DUKE POWER COMPANY
P.O. BOX 33189
CHARLOTTE, N.C. 28242

HAL B. TUCKER
VICE PRESIDENT
NUCLEAR PRODUCTION

TELEPHONE
(704) 373-4531

February 17, 1984

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Ms. E. G. Adensam, Chief
Licensing Branch No. 4

Re: McGuire Nuclear Station
Docket Nos. 50-369, 50-370

Dear Mr. Denton:

This letter is a proposed amendment to Facility Operating Licenses NPF-9 and NPF-17 for McGuire Nuclear Station Units 1 and 2. The proposed amendments would allow spent fuel pool storage capacity expansion from 500 to 1463 spaces for each spent fuel pool. The proposed expansion is to be achieved by reracking each spent fuel pool with two region, poison racks.

The rerack modification for McGuire's spent fuel pools was described to members of the NRC staff on January 31, 1984 in a meeting with Duke Power Company. Attachment 1 is an analysis summary of the proposed amendment request and contains copies of revised overhead slides which were discussed at the meeting.

Duke Power's current schedule calls for reracking of the Unit 2 spent fuel pool to begin on August 1, 1984 and to be completed by December 31, 1984. Under this schedule the reracking would be accomplished prior to the first refueling of Unit 2. Consequently, no water or fuel would be in the pool which would make the reracking operation much simpler, safer, and less costly.

Pursuant to 10 CFR §50.92, Attachment 2 provides an analysis which concludes that the proposed amendments do not involve a significant hazards consideration. In order to provide for timely review and approval, Duke Power requests that the NRC perform its preliminary No Significant Hazards Consideration evaluation upon receipt of this formal amendment request.

Proposed changes to the Technical Specifications are contained in Attachment 3.

As discussed with members of the staff, details of the safety and environmental implications will be submitted to the NRC by March 15, 1984. This will enable the detailed safety evaluation to be performed.

These proposed changes are considered to consist of one Class III and one Class I license amendment; therefore, please find attached a check in the amount of $4,400.

8402230146 840217
PDR ADOCK 05000369
P PDR

A021 w/check $4,400 # 701049
,140

Very truly yours,

Hal B. Tucker

WHM/php

Attachment

cc: Mr. James P. O'Reilly, Regional Administrator
U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30303

Mr. W. T. Orders
NRC Senior Resident Inspector
McGuire Nuclear Station

Mr. Dayne H. Brown, Chief
Radiation Protection Branch
Division of Facility Services
Department of Human Resources
P. O. Box 12200
Raleigh, North Carolina 27605

HAL B. TUCKER, being duly sworn, states that he is Vice President of Duke Power Company; that he is authorized on the part of said Company to sign and file with the Nuclear Regulatory Commission this revision to the McGuire Nuclear Station Technical Specifications, Appendix A to License Nos. NPF-9 and NPF-17; and that all statements and matters set forth therein are true and correct to the best of his knowledge.

Hal B. Tucker

Hal B. Tucker, Vice President

Subscribed and sworn to before me this 17th day of February, 1984.

Sue C. Sherrill

Notary Public

My Commission Expires:

September 20, 1984

DUKE POWER COMPANY
MCGUIRE NUCLEAR STATION

Attachment 1

Units 1 and 2 Spent Fuel Pools
Two Region Rerack Analysis Summary

DUKE POWER COMPANY
McGUIRE NUCLEAR STATION

UNITS 1 AND 2 SPENT FUEL POOL RERACK
MEETING AGENDA

INTRODUCTION

DESCRIPTION OF SPENT FUEL POOL RERACK

- RACK DESIGN
    1. DESIGN DESCRIPTION
    2. DESIGN EVALUATION - INCLUDES STRUCTURAL, CRITICALITY, AND THERMAL HYDRAULICS
- SPENT FUEL POOL INTERFACE
    1. STRUCTURAL
    2. THERMAL
    3. ADMINISTRATIVE CONTROLS
- RACK INSTALLATION
- RADIATION PROTECTION
- SAFETY ANALYSIS
    1. CONSTRUCTION ACCIDENT
    2. CASK/HEAVY LOAD ACCIDENT
    3. NATURAL DISASTERS
    4. LOSS OF FORCED COOLING
    5. FUEL HANDLING ACCIDENT

LICENSING SCHEDULE

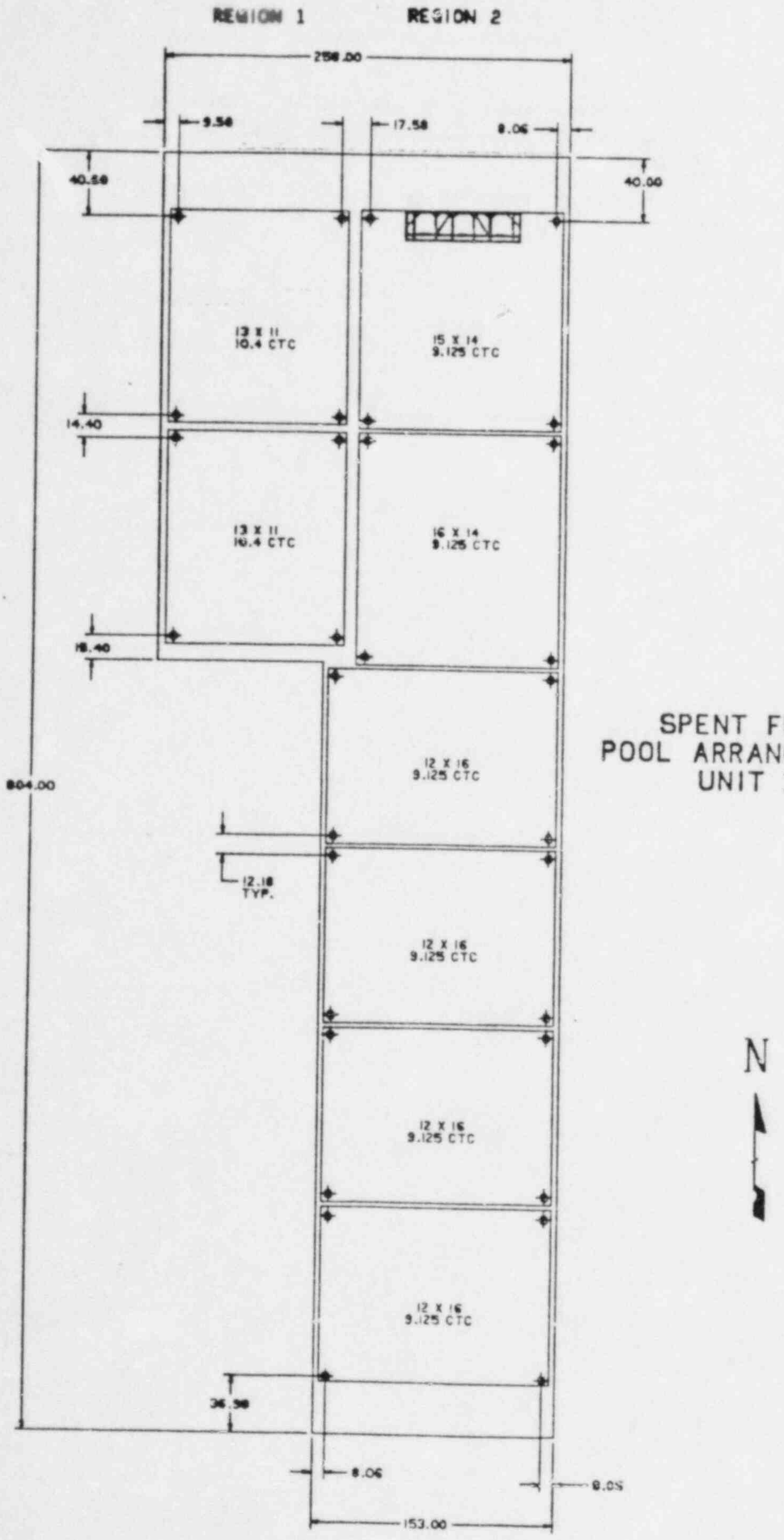
DISCUSSION - COMMENTS

	PRESENT	PROPOSED
FULL CORE DISCHARGE CAPABILITY	1990	2010
RACK TYPE	HIGH DENSITY/ NON-POISON	2 - REGION/POISON
DESIGN CAPACITY OF EACH SFP	500	REGION 1 - 286 REGION 2 - 1177 TOTAL - 1463
STORAGE CELL SPACING (INCHES CENTER-TO-CENTER)	15.5	REGION 1 - 10.4 REGION 2 - 9.125

