CONNECTICUT YANKEE ATOMIC POWER COMPANY

BERLIN, CONNECTICUT
P. O. BOX 270 HARTFORD CONNECTICUT 06101

TELEPHONE
203-666-6911

April 15, 1980

Docket No. 50-213

Mr. Boyce H. Grier, Director
Region I
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406

Gentlemen:

Haddam Neck Plant
FTOL No. DPR-61
Intent to Ship Special Nuclear Material

In accordance with the requirements of 10CFR73.72, Connecticut Yankee Atomic Power Company (CYAPCO) is hereby providing notification of our intent to ship special nuclear material in the form of three (3) irradiated fuel assemblies. Each of these assemblies will be shipped by truck, owned by Tri-State Motor Transit Company of Joplin, Missouri, in three separate shipments from CYAPCO's Haddam Neck Plant in Haddam Neck, Connecticut, to Battelle Columbus Laboratories in Columbus, Ohio.

Shipments are scheduled for departure from Haddam Neck at 8:00 a.m. on April 22, 28, and May 2, 1980, with scheduled arrival at Battelle Columbus 22 hours after departure in each case.

Return shipments of two (2) of the assemblies are expected, but have not yet been scheduled. CYAPCO intends to send notification of those shipments when they are scheduled.

The Region 1 office was notified by phone today, April 15, 1980.

Very truly yours,

CONNECTICUT YANKEE ATOMIC POWER COMPANY

W. G. Counsil
W. G. Counsil
Vice President

By: W. F. Fee
W. F. Fee
Vice President

CONNECTICUT YANKEE ATOMIC POWER COMPANY

BERLIN, CONNECTICUT
P. O. BOX 270 HARTFORD, CONNECTICUT 06101

TELEPHONE
203-666-6911

April 18, 1980

Docket No. 50-213

Director of Nuclear Reactor Regulation
Attn: Mr. D. L. Ziemann, Chief
Operating Reactors Branch #2
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Reference: (1) D. C. Switzer letter to D. L. Ziemann dated March 21, 1978.

Gentlemen:

Haddam Neck Plant
Additional Information in Support of Proposed Changes
to Technical Specifications

In Reference (1), Connecticut Yankee Atomic Power Company (CYAPCO) forwarded proposed Specifications to delete the prohibition of spent fuel cask movement over the spent fuel pool in Technical Specification 3.13H and substitute additional restrictions regarding their movement. Also included were the results of the cask drop analysis.

In late February, 1980, CYAPCO requested that the NRC Staff expedite their review of the proposed changes in order that shipment to Battelle Columbus of three (3) spent fuel assemblies from previous cycles at Haddam Neck could be accomplished before the upcoming May 3, 1980 shutdown for refueling. At that time, it was emphasized that the shipment of these assemblies and the work to be done on them is of interest, not only to CYAPCO, but also to the Electric Power Research Institute (EPRI), the U.S. Department of Energy (DOE), and the industry in general.

Two of the assemblies are being shipped as part of the joint CYAPCO-EPRI fuel examination program directed toward definitively determining the cause of Batch 8 fuel failures experienced in 1979. Shipping and subsequent post-irradiation examination are critical to assuring against future failures and minimizing radioactive contamination. The third assembly is a thoroughly pre-characterized assembly from Cycle 2 operation at Haddam Neck, which has been in the spent fuel pool for approximately seven years. DOE is interested in investigating the effects of long-term storage on spent fuel in connection with the Away-From-Reactor (AFR) spent fuel storage program.

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PDR/LPDR

On March 27, 1980, a conference telephone call was held to discuss questions from the Staff which had been informally transmitted to CYAPCO/NUSCO a week earlier. Further questions and clarification requests resulted from that call. Answers have been informally transmitted for your review previously and are provided formally as Attachment 1 to this letter.

On April 3, 1980, CYAPCO advised the Staff by telephone that we were revising the request for a permanent Technical Specification change to a one-time approval, waiver, license condition, or whatever would be the most expeditious method of modifying the Technical Specifications to allow movement of the spent fuel cask and accomplishment of the shipments. This revision was the result of additional concerns, raised internally at NUSCO, regarding potential criticality in the event of a cask drop.

At this time, CYAPCO respectfully reiterates its requests for expeditious Staff action on this topic. To avoid a very long delay, shipment of the three fuel assemblies must be accomplished before the scheduled refueling outage.

