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AUTH. NAME AUTHOR AFFILIATION
WOODY, C. O. Florida Power & Light Co.
RECIP. NAME RECIPIENT AFFILIATION
Document Control Branch (Document Control Desk)

SUBJECT: Forwards addl info for 860702 application for amend to License NPF-16 re spent fuel storage, per 861210 request. Shipping cask Models NAC-1 & NLI-1/2 only casks that meet 25 ton Tech Spec limit for Unit 1 cask crane.

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FPL

FEBRUARY 9 1987

L-87-48

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 December 10, 1986 (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

Attachment

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

A001
1/1

ATTACHMENT

REQUEST FOR ADDITIONAL INFORMATION
FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNITS 1 AND 2
SPENT FUEL TRANSFER BETWEEN UNITS
PLANT, ELECTRICAL, INSTRUMENTATION AND CONTROL SYSTEMS BRANCH

In your submittal dated July 2, 1986, you proposed a licensing amendment to establish the option of transferring and storing spent fuel assemblies (SFAs) from the St. Lucie Unit 1 spent fuel pool (SFP) to the St. Lucie Unit 2 SFP in order to permit full core off-load capability at Unit 1, should it be required, due to loss of Unit 1 full core reserve storage capacity following the 1987 refueling outage. Provide the following additional information with respect to this proposal:

1. Provide further details regarding the Unit 1 SFAs to be stored in the Unit 2 SFP. The details should include number, type and age of existing SFAs to be transferred to Unit 2 and the SFA locations in the Unit 2 storage racks to be utilized. Also provide any necessary drawings to clarify your response.

Response

The St. Lucie Unit 1 spent fuel assemblies which would be considered initially for storage in the St. Lucie Unit 2 spent fuel pool would be those that have had the longest decay time in the Unit 1 spent fuel pool, i.e. Batch A, Combustion Engineering assemblies which were offloaded from the Unit 1 core during Unit 1's first refueling outage in April-May 1978, and have remained in the spent fuel pool since that offload. Refer to St. Lucie Unit 1 Updated Final Safety Analysis Report (FSAR) Table 4.2-1 and Figure 4.2-3.

Although the proposed amendment would not limit the number of SFAs that could be transferred to the Unit 2 SFP, it is expected that only 15 to 25 SFAs would be subject to transfer, should this option become nescessary. Figure 1-1 shows the Unit 1 spent fuel pool with the Batch A assemblies indicated.

Figure 1-2 shows the Unit 2 spent fuel pool. The Unit 1 assemblies would be put into the indicated rack positions closest to the cask laydown area, should the transfer be necessary. This would be consistent with the requirements of St. Lucie Unit 2 Technical Specification 5.6.1.

2. Confirm that you will handle no more than one SFA at a given time in a shipping cask, and that only one type of shipping cask will be used.

Response

At this time, shipping cask Model Nos. NAC-1 and NLI-1/2 are the only casks that meet the 25 ton Technical Specification 3.9.13 limit for the Unit 1 cask crane. Both the NAC-1 and NLI-1/2 casks are capable of holding only one PWR fuel assembly. Therefore, handling more than one SFA in a cask is prevented by the design of these casks.

[illegible]

3. Provide a summary of the evaluation performed concerning the shipping cask load path between the units. This summary should include a discussion of the means utilized to confirm that safety related equipment including piping, components, and electric conduits that are located near the load path and those that are buried under the load path will not be adversely affected with regard to their capability to perform their intended safety functions during normal spent fuel transfer from Unit 1 to Unit 2 and in the event of an accident such as cask drop. Also, provide any necessary drawings to clarify your response.

Response

The evaluation considered a spent fuel trans-shipment path starting at the Unit 1 cask loading area and traveling to the Unit 2 cask loading area as indicated in Figure 3-1. This path, in its entirety, coincides with a portion of the intermodal cask transporter path previously evaluated for effects upon underground structures and utilities. The spent fuel trans-shipment path road surface is paved with Portland cement concrete or asphaltic concrete.

