

CATEGORY 1

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 9703200106 DOC. DATE: 97/03/14 NOTARIZED: YES DOCKET #
FACIL: 50-400 Shearon Harris Nuclear Power Plant, Unit 1, Carolina 05000400
AUTH. NAME AUTHOR AFFILIATION
ROBINSON, W. R. Carolina Power & Light Co.
RECIP. NAME RECIPIENT AFFILIATION
Document Control Branch (Document Control Desk)

SUBJECT: Provides addl info to support evaluation of potential cask drop scenario while reactor at power.

DISTRIBUTION CODE: IE11D COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 10
TITLE: Bulletin Response (50 DKT)

NOTES: Application for permit renewal filed. 05000400

	RECIPIENT ID CODE/NAME	COPIES LTTR ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR ENCL
	PD2-1 PD	1 1	LF, N	1 1
INTERNAL:	<u>FILE CENTER</u>	1 1	NRR/DE/EMEB	1 1
	NRR/DRPM/PECB	1 1	NRR/DSSA	1 1
	NRR/DSSA/SCSB	1 1	NRR/DSSA/SPLB	1 1
	NRR/DSSA/SPLB/A	1 1	NRR/DSSA/SRXB	1 1
	NUDOCS-ABSTRACT	1 1	RES/DET/EIB	1 1
	RGN2 FILE 01	1 1		
EXTERNAL:	NOAC	1 1	NRC PDR	1 1

NOTE TO ALL "RIDS" RECIPIENTS:
PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK,
ROOM OWFN 5D-5(EXT. 415-2083) TO ELIMINATE YOUR NAME FROM
DISTRIBUTION LISTS FOR DOCUMENTS YOU DON'T NEED!

TOTAL NUMBER OF COPIES REQUIRED: LTTR 15 ENCL 15



Carolina Power & Light Company
PO Box 165
New Hill NC 27562

William R. Robinson
Vice President
Harris Nuclear Plant

SERIAL: HNP-97-064
10 CFR 50.59f(c)
10 CFR 50.90

MAR 14 1997

United States Nuclear Regulatory Commission
ATTENTION: Document Control Desk
Washington, DC 20555

SHEARON HARRIS NUCLEAR POWER PLANT
DOCKET NO. 50-400/LICENSE NO. NPF-63
SPENT FUEL CASK DROP DESIGN AND LICENSING BASIS ISSUES

Dear Sir or Madam:

In a letter dated December 5, 1996, the NRC notified the Harris Nuclear Plant (HNP) that the responses to Bulletin 96-02, "Movement of Heavy Loads over Spent Fuel, Over Fuel in the Reactor Core, or Over Safety-Related Equipment" had been evaluated. In this letter, the NRC stated they had found that some licensees without single-failure-proof cranes had analyzed or were planning to analyze postulated spent fuel storage cask and transportation cask drop accidents to establish design basis accidents for their facilities. The NRC letter described a potential cask drop scenario in which there is a possibility of the cask lid becoming dislodged or the cask lid becoming dislodged and ejecting some or all of the spent fuel elements onto the top of the spent fuel racks, the floor of the pool, or adjacent areas. The NRC requested HNP provide additional information to support the staff evaluation of this potential cask drop scenario while the reactor is at power (in all modes other than cold shutdown, refueling, and defueled).

At HNP, loaded spent fuel shipping casks are received from the other nuclear plants in the CP&L system. The cask is prepared for unloading by removing the valve box covers at the Fuel Handling Building (FHB) railbay. The cask is then moved into the FHB decontamination pit, at which point the cask closure head sleeve nuts are detensioned, and all but four are removed prior to moving the cask to the spent fuel loading/unloading basin. The use of four sleeve nuts is a vendor requirement documented in the IF-300 Cask Safety Analysis report and described operationally in the Cask Operating Manual to prevent the head from coming off in a cask "tipping accident."

9703200106 970314
PDR ADOCK 05000400
P PDR

JEI 11/1

200037



FSAR Section 15.7.5 addresses spent fuel cask drop accidents. FSAR Section 15.7.5.2 specifically addresses a cask drop to a flat surface, and states that ". . . *the potential drop of a spent fuel cask is limited to less than an equivalent 30 ft. drop onto a flat, essentially unyielding, horizontal surface. Since the spent fuel cask is designed to withstand such loadings, the radiological consequences were not evaluated.*"

HNP evaluated the postulated cask drop scenario and revealed that the original vendor evaluations of a cask drop of 30 feet on to an unyielding surface assumed all 32 sleeve nuts in place and properly tensioned. Although required by the Cask Safety Analysis Report and described operationally in the Cask Operating Manual, no vendor analyses supported the use of only four sleeve nuts. Therefore, it could not be conclusively determined whether existing vendor analyses bound HNP in-plant cask handling operations using only four sleeve nuts.