Your continued cooperation is sincerely appreciated.

Very truly yours,

CONNECTICUT YANKEE ATOMIC POWER COMPANY

W. G. Counsil
Vice President

Attachment

DOCKET NO. 50-213

ATTACHMENT 1

HADDAM NECK PLANT

ADDITIONAL INFORMATION IN SUPPORT OF PROPOSED CHANGES TO TECHNICAL SPECIFICATIONS

APRIL, 1980

ATTACHMENT 1

QUESTIONS TELECOPIED FROM NRC AS "ENCLOSURE 1",
HADDAM NECK, CASK HANDLING OPERATIONS, REQUEST FOR ADDITIONAL INFORMATION

Question (1)

Indicate whether a failed-fuel container will be used for movement of the damaged fuel. If it will be, describe the path to be followed and extent to which Staff Positions 1 through 5 of Enclosure 2 will be satisfied for movement of this container.

Response

CYAPCO will be using zero leak cask, and so, will not need a failed-fuel container.

Question (2)

Identify the model cask that will be used for shipment of the fuel.

Response

CYAPCO will use an NAC-1 cask, licensed as NSF-4.

Question (3)

a) Identify the weight of the hatch cover that is moved to the roof to allow handling of the cask.

b) Identify where this load is stored on the roof.

Response

There is no hatch cover which is moved to the roof. There is a hatch in the roof whose cover slides, on tracks, to the side of the opening out of the way. This is at elevation 75'6". There is also a hatch in the floor at elevation 47'0", whose cover is lifted off and set aside on the same floor, away from the pool and out of the way.

Question (4)

a) Identify the weight of the spent fuel cask cover.

b) Identify the crane used for handling this cover, and the defined safe load path for its movement.

Response

The spent fuel cask cover weighs 750 pounds. It is removed from the cask using the Refuel Building's 3-1/2 ton crane. The defined path is indicated on Figure 2.

Question (5)

Identify what safety-related equipment (including cabling) is located in the area below the location where the spent fuel cask is loaded onto the transfer buggy.

Response

There is none.

Question (6)

The response to Question 1 contained in the May 14, 1974 letter from Connecticut Yankee makes reference to analyses docketed for other plants. Describe the assumptions and approach used for the reference analysis and by whom that analysis was made. Describe the similarity of the assumptions made for that analysis and the working conditions in the Haddam Neck Plant.

Response

The referenced analysis was done by Stone and Webster Engineering Corporation for a spent fuel pool of similar design. The assumptions and conservatisms made in that analysis were as follows:

a) All the kinetic energy of the cask at impact is absorbed by crushing of the concrete in the pool floor only -- the cask was assumed to be infinitely stiff, not absorbing any kinetic energy itself.

b) The concrete strength used (3000 psi) is the design strength, that is, the strength after 28 days. The actual strength of the concrete increases over time.

c) Although the cask drop is a dynamic event, the static crushing strength of the concrete was used.

d) The line of impact goes through the cask's center of gravity and the cask's edge which penetrates into the concrete slab for the duration of the event.

e) The crush zone is a 45° cone with a bottom diameter of 15 feet (radius at rock contact = 7.5 feet).

f) The concrete in the crush zone is assumed infinitely permeable.

g) The flow in the rock is calculated using hemispherical artesian flow equation.

The resulting leak rate calculated was approximately 0.4 gpm.

The referenced plant's spent fuel pool is essentially identical to that at Haddam Neck. Both are poured directly on bedrock with a minimum concrete thickness of six (6) feet on the pool floor. It should be noted that the referenced analysis assumed a 100 ton cask is dropped from a height of 42 feet (4 feet through air, 38 feet through water). The cask to be used at Haddam Neck weighs 25 tons and could be dropped from a height of only approximately 38 feet (4 feet through air, 33-1/2 feet through water). The concrete used in the Haddam Neck pool has a design strength of 3000 psi, and has been in place since 1967.

QUESTIONS TELECOPIED FROM NRC AS "ENCLOSURE 2",
HADDAM NECK, CASK HANDLING OPERATIONS, REQUEST FOR ADDITIONAL INFORMATION

Question (1)

Verify that procedures are developed and followed for the proper handling of the spent fuel cask and related heavy loads (such as the hatch cover), and that these procedures include: identification of proper equipment and components for performing these operations; required inspections before movement of the load and related acceptance criteria; the steps and proper sequence to be followed in handling the load; definition of the safe load path; and special precautions.

