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AUTH. NAME AUTHOR AFFILIATION
WOODY, C. O. Florida Power & Light Co.
RECIP. NAME RECIPIENT AFFILIATION
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SUBJECT: Forwards addl info re 860702 application for amend Licnese NPF-16 to establish option of storing spent fuel from Unit 1 in Unit 2 spent fuel pool, in responnse to 870123 request. W/ 12 oversize encl.
SEE DRAWINGS

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FPL

MARCH 02 1987

L-87-104

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

Gentlemen:

Re: St. Lucie Units 1 and 2
Docket Nos. 50-335 and 50-389
Spent Fuel Transfer

By letter L-86-250, dated July 2, 1986, Florida Power & Light Company (FPL) proposed to amend the St. Lucie Unit 2 operating license NPF-16 to establish the option of storing spent fuel from St. Lucie Unit 1 in the St. Lucie Unit 2 spent fuel pool. The Unit 1 spent fuel pool will lose full core reserve capacity as a result of the 1987 refueling outage, and the planned Unit 1 spent fuel pool rerack cannot be accomplished prior to 1988. If, in the interim, full core off-load of Unit 1 should be necessary, Unit 1 spent fuel could be stored in the Unit 2 spent fuel pool.

By letter dated January 23, 1987 (E. G. Tourigny to C. O. Woody) the NRC Staff requested additional information required to continue their review of this proposed license amendment. Attached is FPL's response to this request.

If additional information is required on this topic, please contact us.

Very truly yours,

C. O. Woody
Group Vice President
Nuclear Energy

COW/EJW/gp

Attachments

cc: Dr. J. Nelson Grace, Region II, USNRC
USNRC Resident Inspector, St. Lucie Plant

A001
1/1
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ATTACHMENT

REQUEST FOR ADDITIONAL INFORMATION
PROPOSED LICENSE AMENDMENT
SPENT FUEL TRANSFER
ST. LUCIE UNIT 2

The following requests pertain to Florida Power & Light Company's submittal to the NRC Staff dated July 2, 1986. The Licensee is asked to respond to the following items regarding details of spent fuel transfer from St. Lucie Unit 1 to St. Lucie Unit 2 as described in their "Safety Evaluation/No Significant Hazards Consideration" report.

Item No. 1:

Section 2.4 of the Licensee's submittal states that "Two transporter Vehicles were considered in the load path evaluation. The maximum wheel loads for each of these transporters were found to be acceptable considering the effects on all surfaces including the roadway, missile protection slab, and underground facilities (i.e., pipes, electric conduit, manholes, and catch basins)."

Please provide the following structural details and data which support the above statement:

a. Structure data of the spent fuel shipping cask which will be used to transfer spent fuel assemblies from Unit 1 to Unit 2 spent fuel pool (configuration and basic dimensions, total weight, shipping position..etc.).

b. Wheel arrangements, maximum recommended wheel loads and dead weight of the two transporter vehicles.

c. Structural details and plan layouts of missile protection slab and underground facilities to be crossed by the transporter vehicles along the shipping load path.

d. Results of stress analysis calculations indicating that every structural component listed in item c above shall withstand prescribed sustained and live loads with acceptable margin of safety.

Response

a. As discussed in the responses to questions 2 and 4 in FPL letter L-87-48, dated February 9, 1987, the spent fuel shipping cask that would be used, if required, would be either the Model NAC-1 or NLI-1/2. These shipping casks have Certificates of Compliance No. 9183, Rev. 3, dated November 14, 1984, and No. 9010, Rev. 17 dated August 28, 1986, respectively, issued by the NRC. Further design details of these spent fuel shipping casks are included in Appendices A and B.

b. Wheel arrangements, maximum recommended wheel loads and dead weights of the two transporter vehicles are shown on Figure 1.

c. Category I underground facilities that are in the path to be crossed by the spent fuel transporter vehicles are shown on Table 1. The Table lists the plan layout and structural detail drawings on which the underground facilities can be found (e.g., Manhole 127 (MH 127) is shown in plan on drawing 8770-G-408 Sheet 1 Revision 13 at coordinate J14). Structural details are shown on drawing 8770-G-627 Revision 5 at coordinates E9 and J9 and drawing 8770-G-628 Sheet 1 Revision 2, in the "Notes". Table 2 lists the attached plan layouts and structural detail drawings attached.

d. Table 1 provides a summary of stress analysis results indicating that every Category I structural component discussed in Item 1c. above has the capability to withstand prescribed sustained and live load with an acceptable margin of safety (e.g., Manhole 127 (MH 127) was designed on the basis of ultimate strength design (USD) for an "original design live load" of 26.4^{K} and yielded a margin of safety of 1.8; the spent fuel transporter vehicles produce corresponding loads of 7.33^{K} (RV) and 8.0^{K} (0)).