HNP has addressed this issue by having the cask vendor evaluate a cask drop with the head secured by only four hand-tightened sleeve nuts, one in each quadrant. The evaluation considered potential drop scenarios over the full length of the safe load travel path from the decontamination pit to the cask loading/unloading pool. The conclusion reached by this evaluation is that the cask closure head would not become dislodged, and that the fuel elements would remain within the cask. Additionally, HNP has evaluated the potential radiological consequences of this postulated cask drop event, because it can not be proven that the seal between the cask head and the cask would prevent the release of gaseous or volatile nuclides from the fuel gap of any damaged rods.

Assumptions used to calculate the bounding Low Population Zone (LPZ) and Exclusion Area Boundary (EAB) doses include: (1) fuel rod damage occurs and maximum available gap activity is released; (2) charcoal filtration is not credited, because the valve box covers are removed in the FHB railbay, which is located outside of the emergency ventilation envelope and gap activity released from a cask drop in this area may not be filtered prior to release; (3) releases are considered to be at ground level; (4) the atmospheric dispersion (X/Q) values used for other FSAR Chapter 15 analyses are applied. Using these assumptions, the doses were determined to be a small fraction of the NRC acceptance criteria for Section 15.7.5 of the Standard Review Plan (NUREG-0800). Similarly, HNP calculated the doses to personnel evacuating the FHB following the postulated cask drop event and determined them to be well within occupational exposure limits. The Control Room outside air intake monitors are beta sensitive and would provide their intended isolation function. Therefore, Control Room doses are unaffected by this postulated accident.

This issue was previously discussed with the NRC staff by teleconference on March 4, 1997. Previous cask handling operations will be addressed separately in accordance with 10 CFR 50.73 reporting requirements.

The enclosures to this letter include the proposed FSAR revisions that incorporate the results of the cask drop analysis and dose assessment.

This issue has been determined to be an unreviewed safety question by CP&L and is being submitted for NRC review and approval pursuant to the requirements of 10 CFR 50.59f(c) and 10 CFR 50.90. The no significant hazards and environmental considerations are also enclosed.

Please refer any questions regarding this submittal to Ms. D. B. Alexander at (919) 362-3190.

Sincerely,

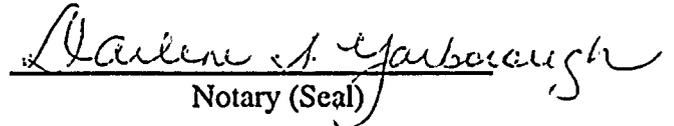


KWS/kws

Enclosures:

1. Proposed FSAR Revisions
2. 10 CFR 50.92 Evaluation
3. Environmental Considerations

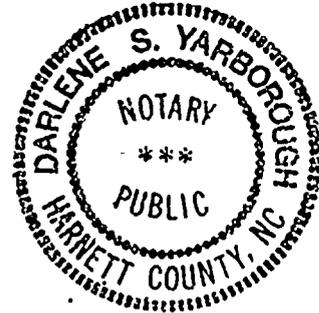
W. R. Robinson, having been first duly sworn, did depose and say that the information contained herein is true and correct to the best of his information, knowledge and belief; and the sources of his information are employees, contractors, and agents of Carolina Power & Light Company.



Notary (Seal)

My commission expires: 2-6-2000

c: Mr. J. B. Brady, NRC Sr. Resident Inspector
Mr. N. B. Le, NRC Project Manager
Mr. L. A. Reyes, NRC Regional Administrator





bc: Mr. H. K. Chernoff (RNP)
Mr. B.H. Clark
Mr. G. W. Davis
Mr. J. W. Donahue
Ms. S. F. Flynn
Mr. H. W. Habermeyer, Jr.
Mr. M. D. Hill
Mr. W. J. Hindman
Mr. R.M. Krich

Ms. W. C. Langston (PE&RAS File)
Mr. R. D. Martin
Mr. W. S. Orser
Mr. G. A. Rolfson
Mr. M. A. Turkal (BNP)
Mr. T. D. Walt
Nuclear Records
File: HI/A-2D

PROPOSED FSAR REVISIONS

15.7.5 Spent Fuel Cask Drop Accidents

15.7.5.1 Cask Drop Into the New or Spent Fuel Pool. As discussed in Section 9.1, the cask handling crane is prohibited from traveling over the new and spent fuel pools or any unprotected safety related equipment. Thus, an accident resulting from dropping a cask or other major load into the new or spent fuel pools is not credible.