Response

Procedures for cask handling operations were supplied by NAC. These have been incorporated into the site-specific procedures for the Haddam Neck Plant. The path of the cask is indicated on Figures 1 and 2 of this Attachment. The cask cover will be stored in a position, suspended off the fuel crane bridge, which will be above the seismic supports, not above the fuel.

The yoke will be oriented (by procedure control) in the East-West direction within the Spent Fuel Building. Thus, if one end of the yoke should break, when the cask is over the pool, the cask would tip either in the East direction away from the fuel storage pool, or in the West direction, over the fuel rack seismic restraints, thus, providing additional protection against the possibility of the cask tipping towards the stored fuel assemblies.

The cask is restricted from motion over the fuel storage racks by the roof hatch opening area. (See Drawing 16103-2703). As a precautionary measure, CYAPCO can put an additional man in the crane cab with a walkie-talkie and another man stationed inside at the crane's main power breaker. Thus, in the extremely unlikely event of the failure of the crane directional control, with coincident failure of the crane stop button and the power breaker the cab, the second man in the cab can relay a message to the man inside and he, in turn, will open the main breaker.
Drawings, numbers 16103-27036 and -59005 (partial), are provided for information. The partial of 16103-59005 is the fuel pool only, showing the seismic restraints.

Question (2)

Verify that operators that will handle the cask and related heavy loads are trained and qualified, prior to handling these loads, and conduct themselves in accordance with Chapter 2-3 of ANSI B30.2-1976, "Overhead and Gantry Cranes".

Response

CYAPCO will ensure that operators are trained and qualified, and conduct themselves in accordance with Chapter 2-3 of ANSI B30.2-1976.

Question (3)

Verify that the yoke used to handle the cask satisfies the guidelines of ANSI N14.6-1978, however, the stress design factor stated in Section 3.2.1.1 of ANSI N14.6 should be based on the combined maximum static and dynamic loads that could be imparted on the handling device based on the characteristics of the crane which will be used.

Response

The NAC-1 cask Lifting Yokes to be used at Connecticut Yankee, for the failed fuel handling operation, are Y-3 and SY-1 designation. Each of these lifting yokes was designed by Nuclear Fuel Services Company (NFSC). Their design criteria (attachment) were as indicated in Paragraph 4.2 of NAC Document 101-0-A2, using a design load of three (3) times the load cask dead weight (@ 150,000 pounds) with design stress less than the minimum yield stress. For a design load of 5W (250,000 pounds) the design stress is less than the ultimate strength of yoke material (92,600 psi).

The adequacy of this design was demonstrated by load test after fabrication (to 150 percent of loaded cask weight) per ANSI 14.6 guidelines.

As indicated in Section 4.2.4 of the design criteria, minimum yield strength of 50,000 psi was utilized. Material certification performed by United States Steel (USS) indicated the minimum yield strength to be 61,700 psi. Utilizing the higher yield strength induces an additional safety factor of 23.4 percent over the safety factors established using a 3W design load and a 50,000 psi yield strength.

NAC's recertification of the design modifications performed on the original NFS yoke designs results in a minimum safety factor of 1.4 for the yield stress criteria using the 3W design load. (NFS's original design basis was not modified.)

Based on the above discussion, it is NUSCO's opinion that the NAC yokes adequately meet ANSI 14.6 requirements. In addition, the yokes will have a minimum safety factor of 1.72 (1.4 * 1.23) for a 3W design load. The minimum dynamic load factor, without exceeding the yield stress criteria, for a 1W load is 5.0.

The cask does not have a redundant or single-failure-proof yoke. There is none available in the industry.

Question (4)

Verify that the slings or handling devices used for movement of the hatch cover and spent fuel cask cover (if different from the cask yoke) are installed and used in accordance with ANSI B30.9-1971, "Slings".

Response

CYAPCO will ensure that the slings used for movement of the cask cover are used in accordance with ANSI B30.9-1971. The lifting spider has a design rating of 2,800 lbs., is load tested to 2,800 lbs., and has a factor of safety of 3.