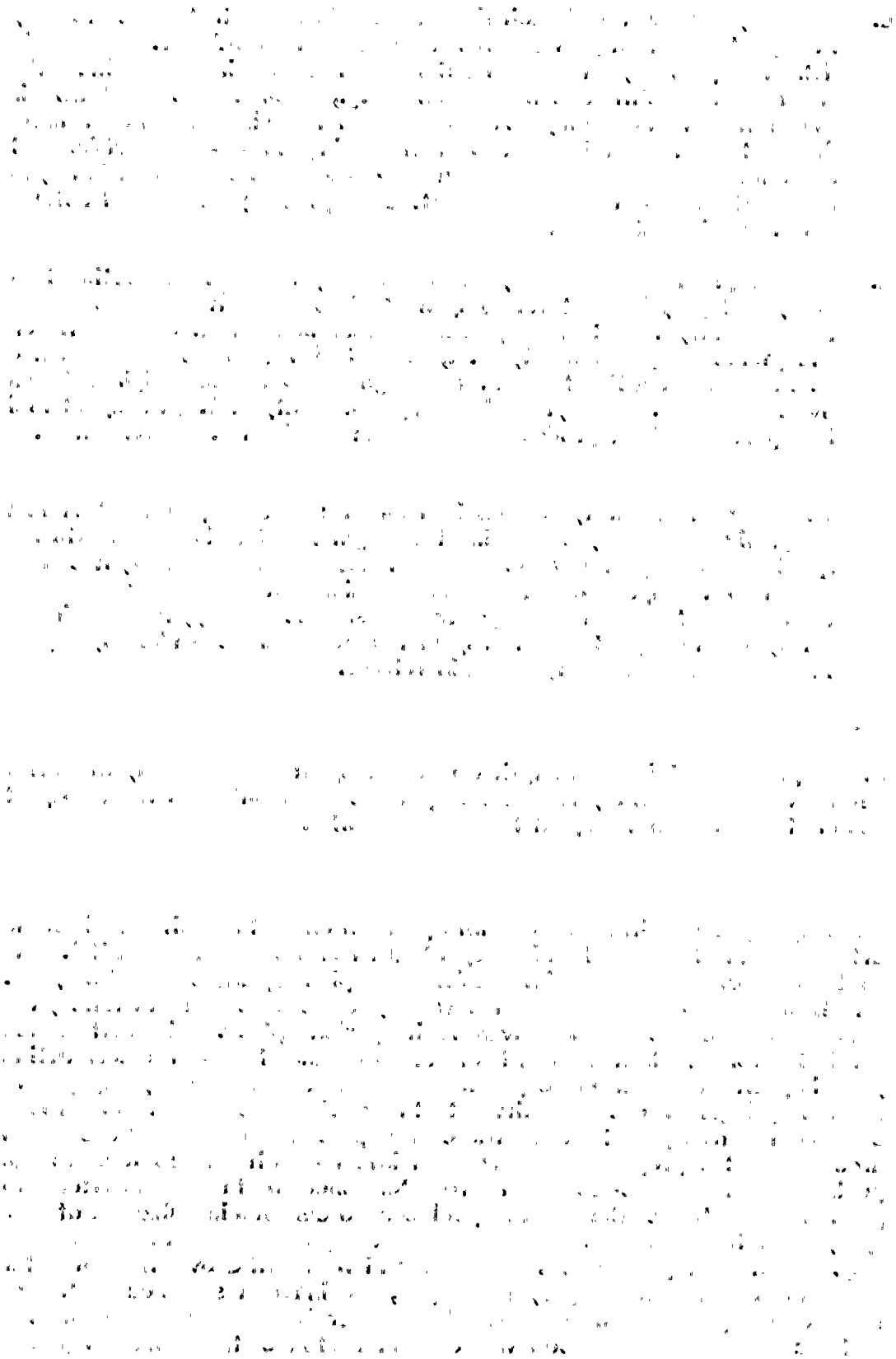
The "margin of safety" shown in Table 1 is based upon the "original design live load". By comparing the original design live loads with the spent fuel transporter vehicle wheel loads shown in Table 1, it can be seen that the spent fuel transporter vehicle wheel loads are no more than half of the original design live loads. Accordingly, the margins of safety for the spent fuel transporter vehicles are considerably higher than the margin of safety shown in Table 1.

Item No. 2:

Please provide detailed description of how a spent fuel assembly of Unit 1 will be transferred safely from the shipping cask mounted on the transport vehicle to the designated spent fuel rack of Unit 2.

Response

The shipping cask will be moved into position under the Unit 2 cask crane after following the predetermined spent fuel transfer path from Unit 1. The Unit 2 cask crane is moved into position and picks up the cask lifting yoke. The trailer down-riggers are then lowered, wheel chocks are installed, the tractor is disconnected and driven to its parking place. The bolts which retain the forward trunion mounts are removed and stored. The cask lifting yoke is positioned over the upper lifting trunions and manually engaged to the lifting lugs. The cask is lifted to the vertical position and then lifted clear of the transport trailer. The cask is placed in the Unit 2 cask wash area where it is prepared for movement into the Unit 2 spent fuel storage pool. The inner head closure bolts are detensioned and the cask is lifted into position over the center of the pool cask area. Demineralized water is sprayed on the cask as it is lowered into the pool through the wash down ring. When the top of the cask is at a covenient height above the pool water level, the demineralized spray is stopped, the inner closure head bolts are removed and placed in storage, and the demineralized water is again started as the cask is continued to be lowered to the bottom of the cask loading area floor.



