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August 10, 2000

2CAN080001

U. S. Nuclear Regulatory Commission
Document Control Desk
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Washington, DC 20555

Subject: Arkansas Nuclear One - Unit 2
Docket No. 50-368
License No. NPF-6
Technical Specification Revision Associated With Region 1 Of The Arkansas Nuclear One – Unit 2 Spent Fuel Pool

Gentlemen:

Attached for your review and approval are proposed changes to the Arkansas Nuclear One – Unit 2 (ANO-2) Technical Specifications (TS) regarding the storage of new and spent fuel within the ANO-2 Spent Fuel Pool (SFP). ANO-2 TS Limiting Condition for Operation (LCO) 3.9.12.b is proposed for revision to allow an alternate storage configuration of fuel assemblies adjacent to the walls within Region 1 of the SFP.

Following the upcoming ANO-2 refueling outage (2R14), sufficient storage space will not be available in the SFP to support future full core offloads. Current TS allowances for storage of new or spent fuel within the SFP prohibit the use of certain vacant spaces along the walls within Region 1 of the SFP when a cross-hatch storage configuration is required. Entergy Operations, Inc. has supplemented the criticality safety analysis (CSA) of this region by crediting neutron leakage at the SFP walls, instead of the infinite assembly array calculation used in the current CSA. The new evaluation does not supercede the current CSA, but rather extends the current analysis to include additional storage configuration options. Results of this supplemented CSA support a slight reduction of such required blocked locations in Region I of the ANO-2 SFP. By utilizing acceptable available space within the SFP as described above, a full core offload can be supported post-2R14.

The proposed change has been evaluated in accordance with 10CFR50.91(a)(1) using the standards of 10CFR50.92(c) and it has been determined that this change involves no significant hazards considerations. The bases for these determinations are included in the attached submittal.

Entergy Operations requests that the effective date for this change be February 1, 2001 with an implementation period of 60 days. Although this request is neither exigent nor emergency, your prompt review is requested.

A001

Very truly yours,

CGA/dbb
Attachments

**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** Pope **County and the State of Arkansas, this** 10th **day of** August **, 2000.**

**Notary Public**
**My Commission Expires** 12/15/07

"OFFICIAL SEAL"
Andrea Pierce
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My Commission Exp. 12/15/2007

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ATTACHMENT

TO

2CAN080001

PROPOSED TECHNICAL SPECIFICATION

AND

RESPECTIVE SAFETY ANALYSES

IN THE MATTER OF AMENDING

LICENSE NO. NPF-6

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT TWO

DOCKET NO. 50-368

## DESCRIPTION OF PROPOSED CHANGES

The proposed changes to the Arkansas Nuclear One, Unit 2 (ANO-2) Technical Specifications (TS) are intended to allow the storage of spent fuel in certain storage locations that are face adjacent to the walls within Region 1 of the ANO-2 spent fuel pool (SFP). The following revisions are proposed:

- Limiting Condition for Operation (LCO) 3.9.12.b is revised to include a "Note 1" in reference to the statement that requires applicable vacant spaces around cross-hatch configured fuel assemblies to be physically blocked. Note 1 is added at the bottom of this page (Page 3/4 9-14). The note provides restrictions regarding when vacant spaces adjacent to the SFP walls of Region 1 may be used for fuel storage instead of being physically blocked-off. Additionally, page formatting has been slightly altered to enhance readability. The format change is administrative in nature and will not be discussed further in this submittal.

- The bases page (Page B 3/4 9-3) is revised to provide clarity in the analysis supporting the different requirements for spent fuel storage within the SFP. Because the following discussion that supports the revision to the above LCO will provide ample justification for the change in the bases, no further discussion of the bases change will be included in this submittal.