15.7.5.2 Cask Drop to Flat Surface.

15.7.5.2.1 Cask With Full Integrity. The spent fuel cask is considered to have full integrity when the cask closure head is fully tensioned and the valve box covers are installed. As discussed in Section 9.1, the potential drop of a spent fuel cask is limited to less than an equivalent 30 ft. Drop onto a flat, essentially unyielding, horizontal surface. Since the spent fuel cask, with the valve box covers installed and the head fully tensioned, is designed to withstand such loadings, the radiological consequences of dropping the cask in this condition are not evaluated.

15.7.5.2.2 Cask With Less Than Full Integrity. The loaded cask may be moved from the railbay with the valve covers removed and from the decontamination pit to the unloading pool with only four cask head bolts installed and hand-tightened. An evaluation of a 30 ft. drop during the movement from the decontamination pit to the unloading pool was performed and determined that, while fuel components would be retained within the cask, the cask is not expected to be gas tight. A release of noble gas and iodine gas activity to the Fuel Handling Building and subsequently to the environment could occur. Damage to the valves caused by dropping the cask could cause the same type of release. The radiological consequences of this accident would be a small fraction of the 10 CFR 100 exposure guidelines.



10 CFR 50.92 EVALUATION

The commission has provided standards in 10 CFR 50.92(c) for determining whether a significant hazards consideration exists. A change involves no significant hazards consideration if it would not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated, (2) create the possibility of a new or different kind of accident from any accident previously evaluated, or (3) involve a significant reduction in a margin of safety. Carolina Power & Light has reviewed this proposed change and determined that it does not involve a significant hazards determination. The basis for this determination follows.

Proposed Change

It is proposed that FSAR Section 15.7.5.2 be revised to include the evaluation of a previously unanalyzed spent fuel cask drop scenario. This scenario involves the potential drop of a loaded spent fuel cask after the cask has been prepared for unloading.

The current analysis in FSAR Section 15.7.5.2 does address a cask drop onto a flat surface. The current analysis, however, did not include an evaluation of radiological consequences, because the spent fuel cask is limited to an equivalent 30 foot drop onto a flat, essentially unyielding, horizontal surface, and the cask is designed to withstand such loads. This determination is based on the critical assumption that the spent fuel cask is in a fully secured configuration in accordance with 10 CFR 71 transportation requirements. However, upon receipt of loaded spent fuel casks received from the Robinson and Brunswick plants, the cask valve box covers are removed before moving the cask from the railway to the decontamination pit. At the decontamination pit, all but four of the cask closure head sleeve nuts are removed prior to transferring the cask to the unloading pool. In this configuration, a crane failure could allow the cask to fall as far as twenty-five feet into either the decontamination pit or cask head & yoke storage pit before reaching the loading/unloading pool.

An engineering evaluation has been performed to evaluate the potential cask drop scenarios specific to the HNP Fuel Handling Building when only four closure head sleeve nuts are used to secure the cask closure head. The evaluation concluded that the cask closure head would not become dislodged, thereby preventing the ejection of spent fuel elements from the cask.

Dose assessments were performed using maximum potential releases assuming failure of the spent fuel and radionuclide release through the opening between the cask closure head and the cask or damage to the valves. Assumptions used to calculate the bounding Low Population Zone (LPZ) and Exclusion Area Boundary (EAB) doses include: (1) fuel rod damage occurs and maximum available gap activity is released; (2) charcoal filtration is not credited, because the valve box covers are removed in the FHB railway, which is located outside of the emergency ventilation envelope and gap activity released from a cask drop in this area may not be filtered prior to release; (3) releases are considered to

2. The proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

Compromising the integrity of the cask by removing the valve box covers and closure head sleeve nuts in preparation for unloading the spent fuel from the cask does not create the possibility of a new type of accident or equipment malfunction. No safety-related equipment, safety function, or operations of plant equipment will be altered as a result of this change. Therefore, the proposed changes do not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. The proposed change does not involve a significant reduction in the margin of safety.