For the NAC-1, the cask crane hook is detached from the cask crane lifting yoke bale. The hook is washed down with demineralized water as it is retracted out of the pool. For the NLI-1/2, the cask lifting yoke arms are disconnected from the cask using the arm-mounted hydraulic actuating system. The inner cask cover is removed as the yoke is lifted out of the pool. A spray of demineralized water is again used to wash down the cable system, the crane hook, the lifting yoke and the inner cask cover.

After a period of drip drying, the trolly is backed out of the pool a sufficent distance to allow free access to the cask top by the Spent Fuel Bridge Crane (SFBC). For the NAC-1, the SFBC is positioned over the cask and the inner cask cover lifting point is engaged. The cover is then removed and placed in a designated temporary storage location for replacement after the fuel assembly has been removed from the cask. The inner cover lifting tool is then placed in its designated temporary storage location. For both the NAC-1 and the NLI-1/2, the SFBC then moves into position over the cask opening to latch onto the fuel assembly. Once latched, the fuel assembly is picked up by the SFBC, moved through the Unit 2 cask keyway door and taken to a predetermined pool storage location where it is lowered into place. The SFBC unlatches from the fuel assembly and returns to its designated storage/parking position.

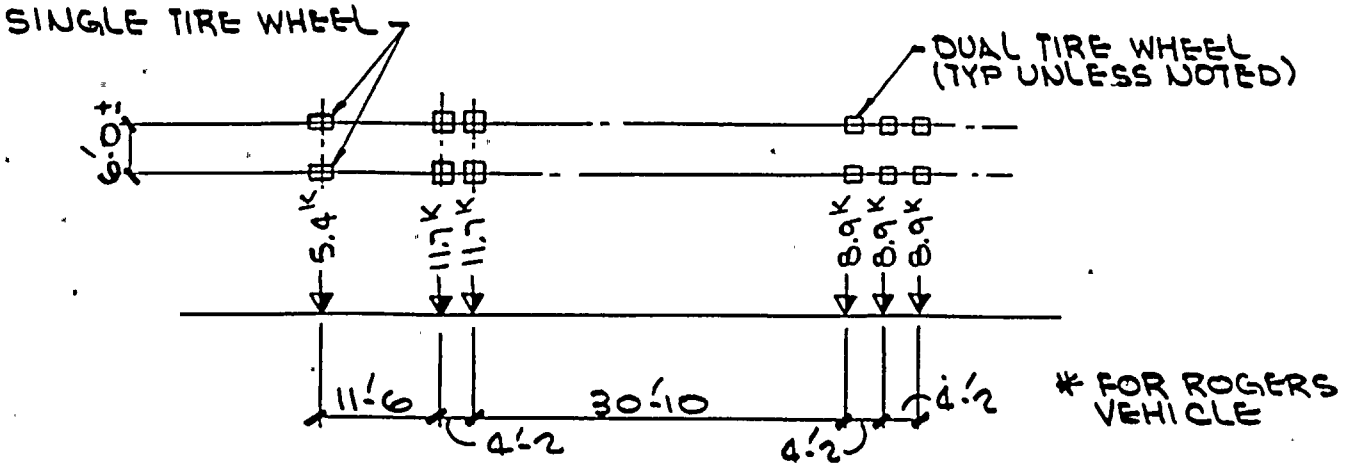
Item No. 3:

Please provide the basic mechanical design parameters of the fuel assemblies manufactured by Exxon Nuclear Company (ENC) since Unit 1 is scheduled to operate with ENC fuel only (Cycle No. 8).

