ENTERGY

Entergy Operations, Inc.
1448 S.R. 333
Russellville, AR 72801
Tel 501 858-5000

May 17, 1996

0CAN059606

U. S. Nuclear Regulatory Commission
Document Control Desk
Mail Station P1-137
Washington, DC 20555

Subject: Arkansas Nuclear One - Units 1 and 2
Docket Nos. 50-313 and 50-368
License Nos. DPR-51 and NPF-6
NRC Bulletin 96-02 30 Day Response

Gentlemen:

NRC Bulletin 96-02, "Movement of Heavy Loads over Spent Fuel, Over Fuel in the Reactor Core, or Over Safety-Related Equipment," dated April 11, 1996 (0CNA049618), requested licensees to provide a 30 day response to address the licensee's review of its plans and capabilities to handle heavy loads. Attached is the response to items (1) through (4) of the bulletin for both of the Arkansas Nuclear One (ANO) units. Due to time constraints associated with a concurrent dry fuel storage inspection as discussed with the ANO NRR Project Manager on May 13, 1996, a one week extension to the required 30 day response was requested.

Entergy Operations at ANO is currently in the process of preparing to transport spent nuclear fuel from the ANO-1 and ANO-2 spent fuel pools to an onsite independent spent fuel storage installation (ISFSI). The transportation and storage of the spent fuel will be accomplished utilizing the Sierra Nuclear dry fuel ventilated storage cask (VSC-24) system licensed under 10CFR72. In preparation for the actual fuel movement, multiple practice exercises have been conducted utilizing the casks. Prior to these cask moves, extensive evaluations were conducted to ensure the continued safe operation of the facility and full compliance with the license and applicable NRC regulations.

Should you have any questions, please contact me.

JE11

Very truly yours,

Dwight C. Mims

Dwigl t C. Mims
Direcior, Nuclear Safety

DCM/nbm
Attachment

To the best of my knowledge and belief, the statements contained in this submittal are true.

SUBSCRIBED AND SWORN TO before me, a Notary Public in and for Johnson **County and the State of Arkansas, this** 17 **day of** May**, 1996.**

Juana M. Tapp
Notary Public
My Commission Expires 11-8-2000

OFFICIAL SEAL
JUANA M. TAPP
NOTARY PUBLIC - ARKANSAS
JOHNSON COUNTY
My Commission Expires: 11 - 8 - 2000

cc: Mr. Leonard J. Callan
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-8064

NRC Senior Resident Inspector
Arkansas Nuclear One
P.O. Box 310
London, AR 72847

Mr. George Kalman
NF R Project Manager Region IV/ANO-1 & 2
U. S. Nuclear Regulatory Commission
NRR Mail Stop 13-H-3
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

NRC Bulletin 96-02 Required Response

(1) For licensees planning to implement activities involving the handling of heavy loads over spent fuel, fuel in the reactor core, or safety-related equipment within the next 2 years, provide the following:

> ***A report, within 30 days, that addresses the licensee's review of its plans and capabilities to handle heavy loads while the reactor is at power (in all modes other than cold shutdown, refueling, and defueled) in accordance with existing regulatory guidelines. The report should also indicate whether the activities are within the licensing basis and should include, if necessary, a schedule for submission of a license amendment request. Additionally the report should indicate whether changes to Technical Specifications will be required.***

Response for spent fuel area (cask handling) crane L-3 (common), and turbine building cranes L-1 (Unit-1) and 2L-1 (Unit-2):

The following is a review of the NUREG-0612 guidelines applicable to the non single-failure proof cranes utilized in moving spent fuel casks from either unit's spent fuel pool to storage on ANO's ISFSI pad, and how the guidelines are applied. The fuel is moved from the spent fuel pool via the cask loading pit utilizing a multi-assembly sealed basket transfer cask/multi-assembly sealed basket (MTC/MSB), across the spent fuel pool floor, and down 50 feet to a special rail car in the train bay utilizing the spent fuel pool crane (L-3). The MTC/MSB is pulled to the turbine building end of the train bay where it is lifted and set on top of the ventilated concrete cask (VCC) using the turbine building crane L-1 or 2L-1. The L-1 or 2L-1 crane then attaches to the MSB and lowers it into the VCC through movable doors in the bottom of the MTC. The spent fuel loading sequence, starting with placing the empty fuel basket and transfer cask in the cask loading pit, is captured by the following maximum heavy load lifts:

1) Lower the MTC/MSB into the cask loading pit (with yoke)	132,091 lbs
2) Lower the shield lid onto the MSB following fuel loading	6,449 lbs
3) Raise the cask full of water, fuel, and shield lid (with yoke)	197,755 lbs
4) Following draining and welding, transport the loaded and sealed cask to the hatch (with yoke)	187,235 lbs
5) Lower the cask to the train bay floor	50'
6) Lift the cask to the top of the VCC	20'
7) Lower the MSB with fuel into the VCC	70,708 lbs

Each lift is evaluated as appropriate in the following summary of NUREG-0612 requirements. The NUREG-0612 requirement is in bold print followed by ANO's method of compliance. NUREG-0612 provides guidelines for crane operations at nuclear power plants. The objectives of the guidelines are to assure that the potential for a load drop

near spent fuel or safe shutdown systems is extremely small, and for each area of concern, the following evaluation criteria are satisfied:

I. Off-site dose as a result of damage to spent fuel from a dropped load will be within 1/4 of 10CFR100 limits, i.e., less than 75 rem thyroid and 6.25 rem whole body.

The 50 ft. cask drop documented in each of the ANO units' safety analysis reports (SARs) was evaluated for the MTC/MSB assembly to be utilized at ANO. Since the spent fuel capsule will hold 24 fuel assemblies, a dose analysis was performed to verify that margins to safety would be maintained. The analysis was performed with 24 fuel assemblies, a post discharge cooling time of the fuel of 5 years, NRC Standard Review Plan NUREG-0800 source terms, and the use of certain Regulatory Guide 1.25 assumptions. The new analysis concluded that the site boundary dose for both units is predicted to be near zero thyroid and 0.01 rem whole body. The dose consequences of a dropped shield lid onto spent fuel loaded in the MSB are discussed in the following item II.

II. Damage to fuel in storage racks involving the drop of a heavy load does not result in a configuration of fuel such that k_{eff} is larger than 0.95.

The MSB shield lid is considered a heavy load under plant procedures because it weights over 2000 pounds. The lid is lowered into the cask loading pit and placed on top of the MSB which contains 24 spent fuel assemblies. This is the only scenario in which a dry fuel storage cask component or any other heavy load is suspended over spent fuel in the cask loading pit. The cask loading pits are not considered part of the spent fuel pool whenever the gate is installed; therefore, lifts over 2000 pounds are not performed over fuel in the spent fuel pool per both units' technical specifications. The MSB shield lid forms the first barrier between the spent fuel and the personnel performing cask closure actions and weighs approximately 6,450 pounds.

The drop of the shield lid into the open MSB could damage a number of fuel assemblies. The lid, at the optimum angle, could penetrate as much as 30 inches below the shield plate support ring before being stopped by the ring and the top of the grid assembly. At that depth of penetration, approximately 16 inches for Unit-1 and 28 inches for Unit-2 of spent fuel in the middle two rows of fuel grid assemblies would be at least partially crushed. However, the MSB shield lid is utilized with spent fuel that has operated in the reactor for a long enough period such that the irradiated fuel reactivity is less than or equal to 1.35 weight percent of U-235 for un-irradiated fuel.

If the shield lid were dropped into the top of the loaded MSB such that the spent fuel is crushed, criticality would not be possible as demonstrated by NUREG-0612 section 2.2 (Table 2.2-2 approximate K_{EFF} for 2.0 weight percent U-235) due to required burn-up and the minimum boron content of the cask loading pit. The resultant K_{EFF} from a scenario in which the rack and fuel is crushed to maximize K_∞ with water containing 3000 ppm boron concentration (minimum 2850 ppm required) is 0.93. Table 2.2-1 of NUREG-0612 notes that 0.9 weight percent U-235 is the typical enrichment for discharged fuel and lists a K_{EFF} of 0.74 with 2000 ppm boron spent fuel pool water, and thus, it is concluded that the criticality limit of less than or equal to 0.95 K_{EFF} is enveloped. In addition, the radiological consequences of the drop of the shield lid and subsequent breach of fuel rods would result in a release of primarily Kr-85 in a much smaller quantity than that calculated for the cask drop in the train bay. The resulting site boundary dose from the drop of the shield lid and breach of the fuel would be lower than the train bay cask drop analysis results.

III. Damage to the reactor vessel or spent fuel pool from the drop of a heavy load is limited so as not to result in water leakage that could uncover fuel.