The fuel elements to be transported will utilize a one element shipping cask having a maximum weight of 25 tons when loaded with the spent fuel assembly. Two transport vehicles were considered in the evaluation. Wheel loads for the two vehicles are shown in Figures 3-1 and 3-2. The reactions of the two transport vehicles were compared to the maximum reactions of the intermodal cask transporter that was previously evaluated. Since the reactions of the intermodal cask transporter are greater than the reaction for either of the two transport vehicles, the intermodal cask transporter evaluation is considered to be an enveloping evaluation.

The effect of the intermodal cask transporter wheel loads (and thus the spent fuel transporter wheel loads) on the roadway, missile protection slabs and underground facilities (i.e., pipes, electrical conduit, manholes and catch basins) has been analyzed. The punching shear of the concrete roadway is acceptable for surface areas of both single and dual tire wheels. Each surface area was also evaluated for maximum soil bearing capacity and found to be acceptable. The maximum stresses and deflections of the missile protection slabs, underground pipes and conduit are within the allowable range. The ultimate strength design of the manholes and catch basins using the appropriate load criteria was reviewed and found to be acceptable.

The roadway will be inspected for general deterioration so that it can be repaired, if necessary, prior to the transport of spent fuel. The shipping cask will be adequately secured to the transport vehicle.

The possibility of a cask drop has been greatly minimized by the following:

a. conservative design margins in the lifting components

b. redundant braking systems for hoist systems

c. periodic tests and inspections of the cranes

d. use of qualified crane operators and riggers

e. the use of approved operating and administrative procedures

Refer to FPL response to Question No. 8 for a discussion of a cask drop accident in the cask laydown area of either unit.

4. Provide the details of the spent fuel shipping cask and verify that it meets the requirements of 10 CFR Part 71.

Response

For any transfer of fuel between St. Lucie Units 1 and 2 prior to completion of the rerack of the Unit 1 fuel storage pool, the specific cask type will be either the Model No. NAC-1 or the Model NLI-1/2 series.

Pursuant to 10 CFR 71.12, FPL will register the NAC-1 cask with the NRC prior to its use. The NRC has issued Certificate of Compliance No. 9183, Revision No. 3 dated November 14, 1984 for this cask which states that the NAC-1 is approved for use under the general license provisions of 10 CFR Part 71.12.

The NLI-1/2 cask is currently registered for use by FPL. The NRC has issued Certificate of Compliance No. 9010, Revision No. 16, dated January 16, 1986 for this cask which states that the NLI-1/2 is approved for use under the general license provisions of 10 CFR Part 71.12.

5. According to the technical specification for St. Lucie Unit 1, the spent fuel storage cask can be moved into the spent fuel storage pool area when the spent fuel in the pool has aged more than 1190 or 1490 hours, depending on the amount of spent fuel in the pool. The technical specifications also allow new spent fuel to be moved into the spent fuel storage area after the reactor has been shutdown for 72 hours. However, there is no basis provided for the minimum shutdown time that would be required if new spent fuel were transferred by a shipping cask to the St. Lucie Unit 2 SFP. Therefore, provide an analysis for the minimum shutdown time that would be required for a postulated design basis cask drop accident occurring outdoors between Units 1 and 2 and confirm that the resulting off-site doses are less than 10% of the 10 CFR Part 100 guideline dose values.

Response

Section 9.1.4.3.e of the Unit 1 FSAR provides an analysis of the potential offsite dose resulting from the dropping of a cask containing ten spent fuel assemblies outside the fuel handling building under adverse meteorological dilution conditions. This analysis assumes not only ten assemblies, but also a minimum decay of 90 days. Because the Batch A assemblies have decayed in excess of eight years and only one SFA will be transferred at a time as discussed in the response to Question 2, the above referenced analysis is bounding. Therefore, no additional analysis is necessary.