Question (5)

Verify that the crane(s) used for handling of the spent fuel shipping cask and related heavy loads are inspected, tested, and maintained in accordance with Chapter 2-2 of ANSI B30.2-1976, with the exception that tests and inspections should be performed prior to use where frequency of crane use for these loads is less than the specified inspection and test frequency.

Response

The fuel building auxiliary hoist and the large overhead crane, which will be used for handling heavy loads and the spent fuel shipping cask, were recently (April 11, 1980 and April 15, 1980) inspected by Dwight-Foote, Incorporated, of Berlin, Connecticut. Their representatives have indicated that inspection requirements of ANSI B30.2-1976 were met or exceeded, and that certification to that effect will be provided. It is CYAPCO's intent to load test the crane and complete lifting rig to approximately 150% of the shipping cask/fuel assembly weight before cask handling operations begin.

Question (6)

Verify that the crane design satisfies the guidance of ANSI B30.2-1976, Chapter 2-1. Provide justification for those provisions that are not met.

Response

The crane was purchased in 1964. It was designed to the following specifications applicable at that time:

a) AISC Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings.

b) Specification for Steel for Bridges of the ASTM, Serial Designation A-7.

c) Electric Overhead Crane Institute Specifications.

d) General Information for Standard Industrial Service Electric Overhead Traveling Cranes.

e) ASA Standards.

As indicated above (Question (5)), inspection results meet or exceed the requirements of ANSI B30.2-1976 and CYAPCO intends to load test the crane and lifting rig before cask operations are started.

