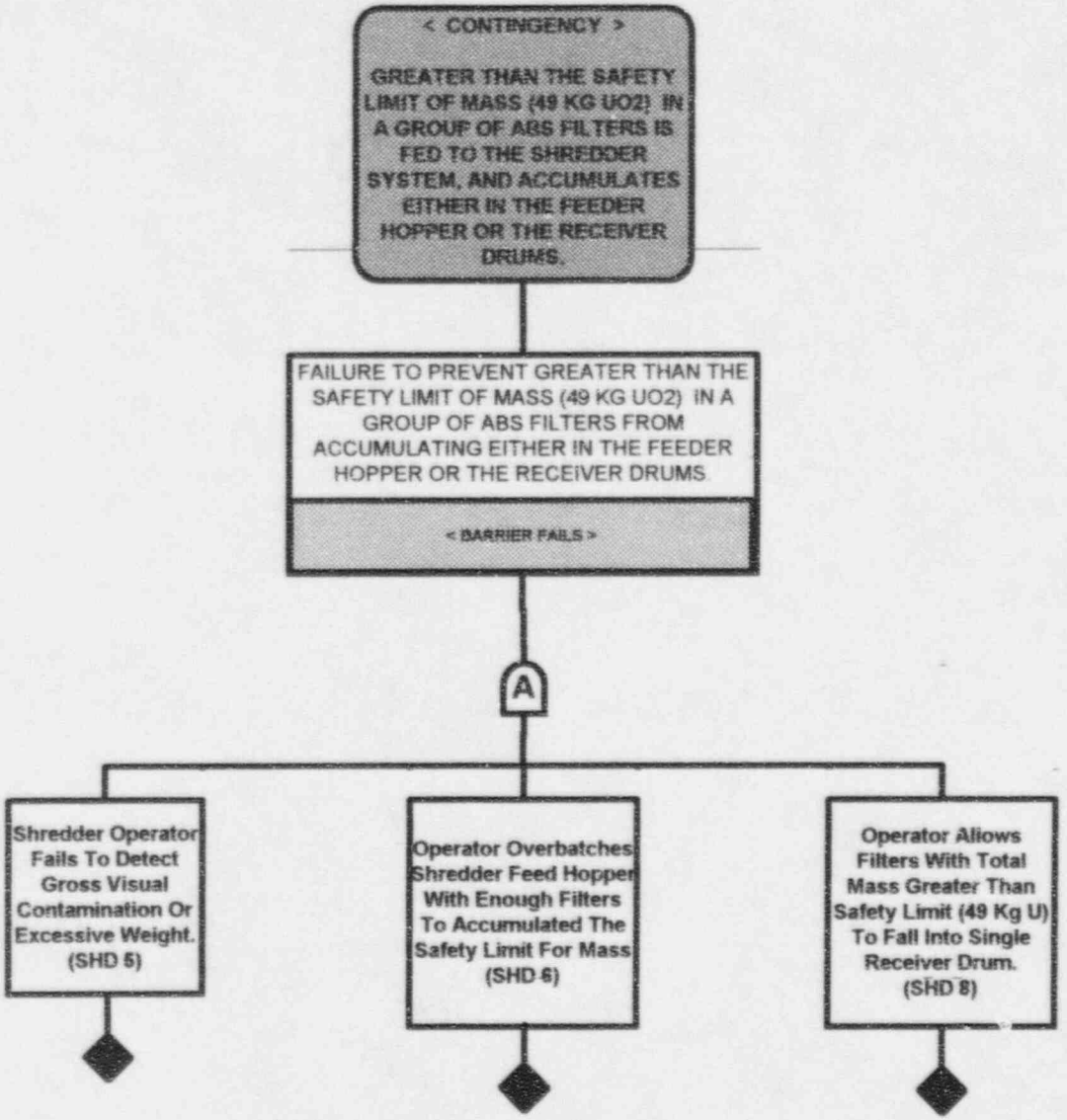

SUMMARY OF CRITICALITY SAFETY ASSESSMENT (CSA)

HOODS & CONTAINMENT

The Nuclear Criticality Safety Assessment (CSA) for Hoods & Containment includes all the various hoods throughout the plant that are used for process steps involving cleaning, disassembly, screening, oxidation, drying, sieving, inspection, loading and unloading fuel tubes, etc. Material forms include ADU, powder, sludge, and pellets, i.e., homogeneous and heterogeneous SNM.

In Section 6.2.3 of SNM-1107, the Table of Plant Systems & Parametric Controls contains the following Evaluation Bounding Assumptions for the IFBA Pellet Stripping System and for Hoods & Containment:

- Heterogeneous UO2
- Optimum H20 Moderation
- Partial Reflection

In performing the CSA, it became apparent that some clarification is needed regarding these bounding assumptions. Therefore separate from this transmittal, a license change is being submitted to replace the current entry for the IFBA Pellet Stripping System and for Hoods & Containment with two classifications: one including bounding assumptions of Homogeneous UO2 and Optimum H20 Moderation, and a second including assumptions of $\leq$ 10 wt. % water equivalent internal moderation for heterogeneous material. (Each still includes partial reflection.)