6. Provide a description of the dose rate at the surface of the pool water for both Units 1 and 2 from the fuel assemblies, control rods, burnable poison rods or any miscellaneous materials stored in the pool. Also, provide the dose rate from individual fuel assemblies as they are being transferred to the cask, and specify the depth of water shielding the fuel assemblies as they are being transferred. If the depth of water shielding over a fuel assembly during transfer is less than 10 feet, or the dose rate 3 feet above the SFP water is greater than 5 mR/hr above ambient radiation levels, then propose a technical specification specifying the minimum depth of water shielding to be maintained over the fuel assembly as it is being transferred in order to maintain ALARA limits, and identify the measures taken to assure that this minimum depth will be maintained.

Response

Travel stops in the fuel handling equipment for both units limit the travel to restrict withdrawal of the spent fuel assemblies. This limitation, together with water level control, results in the maintenance of a minimum water cover of 9 ft. over the active portion of the fuel assembly, resulting in a radiation level of 2.5 mR/hr or less at the surface of the water (see St. Lucie Unit 1 FSAR Section 9.1.4.3 and St. Lucie Unit 2 FSAR Section 9.1.4.3.3). Note that if the travel stops should fail and there were no operator action, the fuel handling machine cannot raise the assembly above a 9 ft. water-to-active-fuel-length height because of the spent fuel machine design geometry.

Refer to FPL response to Question 7 for a discussion on maintaining ALARA limits during fuel assembly transfer. FPL's ALARA program, coupled with design geometry, interlocks and limit switches obviate the need for additional fuel transfer Technical Specifications.

7. a. Describe the manner in which occupational exposure will be kept ALARA during the transfer, including the need for and the manner in which cleaning of the crud on SFP walls will be performed to reduce exposures rates in the SFP area. Also, describe the means to be utilized to ensure that doses to divers are maintained ALARA.

   b. Describe the manner in which occupational exposure will be kept ALARA during cleanup operations after completion of the spent fuel transfer.

Response

a. During the postulated fuel transfer, occupational exposures will be limited by ALARA procedures and guidelines which currently exist at St. Lucie. Additionally, experience gained from previous fuel movement operations and the thermal shield removal from Unit 1 will be used in keeping exposures ALARA. FPL letter L-86-458, dated November 14, 1986 describes FPL's ALARA program and personnel exposure experiences.

   Crud on the SFP walls for either unit presents an insignificant contribution to exposure at St. Lucie.

   Divers would not be used in transferring spent fuel between the units.

b. As discussed in item a., above, occupational exposure from cleanup operations which would result from the postulated fuel transfer will be limited to ALARA by procedures and guidelines which currently exist at St. Lucie.

8. Discuss the extent of damage that the SFP may incur from a dropped spent fuel shipping cask, and confirm that sufficient borated make-up water is available to maintain the minimum SFP water level for any resulting leakage.

Response

Section 9.1.4.3 of the Unit 1 FSAR postulates two cask drop accidents for the Unit 1 SFP, a vertical and a tipped cask drop. The vertical cask drop into the cask storage area has been analyzed to determine if the leaktight barrier of the pool can be breached. The results of the analysis indicate that the leaktight integrity is maintained for a 25 ton cask drop. Technical Specification 3/4.9.13, "Spent Fuel Cask Crane," provides assurance that the Unit 1 fuel cask crane does not handle loads in excess of 25 tons. A tipped cask drop has also been considered and the analysis results found to be acceptable.

In the Unit 2 spent fuel pool a concrete wall to the top of the SFP separates the cask storage area from the spent fuel storage area. The wall prevents a water level reduction over the spent fuel assemblies even if a dropped fuel cask causes damage to the pool or pool liner in the cask storage area.

For both units, the cask is physically prevented and administratively prohibited from traveling over the SFP outside the cask storage area.