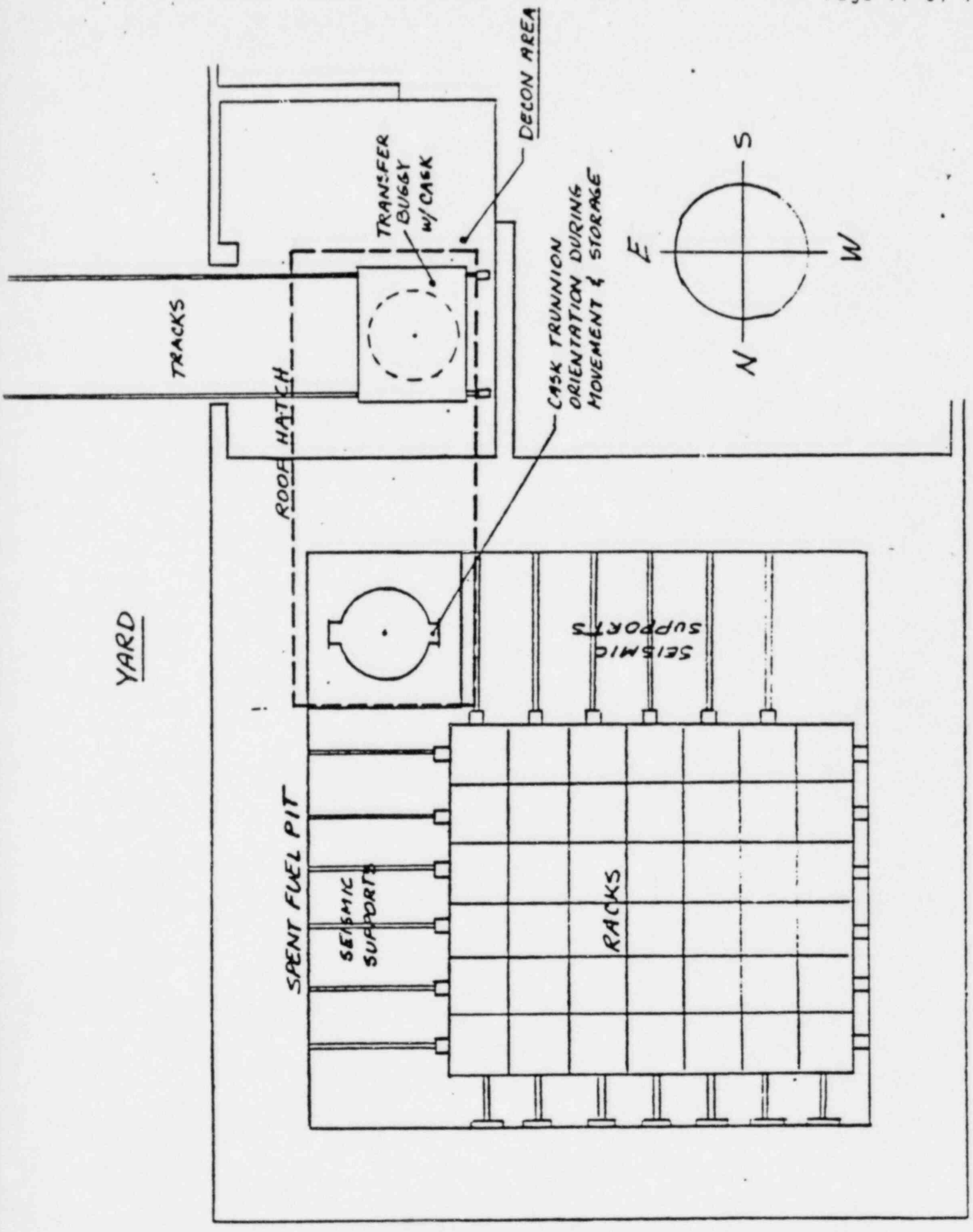

DECON AREA
TRANSFER BUGGY W/CASK
CASK TRUNNION ORIENTATION DURING MOVEMENT & STORAGE
S
E
W
N
TRACKS
ROOF HATCH
YARD
SEISMIC SUPPORTS
SPENT FUEL PIT
SEISMIC SUPPORTS
RACKS