Response

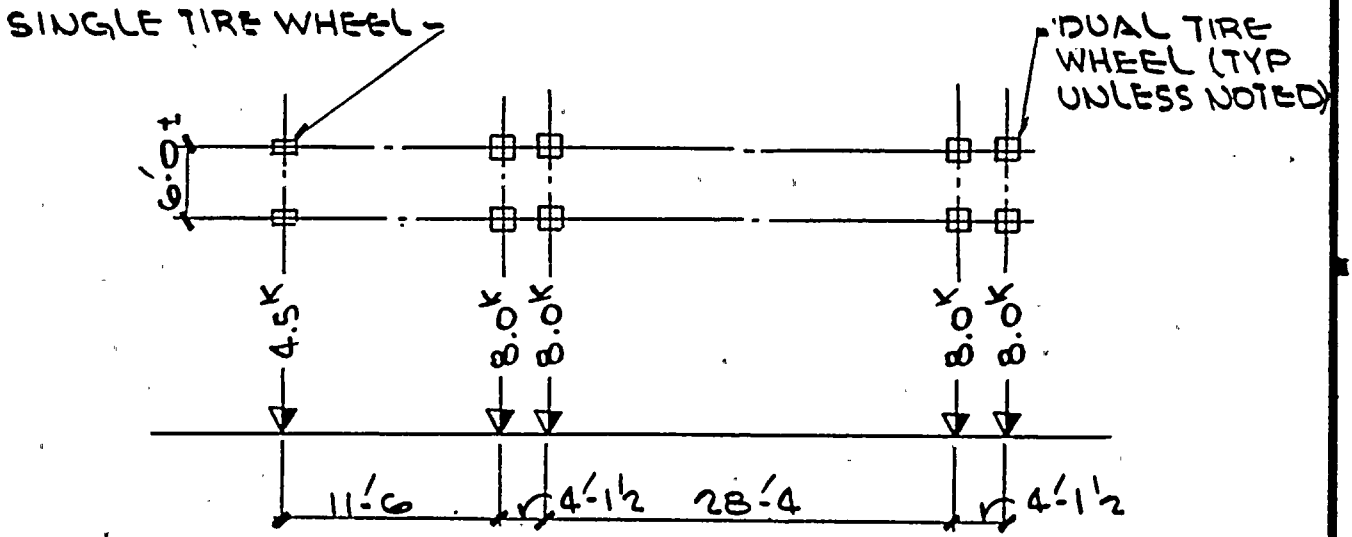
The basic mechanical design parameters of ENC SFAs are described in ENC Topical Report XN-NF-82-09, which was submitted to the NRC in November 1982. This Topical Report was approved by the staff in August 1983.

As discussed in the response to question 1 in FPL's letter L-87-48, dated February 9, 1987, FPL would initially plan to move only the fuel which has had the longest decay time. As a result, Batch A assemblies, which were removed from the Unit 1 reactor at the end of Cycle 1, would be moved first. These assemblies have almost nine years of decay time and are spent fuel assemblies (SFAs) of the Combustion Engineering (CE) design. The basic mechanical design parameters of these CE-design SFAs are also discussed in the response to question 1 of L-87-48.



MAXIMUM RECOMMENDED WHEEL LOAD
SPENT FUEL CASK TRANSPORTER *

VEHICLE DEAD WEIGHT WITHOUT CASK = 45 K



MAXIMUM RECOMMENDED WHEEL LOAD
SPENT FUEL CASK TRANSPORTER

VEHICLE DEAD WEIGHT WITHOUT CASK = 23 K

TRANSPORTER VEHICLES WHEEL ARRANGEMENT
DEAD WEIGHT & MAXIMUM RECOMMENDED WHEEL LOADS

REFERENCE DRAWINGS:

RODGERS BROS. CORP. TRAILER DWG
MODEL # T3HPG15D22-150-20, SERIAL # 17669

FONTAINE TRUCK EQUIPMENT CO. TRACTOR/TRAILER
DWG MODEL # DLBTT-3-38A

MEMO FROM GI ZAMRY TO CS KENT,
DATED OCTOBER 22, 1985 WITH ATTACHED
FIGURE #3, "HEAD ROOM & TRAVEL REQUIREMENTS
FOR UPRIGHTING NL 1/2 CASK"