## BACKGROUND

The ANO-2 spent fuel storage rack provides storage locations for 988 spent fuel assemblies in a rectangular array. The spent fuel pool is lined with type 304L stainless steel. The rack is comprised of four modules in a 9x9 array, four modules in a 9x10 array, two modules, in an 8x10 array, and two modules, in an 8x9 array. Two of the 9x9 and one of the 8x9 arrays located on the southern-most end of the SFP make up what is referred to as Region 1. The remaining arrays are considered Region 2. The smaller Region 1 area utilizes Boraflex, a fixed poison absorber, in a "flux trap" design. The larger Region 2 area also utilizes a "flux trap" design, but contains no Boraflex. All twelve modules are free standing structures and are arranged as shown in ANO-2 SAR Figure 9.1-13. Each fuel storage module is made up of rectangular storage cells with each cell capable of accepting one fuel assembly. The cells are open at the top and bottom to provide a flow path for convective cooling of spent fuel assemblies through natural circulation. The fuel storage cells are structurally connected to form storage modules, which provide assurance that the required minimum fuel assembly spacings are maintained for all design conditions. Further information regarding the design of the ANO-2 SFP may be referenced in the ANO-2 SAR Section 9.1.2.2.

The current criticality safety analysis (CSA) requires that spent or new fuel stored in a cross-hatch configuration have four vacant spaces diagonal to the four corners of the fuel assembly or have vacant spaces adjacent to at least two of it's faces. These restrictions result in several

vacant spaces along the Region I walls of the SFP to be physically blocked, preventing their use for the storage of spent or new fuel. The NRC approved the storage of fuel assemblies enriched to 5.0 w/o of U-235 within the ANO-2 SFP in it's Safety Evaluation Report (SER) for ANO-2 TS Amendment 178, dated January 14, 1997. The analysis was based upon infinite assembly array calculations and did not credit radial neutron leakage effects. Since that analysis, additional fuel has been discharged resulting in reduced SFP capacity (i.e., decreasing slots to place fuel assemblies in). Following the ANO-2 refueling outage (2R14) scheduled for September 2000, future full core offloads will no longer be able to be supported due to this reduced space capacity. Therefore, Entergy Operations, Inc. has performed an evaluation to support storing fuel assemblies along the Region I walls of the SFP.

The new evaluation does not supercede the CSA in which the above January 14, 1997 SER is based, but rather extends the current analysis to include additional storage configuration options. All tolerances, fuel assembly data, spectral history effects, reactivity equivalence considerations, Region I/Region II interface considerations, etc. are identical to those referenced in support of the above SER and are applicable to this evaluation. This evaluation remains based upon the limiting configuration identified in the above correspondence, but modifies the KENO model from an infinite array to a model that includes the SFP wall as a boundary condition.

## DISCUSSION OF CHANGE

The evaluation has been performed using identical design basis assembly types as referenced in the previously mentioned January 14, 1997 SER. The following table provides a review of the designators used to describe the various fuel loads stored within the SFP.

| Assembly Types | Description |
|---|---|
| Region I Configuration A (RI A) | Uniformly loaded 5.0 w/o U235 assembly |
| Region I Configuration B (RI B) | 5.0 w/o U235 initial loading at 22.2 GWd/MTU burnup |
| Region II Configuration C (RII C) | Uniformly loaded 1.45 w/o U235 assembly to 5.0 w/o U235 initial loading at 46.6 GWd/MTU burnup |

The CSA for the ANO-2 fuel storage racks is supplemented to allow a specific storage configuration in the Region I locations that are face adjacent to the SFP walls. This will reduce the number of blocked storage locations. ANO-2 SAR Figure 9.1-16 illustrates the currently allowed Region I loading configuration that meets the limitations/configuration requirements of the current CSA. The new configuration addressed in this evaluation is illustrated in Figure 1 of this submittal.