The cask loading pit is isolated from the main spent fuel pool by the spent fuel pool gate whenever heavy loads are suspended in the pit. Control of heavy loads over the pool is accomplished by a combination of physical barriers and administrative controls. Interlocks provide loss of power to the crane prior to reaching the edge of the pool. Power from a second set of breakers must be applied prior to moving a load to and over the pools. Further movement is controlled by procedure instructions/approved load paths.

The only suspended loads approved for use over the pool that weigh 2000 pounds or more are the pool gates. The impact on the spent fuel pool from a dropped gate has been evaluated and determined not to result in damage which would affect the integrity of the pools. To avoid damage to spent fuel, the fuel rack rows immediately adjacent to the gates are not loaded with fuel.

IV. Damage to equipment in dual shutdown paths from a heavy load drop will be limited so as not to result in loss of required safe shutdown functions.

Following loading of the MTC/MSB assembly (heaviest fuel, control rod assemblies, shield lid, structural lid, and impact material for a total weight of approximately 94 tons), it is moved utilizing the spent fuel pool area crane L-3 to the train bay equipment hatch. During its travel along the path required by the ANO heavy load procedure and the L-3 crane operating procedure, the assembly will pass across the top of one unit's

control room (which control room depends on the unit pool that loaded fuel).

The structural capacity of the floors (404' elevation) has been analyzed to determine required restrictions on the loaded cask movement to prevent damage to the control rooms (or any other safety-related equipment) should the assembly be dropped. This analysis concluded that limiting the height of the MTC above the floor and use of an impact limiting material combined with other controls, such as lock out of controls, etc., would assure no safety-related equipment would be affected by a cask drop. This is accomplished by use of an three inch thick impact pad that is attached directly to the MTC and by a limit in height of the cask to a maximum of nine inches above the floor level during most of the cask's travel to the train bay hatch. The NRC has approved the Unit-1 analysis in technical specification amendment 173.

An exception to the use of single impact limiting pad for the MTC is during the process of removing the MTC from the work platform over the cask loading pad. During that portion of loaded cask travel, the MTC/MSB assembly must be raised sufficiently to clear the top edge of the work platform (approximately 30 inches from the spent fuel area floor) in order to move it away from the pit. The areas next to the cask loading pits are not close enough to either unit's control room for them to be in danger from the consequences of a cask drop from the additional height needed to pass over the platform. However, an additional layer of impact material is placed on the floor in the pathway (in the cask wash down pit) to preclude damage to the 404' elevation floor from a cask drop of approximately thirty inches at this location. Once the MTC is lowered to near the height of the wash down pit impact pad, it will be within the height restriction limits required for the balance of the journey to the train bay hatch.

From the train bay hatch to the transfer of the MSB into the VCC, the loaded transfer cask is not carried above any safety-related or safe shutdown equipment. However, a cask drop impact structure, consisting of two layers of 10"x10" tube steel 34 feet long with a 23 inch thick balsa type impact inhibitor on top, is utilized in the train bay under the hatch shaft to the spent fuel pool area. Without the impact structure, analysis (and the ANO-2 SAR) indicates that if the cask were dropped during its travel to or from the spent fuel pool area floor level, the cask would penetrate the train bay floor and the next lower floor.

The result of this postulated drop would be that the cask structural limits would be exceeded due to de-acceleration forces; however, redundant safety-related equipment would not be affected. With the impact structure, the combination of crushing the tube steel and impact inhibitor with the

bending (but not breaking) of the train bay floor would prevent penetration of the 354' elevation floor. The balsa wood impact inhibitor bearing directly upon the impact structure would slow the cask such that its structural limits would not be exceeded. Use of the impact structure prevents perforation of the train bay slab, and no safety-related systems are affected. If any spalling were to be encountered, the components, systems, and support structures will remain code qualified.

To aid in assuring that the criteria are met, the following should be satisfied for handling the heavy loads (from 5.1.1 of NUREG-0612):

1) Safe load paths should be defined for the movement of the heavy load. Deviations from a defined load path should require written evaluation and approval from the plant safety committee.

The loads paths have been determined, analyzed, and documented in procedures for control of heavy loads and the crane operating procedures for the cranes utilized. The crane procedures have been reviewed and approved by the ANO plant safety committee. Any load not previously analyzed which utilizes a load path specified in the site heavy load procedure is required to be reviewed and documented by engineering. This review includes consideration of the crane lifting capacity, rigging, and adherence to the load path sketches in the appropriate procedure with any deviations analyzed with respect to locations of the reactor vessel, fuel, or safe shutdown equipment. Revisions to heavy load procedures and associated 10CFR50.59 evaluations are reviewed and approved by the plant safety committee.