FIG.1

TABLE 1

UNDERGROUND FACILITIES CROSSED BY SPENT FUEL TRANSPORT VEHICLE

ITEM IN PATH	PLAN DRAWING(3)	DWG REV	DRAWING COORDINATE	STRUCTURAL DRAWING(3)	DWG REV	DRAWING COORDINATE	TYPE OF ANALYSIS	MARGIN OF SAFETY	ORIGINAL DESIGN LIVE LOAD	SPENT FUEL TRANSPORTER VEHICLE WHEEL LOAD RV	SPENT FUEL TRANSPORTER VEHICLE WHEEL LOAD O
Missile Protection Slab over Pipe Tunnel	8770-G-671	6	G5 to I5	8770-G-671 8770-G-672 8770-G-673	6 3 5	G5 to I5 N1 G15, H15	USD	1.8	20.15k	7.33k	8.0k
Missile Protection Slab over Pipe Tunnel	8770-G-671	6	G9 to I9	8770-G-671 8770-G-672 8770-G-673	6 3 5	G9 to S9 N3 & N5 H11	USD	1.8	26.3k	7.33k	8.0k
30"ϕCW-90	8770-G-170sh1	9	F11 to F14	N/A			Deflection	1.77(1)	52.25k	22k	16k
30"ϕCW-91	8770-G-170sh1	9	F11 to F14	N/A			Deflection	1.77(1)	52.25k	22k	16k
MH126	8770-G-408sh1	13	J17	8770-G-627 8770-G-628 Sh 1	5 2	E9 & J9 Notes	USD	1.47(2)	26k	7.33k	8.0k
MH127	8770-G-408sh1	13	J14	8770-G-627 8770-G-628 Sh 1	5 2	E9 & J9 Notes	USD	1.8	26.4k	7.33k	8.0k
MH128	8770-G-408sh1	13	J13	8770-G-627 8770-G-628 Sh 1	5 2	D9 & I9 Notes	USD	1.8	26.4k	7.33k	8.0k
MH129	8770-G-388	24	L8	8770-G-627 8770-G-628 Sh 1	5 2	E9 & I9 Notes	USD	1.8	26.4k	7.33k	8.0k
MH130	8770-G-388	24	L4	8770-G-627 8770-G-628 Sh 1	5 2	F9 & J9 Notes	USD	1.8	26.4k	7.33k	8.0k
MH136	8770-G-408sh1	13	I10	8770-G-627 8770-G-628 Sh 1	5 2	D9 & I9 Notes	USD	1.8	26.4k	7.33k	8.0k
MH137	8770-G-408sh1	13	H7	8770-G-627 8770-G-628 Sh 1	5 2	D9 & I9 Notes	USD	1.8	26.4k	7.33k	8.0k
MH299X	2998-G-057S01	1	H3	2998-G-628 Sh 7 2998-G-627	0 7	E10 Notes	USD	1.47(2)	26k	7.33k	8.0k
MH299Y	2998-G-057S01	1	H3	2998-G-628 Sh 7 2998-G-627	0 7	E10 Notes	USD	1.47(2)	26k	7.33k	8.0k

TABLE 1 (Continued)

ITEM IN PATH	PLAN DRAWING(3)	DWG REV	DRAWING COORDINATE	STRUCTURAL DRAWING (3)	DWG REV	DRAWING COORDINATE	TYPE OF ANALYSIS	MARGIN OF SAFETY	ORIGINAL DESIGN LIVE LOAD	SPENT FUEL TRANSPORTER VEHICLE WHEEL LOAD RV	SPENT FUEL TRANSPORTER VEHICLE WHEEL LOAD O
MH299Z	2998-G-057S01	1	H3	2998-G-628 Sh 7 2998-G-627	0 7	R10 Notes	USD	1.47(2)	26k	7.33k	8.0k
Manhole Covers	Various			n/a			WSD	2.0	26k	7.33k	8.0k
Electrical Conduit	8770-G-388S13 8770-G-408sh1	24 13		n/a			WSD	1.31	52.55k	22k	16k
Missile Protection over Electrical Conduit	8770-G-408sh1	13		8770-G-407 Sh 1	14	A thru D13	USD	1.0	44k	7.33k	8.0k

NOTES: (1) Margin of safety (MS) for deflection is based on allowable deflection of 2 % of diameter; actual deflection is 1.13 % of diameter; MS = 2.0/1.13 = 1.77

(2) Margin of safety (MS) is based on a required area of steel of .81 sq. in. and a provided area of steel of 1.19 sq. in. MS = 1.19/.81 = 1.47

(3) See Attachment 4 for drawings.

ABBREVIATIONS:

USD - Ultimate strength design

WSD - Working stress design

MH - Manhole

R - Revision

CW - Circulating & Intake Cooling water system

RV - Spent Fuel Cask Transporter - Rogers vehicle - shown on Figure 1

O - Spent Fuel Cask Transporter - shown on Figure 1

DEFINITIONS FOR TERMS IN TABLE I

Type of Analysis -
This denotes the method of analysis used to determine a design that is acceptable.

Margin of safety -
This defines the ratio between the original design requirements and original design allowables of the item. It is based on the "original design live load".

Original Design Live Load -
This is the live load that was applied at the road surface and used to design structures in the load path.

Transporter vehicle wheel load -
This shows the wheel load from the vehicles that will transport the fuel between units. The wheel loads are presented in a manner equivalent to those presented for "original design live load".

TABLE 2

Drawing No.	Rev. No.	Title
8770-G-170 Sh 1	9	Yard Piping Sh No. 1A
8770-G-388	24	Diesel Generator Building - Conduit, Grounding & Lighting
8770-G-407 Sh 1	14	Yard Duct Runs
8770-G-408 Sh 1	13	Yard Duct Runs and Lighting Plan, Sections and Details - Sh 1
8770-G-627	5	Electrical Manhole Details - M&R Sh 1
8770-G-628 Sh 1	2	Electrical Manhole Details - M&R Sh 2
8770-G-671	6	Component Cooling Pumps - Foundations Masonry
8770-G-672	3	Component Cooling Pumps - Mas & Reinf Sh 1
8770-G-673	5	Component Cooling Pumps - Mas & Reinf Sh 2
2998-G-057 S01	1	Yard Composite Sh 1
2998-G-627	7	Elec. Manhole Details - M&R
2998-G-628 Sh 7	0	Elec. Manhole Details - M&R

