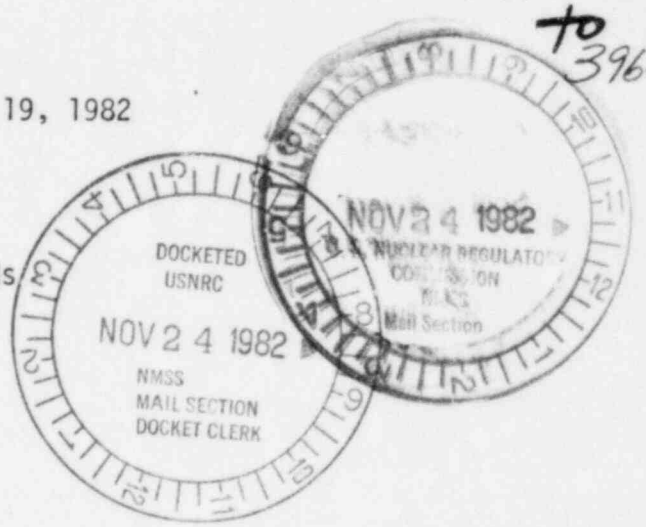
LA 82-217

70-1151
PDR
Return
to
39655

Westinghouse Electric Corporation
Water Reactor Divisions
Box 355
Pittsburgh Pennsylvania 15230

November 19, 1982



U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards
Division of Fuel Cycle and Material Safety
Washington, D.C. 20555

Attention: Mr. R. G. Page, Chief
Uranium Fuel Licensing Branch

Gentlemen:

Subject: Submittal of Additional Information to Application to License SNM-1107, Docket 70-1151 (Revisions 13 and 13a)

References: (1) Westinghouse Letter No. LA 82-70, A. J. Nardi to John G. Davis, dated March 26, 1982.

(2) NRC Letter, G. H. Bidinger to A. J. Nardi, dated November 2, 1982.

In response to Mr. G. H. Bidinger's request (Reference 2) for additional information, the Westinghouse Electric Corporation hereby submits the attached additional information for our application to amend License SNM-1107 (Reference 1). This information is provided in the form of revised pages with each page marked in the margin to identify the information which has been changed by this submittal. The original January 9, 1981 date has been retained as the date of this amendment request. However in order to clearly distinguish between these revised pages and the corresponding pages provided with Reference 1, this submittal has been designated as Revision 13a.

Attachment 2 to this letter gives a cross reference between the revised pages included in Attachment 1 and the questions provided in Mr. Bidinger's letter (Reference 2). If you have any questions regarding this matter, please call me at (412) 373-4652 or write to the above address.

Very truly yours,

A. J. Nardi

A. J. Nardi, Manager
NES License Administration

AJN/dr

Attachments

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ATTACHMENT 1

REVISION 13a

TO

LICENSE APPLICATION SNM-1107

REVISION RECORD

Revision No.	Date of Revision	Pages Revised	Revision Reason
13	1/9/81	204	Revise the enrichment.
13	1/9/81	212	Add criteria for hot water UF6 vaporizers.
13	1/9/81	215	Define moderation control criteria.
13	1/9/81	220	Add Section "f" describing fixed poisons.
13	1/9/81	232	Include the term "dry."
13	1/9/81	235	Include Sections 2.2.13 and 2.2.14.
13	1/9/81	275	Revise Table of Contents to include Section 4.7, "Transfer of Special Nuclear Material."
13	1/9/81	282	Add new Section 4.7, "Transfer of Special Nuclear Material."
13	1/9/81	123	Blank page to reflect removal of pages 123 thru 144 which described DCFB conversion process.
13a	1/9/81	60a, 60d, 166a,167a, 167b,c,d, e,f 168, 213, 213a,b,c	Revisions made in response to NRC questions in NRC letter dated November 2, 1982.

The Moderation-Controlled Area is protected against the ingress of external water (or other hydrogenous liquids), under normal and accident conditions, from areas not subject to moderation control.

The building construction (roof and walls) is of high integrity, and surround a secondary high integrity "water barrier" enclosing the Moderation-Control Area.