**Figure 1 ANO2 SFP - Example of Additional Allowed Region I Configuration Based on SFP Wall Boundary Conditions**

(NORTH)
Reflective BC

| Row ID | A | B | C | D | E | F | G | H | J | K | L | M | N | P | Q | R | S | T | U | V | W | X | Y | Z | AA | BB | Column ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | |
| 11 | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | |
| 10 | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | RII C | Region II |
| 9 | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | Region I |
| 8 | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | |
| 7 | RI B | RI A | BP | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | BP | RI A | BP | RI A | RI B | |
| 6 | RI A | RI A | RI A | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI A | RI A | RI A | RI A | RI A | |
| 5 | RI B | RI A | BP | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | BP | RI A | BP | RI A | RI B | |
| 4 | RI A | RI A | RI A | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI B | RI A | RI A | RI A | RI A | RI A | |
| 3 | RI B | RI A | BP | RI A | BP | RI A | BP | RI A | BP | RI A | BP | RI B | RI B | BP | RI A | BP | RI A | BP | RI A | BP | RI A | BP | RI A | BP | RI A | RI B | |
| 2 | RI A | RI A | RI A | RI A | RI A | RI A | RI A | RI A | RI A | RI A | RI A | RI B | RI B | RI A | RI A | RI A | RI A | RI A | RI A | RI A | RI A | RI A | RI A | RI A | RI A | RI A | |
| 1 | BP | RI A | RI B | RI A | RI B | RI A | RI B | RI A | RI B | RI A | RI B | RI B | RI B | RI B | RI A | RI B | RI A | RI B | RI A | RI B | RI A | RI B | RI A | RI B | RI A | BP | |

Concrete Wall BC (WEST WALL)

Concrete Wall BC (EAST WALL)

Concrete Wall BC
(SOUTH WALL)

| Assembly Types: | |
|---|---|
| RI A | Fresh 5.0 w/o U235 - Region I Restricted Fuel Type A DBA |
| RI B | 5.0 w/o U235 Initial Loading at 22.2 GWd/MTU - Region I Restricted Fuel Type B DBA |
| RII C | Region II Unrestricted Fuel Type C DBA |
| BP | Blocker Plate locations to prevent assembly storage |

This evaluation employs the same Boraflex gap and degradation assumptions as the current CSA. Fuel and rack manufacturing tolerances are unchanged as well as the methodology benchmark and the methodology for combining these uncertainties. However, radial neutron leakage is now accounted for based on a conservative model of the rack positioning and the SFP walls.

The following major conservatisms were assumed in the evaluation:

- The minimum as-designed Boraflex dimensions and the minimum B10 areal density are used. End shrinkage is predicted based on distributions from blackness testing of high dose panels in a Westinghouse-designed rack. Both end shrinkage and gap formation has been experienced in Westinghouse racks. The end shrinkage assumptions are more conservative than gap formation assumptions for the ANO-2 rack geometry.

- The Boraflex panels are assumed to shrink 4.1% in width.

- The moderator is pure water at 68°F. Water is set to the maximum density of 1.0 gm/cc.

- Much of the structure within the SFP (spacers, Inconel springs, rack base plate) was not credited. This reduces the assumed amount of neutron absorption and increases moderation.

- Neutron absorption by the stainless steel SFP liner is not credited.

The Region I racks have Boraflex panels between cells, but no Boraflex is present on the storage cell walls that are face adjacent to the SFP concrete walls. The Region I rack-to-wall gap is 6.0 inches on the west and east sides of the SFP and 5.13 inches on the south end of the SFP. The SFP liner is not explicitly modeled, but its volume is modeled as concrete. The SFP concrete wall and metal liner will not have significantly different neutron reflection characteristics since the rack-to-wall water gap is greater than 3.0 inches. The neutron absorption characteristics of the steel liner are conservatively removed from the modeling. The SFP walls are modeled as 4-foot thick concrete slabs followed by a void boundary condition.

The KENO model from the current CSA has been expanded from the 4x4 base unit to the full Region I rack and includes the first three rows of Region II. This was performed by repeating the Region I base 4x4model in a manner that preserves the configurations used in the current CSA. The Boraflex remains modeled based upon statistically generated shrinkage/gaping of the 32 Boraflex panels in the 4x4 unit. The 4x4 model was placed in the new model in a manner that preserves the current CSA periodic evaluation with respect to Boraflex panel configurations. Modeling all of Region I also avoids the overly conservative use of a

reflective boundary. However, a reflective boundary condition was used beyond the first three rows of the Region II rack. The model confirms the Region I/Region II interface and internal Region I interface configurations to have a $K_{eff}$ less than 0.95. The results of the ANO-2 SFP Region I rack CSA are summarized below.