FIGURE 1

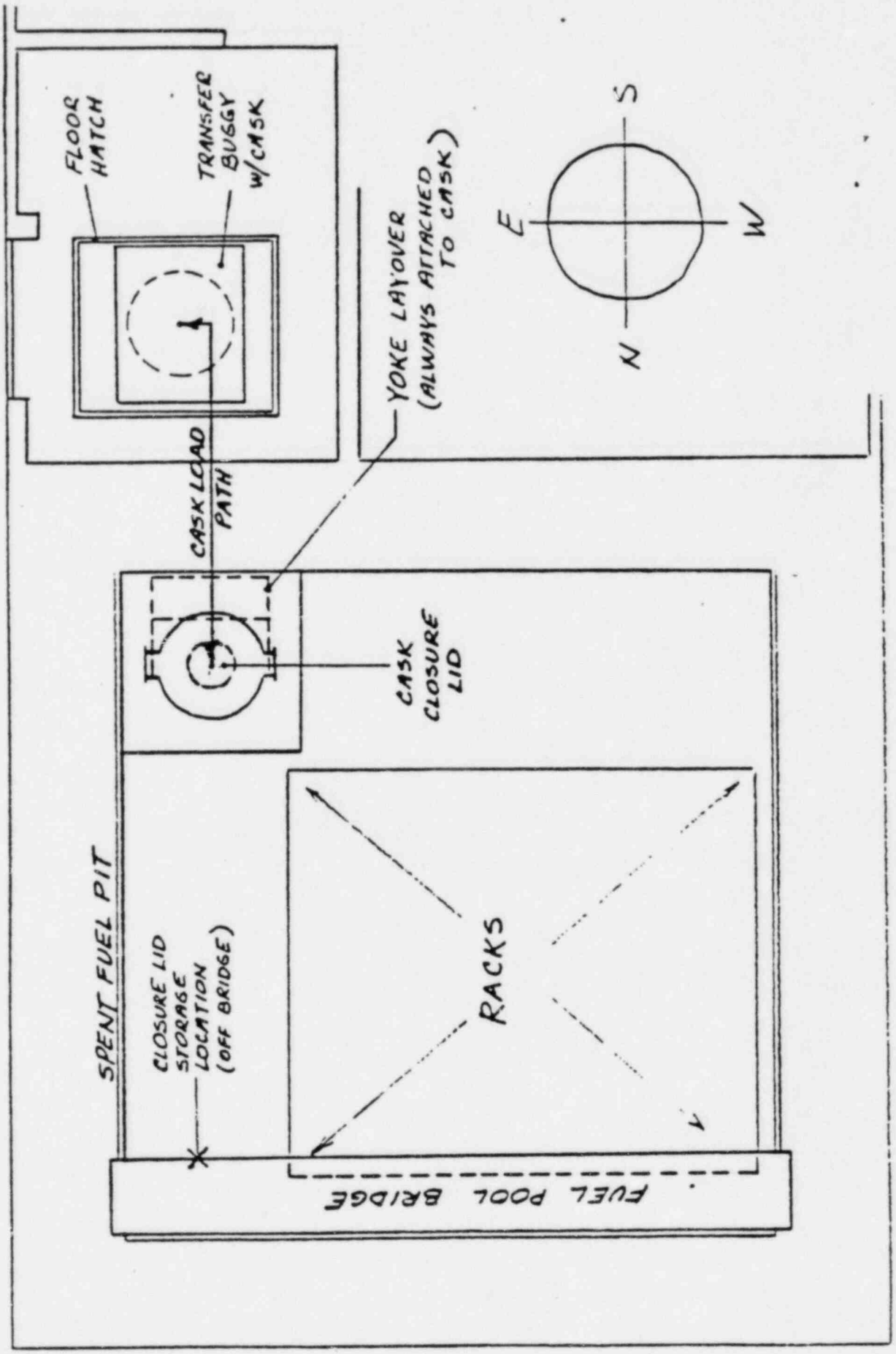

FLOOR HATCH
TRANSFER BUGGY W/CASK
YOKE LAYOVER (ALWAYS ATTACHED TO CASK)
S
E
W
N
CASK LOAD PATH
CASK CLOSURE LID
SPENT FUEL PIT
CLOSURE LID STORAGE LOCATION (OFF BRIDGE)
RACKS
FUEL POOL BRIDGE

FIGURE 2

Section: EDA	Document No. 101-0-A2	Page 1
Title: Design Analysis for NAC-1 Cask Lifting Yoke Modification	Revision No.	Date
Prepared By: C. C. Hoffman	0	12/10/76

1.0 PURPOSE

Provide Design Analysis of the NAC-1 Cask Lifting Yokes Y-3 and Y-4.

2.0 APPLICABILITY AND SCOPE

This Analysis applies to the NAC-1 Cask Lifting Yokes Y-3 and Y-4.

3.0 DEFINITIONS

None

4.0 ANALYSIS

4.1 Design Bases

4.1.1 The design of the NAC-1 Cask Lifting Yoke Y-3 and Y-4 is based upon Nuclear Fuel Services, Inc., lifting yoke design, Drawing No. NSF E10099, Rev. 8. Five yokes built to this NFS design have been proof-load tested to 130,000 pounds and used in service with the NFS-4 and NAC-1 casks for several hundred shipments without any evidence of failure.

4.1.2 The design of the NAC-1 Cask Lifting Yoke Y-3 and Y-4 is identical to NSF E10099, Rev. 8, design with the exception that width of the hook-eye opening is increased from 10 inches to 13 inches.

4.1.3 Material specifications are identical to those utilized on the original NFS design.

4.1.4 A stress analysis covering only the modification incorporated, the increase in width of the hook-eye, is performed.