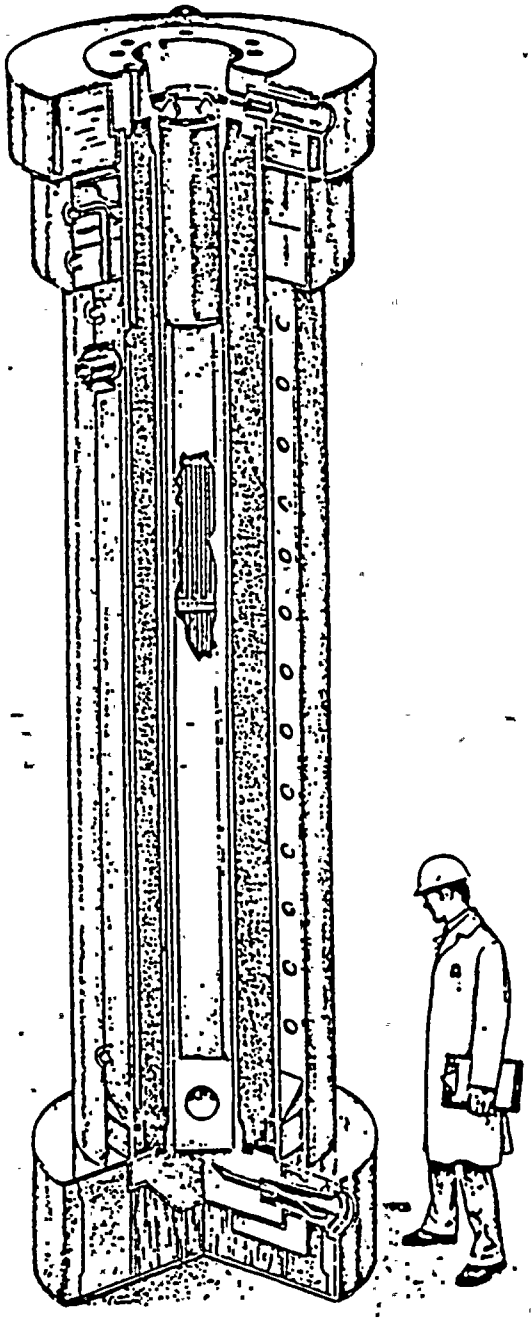
NOTE: 8770- denotes St. Lucie #1 drawings and 2998- St. Lucie #2.

APPENDIX A

NUCLEAR ASSURANCE CORPORATION

INFORMATION ON
NAC-1 SPENT FUEL SHIPPING CASK

CERTIFICATE OF COMPLIANCE No. 9183, REV. 3



NAC-1 SHIPPING CASK DATA

Cask weight, loaded, lbs.	50,000
Gross vehicle weight, lbs.	< 73,280
Overall cask length, inches	214
Minimum loading height, inches	200
Clearance above highest fixed object, inches	258
Cask diameter, inches	50
Internal cavity length, inches	178
Internal cavity diameter, inches	13.5
Shield thickness, inches	
lead	6.625
water	4.5

1. Irradiated Fuel

Clad, irradiated metallic natural uranium fuel rods.