Equipment is designed to minimize the use of hydrogenous materials as services; only process feed lines essential to the enclosed operation are permitted to pass through the water barrier, and only analyzed hydrogenous materials and evaluated material containers specifically authorized by the radiation protection component may be introduced to the Moderation-Control Area.

Processing Operation Moderation Controls -- The nuclear criticality safety of large units of low-enriched uranium, and arrays of such units, based on moderation control where the moderator is assumed to be uniformly distributed throughout the fissile material, has been well documented in the literature (and has been in general use by the nuclear industry for many years). Moderation control can be logically extended to additional applications by establishing suitable administrative and/or engineered safeguards, which necessarily involve consideration of postulated normal and accident conditions in which the moderator might not be so uniformly distributed. A nearly infinite number of combinations of uranium mass and density, moderator mass and density, and uranium-moderator system geometry can be postulated for such applications. (Some configurations would require more moderator than a

The previously described plotted data supports the following maximum subcritical moderation levels in homogenous UO2, at an enrichment of 5 w/o U235:

Maximum permitted weight percent water equivalent in an infinite dry UO2 system - weight percent:	1.0
Maximum permitted hydrogen to uranium atomic ratio in an infinite dry UO2 system - H/U:	
- Enrichment $\leq$ 4.15 weight percent	0.5
- Enrichment $>$ 4.15 weight percent but $\leq$ 5.0 weight percent	0.3
Maximum permitted water volume to a dry (moderation-controlled), aqueous reflected UO2 system - liters:	19

The minimum quantity of water required for criticality increases as uranium enrichment falls below 5 w/o U235, and as less than full reflection is provided. This is shown in figure 1.8.1.12c which was extracted from ARH-600 data. Therefore, controls on water equivalent volumes based on 5 w/o enrichment and full reflection are shown to be conservative at lower enrichments and/or less than full reflection.

Hygroscopicity

Oxides of uranium are transported and stored in closed and sealed containers. Bulk containers are equipped with a gasket seal to minimize hygroscopic effects. A study of hygroscopic effects at the Columbia Plant indicates that oxides of uranium will attain an equilibrium H/U of less than 0.26 when subjected to a 100% relative humidity atmosphere.

Operator Training

All operations/maintenance personnel authorized to perform moderation-controlled operations have received training from the radiation protection function, with emphasis on the following:

- types of moderators and their effects on special nuclear materials,
- effects of moderator additions to bulk powders,

1.9.5.1.2 Conversion Area Operations

Comminution

Dry uranium oxide powder is conveyed from the calciner exit chute, through a milling operation into a receiving container (~150 Kg U capacity). The receiving containers are 304 stainless steel cylinders, approximately 64 inches in length and 10.4 inches inside diameter. The 10.4-inch inside diameter of the receiving containers satisfies the MPV for homogeneous oxides for enrichments $\leq$ 4.15 w/o U-235. Powder dryness is verified by representatively sampling the powder as it flows from the milling exit chute to the receiving container and analyzing the sample for moisture content. Administrative controls (e.g., visual inspection of empty containers) assure that there are no moderator materials present prior to filling. Calciner contents empty into a 6-inch equivalent diameter discharge hopper and then to a 4-inch equivalent diameter, 6 feet long screw conveyor which empties to a 6-inch equivalent diameter gravity flow section and then to the mill. Powder exiting the mill gravity flows to the 10.4-inch equivalent diameter receiving container described above. Alternatively, powder can flow from the calciner discharge hopper through a 6-inch equivalent diameter gravity flow section to an approximately 9.5-inch diameter polypak. Add-back materials are introduced to the mill via a 6-inch equivalent diameter gravity flow section into the discharge point of the screw conveyor. Polypaks are automatically discharged into a hopper which feeds the 6-inch equivalent diameter section. The total volume of the hopper is 20.4 liters which represents a safe volume. The screw conveyor and hoppers satisfy the reduced diameter requirements for ells and tees (9.4 inches and 8.6 inches respectively) for homogeneous oxide systems for enrichments $\leq$ 4.15 w/o U-235. The connecting hoppers, feed chutes and mill form a slab type gravity flow arrangement with a maximum cross section of 5.5 x 15.5 inches which is equal in cross sectional area to the MPV for homogeneous oxides for enrichments $\leq$ 4.15 w/o U-235.