| Storage Configuration | Acceptance Criterion ($K_{eff}$) | Final 95/95 $K_{eff}$ |
|---|---|---|
| Currently allowed Region I loading configuration with infinite assembly array calculations and with no neutron leakage credit | 0.95 | 0.9450 |
| Additional allowed configuration with revised boundary conditions and with neutron leakage credit (see Figure 1) | 0.95 | 0.9493 |

For accident conditions, two unlikely, independent, concurrent events is assumed in order to generate a criticality event (double contingency principle). Therefore, the presence of soluble boron in the SFP water may be assumed to be a realistic initial condition. The currently approved CSA indicated little sensitivity to this type of fuel "misload" configuration and resulted in a large margin to the acceptance criteria, without credit taken for neutron leakage. The only additional misloaded configuration pertaining to this evaluation is the placement of a RI A type design basis assembly into a cell location on a peripheral row or column of the Region I rack that is face adjacent to the SFP walls. An evaluation for such an event demonstrates that the fuel handling accident reactivity values will remain well below a $K_{eff}$ of 0.95 when a credit for 1000 ppm of soluble boron is assumed. The crediting of 1000 ppm boron in the SFP water is bounded by the current ANO-2 TS LCO 3.9.12.c which requires that the SFP boron concentration be maintained above 1600 ppm boron at all times.

In summary, if the most peripheral row/column of Region I contains vacant spaces in a cross-hatch storage configuration, these vacant spaces may be filled with fuel assemblies that are outside of the area of the graph enclosed by Curve A on ANO-2 TS Figure 3.9.2, provided that the most southwest and southeast corner locations remain empty. The proposed additional Region I loading configuration is acceptable since the resultant $K_{eff}$ is maintained less than 0.95 during normal conditions that assume unborated water, and during fuel handling accidents when the borated SFP water is maintained at or above 1000 ppm. Therefore, the proposed configuration meets the required criticality safety requirements while supporting future full core offloads to the SFP at ANO-2.

## DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATION

Entergy Operations, Inc. is proposing that the Arkansas Nuclear One - Unit 2 (ANO-2) Operating License be amended to allow certain storage spaces that are face adjacent to the walls of Region I of the spent fuel pool (SFP) to be used to store design basis assemblies that are outside of the area of the graph enclosed by Curve A of ANO-2 Technical Specification (TS) Figure 3.9.2. Under the current ANO-2 Technical Specifications (TSs), diagonal spaces to RI A type design basis assemblies stored in a cross-hatch configuration must remain vacant and physically blocked. This proposal will allow placing design basis assemblies that are less reactive than RI A types in the aforementioned vacant spaces that are located along the Region I walls of the SFP. However, the most southwest and southeast corner locations of Region I must remain empty and physically blocked when this configuration are employed. The additional storage locations are necessary to allow future full core offloads to the SFP. An evaluation has been performed to ensure the Criticality Safety Analysis (CSA) acceptance criteria of 0.95 is maintained under the proposed configurations during normal and accident conditions.

An evaluation of the proposed change has been performed in accordance with 10CFR50.91(a)(1) regarding no significant hazards considerations using the criteria in 10CFR50.92(c). A discussion of these criteria as they relate to this amendment request follows:

**Criterion 1 - Does Not Involve a Significant Increase in the Probability or Consequences of an Accident Previously Evaluated.**

The probability of fuel handling accidents (dropped assemblies, misplaced/misloaded assemblies, etc.) is not changed by utilizing the previously described vacant spaces that are face adjacent to the SFP walls in Region I to store design basis assemblies that are less reactive than RI A type assemblies. Fuel assemblies of different types are presently stored face adjacent to these walls. This proposal will allow additional assemblies to be located face adjacent to the Region I SFP walls and does not effect the precursors to any postulated spent fuel pool accidents.

The consequences of an accident different than that previously analyzed additionally remains unchanged. Evaluations have demonstrated that the fuel handling accident reactivity values will remain less than the 0.95 $K_{eff}$ acceptance criteria in the event of a fuel handling accident, assuming an initial SFP boron concentration of 1000 ppm. The boron concentration limit is additionally bounded by ANO-2 TS Limiting Condition for Operation (LCO) 3.9.12.c which limits SFP boron to greater than 1600 ppm at all times.