9. Provide an evaluation of the total dose to members of the public resulting from the proposed transfer considering the following:

a. time required to move each fuel assembly from the Unit 1 SFP to the Unit 2 SFP;

b. releases of radioiodines and other radionuclides during this time;

c. direct radiation;

d. transfer and cleanup operations; and

e. other sources of exposure at the site.

Response

The only dose to members of the public that could potentially occur would be as a result of a fuel handling or cask drop accident. These accidents have been analyzed in the Unit 1 FSAR Sections 9.1.4.3 and 15.4.3.2 and in the Unit 2 FSAR Sections 15.7.4.1.2 and 15.7.4.1.3.

10. Describe the provisions for monitoring releases of radioactive materials, environmental radiological monitoring, and calculating and reporting effluents and offsite doses from the proposed transfer operations and subsequent clean-up operations, or justify not providing such monitoring, calculating, and reporting.

Response

St. Lucie Unit 1 and Unit 2 Technical Specifications Section 3/4.11, "Radioactive Effluents," and 3/4.12, "Radiological Environmental Monitoring", provide requirements on the monitoring of radioactive releases, environmental monitoring and subsequent reporting requirements. Any potential fuel transfer would be subject to these requirements.

11. Your request indicates that spent fuel will be transferred only from Unit 1 to Unit 2. Confirm that this is the case. If your request also involves the capability to transfer spent fuel from Unit 2 to Unit 1, provide information comparable to that indicated previously for this case, or confirm that the conditions of the transfer will be identical to that for Unit 1 to Unit 2.

Response

If a full core off-load is required prior to reracking the Unit 1 SFP, only fuel discharged from Unit 1 will be transferred to Unit 2. No fuel discharged from Unit 2 will be transferred to Unit 1. However, after reracking the Unit 1 SFP, any spent fuel from Unit 1 which may have been transferred to the Unit 2 SFP could be returned to the Unit 1 SFP under the conditions described above.