Loading of Bulk Containers - Uranium oxides are transferred from geometry control containers into bulk containers by gravity feed from overhead containers via feeders. The feeders are physically attached to the bulk containers and to the feed containers. Where the feed container is a polypak, the feeder is physically connected to a ventilated enclosure which provides containment during the powder transfers. Scales are used to measure the weight of powder transferred into the bulk containers. Total mass of uranium oxides in the bulk containers is approximately 1700 Kg.

Installation and Removal of Cover Plate from Bulk Container - Bulk containers are loaded with a feeder affixed (bolted and gasketed) to the container. This feeder is repaced with a cover plate (bolted and gasketed) which is attached to the bulk container during blending and storage. Secondary containment and ventilation are provided to minimize airborne radioactivity during installation and removal of the cover plate and feeder.

Blending - Bulk containers are transferred via lift truck to the blending station consisting of a hydraulic clamping device to hold the bulk container and a hydraulic container rotating device. The clamping device contains approximately three gallons of low-hydrogenous hydraulic fluid (~5.5 ppm hydrogen). The rotating mechanism contains approximately fifty gallons of hydraulic fluid

which is physically shielded from the container being blended and from other nongeometry controlled containers in the area. Since the bulk containers are sealed during blending, no special radiological safety controls are required.

Container Sampling - Samples of powder are extracted from the containers as required by product specifications. A sampler station with appropriate containment and ventilation is provided to minimize airborne radioactivity.

- Powder Transfer and Rework -- Powder is transferred between containers for purposes such as remilling, consolidation, and off-loading powder into pre-production containers.

  Remilling and consolidation involve powder transfers between bulk containers and from 150 kg containers to bulk containers as required, using gravity feed from overhead containers via a feeder. Although the connectors between the containers are sealed, secondary containment and ventilation are provided to minimize airborne radioactivity during connecting and disconnecting steps.

  Powder can be off-loaded into moderation controlled containers (~60 kg capacity) or geometry controlled containers (polypaks) depending upon the required sample size for pre-production purposes.

Powder is transferred to the 60 kg container by connecting the 60 kg container to the bulk container, using gravity powder feed from the bulk container. Secondary containment and ventilation are provided to minimize airborne radioactivity during connecting ard disconnecting steps. When filled, the 60 kg containers are sampled within ventilated enclosures, transported to a pellet line and off-loaded within the enclosure described in Section 1.9.5.1.5. The 60 kg containers are subject to the same philosophy as the bulk container, when in transit from the Blending/Storage Area to the pellet lines, to assure that hydrogenous materials are excluded from the containers. The containers are transported within a cart designed to protect the container during transport.

Powder can be transferred from the bulk container to polypaks using gravity flow through a feeder to a polypak which is mated to the feeder via a pressure fit between the top of the polypak and a gasket. The polypak and connecting surfaces are enclosed within ventilated confinement.

The following controls are in effect for polypaks used within the moderation controlled area:

1. Prior to bringing polypaks containing SNM into the moderation controlled area, appropriate moisture determinations shall be completed to confirm "dryness" and the containers appropriately labelled.

2. Polypaks shall be stored in a designated area to assure that there are no commingling of polypaks and moderation controlled powder (e.g. preclude polypak storage between bulk containers).

3. Procedural controls are in effect which provide specific handling criteria for polypaks, particularly during powder transfers, polypak transfers and storage. Procedures are reviewed and approved by the radiation protection component.

Storage - Uranium-bearing polypaks and 150 Kg containers on geometry-controlled transfer carts are permitted to be stored in this area. Storage is provided for geometry controlled and bulk containers to assure a minimum 12-inch edge-to-edge spacing. Designated storage areas are provided for polypaks to assure that there are no commingling of polypaks and moderation controlled powder.

Bulk Container Description

The bulk containers are approximately 60 cubic feet capacity, with a 48 x 42 inch rectangular cross section, approximately 80 inches in length with a conical end which tapers to approximately 16 inches. The tapered end is equipped with a flange

to which a flange cover or vibratory feeder can be attached. The units are fabricated from minimum 0.140 inch thick 304 stainless steel. Flange covers and vibratory feeder flanges are constructed of minimum 0.250 inch thick 304 stainless steel with approximately one inch wide by approximately 1/8 inch thick gasket and bolted to the cone with 1/2 inch bolts at approximately 5-inch spacings. The container is equipped with an angle iron frame which provides structural support and protects the container from physical damage during transport and storage.