4.2 Design Criteria

4.2.1 Yoke design is to the yield point (or less) of the material for the design load.

4.2.2 Static load (cask weight) is 50,000 pounds.

4.2.3 Design load is 150,000 pounds (3 times the actual load).

4.2.4 Material is Corten-B with a minimum yield strength of 50,000 psi.

4.2.5 Load test is required 75,000 pounds (150% of loaded NAC-1 cask weight).

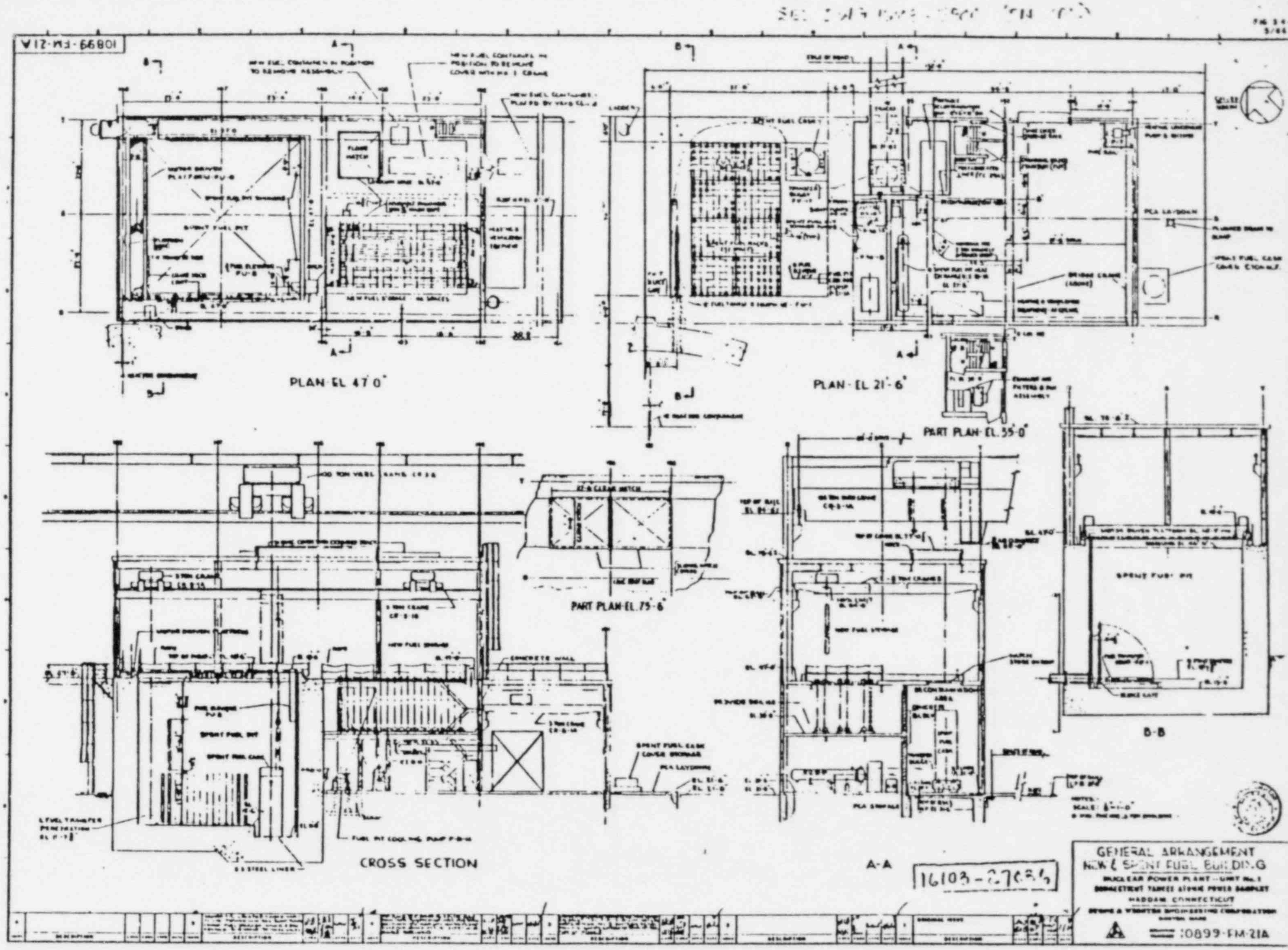
4.2.6 The yoke is a safety-related item and quality assurance control and documentation is required covering materials, fabrication, and testing.