SPENT FUEL STORAGE RACK DESIGN

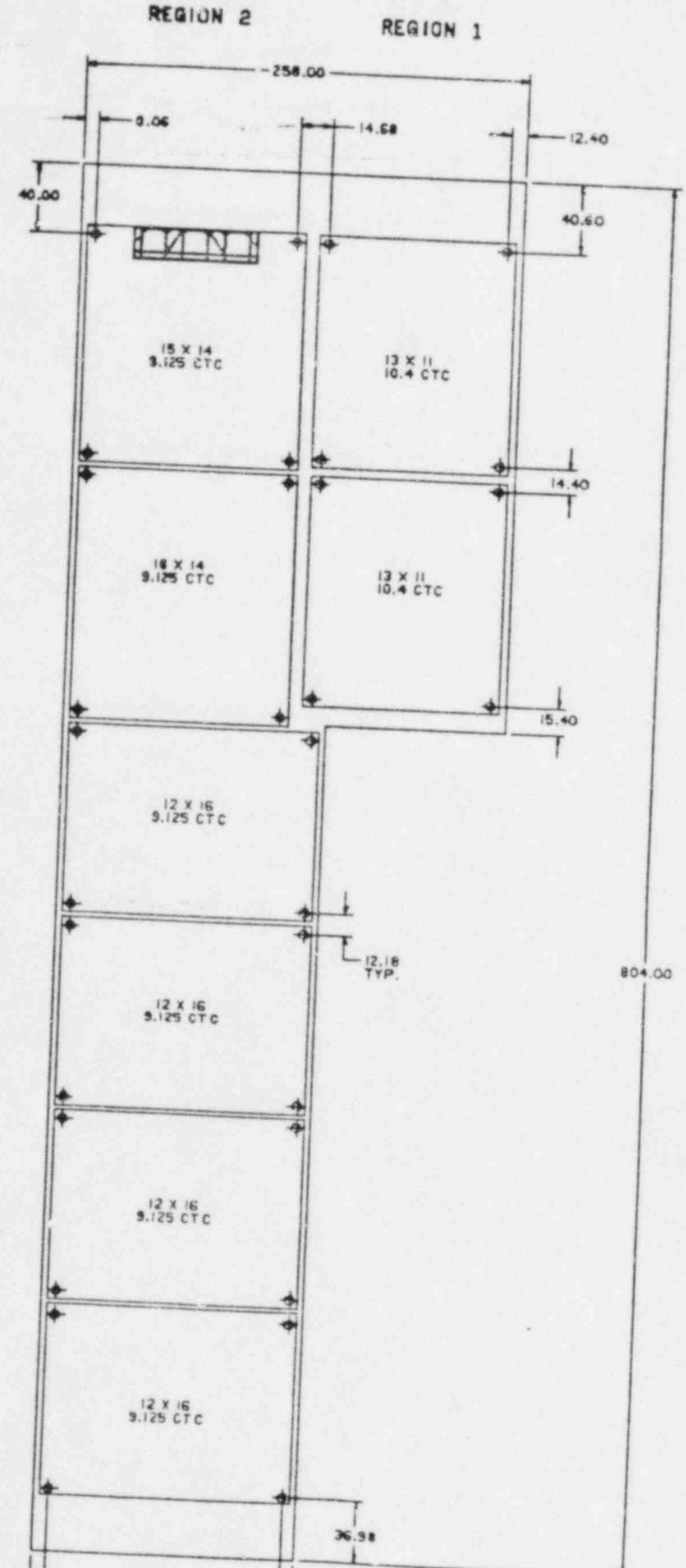
- DESIGN DESCRIPTION
  - UNIT 1 & 2 SFP ARRANGEMENT
  - REGION 1 DESIGN CONFIGURATION
  - REGION 2 DESIGN CONFIGURATION
- DESIGN EVALUATION
  - SEISMIC
  - STRUCTURAL
  - CRITICALITY
  - THERMAL-HYDRAULICS

1/27/84



SPENT FUEL
POOL ARRANGEMENT
UNIT 1

SPENT FUEL
POOL ARRANGEMENT
UNIT 2



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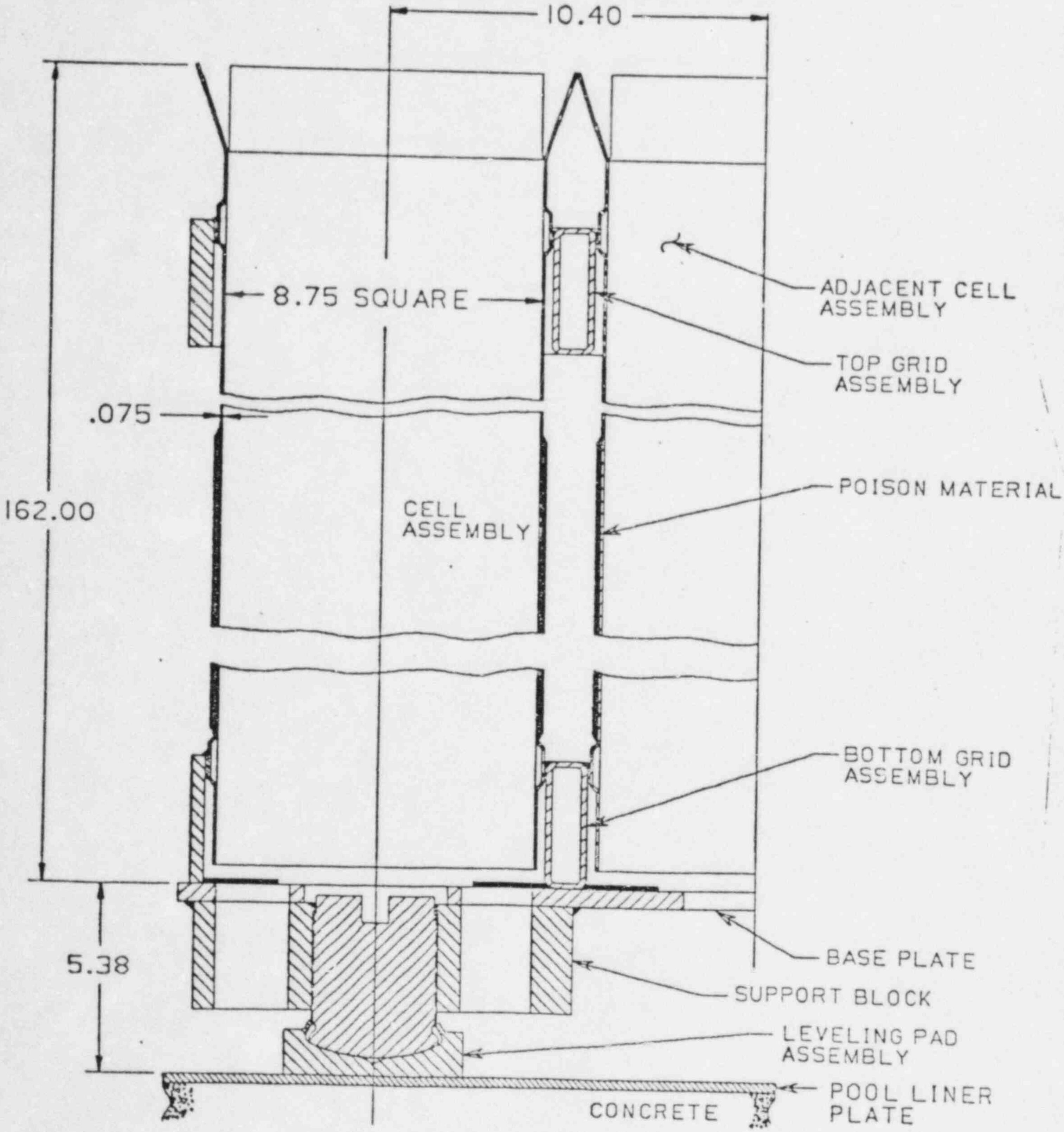
Design Configuration

Region 1
- 286 Locations (1.48 Cores)
- Fresh Fuel @ 4.0 Wt. % U^{235} Enrichment
- W 17 x 17 and W 17 x 17 Opt. Fuel Assemblies
- 10.40 Centerline Spacing - 2 Racks
- Boraflex™ Poison @ .020 gm $^{10}B/cm^2$