A vent located near the bottom/top of the rectangular area is equipped with two metal filters and a quick disconnect fitting.

Each end of the frame is equipped with a steel plate approximately 3/16 inch thick to protect the container during transport. (Physical protection is also provided for the other four sides of the container during transport.)

Bulk containers are designed, constructed and tested in accordance with applicable portions of 49 CFR 178.251 and 178.252 for specification 56 portable tanks.

Radiological Safety

Powder transfer operations utilize sealed connections for powder containment. Furthermore, secondary ventilated enclosures are provided to minimize airborne radioactivity during connecting and disconnecting operations. Exhaust air is discharged through HEPA filtration.

Radiation protection programs are conducted in accordance with this license.

Nuclear Criticality Safety

The following administrative controls are in effect for operations conducted in the Blending/Storage Area:

- The types and amounts of hydrogenous materials permitted in the Blending/Storage Area are specifically authorized by the radiation protection component.
- Vessels are limited to safe geometry or safe volume except for process vessels and LSA waste containers.
- Before introduction of SNM into unsafe geometry containers, the containers are inspected to verify that they are free of hydrogenous materials and that the materials to be introduced are acceptable. This inspection is documented and is verified by a second person.
- Only authorized individuals are permitted access to the Blending/Storage Area.
- When maintenance is performed on the Blending/Storage Area water barrier, procedural controls are instituted to limit operations until the barrier integrity is reestablished.

1.9.5.1.4 Powder Transport

Method of Transport

Bulk containers are transported using a hydraulic lift truck which is equipped with physical shields to protect the containers during transport to and from the Blending/Storage Area. Hydraulic fluid associated with the lift truck is physically shielded from the bulk container being transported and from other bulk containers in the Blending/Storage Area except where the volume of hydraulic fluid is less than 19 liters..

Bulk containers are transported, via lift truck, from the Blending/Storage Area to an appropriate pellet line for further processing. The following controls are in effect during bulk container transport: (1) the bulk containers are physically protected from damage during transport, (2) transport speed is limited to ∿3 feet per second by a governor device, (3) the bulk containers are always transported with the feeder mechanism in the down position, (4) the feeder valve is closed and equipped with a water-tight gasketed cap ir place, (5) during bulk container transports, the activities are subject to continuous operator surveillance, (6) except for maintenance operations on empty containers, bulk containers are transported directly from the Blending/Storage Area to the Pellet Area and returned, (7) all bolts used to seal the bulk containers are provided with lock wires or equivalent to assure that a water-tight closure is maintained.

2.2.12 (continued)

Cooling water flow monitoring devices.

Pressure monitoring devices in the breech and scrubber exhaust.

A means for automatic shutdown of the incinerator in case of insufficient negative pressure in the breech and scrubber exhaust.

Continuous, representative gaseous effluent sampler.

HEPA filtered exhaust and ash removal systems.

A means of monitoring and adjustment of the pH of scrubber solutions.

Maintenance of a log indicating the mass of 235U charged and removed for each burn cycle, and the cumulative total of the net, assumed to remain in the incinerator.

2.2.13 Moderation Control Areas

Fire control in areas of the Manufacturing Building where uranium is processed, handled, or stored under moderation control criteria shall receive particular attention, as follows:

- Special consideration shall be given to use of fire-resistive or noncombustible building components, equipment, and materials. Enclosures shall be constructed using non-combustible components where practicable; where visibility or other operating requirements dictate their use, plastics or other enclosure materials shall conform to Class 1 fire rating.
- Personnel shall receive training in the importance of minimizing the accumulation of combustible materials. Monthly audits by the radiation protection component shall include this item.
- Special consideration shall be given to the prompt disposal of combustible waste. Waste generated during work activities shall be stored in metal containers having fire protection covers with containers emptied promptly when filled.
- A readily available supply of portable fire extinguishers suitable for use on the specific hazards encountered shall be provided.

- Such areas shall be subject to administrative controls, including specific personnel training and appropriate posting of instructions, to assure that only permissible firefighting means and materials are used.