2) Procedures should be developed to cover load handling operations for heavy loads that are or could be handled in proximity to spent fuel or safe shutdown equipment. The procedure should include identification of required equipment, inspections and acceptance criteria required prior to movement of the load, the steps and proper sequence to be followed in handling the load, definition of the safe load path, and any special precautions.

The crane operating procedures utilized for the cask and cask component lifts include the noted items. Also, the specific cask loading and handling procedure provides additional details for controlled movement during cask operations.

3) Crane operators should be trained to and use Chapters 2-3 of ANSI B30.2

ANO crane operators receive classroom training that includes the provisions of chapters 2-3 of ANSI B30.2. In addition, completion of a crane-specific on-the-job-training qualification card is required utilizing the

specific crane and crane operating procedures that require operation in accordance with ANSI B30.2.

4) Special lifting devices should satisfy guidelines of ANSI N14.6

The MTC and MTC yoke are the only lifting devices that are required to meet the guidelines of ANSI-N14.6 while at power.

5) Lifting devices not specifically designed for the load should meet the guidelines of ANSI B30.9

Heavy load lifts made without special lifting devices utilize slings and other devices that meet the requirements of ANSI B30.9.

6) The crane should be inspected, tested, and maintained in accordance with Chapter 2-2 of ANSI B30.2

The spent fuel pool area crane, and both turbine building cranes (L-1 and 2L-1) are inspected, tested, and maintained in accordance with the requirements of ANSI B30.2.

7) The crane should be designed to Chapter 2-1 of ANSI B30.2 and to CMAA-70

As noted in correspondence to the NRC dated June 22, 1981 (0CAN068108), in response to NUREG-0612 (Generic Letter 81-07), the 100 ton rated L-3 spent fuel pool area crane was designed and constructed to EOCI-61, "Specifications for Electric Overhead Traveling Cranes" which was superseded by CMAA-70. The response provided a detailed comparison between the two specifications. ANO's comparison of the crane specification was reviewed by the NRC, and a safety evaluation report was issued by the NRC for the L-3 crane (and other cranes) on October 11, 1984 (0CNA108406). Since that time the NRC has specifically approved the L-3 crane for use in moving spent fuel cask in the SER for ANO-1 Technical Specification Amendment 173 (1CNA089404).

The L-1 and 2L-1 turbine building cranes, rated at 150 and 195 tons, respectively, were designed to EOCI-1961 and CMAA-70 requirements, respectively. The analyses performed to reconcile the 1961 EOCI code to CMAA 1970 for L-3, as noted above, is applicable to L-1 and is acceptable by comparison. ANSI B30.2 is not specifically referenced in the crane manufactures' design and construction specification; however, in review of that document, the as-built aspects of the crane and comparison of ANSI B30.2 to the CMAA-70 requirements indicates that the intent of the ANSI specification have been met.

Additional items to be satisfied specifically for use of a non single-failure-proof crane with near or spent fuel are (from 5.1.2 of NUREG-0612):

- **Interlocks should be provided to prevent movement of the crane load block over or within 15 feet of the pool and should not be bypassed without shift supervisor approval.**

  Control of heavy loads over the spent fuel pool (but not out to the suggested 15 feet) is accomplished by a combination of physical barriers and administrative controls. Interlocks provide loss of power to the crane prior to reaching the edge of the spent fuel pool. Power from a second set of breakers must be applied prior to moving the load to and over the spent fuel pools. In addition, interlocks are set such that if the crane bridge reaches the dead bus at full speed and should the cask be released from the crane, the resultant swing will not drop the cask in the spent fuel pool.

- **The interlocks should not be bypassed unless analysis demonstrates that a load drop would not result in criticality or leakage that could uncover fuel.**

  Heavy loads are administratively restricted over the cask loading pit when the gate to the pools is removed. Application of power to the crane beyond the cask loading pit is controlled by operations.

- **A spent fuel shipping cask should not be carried higher that 6 inches off the floor to preclude rolling if dropped.**

  The cask is specifically analyzed and approved by the NRC for a postulated drop over the unit control rooms for a maximum lift height of nine inches with three inches of energy absorbing material between the floor and the cask.

- **An interlock should be provided to preclude crane travel from areas where a drop could damage equipment from redundant or alternate safe shutdown paths**

  Other than control rooms and near the extreme west end of the spent fuel pool area hatch, the cranes (L-3, L-1, or 2L-1), will not travel over areas where a drop could damage safe shutdown equipment. Travel over the control rooms with a 100 ton cask at a restricted height above the floor was specifically approved by the NRC. Cask movement over the west end of the train bay hatch is administratively restricted. An impact limiting device is utilized to prevent cask penetration of the train bay floor.