Therefore, this change does <u>not</u> involve a significant increase in the probability or consequences of any accident previously evaluated.

**Criterion 2 - Does Not Create the Possibility of a New or Different Kind of Accident from any Previously Evaluated.**

As discussed previously, the proposed SFP configuration will not result in exceeding the acceptance criteria of 0.95 $K_{eff}$ during normal or accident conditions. Since fuel assemblies are currently located along the Region I SFP walls, no new or different kind of accident than that previously evaluated exists. Locations required to be vacant will remain physically blocked. In the event that a "misloading" type accident occurs in this region, evaluations have shown that the fuel handling accident reactivity values will remain well below 0.95 $K_{eff}$ when initial SFP boron concentrations are at or above 1000 ppm, which is significantly less than the TS boron limit of 1600 ppm.

Therefore, this change does <u>not</u> create the possibility of a new or different kind of accident from any previously evaluated.

**Criterion 3 - Does Not Involve a Significant Reduction in the Margin of Safety.**

As previously discussed, the proposed configuration will not result in exceeding the 0.95 $K_{eff}$ acceptance criteria during normal operations that assume zero concentration of boron at the maximum water density in the SFP or during accident conditions that assume an initial SFP boron concentration of at least 1000 ppm. Furthermore, ANO-2 TS 3.9.12.c requires SFP boron to be maintained greater than 1600 ppm at all times. Fuel assemblies are presently stored along the Region I SFP walls; therefore, storing additional assemblies along these same walls will not significantly reduce the margin to safety since it has been shown that the current CSA remains valid.

Therefore, this change does <u>not</u> involve a significant reduction in the margin of safety.

Therefore, based upon the reasoning presented above and the previous discussion of the amendment request, Entergy Operations has determined that the requested change does <u>not</u> involve a significant hazards consideration.

## ENVIRONMENTAL IMPACT EVALUATION

10 CFR 51.22(c) provides criteria for and identification of licensing and regulatory actions eligible for categorical exclusion from performing an environmental assessment. A proposed amendment to an operating license for a facility requires no environmental assessment if operation of the facility in accordance with the proposed amendment would not: (1) involve a significant hazards consideration, (2) result in a significant change in the types or significant increase in the amounts of any effluents that may be released off-site, or (3) result in a significant increase in individual or cumulative occupational radiation exposure. Entergy

Operations, Inc. has reviewed this license amendment and has determined that it meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the proposed license amendment. The basis for this determination is as follows:

1. The proposed license amendment does not involve a significant hazards consideration as described previously in the evaluation.

2. As discussed in the significant hazards evaluation, this change does not result in a significant change or significant increase in the radiological doses for any Design Basis Accident. The proposed license amendment does not result in a significant change in the types or a significant increase in the amounts of any effluents that may be released off-site.

3. The proposed license amendment does not result in a significant increase to the individual or cumulative occupational radiation exposure because no change is made to the method of system operation or components necessary to prevent a radioactive release.

# PROPOSED TECHNICAL SPECIFICATION CHANGES

## FUEL STORAGE

### LIMITING CONDITION FOR OPERATION

3.9.12.a Storage in the spent fuel pool shall be restricted to fuel assemblies having initial enrichment less than or equal to 5.0 w/o U-235. The provisions of Specification 3.0.3 are not applicable.

3.9.12.b Storage in Region 1 or Region 2 (as shown on Figure 3.9.1) of the spent fuel pool shall be further restricted by the limits specified in Figure 3.9.2. In the event a cross-hatch storage configuration is deemed necessary for a portion of either Region 1 or Region 2, vacant spaces diagonal to the four corners of any fuel assembly or vacant spaces on two opposite faces of any fuel assembly shall be physically blocked before any such fuel assembly may be placed in that region (Note 1). Also, the Region 1 storage cells adjacent to the Region 2 interface are restricted to fuel assemblies that are outside of the area of the graph enclosed by Curve A on Figure 3.9.2. In the event a checkerboard storage configuration is deemed necessary for a portion of Region 2, vacant spaces adjacent to the four faces of any fuel assembly shall be physically blocked before any such fuel assembly may be placed in Region 2. The provisions of Specification 3.0.3 are not applicable.