All possible sources of moderator to the Moderation-Controlled Area (through service flows, etc.) shall be minimized to the extent practicable; then, those remaining shall be evaluated by the radiation protection component using the double contingency principle. All possible sources of moderator to the moderation-controlled nuclear material (process equipment, bulk containers, etc.) shall be minimized to the extent practicable; then, those remaining shall be investigated by the radiation protection component, and controls shall be installed, which conform with the double contingency principle. The radiation protection component shall review the initial designs, subsequent modifications to equipment and introductions of moderators into moderation controlled areas and materials, prior to implementation and following any changes to assure that double contingency criteria are maintained. Moderator additions may be controlled on a generic or case-by-case basis.

During nonprocess operations, such as maintenance involving temporary openings in the area hydrogenous barrier, moderation-controlled equipment and bulk containers within the affected area shall not be opened without prior unloading of the fissile material.

Moderation-Controlled Areas shall be conspicuously posted with instructions that only evaluated material containers, and other authorized moderators specifically approved by the radiation protection component may be introduced to the area. Individual containers of moderator (e.g. water) shall be limited to 5 gallon capacity.

Moderator additions to moderation-controlled processes (e.g., IDR operations) shall be made batchwise so that accidental addition of large quantities of moderator has a low probability.

Controls associated with transfers of enriched uranium from geometry-controlled containers to moderation-controlled containers (e.g., completion of moisture determinations, container sealing, verifying that moderation-controlled containers are free of hydrogenous materials) shall be documented. This documentation shall be overchecked for completeness and accuracy by an individual other than the one performing the original determination prior to further processing of the material. Moisture determinations shall be completed before the material is transferred into moderation controlled areas.

Monthly audits shall be conducted by the radiation protection component to verify continued proper functioning of moderation-control systems and controls.

Nuclear criticality safety analysis of moderation-controlled operations shall include consideration of the effect of accidental moderator double batching (e.g., IDR operations).

The following controls shall apply when bulk containers containing fissile material, are removed from the Moderation-Controlled Area:

- During transport, bulk containers shall be physically protected (barrier shield, etc.) against conditions incident to transport.
- During transport, storage and powder off-loading, the bulk containers shall be oriented with the discharge feeder in the "down" position.

- During powder off-loading and container breaches, controls shall be established to assure that a closed system is maintained, providing positive containment of powder and precluding accidental introduction of moderating materials. This containment shall consist of a ventilated confinement surrounding the bulk powder container and discharge equipment and designed to exclude moderator material.
- Bulk containers shall be designed, constructed, and tested in accordance with applicable specifications in Title 49, Code of Federal Regulations, Part 178.251 and 178.252, for Specification 56 portable tanks.
- Container closure devices (gaskets, flanges, etc.) shall be inspected for integrity prior to each closure.
- Bulk container hoists shall be designed and operated to provide a margin of safety for both routine and accident conditions, including excess speed braking provision, brake-motor interlocks, semiannual load testing of hoists and chains or cables.

ATTACHMENT 2

RESPONSE TO BIDINGER S NOVEMBER 2, 1982 LETTER

REVISED PAGES	REASON
60a	Deleted specific example of facility design aspects.
60d	Specify maximum H/U values for two categories of enrichments (less than or equal to 4.15 w/o and greater than 4.15 w/o but less than or equal to 5.0 w/o) (responds to paragraph 2 of Bidinger's question #1).
166a	Add two sentences describing add-back of materials to Fitzmill via polypaks (responds to Bidinger's question #2).
167a	Add a description of powder transfers in moderation controlled area via polypaks (responds to Bidinger's question #2).
167b,c,d,e	Modify "Storage" section. Note pages 167d and 167e are new because of these additions (responds to Bidinger's question #2).
168	Modify "Method of Transport" section to reflect design change.
213	Provide more specifics for fire control in moderation controlled areas (responds to Bidinger's question #3).
213a	Modify criteria for moderation controlled areas (responds to Bidinger's questions #1 and 3).
213b	Modify criteria for moderation controlled areas (responds to Bidinger's questions #3 and 4).
213c	Modify criteria for moderation controlled areas (responds to Bidinger's question #3).