-- 21 rods or 10 encapsulated (defective) rods

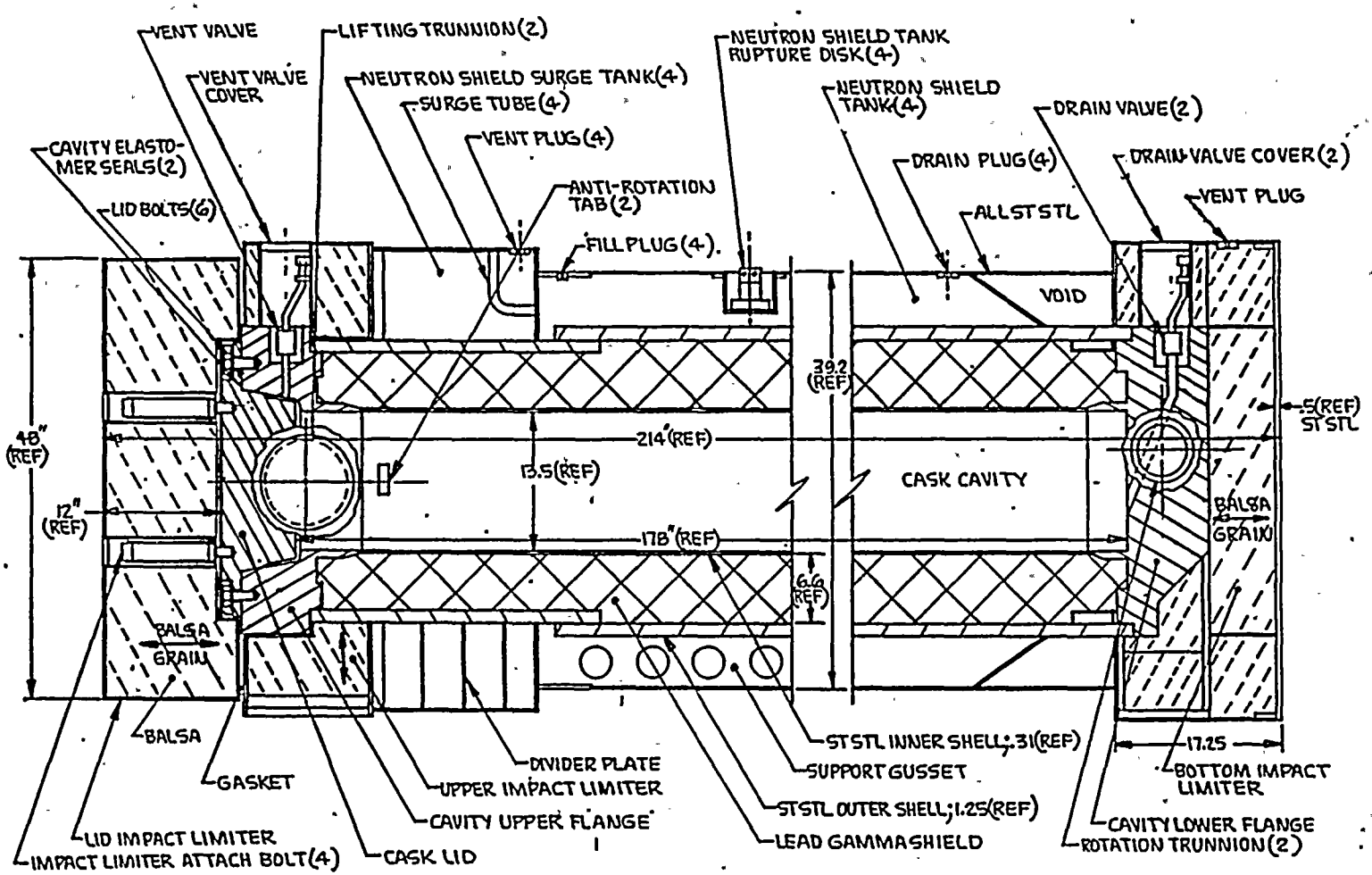
-- 1600 MWD/MTU average burn-up

-- cooled for at least 730 days after irradiation

2. Solid Non-fissile Irradiated Hardware.

3. Maximum Allowable Decay Heat: 625 watts.

4. Maximum Allowable Contained Weight, including baskets, canisters and or spacers: 3,700 pounds.



NAC-1 CASK CONFIGURATION

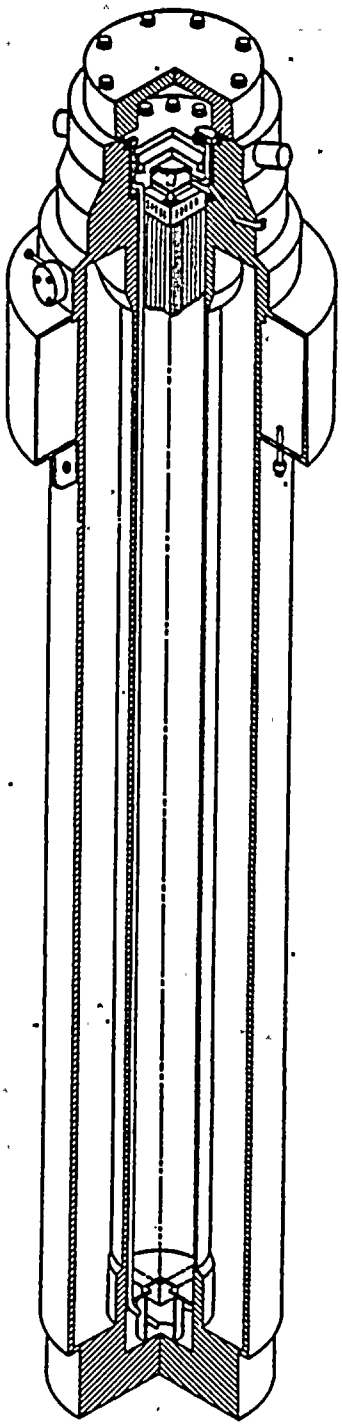
APPENDIX B

NUCLEAR ASSURANCE CORPORATION

INFORMATION ON
NLI-1/2 SPENT FUEL SHIPPING CASK

CERTIFICATE OF COMPLIANCE No. 9010, REV. 17

EJW4/008/6



NL-1/2 SHIPPING CASK DATA

Cask weight, loaded, lbs.	50,000
Gross vehicle weight, lbs.	< 73,280
Overall cask length, (max) inches	198
Minimum loading height, inches	193
Clearance above highest fixed object, inches	258
Cask diameter, inches	48
Internal cavity length, inches	178
Internal cavity diameter, inches	13.375
Shield thickness, inches	
lead	2.125
depleted uranium	2.75
water	5.0

Cask Description

The NL-1/2 shipping cask is designed and licensed to transport one PWR fuel assembly, two BWR fuel assemblies, or irradiated nuclear components such as control and poison rods. In conjunction with its special trailer, it is a Legal Weight Truck cask capable of unrestricted travel.