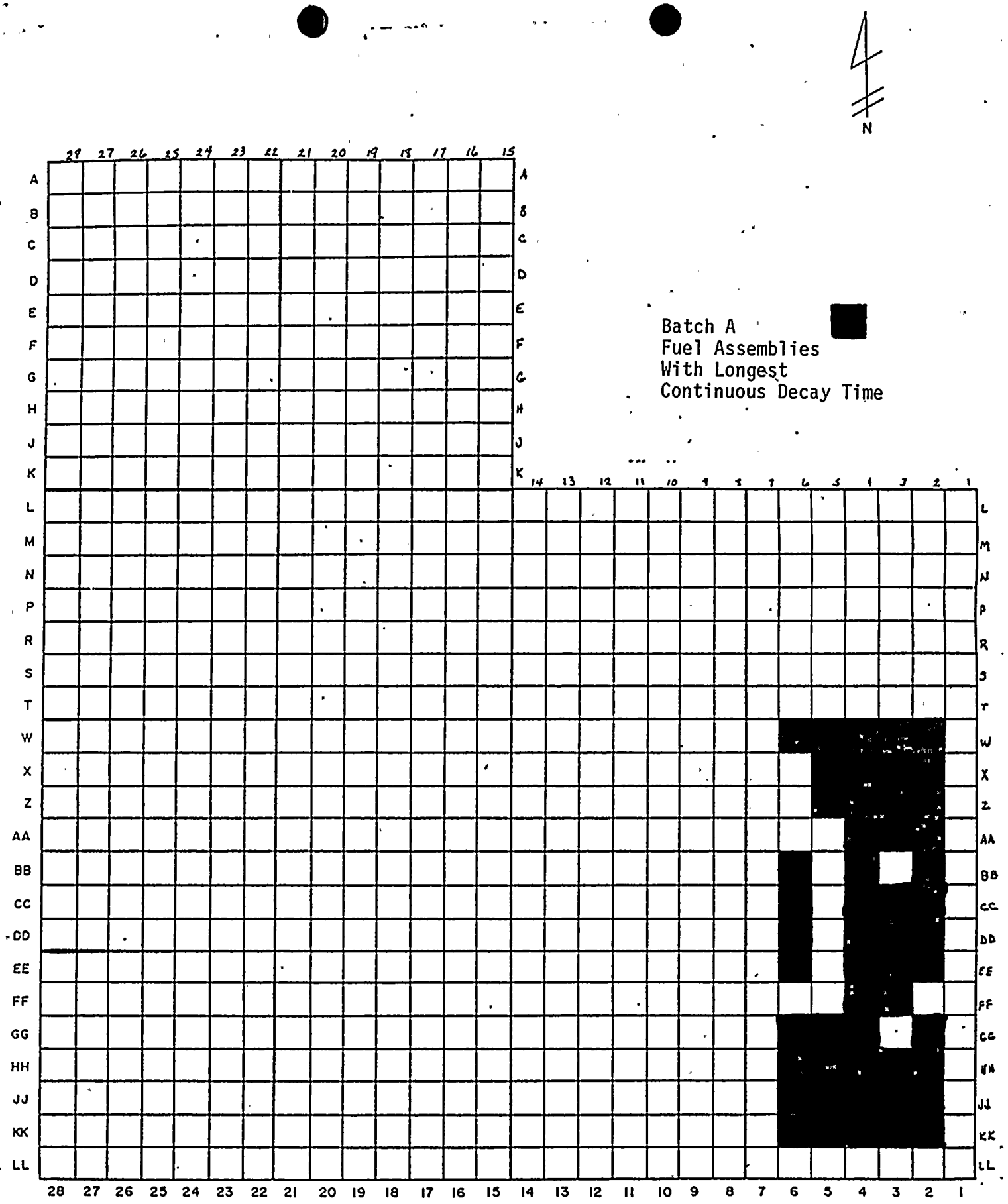


Figure 1-1
Spent Fuel Storage