- **Analysis performed should conform to the guidelines of Appendix A of the NUREG**

Analysis of the postulated load drops include consideration of all areas listed under General Considerations A-1, Spent Fuel Cask Drop Analysis A-3, and Spent Fuel Pool Neutronics Analysis A-4 with the following exceptions:

A-1 Item 2: The fuel impacted is 100 hours subcritical

The cask drop site boundary dose calculations considers 24 fuel assemblies with a minimum of five years of being subcritical due to the restrictions from the Conditions of System Use (CSU) for the VSC system issued by the NRC under provisions of 10CFR72.

A-1 Item 3: The load may be dropped at any location not restricted to stops or interlocks

While there is not an interlock that prevents cask movement to the far west end of the of the spent fuel pool area hatch during movement of the cask to or from the train bay, administrative controls are considered sufficient due to the natural path away from that area and the augmented supervision of the cask lift and movement. In addition, the use of the previously described impact inhibitor system on the train bay floor would prevent damage to any equipment outside the load path that the crane could reach.

A-4: If the pool boron content is credited in an accident condition, the required boron concentration should be specified in Technical Specifications

The required boron in the spent fuel pool credited under the accident condition of the drop of a shield lid into the loaded MSB is from the Conditions of System Use (CSU) for the VSC system issued by the NRC under provisions of 10CFR72.

- **Alternately, the effects of drops of heavy loads should be analyzed and shown to meet the evaluation criteria.**

All postulated load drops during any phase of cask handling or movement analyzed satisfy the recommended guidelines of section 5.1 of NUREG-0612.

In other plant areas, loads may be handled which, if dropped in a certain location, may damage safe shutdown equipment. Interlocks, limit switches, or mechanical

stops should be provided to prevent movement of the load in proximity to the safe shutdown equipment. or (from 5.1.5 of NUREG-0612):

The turbine building cranes L-1 and 2L-1 cannot travel over areas where a drop could damage safe shutdown equipment.

- **The effects of a load drop has been analyzed and the result indicates that damage to the equipment would not preclude operation of sufficient equipment to achieve safe shutdown.**

  The postulated drop of the cask has been reviewed for potential damage to other plant areas during the progress of its movement from the auxiliary building to sitting on top of the VCC in the train bay. A drop in this area would not damage any safety-related equipment. The drop of a loaded cask in other areas would require three failures: i.e., inadvertent lift from the train bay, lateral movement of the cask to the safety-related equipment (such as the control rooms), and failure of the crane to stop or inadvertent release of the load.

- **Where safe shutdown equipment has a ceiling separating from the overhead handling system, an alternate to the limits, interlocks or stops would be analysis that the largest load handled by the crane would not penetrate the ceiling or cause spalling that could cause failure of safe shutdown equipment.**

  Other than the control rooms, there are no other cases where safe shutdown equipment has a ceiling separating it from the overhead handling system. Heavy loads in excess of 2000 pounds over these ceilings are procedurally controlled.

  There is safety-related piping below the west end of the spent fuel pool area train bay hatch shaft under the train bay floor that could be affected from a postulated drop. However, the load path does not allow movement of the cask over that area, and the use of the previously described impact inhibitor system on the train bay floor would prevent damage to any equipment under the floor.

<u>Response for other heavy load cranes:</u>

The intake structure crane, L-007, may be used at any time to accomplish service water pump or motor maintenance activities for either Unit 1 or Unit 2 while at power. All lifts of heavy loads in the vicinity of the service water pumps have been analyzed and are included in previous responses regarding NUREG-0612 (0CAN128213). Due to the physical separation of the service water pumps, it is not possible to drop one pump on another pump. Load paths have been established and are utilized as required by ANO procedures when these activities are in progress.

There are no heavy load lifts (as defined by NUREG-0612) utilizing the following cranes planned in the next two years while at power:

- Unit Polar Cranes L-2, and 2L-2

- MSIV Bridge Crane 2L-10

- New Fuel Handling Crane 2L-35

- CRD Crane L-21 and Unit-1 Containment Building Crane L-37

(2) For licensees planning to perform activities involving the handling of heavy loads over spent fuel, fuel in the reactor core, or safety-related equipment while the reactor is at power (in all modes other than cold shutdown, refueling, and defueled) and that involve a potential load drop accident that has not previously been evaluated in the FSAR, submit a license amendment request in advance (6-9 months) of the planned movement of the loads so as to afford the staff sufficient time to perform an appropriate review.