3.9.12.c The boron concentration in the spent fuel pool shall be maintained (at all times) at greater than 1600 parts per million.

APPLICABILITY: During storage of fuel in the spent fuel pool.

ACTION:

Suspend all actions involving the movement of fuel in the spent fuel pool if it is determined a fuel assembly has been placed in an incorrect location until such time as the correct storage location is determined. Move the assembly to its correct location before resumption of any other fuel movement.

Suspend all actions involving the movement of fuel in the spent fuel pool if it is determined the pool boron concentration is less than 1601 ppm, until such time as the boron concentration is increased to 1601 ppm or greater.

### SURVEILLANCE REQUIREMENTS

4.9.12.a Verify all fuel assemblies to be placed in the spent fuel pool have an initial enrichment of less than or equal to 5.0 w/o U-235 by checking the assemblies' design documentation.

4.9.12.b Verify all fuel assemblies to be placed in the spent fuel pool are within the limits of Figure 3.9.2 by checking the assemblies' design and burnup documentation.

4.9.12.c Verify at least once per 31 days the spent fuel pool boron concentration is greater than 1600 ppm.

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Note 1: If the most peripheral row/column of the Region I contains vacant spaces in a cross-hatch storage configuration, these vacant spaces may be filled with fuel assemblies that are outside of the area of the graph enclosed by Curve A on Figure 3.9.2, provided that the most southwest and southeast corner locations remain empty.

## 3/4.9.9 and 3/4.9.10 WATER LEVEL-REACTOR VESSEL AND SPENT FUEL POOL WATER LEVEL

The restrictions on minimum water level ensure that sufficient water depth is available to remove 99% of the assumed 12% iodine gap activity released from the rupture of an irradiated fuel assembly. The minimum water depth is consistent with the assumptions of the accident analysis.

## 3/4.9.11 FUEL HANDLING AREA VENTILATION SYSTEM

The limitations on the fuel handling area ventilation system ensure that all radioactive materials released from an irradiated fuel assembly will be filtered through the HEPA filters and charcoal adsorbers prior to discharge to the atmosphere. The operation of this system and the resulting iodine removal capacity are consistent with the assumptions of the accident analyses.

## 3/4.9.12 FUEL STORAGE

Region 1 and Region 2 of the spent fuel storage racks are designed to assure fuel assemblies of less than or equal to 5.0 w/o U-235 enrichment that are within the limits of Figure 3.9.2 will be maintained in a subcritical array with $K_{eff} \leq 0.95$ in unborated water. These conditions have been verified by criticality analyses.

The requirement for 1600 ppm boron concentration is to assure the fuel assemblies will be maintained in a subcritical array with $K_{eff} \leq 0.95$ in the event of a postulated accident. Analysis has shown that, during a postulated accident with the fuel stored within the limits of this specification, that a $K_{eff}$ of $\leq 0.95$ will be maintained when the boron concentration is at or above 1000 ppm.

Normally, fuel stored in a cross-hatch storage configuration must have all four diagonal spaces or at least two adjacent faces remain vacant to meet the criticality safety analysis mentioned above. However, the spent fuel pool walls may be credited as a neutron leakage path. Therefore, vacant spaces face adjacent to the walls of the Region I cross-hatch configured assemblies may be used to store fuel assemblies that are outside of the area of the graph enclosed by Curve A on Figure 3.9.2, excluding the most southeast and southwest corner spaces of Region 1 which must remain empty.

MARKUP OF CURRENT ANO-2 TECHNICAL SPECIFICATIONS

(FOR INFO ONLY)

## FUEL STORAGE

### LIMITING CONDITION FOR OPERATION

3.9.12.a Storage in the spent fuel pool shall be restricted to fuel assemblies having initial enrichment less than or equal to 5.0 w/o U-235. The provisions of Specification 3.0.3 are not applicable.