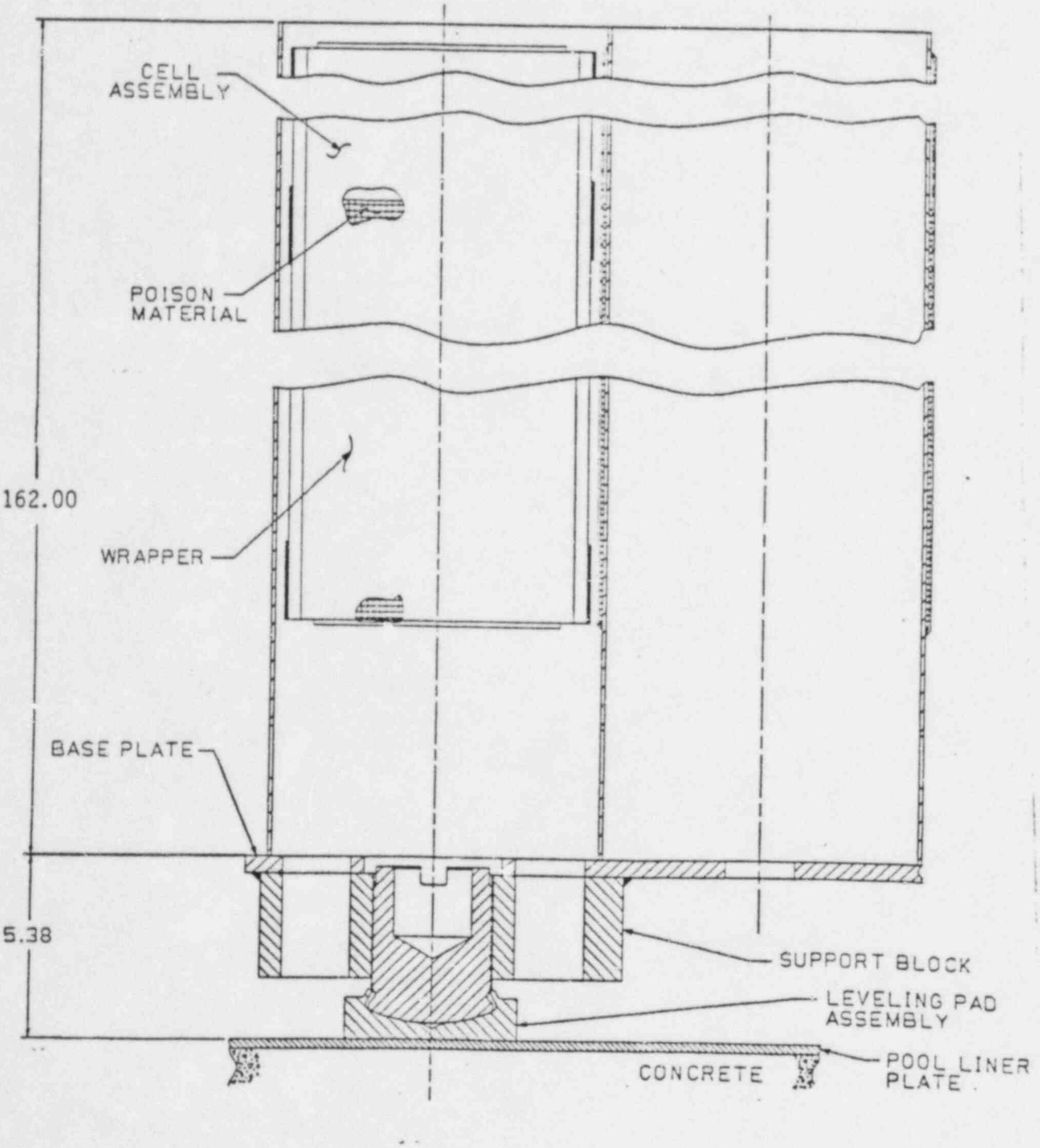


REGION I MODULE CROSS-SECTION

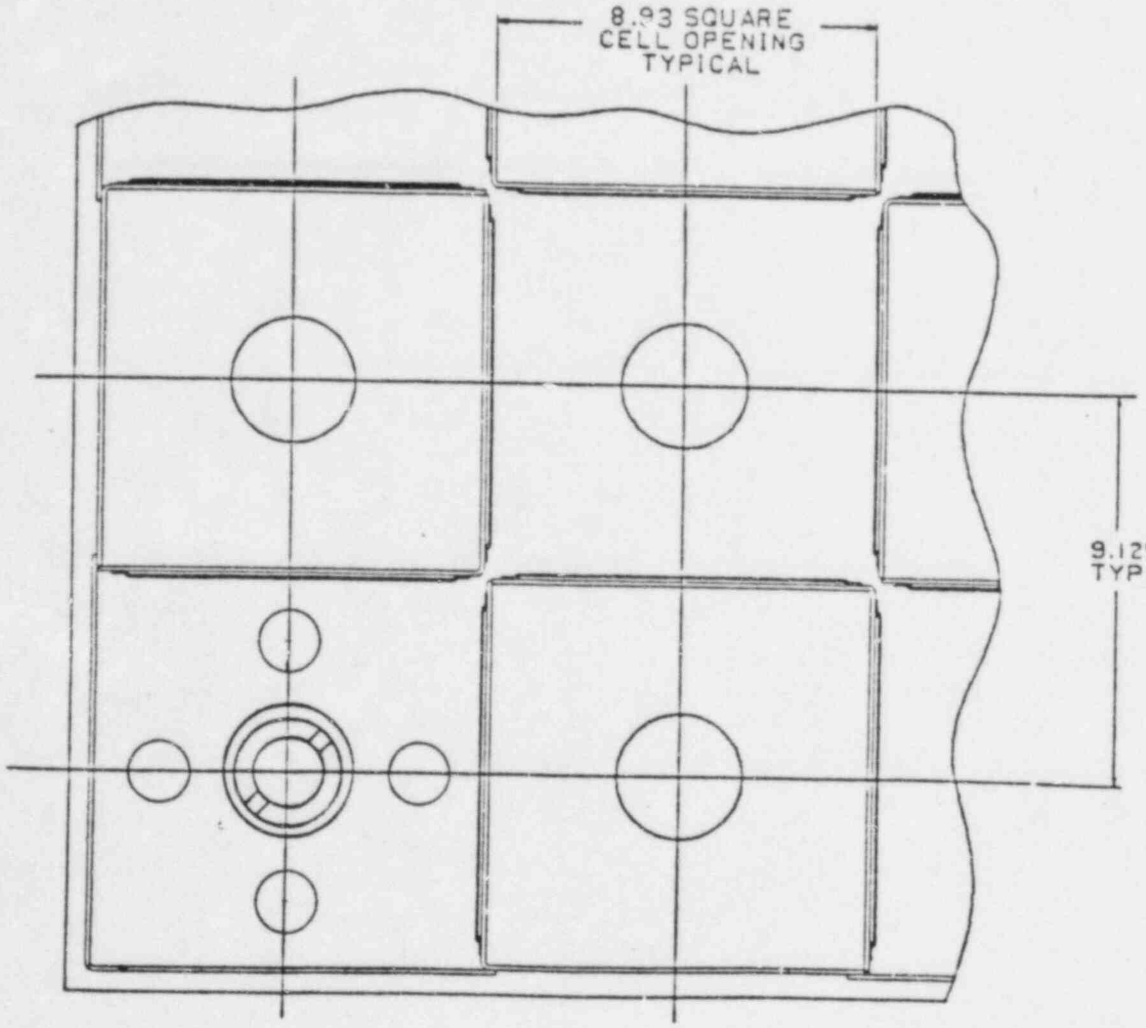
Design Configuration

Region II

- 1177 Locations (6.09 Cores)
- Burnup Fuel @ 4.0 Wt. % U^{235} Initial Enrichment
- W 17 x 17, W 17 x 17 Opt. and B & W 15 x 15 Fuel Assemblies
- 9.125 Centerline Spacing - 6 Racks
- Boraflex™ Poison @ .006 gm $^{10}B/cm^2$