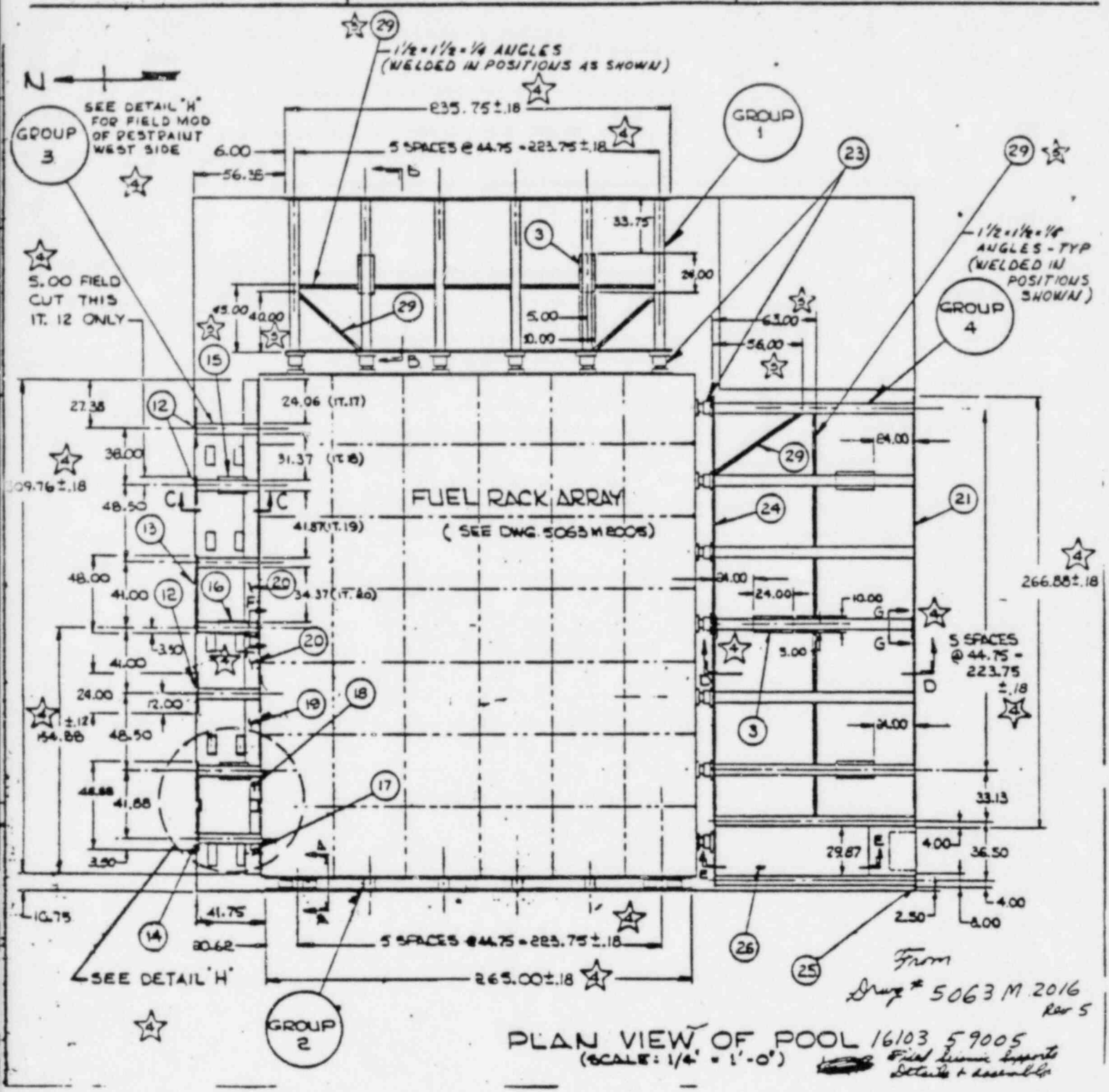
4.2.7 Operating environmental conditions are identical to those previously experienced in service for the NFS E10099, Rev. 8, yokes.

Section: EDA	Document No. 101-0-A2	Page 3
Title: Design Analysis for NAC-1 Cask Lifting Yoke Modification	Revision No.	Date
Prepared By: C. C. Hoffman	0	12/10/76

4.3 Design Analysis

The design of the NAC-1 Cask Lifting Yokes Y-3 and Y-4 is identical with one minor exception, to the design of the NFS-4 Cask Lifting Yoke. As noted in the design bases, load testing and service use has demonstrated the adequacy of that design. This analysis covers only the effect of the hook-eye modification to the design.


10899-FM-21A
PLAN-EL 47'0"
PLAN-EL 21'-6"
PART PLAN-EL 35'0"
PART PLAN-EL 79'-6"
CROSS SECTION
A-A
B-B
SPENT FUEL PIT
NEW FUEL STORAGE
CONCRETE WALL
FUEL PIT COOLING PUMP
SPENT FUEL CASK COVER STORAGE
16103-27034
GENERAL ARRANGEMENT
NEW & SPENT FUEL BUILDING
NUCLEAR POWER PLANT-UNIT No.1
CONNECTICUT YANKEE ATOMIC POWER COMPANY
HADDAM, CONNECTICUT
STONE & WEBSTER ENGINEERING CORPORATION
10899-FM-21A



PLAN VIEW OF POOL 16103 59005
(SCALE: 1/4" = 1'-0")

[redacted] Fuel Racks Inserts Details + Assembly