3.9.12.b Storage in Region 1 or Region 2 (as shown on Figure 3.9.1) of the spent fuel pool shall be further restricted by the limits specified in Figure 3.9.2. In the event a cross-hatch storage configuration is deemed necessary for a portion of either Region 1 or Region 2, vacant spaces diagonal to the four corners of any fuel assembly or vacant spaces on two opposite faces of any fuel assembly shall be physically blocked before any such fuel assembly may be placed in that region (Note 1). Also, the Region 1 storage cells adjacent to the Region 2 interface are restricted to fuel assemblies that are outside of the area of the graph enclosed by Curve A on Figure 3.9.2. In the event a checkerboard storage configuration is deemed necessary for a portion of Region 2, vacant spaces adjacent to the four faces of any fuel assembly shall be physically blocked before any such fuel assembly may be placed in Region 2. The provisions of Specification 3.0.3 are not applicable.

3.9.12.c The boron concentration in the spent fuel pool shall be maintained (at all times) at greater than 1600 parts per million.

APPLICABILITY: During storage of fuel in the spent fuel pool.

ACTION:

Suspend all actions involving the movement of fuel in the spent fuel pool if it is determined a fuel assembly has been placed in an incorrect location until such time as the correct storage location is determined. Move the assembly to its correct location before resumption of any other fuel movement.

Suspend all actions involving the movement of fuel in the spent fuel pool if it is determined the pool boron concentration is less than 1601 ppm, until such time as the boron concentration is increased to 1601 ppm or greater.

### SURVEILLANCE REQUIREMENTS

4.9.12.a Verify all fuel assemblies to be placed in the spent fuel pool have an initial enrichment of less than or equal to 5.0 w/o U-235 by checking the assemblies' design documentation.

4.9.12.b Verify all fuel assemblies to be placed in the spent fuel pool are within the limits of Figure 3.9.2 by checking the assemblies' design and burnup documentation.

4.9.12.c Verify at least once per 31 days the spent fuel pool boron concentration is greater than 1600 ppm.

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Note 1: If the most peripheral row/column of the Region I contains vacant spaces in a cross-hatch storage configuration, these vacant spaces may be filled with fuel assemblies that are outside of the area of the graph enclosed by Curve A on Figure 3.9.2, provided that the most southwest and southeast corner locations remain empty.

3/4.9.9 and 3/4.9.10 WATER LEVEL-REACTOR VESSEL AND SPENT FUEL POOL WATER LEVEL

The restrictions on minimum water level ensure that sufficient water depth is available to remove 99% of the assumed 12% iodine gap activity released from the rupture of an irradiated fuel assembly. The minimum water depth is consistent with the assumptions of the accident analysis.

3/4.9.11 FUEL HANDLING AREA VENTILATION SYSTEM

The limitations on the fuel handling area ventilation system ensure that all radioactive materials released from an irradiated fuel assembly will be filtered through the HEPA filters and charcoal adsorbers prior to discharge to the atmosphere. The operation of this system and the resulting iodine removal capacity are consistent with the assumptions of the accident analyses.

3/4.9.12 FUEL STORAGE

Region 1 and Region 2 of the spent fuel storage racks are designed to assure fuel assemblies of less than or equal to 5.0 w/o U-235 enrichment that are within the limits of Figure 3.9.2 will be maintained in a subcritical array with $K_{eff} \leq 0.95$ in unborated water. These conditions have been verified by criticality analyses.

The requirement for 1600 ppm boron concentration is to assure the fuel assemblies will be maintained in a subcritical array with $K_{eff} \leq 0.95$ in the event of a postulated accident. Analysis has shown that, during a postulated accident with the fuel stored within the limits of this specification, that a $K_{eff}$ of $\leq 0.95$ will be maintained when the boron concentration is at or above 1000 ppm.

Normally, fuel stored in a cross-hatch storage configuration must have all four diagonal spaces or at least two adjacent faces remain vacant to meet the criticality safety analysis mentioned above. However, the spent fuel pool walls may be credited as a neutron leakage path. Therefore, vacant spaces face adjacent to the walls of the Region I cross-hatch configured assemblies may be used to store fuel assemblies that are outside of the area of the graph enclosed by Curve A on Figure 3.9.2, excluding the most southeast and southwest corner spaces of Region 1 which must remain empty.