REGION II MODULE CROSS SECTION

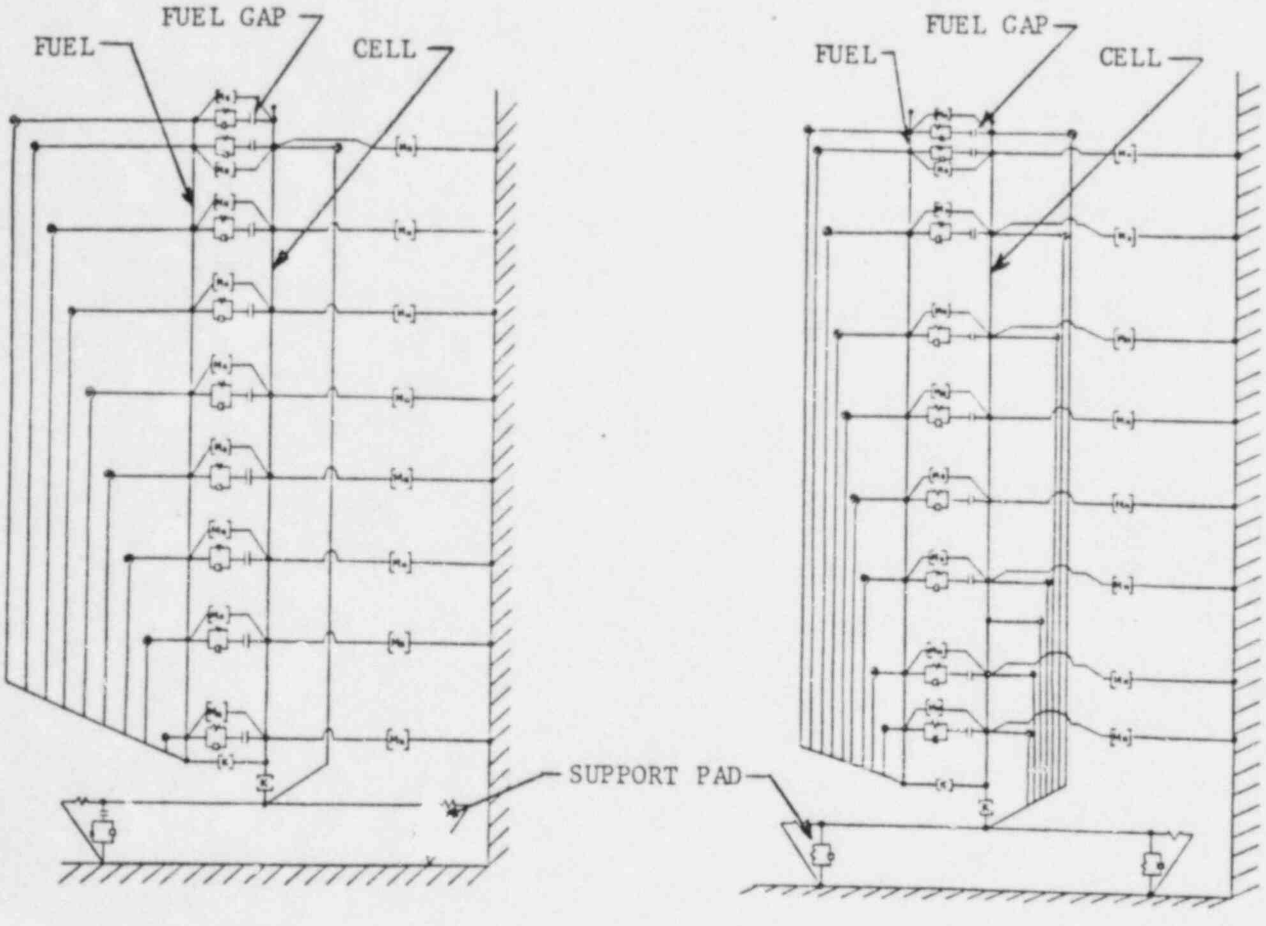


REGION II MODULE TOP VIEW

FUNCTIONAL DESCRIPTION

- MAINTAIN SUBCRITICAL ARRAY DURING ALL CONDITIONS
- PROTECT FUEL FROM MECHANICAL DAMAGE
- PERMIT ADEQUATE COOLANT CIRCULATION TO FUEL

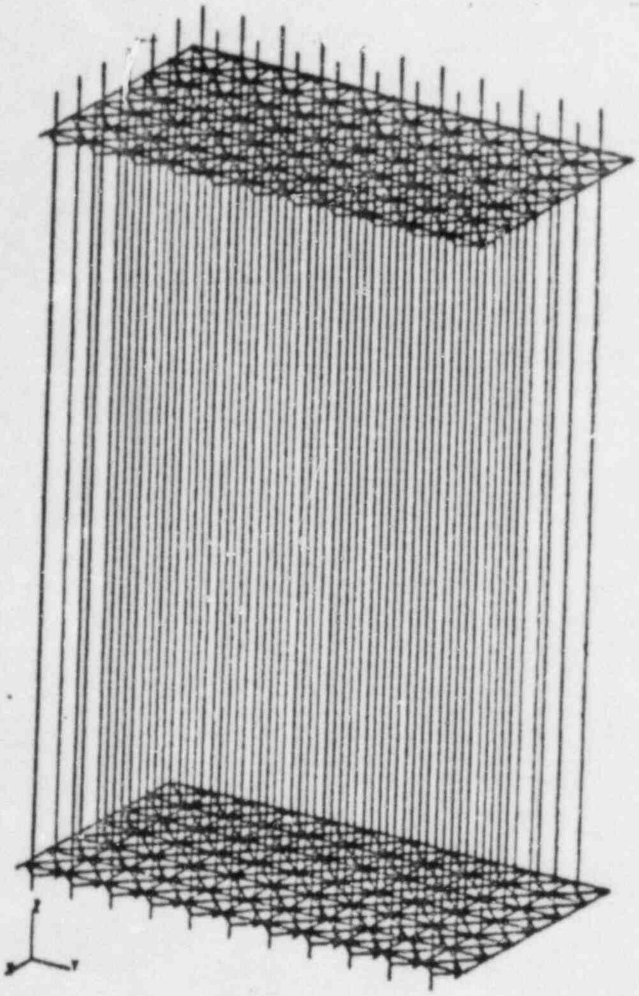
NONLINEAR FINITE ELEMENT MODELS



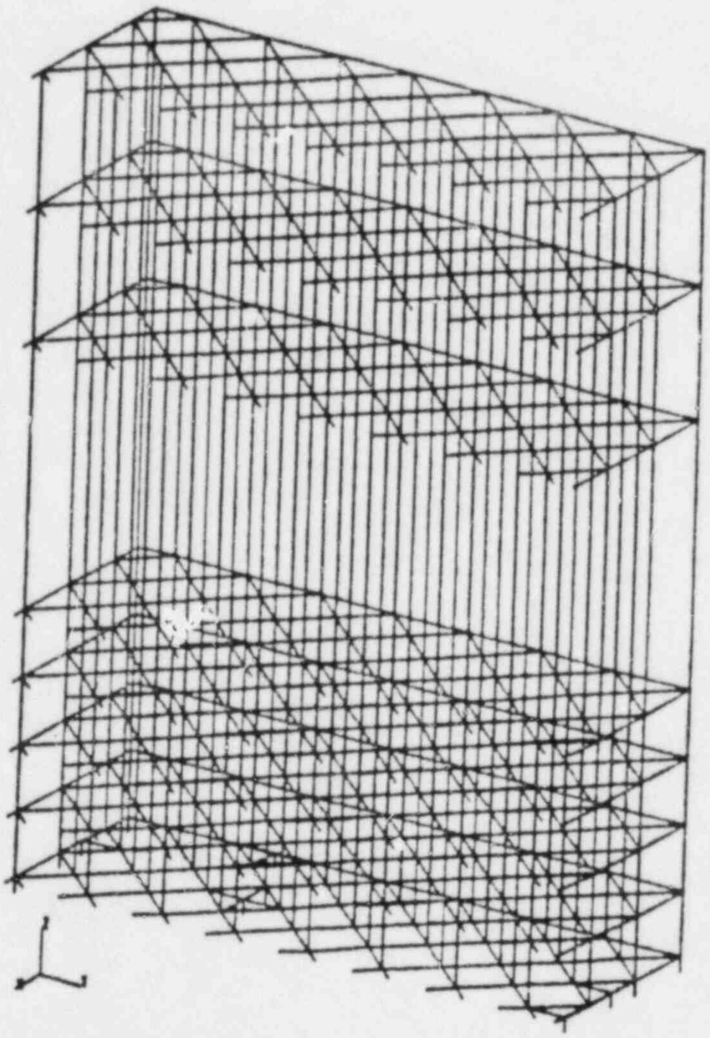
REGION 1

REGION 2

LINEAR FINITE ELEMENT MODELS



REGION 1



REGION 2

FINAL K_{EFF} CALCULATION INCLUDING BIAS AND UNCERTAINTY

$$K_{EFF} = K_{NOMINAL} + B_{MECH} + B_{METHOD} + B_{PART} + B_{MAT}$$
$$+ \left[(KS_{NOMINAL})^2 + (KS_{MECH})^2 + (KS_{METHOD})^2 + (KS_{MAT})^2 + (KS_{PU})^2 + (KS_{BU})^2 \right]^{1/2}$$