With the above clarification for material types, the Nuclear Safety Criticality Analysis for the IFBA Pellet Stripping System and for Hoods & Containment relies on a series of administrative controls to ensure subcriticality. The safety basis for homogeneous material is an array of full poly packs with optimum internal moderation and partial reflection. The safety basis for heterogeneous material is an infinite X-Y slab 4.5" high with $\leq$ 10 wt. % water equivalent internal moderation and partial reflection.

M:\RA\CSA\HOODCONT\SUM

METALLURGICAL LABORATORY (MET LAB) SUMMARY

The Metallurgical Laboratory (MET LAB) performs porosity measurement, and microstructure and grain size analysis on representative pellet samples. The analyses are performed to provide data for ongoing quality studies, and to support research and development efforts. MET LAB analyses are not used for production release.

Pellet samples are prepared for metallurgic evaluation in a multistep process; cutting and mounting, rough grinding, polishing, ultrasonic cleaning, and etching. Approximately half of each pellet is removed from the sample during preparation.

The MET LAB processes a minimal quantity of UO_2 pellets per year. The lab is under mass control, restricted to a total of 1000 grams ^{235}U. Laboratory personnel maintain a ^{235}U inventory log in accordance with procedure. A review of the log for the past two complete calendar years indicates that < 10 kg UO_2 was handled by the lab each year.

The MET LAB pellet grinder/polisher system discharge line passes through a filtration system consisting of a bag filter and cartridge (CUNO) filter housing in series. These filters are monitored by MET LAB personnel, and changed out as necessary in accordance with procedure. Dirty filters are sent to the Conversion area scrap cage for proper disposal. Because of the low mass quantities handled by the lab, the filtration system is not a criticality concern.

The MET LAB evaluation indicated that, in order for a criticality to be possible, laboratory personnel would have to stockpile pellets for at least five years in order to collect enough material to form a critical configuration. Hence, criticality is not credible.

ANALYTICAL SERVICES LABORATORY (CHEM LAB) SUMMARY

The Analytical Services Laboratory (CHEM LAB) provides routine analytical chemistry analysis for process control, product quality assurance, waste treatment and disposal, and special nuclear material accountability. The CHEM LAB analyzes several uranium compounds, including ADU, UO2 powder, UF6, U3O8, uranyl nitrate, and UO2 pellets. There are numerous function specific laboratory rooms within the facility.

Material is received by the CHEM LAB for analysis in small quantities. Sample sizes received by the lab are typically 50 grams for powder, approximately 180 pellets per shift, and 60 cc for uranyl nitrate. All scrap material is taken to one of two scrap polypacks, each in a different hood. When full, the scrap packs are exchanged for empties (once or twice a week).

Double contingency protection for the CHEM LAB consists of limiting the configuration of material in the hoods. The system relies on administrative controls applied to geometry to ensure subcriticality and a large margin of safety.

HEALTH PHYSICS (HP LAB) SUMMARY

The Health Physics Laboratory (HP Lab) is used by the Regulatory Engineering and Operations Department to provide radiation and environmental measurement and protection services for the chemical manufacturing lines. Typical activities include monitoring inplant airborne radioactivity concentrations, monitoring radioactivity levels in effluents discharge to the environment, and analyzing uranyl nitrate ^{235} U for concentration. In fact, the only function performed in the HP Lab that is of criticality safety significance is the uranyl nitrate measurement function.

At any one time, several 60 ml sample bottles are in the lab, either awaiting analysis on the Tennelec Ge-Si system. The vials are kept in one of three locations: either on a small metal tray by the Ge-Si analyzer, on a tray on a counter in the lab, or in the disposal bag on the same counter. The samples are always kept in 60 ml bottles. They are not stored in any bulk container. Finally the laboratory does not accumulate more than approximately 5 gallons worth of sample bottles (volume of one poly bag). When full, the bag is taken to the scrap cage for disposal. Hence, it does not present a criticality issue.

CHEMICAL PROCESS DEVELOPMENT LABORATORY (CPD LAB) SUMMARY

The Chemical Process Development Laboratory (CPD Lab) is used for process research, prototype development, and equipment check-out prior to installation in the manufacturing lines. Typical activities include uranium chemical processing, powder preparation and characterization, pelleting and sintering studies, development of rod loading techniques, uranium recovery and waste treatment applications, and material handling improvements to enhance airborne radioactive control.

Hence, fissile material is brought into the laboratory, either in very small quantities for studies and analyses, or in larger quantities for the purpose of performing operational tests of development projects. In the former, fissile material in the hoods, criticality safety is covered in the Hoods/Containment CSA. Concerning the latter, the responsible engineer completes a configuration control request form which is routed to Regulatory Affairs for evaluation. Any development project that includes SNM is evaluated by the criticality function on a case-by-case basis to ensure that double contingency protection exists.