The NRC basis for acceptance of a spent fuel cask drop is documented in Section 15.7.5 of the Safety Evaluation Report, NUREG-1038, dated November 1983. It states, ". . . *no loss of cask integrity is postulated to occur in the event of a drop, and the staff concludes there will be no significant radiation released to the environment. The radiological consequences will be less than a small fraction of the 10 CFR 100 exposure guideline values.*"

As described in the proposed change, even though complete cask integrity may not be preserved in the event of a loaded cask drop with the valve box covers removed or with only four, rather than 32, closure head sleeve nuts installed, the radiological consequences calculated using conservative assumptions were determined to be a small fraction of the 10 CFR 100 values. Therefore, the proposed change does not involve a significant reduction in the margin of safety.

be at ground level; (4) the atmospheric dispersion (X/Q) values used for other FSAR Chapter 15 analyses are applied. Using these assumptions, the doses were determined to be a small fraction of the NRC acceptance criteria for Section 15.7.5 of the Standard Review Plan (NUREG-0800). Similarly, HNP calculated the doses to personnel evacuating the FHB following the postulated cask drop event and determined them to be well within occupational exposure limits. The Control Room outside air intake monitors are beta sensitive and would provide their intended isolation function. Therefore, Control Room doses are unaffected by this postulated accident. Calculated doses at the Exclusion Area Boundary (EAB) and the Low Population Zone (LPZ) are as follows:

Comparison of Consequences

	Exclusion Area Boundary 0 - 2 hrs.		Low Population Zone 0 - 8 hrs.	
	Whole-Body (rem)	Thyroid (rem)	Whole-Body (rem)	Thyroid (rem)
Dose Limits - 10 CFR 100	25	300	25	300
Standard Review Plan 15.7.5 Acceptance Limits	.6	75	6	75
Calculated Radiological Dose from Cask Drop Event (Cask with Less Than Full Integrity)	0.005	0.087	0.001	0.020

The calculated doses are a small fraction of Standard Review Plan 15.7.5 acceptance limits.

Basis

This change does not involve a significant hazards consideration for the following reasons:

1. The proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

The changes described do not impact the probability of occurrence of accidents previously analyzed. Removal of the valve box covers and all but four of the cask closure head sleeve nuts has no impact on accident initiators. Dose assessments using maximum potential releases assuming failure of the spent fuel and radionuclide release through the gap between the cask closure head and the cask or damage to the valves show that no significant increase in consequences of an accident previously evaluated would occur.



ENVIRONMENTAL CONSIDERATIONS

10 CFR 51.22(c)(9) provides criterion for and identification of licensing and regulatory actions eligible for categorical exclusion from performing an environmental assessment. A change requires no environmental assessment if it 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 offsite; (3) result in a significant increase in individual or cumulative occupational radiation exposure. Carolina Power & Light Company has reviewed this proposed change and 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 needs to be prepared in connection with this issue. The basis for this determination is as follows.

Proposed Change

It is proposed that FSAR Section 15.7.5.2 be revised to address the evaluation of a previously unanalyzed spent fuel cask drop scenario. This scenario involves the potential drop of a loaded spent fuel cask after the valve covers and all but four of the cask closure head sleeve nuts have been removed in preparation for cask unloading.

The current FSAR analysis in Section 15.7.5.2 does address a cask drop onto a flat surface. The current analysis, however, did not include an evaluation of radiological consequences, because the spent fuel cask is limited to an equivalent 30 foot drop onto a flat, essentially unyielding, horizontal surface, and the cask is designed to withstand such loads. This determination is based on the critical assumption that the spent fuel cask is in a fully secured configuration in accordance with 10 CFR 71 transportation requirements. Upon receipt of loaded spent fuel casks from the Robinson and Brunswick plants, the cask valve covers and all but four of the cask closure head sleeve nuts are removed prior to transferring the cask to the unloading pool.

An engineering evaluation has been performed to evaluate the potential cask drop scenarios specific to the HNP Fuel Handling Building when only four closure head sleeve nuts are used to secure the cask closure head. The evaluation concluded that the cask closure head would not become dislodged, thereby preventing the ejection of fuel elements from the cask.

Dose assessments were performed that considered potential releases as a result of either damage to the valve boxes or through the gap between the cask head and the cask. The calculated doses are well within 10 CFR 100 limits.

Basis

The change meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9) for the following reasons:

1. As demonstrated in Enclosure 2, the proposed change does not involve a significant hazards consideration.
2. The proposed change does not result in a significant change in the types or significant increase in the amounts of any effluents that may be released offsite.

The proposed revision to the FSAR will have no impact on the types of effluents that may be released offsite. As shown in the significant hazards analysis (Enclosure 2), the proposed change will result in a release that is only a small fraction of Standard Review Plan 15.7.5 acceptance limits.

3. The proposed change does not result in a significant increase in individual or cumulative occupational radiation exposure.

The proposed FSAR change and dose analyses will have minimal impact on normal occupational doses. HNP calculated the doses to personnel evacuating the FHB following the postulated cask drop event and determined them to be well within occupational exposure limits. The Control Room outside air intake monitors are beta sensitive and would provide their intended isolation function. Therefore, the FSAR change does not result in a significant increase in either individual or cumulative occupational radiation exposure.