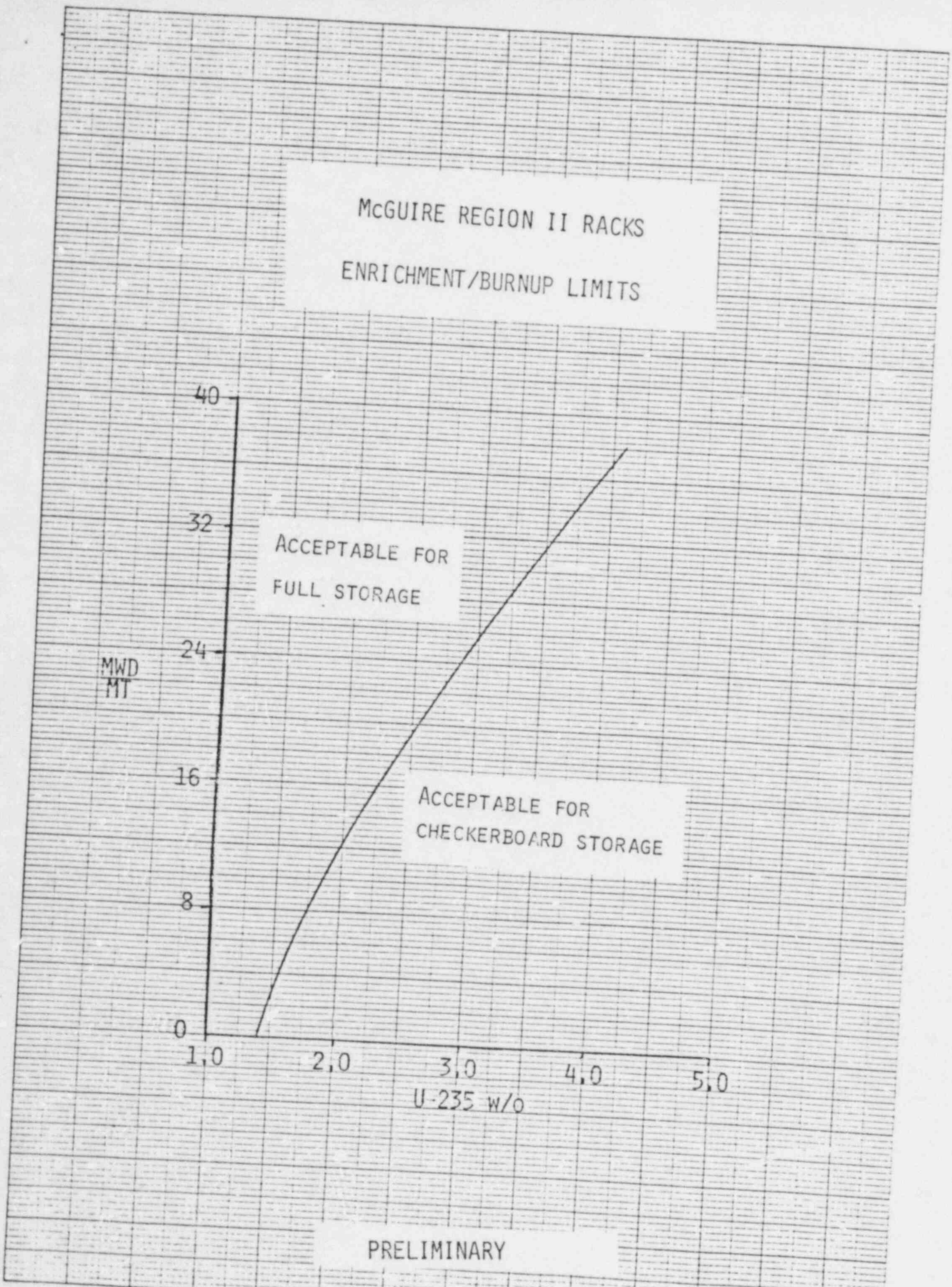
USE OF THE ABOVE EQUATION YIELDS 95 PERCENT PROBABILITY/

95 PERCENT CONFIDENCE FACTOR THAT $K_{EFF} \leq 0.95$.

BURNUP CREDIT METHODOLOGY

- Calculate 0-BU Enrichment in KENO (K_1)
- Duplicate Model in PHOENIX (K_2)
- Deplete Fuel in PHOENIX with Maximum Enrichment
- Find BU Which Results in Same K_2
- Repeat Last Two Steps for other Enrichments

46 1320


McGUIRE REGION II RACKS
ENRICHMENT/BURNUP LIMITS
40
32
24
16
8
0
MWD/MT
ACCEPTABLE FOR FULL STORAGE
ACCEPTABLE FOR CHECKERBOARD STORAGE
1.0
2.0
3.0
4.0
5.0
U-235 w/o
PRELIMINARY

THERMAL-HYDRAULIC CRITERIA

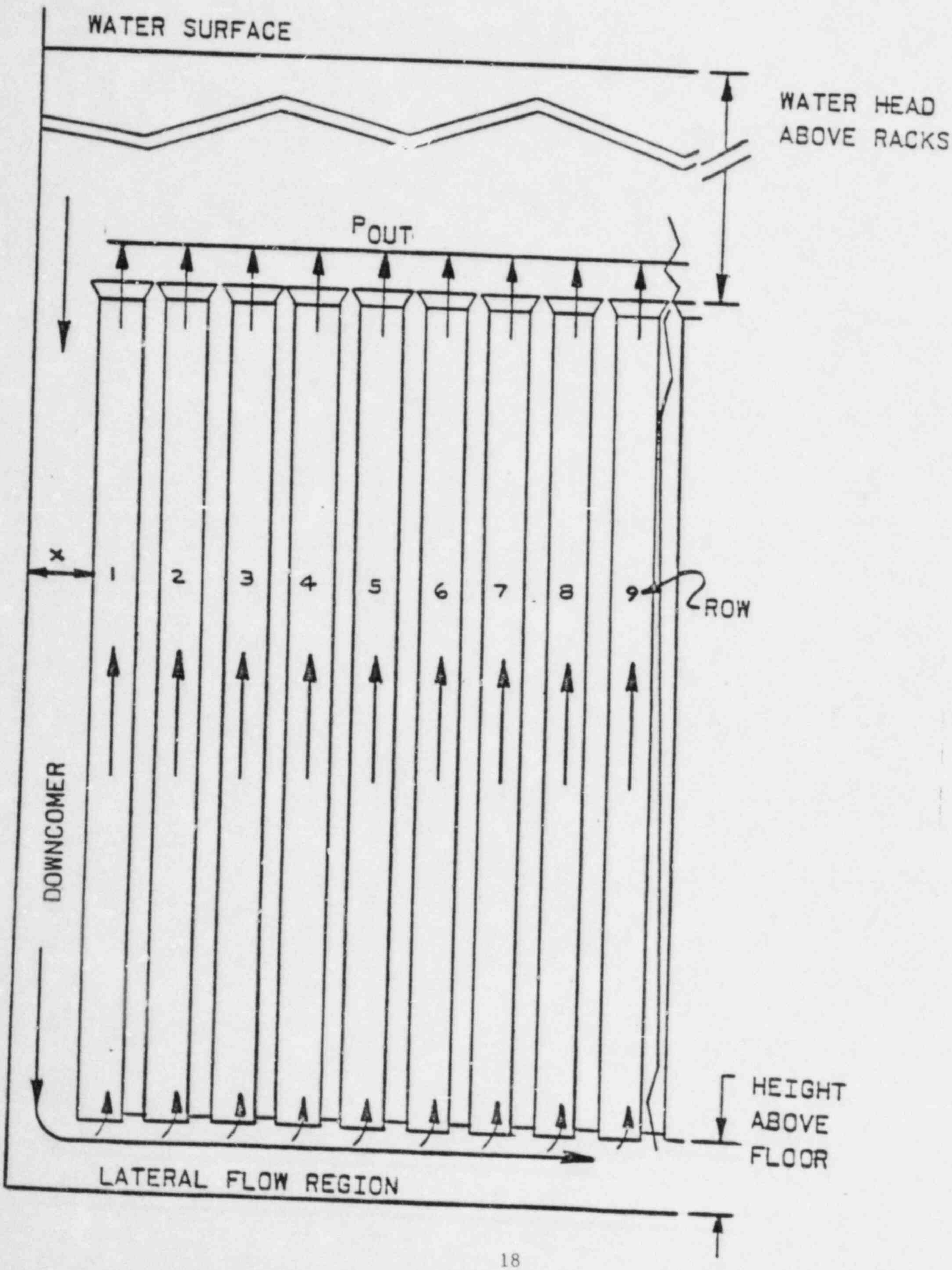
1) NO BOILING WHEN COOLING SYSTEM OPERATIONAL