St. Lucie Unit 1

2
/R2

FIGURE 6
SPENT FUEL STORAGE
FOLLOWING REFUELING OPERATION

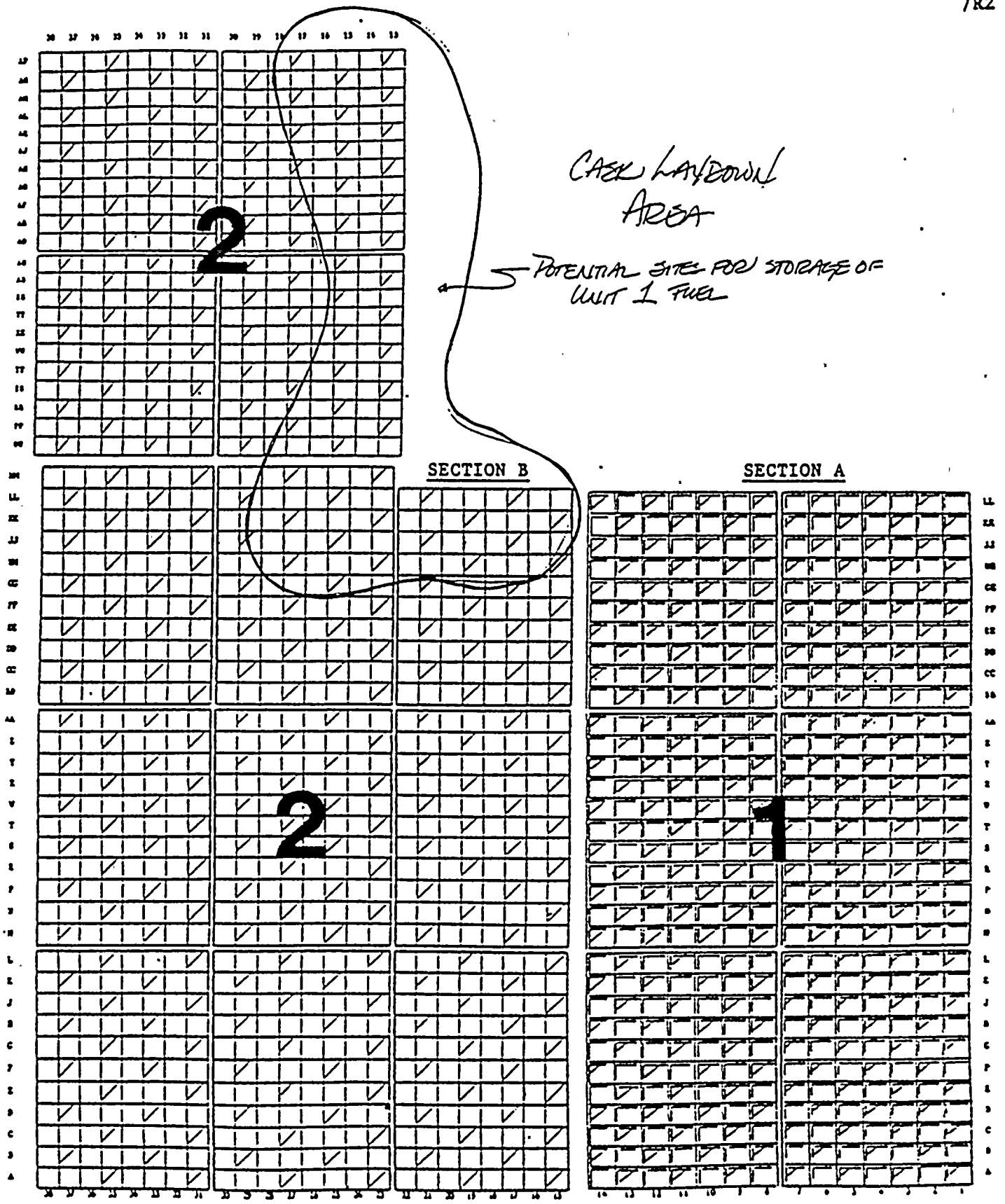
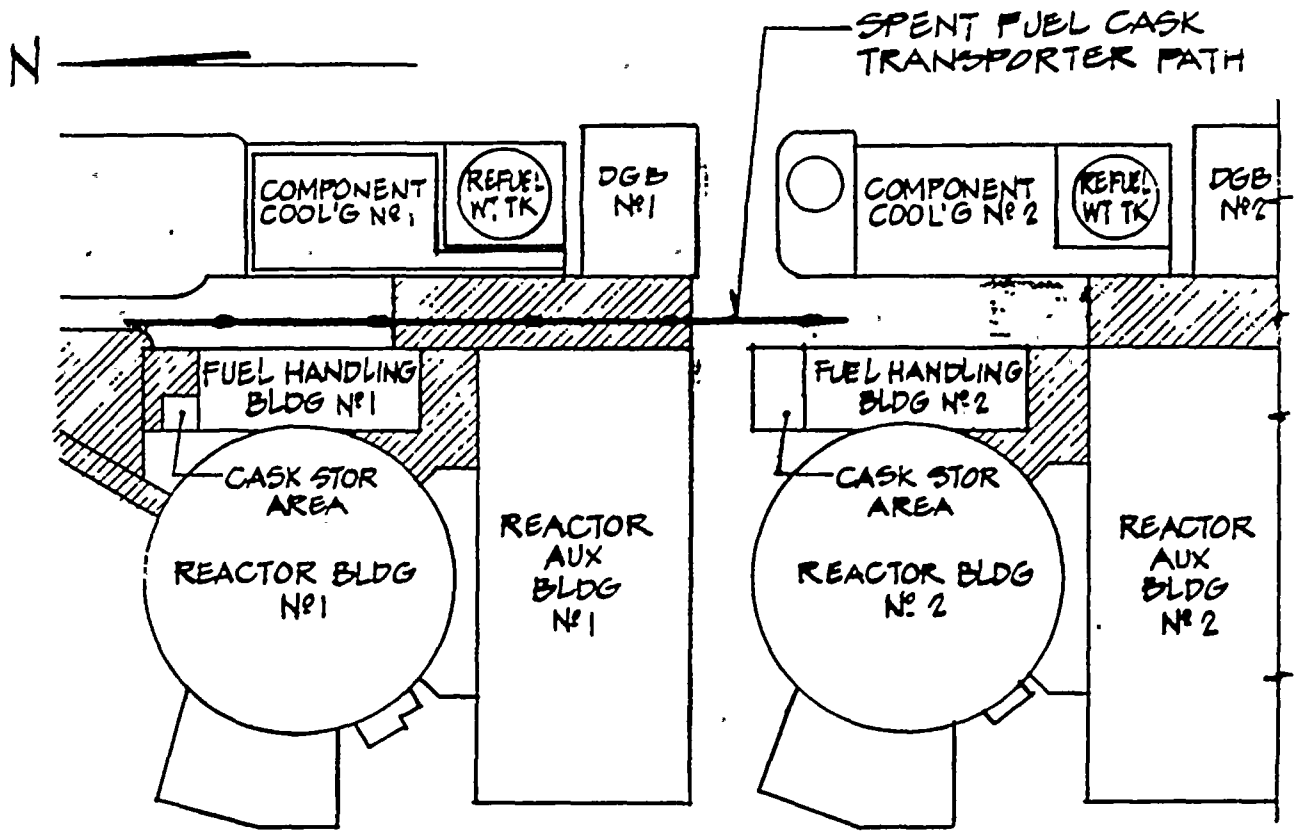