Contents - Type and Limits

1. Fuel Assemblies

	PWR	BWR
Envelope, max. (in.)	8.75 x 8.75 x 144	5.75 x 5.75 x 144
Enrich., max., w/o 235	3.7	2.65
Uranium wt., max., kg.	475	197

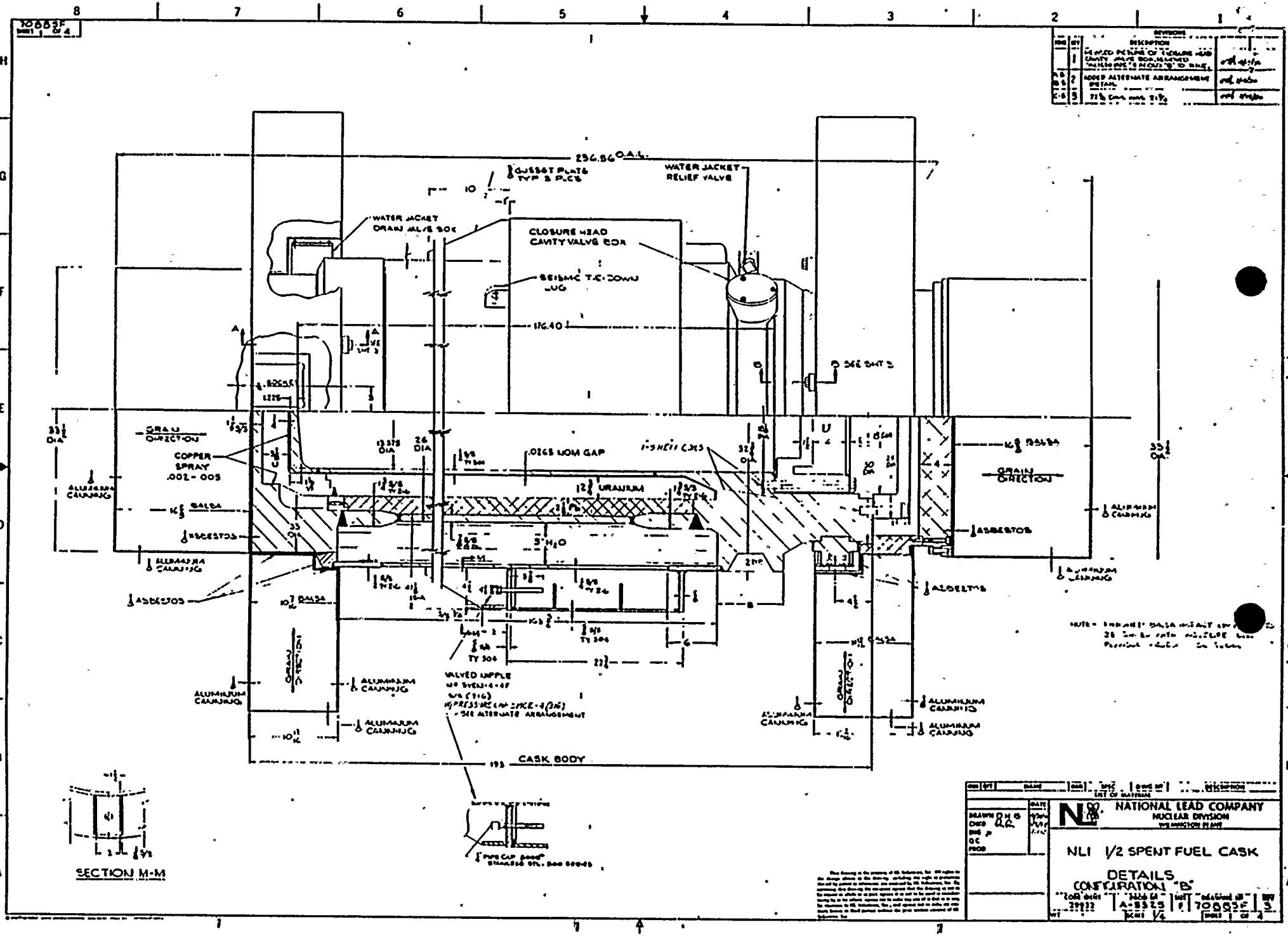
2. Byproduct and special nuclear materials in the form of irradiated uranium oxide fuel rods.

Maximum Enrichment w/o U235	Maximum Fissile Mass Limit kg. U235 + plutonium
3.7	4.0

3. Radiation Source Terms

Total-Gamma Energy	3.074×10^{16} Mev/sec
Total neutron flux	7.55×10^{8} n/sec

4. Maximum allowable decay heat, kw 10.6



NATIONAL LEAD COMPANY
NUCLEAR DIVISION

NLI 1/2 SPENT FUEL CASK

DETAILS
CONFIGURATION "B"