2) NO STRUCTURAL FAILURES AND SAFETY CONCERNS WHEN COOLING SYSTEM IS POSTULATED TO BE INOPERABLE

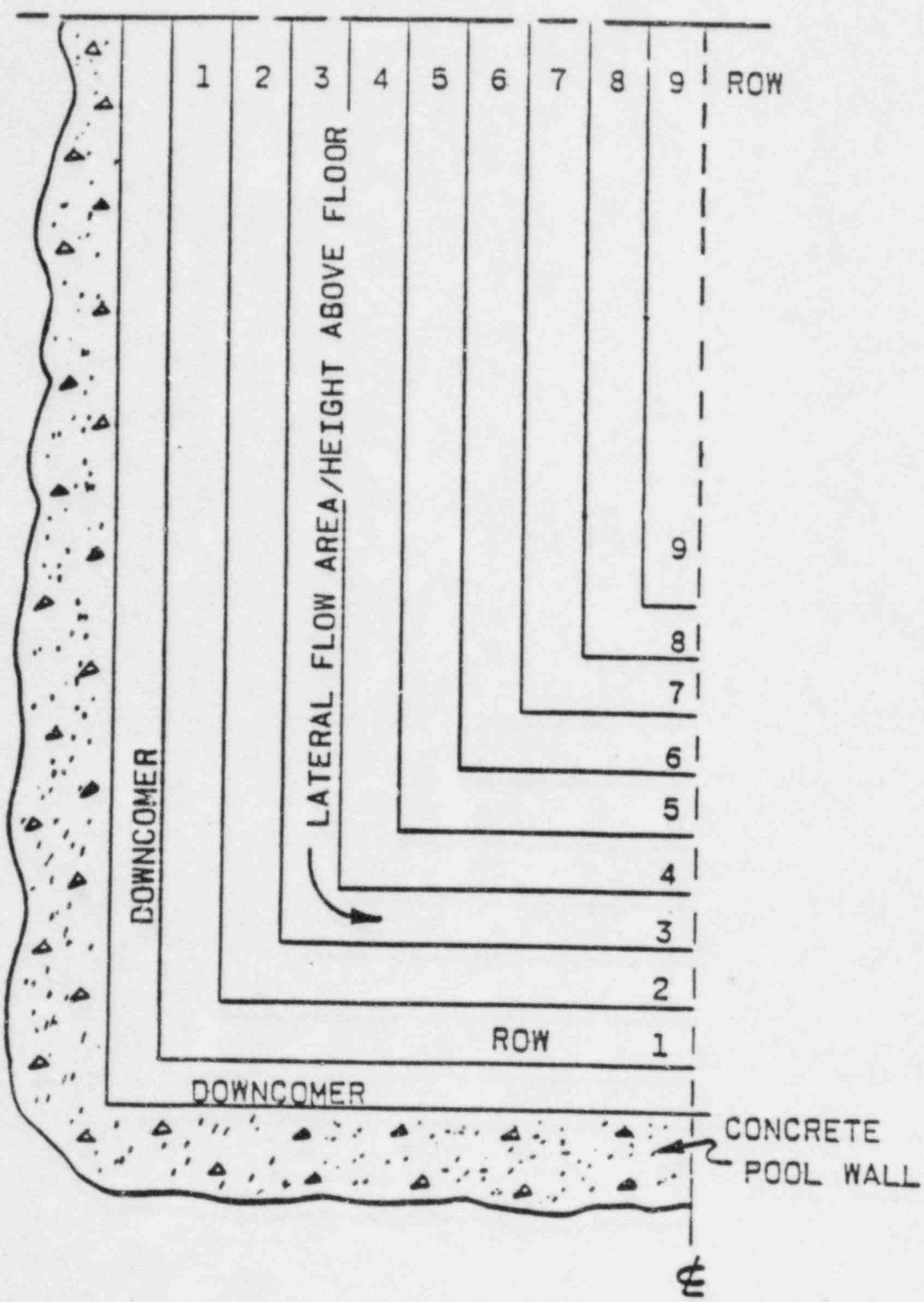
3) MAXIMUM POOL TEMPERATURE NOT GREATER THAN 150°F FOR NORMAL OPERATION

4) NO BOILING IN INTER-CELL GAPS

SPENT FUEL POOL NATURAL CIRCULATION
MODEL
(Elevation View)



SPENT FUEL POOL NATURAL CIRCULATION MODEL
(Plan View)



MCGUIRE SPENT FUEL POOLS ARE DESIGNED TO WITHSTAND THE FOLLOWING:

- NORMAL DEAD AND EQUIPMENT LOADS PLUS DESIGN SEISMIC LOADS
- ALL NORMAL DEAD, EQUIPMENT, AND LIVE LOADS
- NORMAL DEAD AND EQUIPMENT LOADS PLUS TORNADO WIND LOAD
- THERMAL STRESSES
- CASK DROP ACCIDENT

CONCLUSION: PROPOSED RERACKING WITH ASSOCIATED LOADINGS, DESIGN CRITERIA, AND ALLOWABLE STRESSES ARE IN COMPLIANCE WITH APPLICABLE FSAR REQUIREMENTS FOR CLASS I STRUCTURES

SPENT FUEL POOL INTERFACE - THERMAL

Design Basis - Spent Fuel Pool Cooling System

Standard Review Plan 9.1.3 method and criteria adopted:

- Maintain Spent Fuel Pool coolant temperature below 140°F under Normal Maximum Heat Load conditions assuming a single failure.
- Maintain Spent Fuel Pool coolant below saturation temperatures during periods following full core offloads (Abnormal Maximum Heat Load).

Additional assumptions:

- Fully loaded pool.
- Two Oconee units discharging 5 years decayed fuel to one McGuire fuel pool.
- Freshest irradiated spent fuel available at Oconee meeting 5 year minimum decay criteria is transhipped.
- No credit for heat loss through pool walls or from pool surface.

TABLE 3.2-3

Peak Heat Loads and Pool Temperatures

for the McGuire Units 1 & 2 Spent Fuel Pools Following Rerack

Operating Condition			Pool Temperatures (°F)	
Case	Heat Load (10^6 BTU/HR)	Cooling Trains Operating	Design Basis	Calculated
Normal Maximum	18	2	120	113
	18	1	140	133
Abnormal Maximum	41.6	2	140	137
	41.6	1	<212	178

TABLE 3.2-1 - Normal Maximum Heat Load for McGuire Units 1 & 2 Spent Fuel Pools

Station	# of Spaces (Assemblies)	Irradiation (EFPD)	Decay Time	Heat Output ($*10^6$ BTU/HR)
McGuire	61	863	150 hrs.	11.4
McGuire	61	863	1 yr.	1.07
McGuire	61	863	2 yrs.	.558
McGuire	61	863	3 yrs.	.398
McGuire	61	863	4 yrs.	.333
McGuire	61	863	5 yrs.	.303
McGuire	61	863	6 yrs.	.287
McGuire	61	863	7 yrs.	.277
McGuire	61	863	8 yrs.	.269
McGuire	61	863	9 yrs.	.262
McGuire	61	863	10 yrs.	.256
Oconee	72	1263	5 yrs.	.339
Oconee	72	1263	6.5 yrs.	.316
Oconee	72	1263	8 yrs.	.302
Oconee	72	1263	9.5 yrs.	.291
Oconee	72	1263	5 yrs.	.339
Oconee	72	1263	6.5 yrs.	.316
Oconee	72	1263	8 yrs.	.302
Oconee	72	1263	9.5 yrs.	.291
Oconee	23	1263	11 yrs.	.089
	1270			18.00

Note: This analysis conservatively assumes the freshest fuel meeting the minimum 5 year decay criteria at two Oconee units will be transhipped in a manner as to maximize the total calculated heat load for a fully loaded McGuire spent fuel pool. To the extent that Oconee to McGuire transhipments will involve fewer assemblies with higher decay times, actual peak heat loads will be lower.

TABLE 3.2-2 - Abnormal Maximum Heat Load for McGuire Units 1 & 2 Spent Fuel Pools

Station	# of Spaces (Assemblies)	Irradiation (EFPD)	Decay Time	Heat Output ($*10^6$ BTU/HR)
McGuire	64	23.5	150 hrs.	6.53
McGuire	64	311.5	150 hrs.	11.2
McGuire	65	599.5	150 hrs.	11.9
McGuire	61	863	36 days	5.38
McGuire	61	863	1 yr.	1.07
McGuire	61	863	2 yrs.	.558
McGuire	61	863	3 yrs.	.398
McGuire	61	863	4 yrs.	.333
McGuire	61	863	5 yrs.	.303
McGuire	61	863	6 yrs.	.287
McGuire	61	863	7 yrs.	.277
McGuire	61	863	8 yrs.	.269
McGuire	61	863	9 yrs.	.262
McGuire	61	863	10 yrs.	.256
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Oconee	72	1263	6.5 yrs.	.316
Oconee	72	1263	8 yrs.	.302
Oconee	72	1263	9.5 yrs.	.291
Oconee	23	1263	11 yrs.	.089
	1463			41.61

FUEL PLACEMENT ADMINISTRATIVE CONTROLS

FUEL STORAGE "DIRECTORY"

REGION 1: NO RESTRICTIONS → 4.0 w/o DESIGN

286 STORAGE CELLS

RESERVED FOR NEW FUEL STORAGE

RESERVED FOR TEMPORARY CORE OFF-LOADING

RESERVED FOR "UNQUALIFIED" IRRADIATED FUEL

REGION 2: RESTRICTED STORAGE

1177 STORAGE CELLS

EXCLUSIVELY FOR "QUALIFIED" IRRADIATED FUEL

NO RESTRICTIONS WITH CHECKERBOARDING

FUEL PLACEMENT ADMINISTRATION CONTROLS

SPENT FUEL CLASSIFICATION STEPS

- BURNUP CALCULATIONS AT END OF CYCLE
- CALCULATED BURNUP COMPARED WITH PROJECTED
- BURNUP VALUE COMPARED WITH BURNUP CURVE (TECH SPEC)
- CLASSIFICATION AS "QUALIFIED" OR "UNQUALIFIED"
- DOCUMENTATION OF "QUALIFIED" ASSEMBLIES