There are no heavy load lifts (as defined by NUREG-0612) by any of the previously listed cranes while at power that were not identified in the units' SARs. Use of a 100 ton spent fuel shipping cask was part of the original licensing basis for both units as described in the respective SARs. Both of the units' SARs have been updated to describe use of the VSC which was incorporated under provisions of 10CFR50.59.

There is no damage to safety-related equipment postulated as the result of the drop of the shipping cask as described in the SARs; however, breach of the cask is assumed and evaluated for both units. The use of the VSC does not invalidate that conclusion, but it does change some of the assumptions as described in the response to the first request of this submittal. The drop and breach of the VSC was evaluated assuming 24 spent fuel assemblies that had been subcritical for at least five years using Regulatory Guide 1.25 guidelines. The drop and subsequent release of radioactive gases would not impact the ability to utilize safe shutdown equipment due to the relatively short duration of the release of fission gases such as KR-85. Breach of fuel rod cladding such that radioactive particulates are released is not postulated due to the use of impact inhibitors and the structural ruggedness of the cask.

(3) For licensees planning to move dry storage casks over spent fuel, fuel in the reactor core, or safety-related equipment while the reactor is at power (in all modes other than cold shutdown, refueling, and defueled), include in item 2 above, a statement of the capability of performing the actions necessary for a safe shutdown in the presence of radiological source term that may result from a breach of the dry

storage cask, damage to the fuel, and damage to safety-related equipment as a result of a load drop inside the facility.

See response in item (2).

(4) For licensees planning to perform activities involving the handling of heavy loads over spent fuel, fuel in the reactor core, or safety-related equipment while the reactor is at power (in all modes other than cold shutdown, refueling, and defueled), determine whether changes to Technical Specifications will be required in order to allow the handling of heavy loads (e.g., the dry storage canister shield plug) over fuel assemblies in the spent fuel pool and submit appropriate information in advance (6-9 months) of the planned movement of the loads for NRC review and approval.

No heavy loads are handled over the spent fuel pool during the cask loading (or unloading) evolution. Unit-1 Technical Specification 3.8.14 and Unit-2 Technical Specification 3.9.7 both prohibit loads in excess of 2000 pounds from travel over fuel assemblies in the spent fuel pools. The dry fuel storage technology selected for use at ANO will not require loads to be carried over the spent fuel pool, but will suspend loads over the cask loading pits. Whenever a load is moved in or out of the pit, the gate that isolates the pit from the pool will be in place. However, there is one case where a dry fuel storage cask component is lowered into the cask loading pit that contains an open cask loaded with fuel. That component is the MSB shield lid that forms the first barrier between the fuel and personnel and weighs approximately 6,450 pounds.

NUREG-0612 describes three scenarios related to damage of spent fuel. These include the drop of an object or fuel assembly on top of a fuel assembly or a number of assemblies, the drop of an assembly onto the floor of the spent fuel storage pool floor, and the drop of a spent fuel shipping cask. In the first scenario the dropped object or fuel assembly damages one or more fuel assemblies such that fuel rods are crushed, and the result is a configuration that could cause nuclear criticality. The same scenario could instead produce damage such that spent fuel rods are broken, and radioactive material could be released. In both cases, the concern is with "hot" fuel, i.e., spent fuel that is either un-burned (significant amount of remaining uranium) or spent fuel that has not "cooled" sufficiently following removal from the reactor.

In comparison with the NUREG scenarios, the use of the MSB shield lid is with spent fuel that has been cooled at least five years. The spent fuel meets minimum burn-up requirements and is contained in a vessel enclosed in the cask loading pit that is isolated from the main spent fuel pool by a water tight gate. If the lid were dropped into the top of the loaded MSB and fuel crushed, analyses show that criticality would not be expected due to required burn-up and boron content in the spent fuel pool. If the drop of the lid results in a breach of some or all fuel rods, the radiological release is well within

10CFR100 limitations and is enveloped by the analysis completed for the hypothetical cask drop in the train bay.

In summary, since the concerns described in NUREG-0612 were clearly written for the possibility of impacting "hot" fuel or puncturing the spent fuel pool floor, and because the ANO technical specifications specifically describe requirements only for the spent fuel pool, it is concluded that handling the shield lid above loaded MSB is not prohibited by technical specifications. As a result of this review, it is determined that no technical specifications are affected by any of the described actions, and there are no changes required.