Figure 1-2

Figure 3

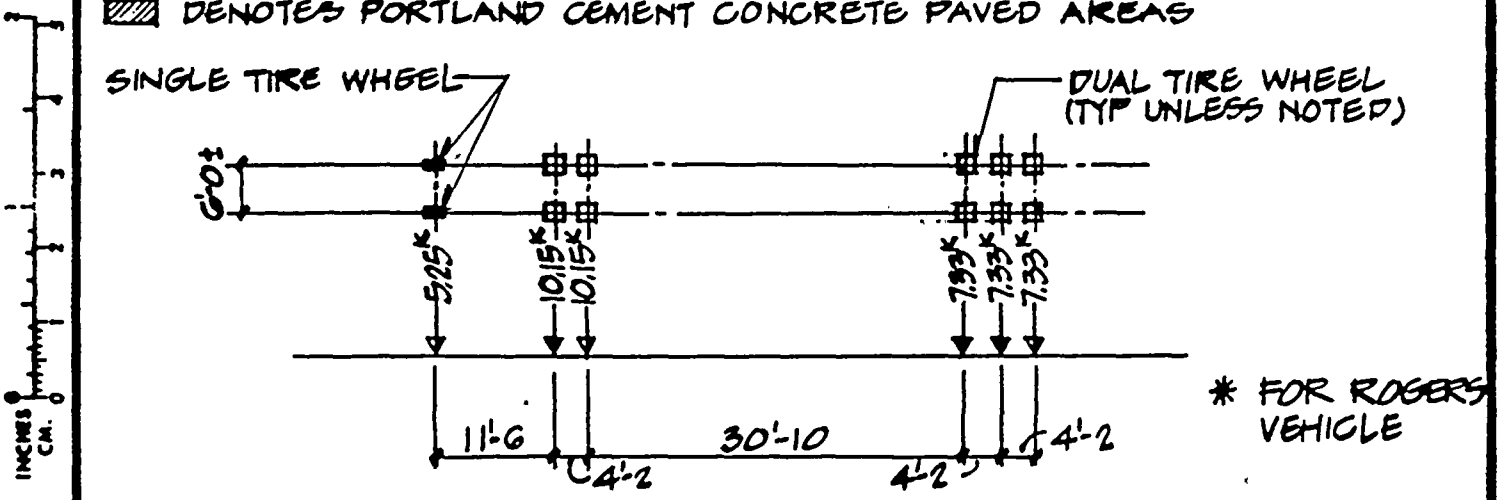


UNIT Nº 1 & 2 - PARTIAL SITE PLAN

LEGEND

DENOTES ASPHALTIC CONCRETE ROADS & PAVING

DENOTES PORTLAND CEMENT CONCRETE PAVED AREAS



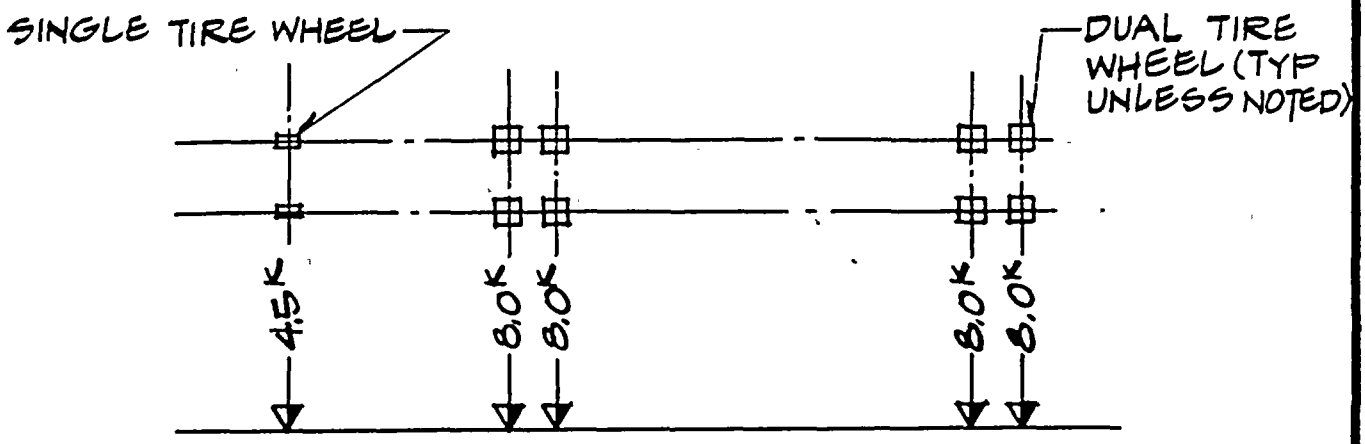
WHEEL LOAD

SPENT FUEL CASK TRANSPORTER*

(TOTAL LOAD = 55K)

NO.	DATE	REVISION	BY	CH	APPROVED

EBASCO SERVICES INCORPORATED	FLORIDA POWER & LIGHT CO. ST. LUCIE PLANT UNIT NO. 1 & 2 SPENT FUEL POOL RERACK SAFE LOAD PATH & TRANSPORTER LOADINGS	3056-138 C-SK-001
DIV CIVIL DR. DC/DC SCALE - CH. RGeyer DATE 2-4-86 APPROVED J P Quirk EMG RR	FILE: N/A	SH. 1 OF 2



WHEEL LOAD

SPENT FUEL CASK TRANSPORTER

(FOR VEHICLE PER FIG #3, "HEAD ROOM & TRAVEL REQUIREMENTS FOR UPRIGHTING NL 1/2 CASK')

(TOTAL LOAD = 73K)

Figure 3-2

NO.	DATE	REVISION	BY	CH	APPROVED

EBASCO SERVICES INCORPORATED

DIV. CIVIL DR. BB/DC
SCALE — CH. RG
DATE 2-9-86

APPROVED JP Burkert

EMG TGK RA

FLORIDA POWER & LIGHT CO.
ST. LUCIE PLANT UNIT NO. 1 & 2
SPENT FUEL POOL RERACK
TRANSPORTER LOADING

FILE: N/A

3056-138
C-SK-001

SH. 2 OF 2