FUEL PLACEMENT ADMINSTRATIVE CONTROLS

FUEL MOVEMENT SAFEGUARDS - REFUELING

ALL FUEL MOVEMENTS FROM REACTOR CORE WILL BE DIRECTLY INTO REGION I

CORE TO REGION 1:

- NO LOADING RESTRICTIONS
- NO VERIFICATION REQUIREMENTS

REGION 1 TO REGION 2:

- FUEL MUST HAVE DECAYED 16 DAYS
- REVIEW DOCUMENTATION
- DOUBLE VERIFICATION OF ID/LOCATION
- REGION 2 PLACEMENT

FUEL PLACEMENT ADMINISTRATIVE CONTROLS

FUEL MOVEMENT SAFEGUARDS - GENERAL

ON-SITE TRANSFERS:

- GENERALLY WITHIN SAME REGION
- DOCUMENTATION REVIEW AND DOUBLE VERIFICATION REQUIRED FOR REGION 1 TO REGION 2 MOVES

OCONEE SHIPMENTS:

- BURNUP VERIFICATION/DOCUMENTATION PRIOR TO SHIPMENT
- SHIPMENT OF QUALIFIED ASSEMBLIES ONLY
- DOCUMENTATION REVIEW PRIOR TO PLACEMENT

CHECKERBOARD STORAGE:

- PROCEDURAL CONTROL ON EMPTY LOCATIONS
- BOUNDARY DEFINED BY ONE VACANT ROW

NOTE: PRE-RERACK INVENTORY WILL BE VERIFIED AND DOCUMENTED PRIOR TO COMMENCEMENT OF RERACKING OPERATIONS (McGUIRE 1)

NEUTRON POISON SURVEILLANCE PROGRAM

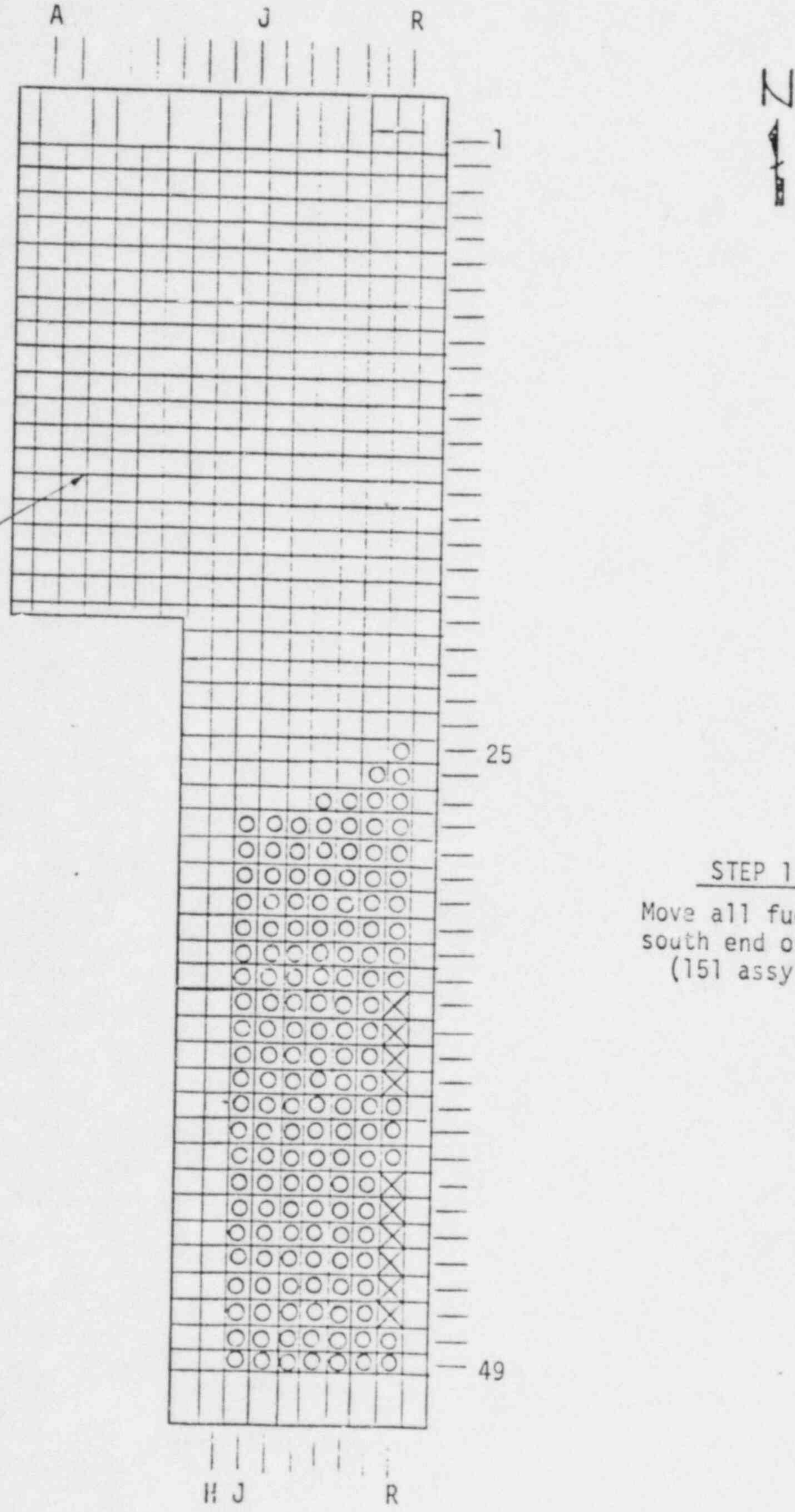
- TWO SEPARATE SURVEILLANCE SPECIMENS PER LOT
- INDEPENDENT PROGRAMS FOR EACH REGION, POOL
- PROCEDURAL CONTROLS ON FUEL PLACEMENT TO INSURE MAXIMUM SPECIMEN EXPOSURE
- PERIODIC TESTING OF MECHANICAL INTEGRITY AND ABSORPTION CAPABILITIES
- INITIAL INSPECTION SCHEDULED FOR 5 YEARS FROM INSTALLATION

RACK INSTALLATION

THE INSTALLATION PLAN IS BASED ON THE FOLLOWING OBJECTIVES:

- MAINTAINING INSTALLATION EXPOSURE LEVELS AS LOW AS REASONABLY ACHIEVABLE (ALARA)
- HAVE A MAXIMUM OF 151 FUEL ASSEMBLIES TOTAL (INCLUDES OCONEE AND MCGUIRE FUEL) IN THE POOL AT THE COMMENCEMENT AND DURING THE RERACK OPERATION FOR UNIT 1
- UTILIZE AN UNFLOODED POOL WITH NO FUEL ASSEMBLIES STORED FOR UNIT 2 TO ACHIEVE SIGNIFICANT EXPOSURE (ALARA) AND COST SAVINGS
- ACHIEVING ACCEPTABLE TOLERANCES ON MODULE VERTICALITY, LEVELNESS, AND POSITIONING

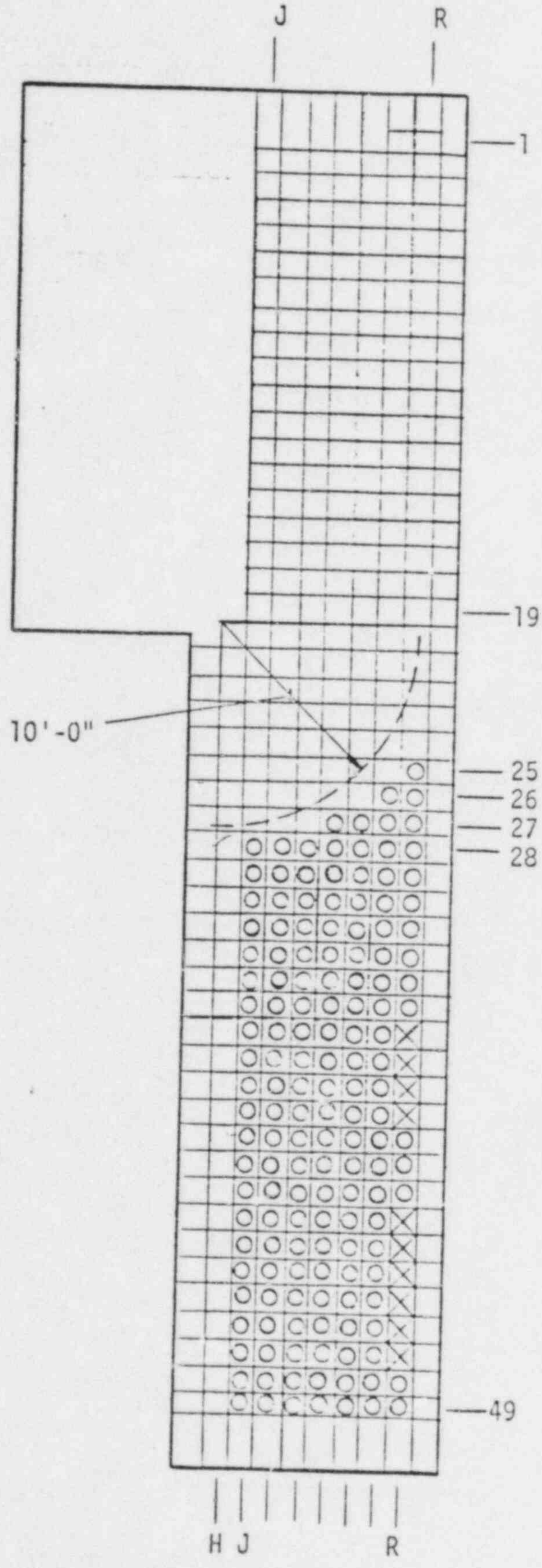
INSTALLATION PLAN
UNIT 1



STEP 1

Move all fuel to south end of pool (151 assy's)

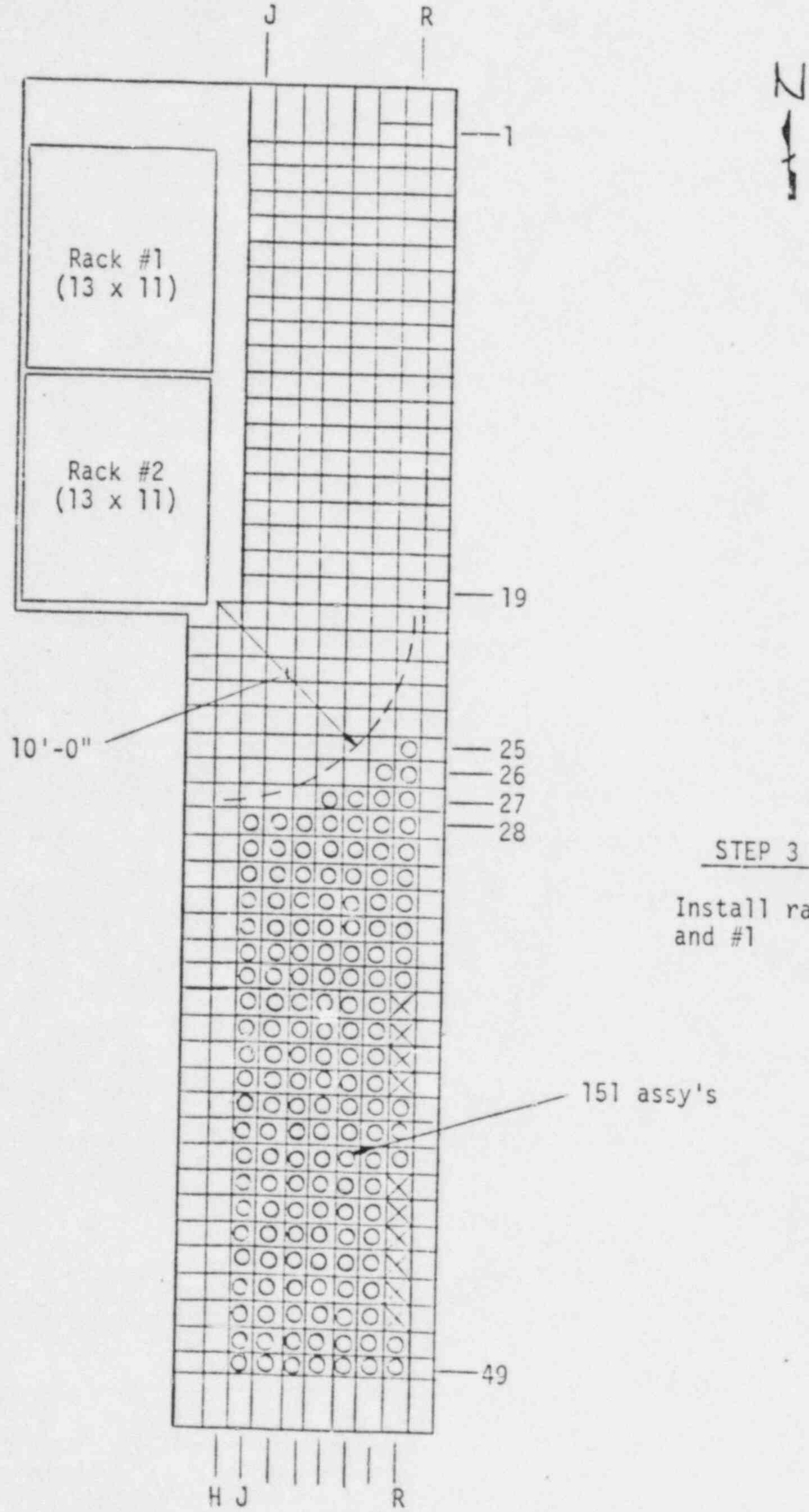
UNIT 1



STEP 2

Remove existing grid and cells in north-west area of pool

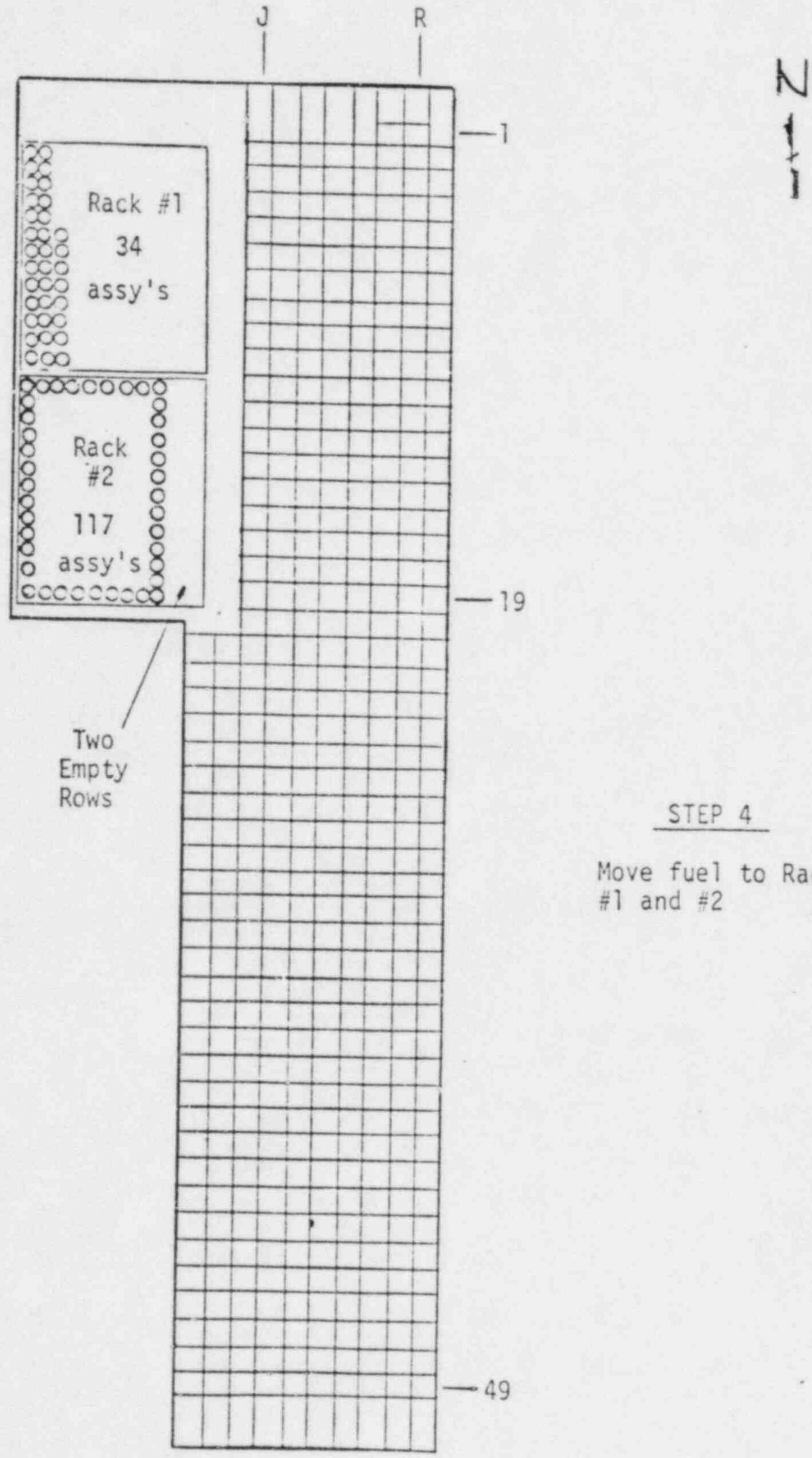
UNIT 1



STEP 3

Install racks #2 and #1

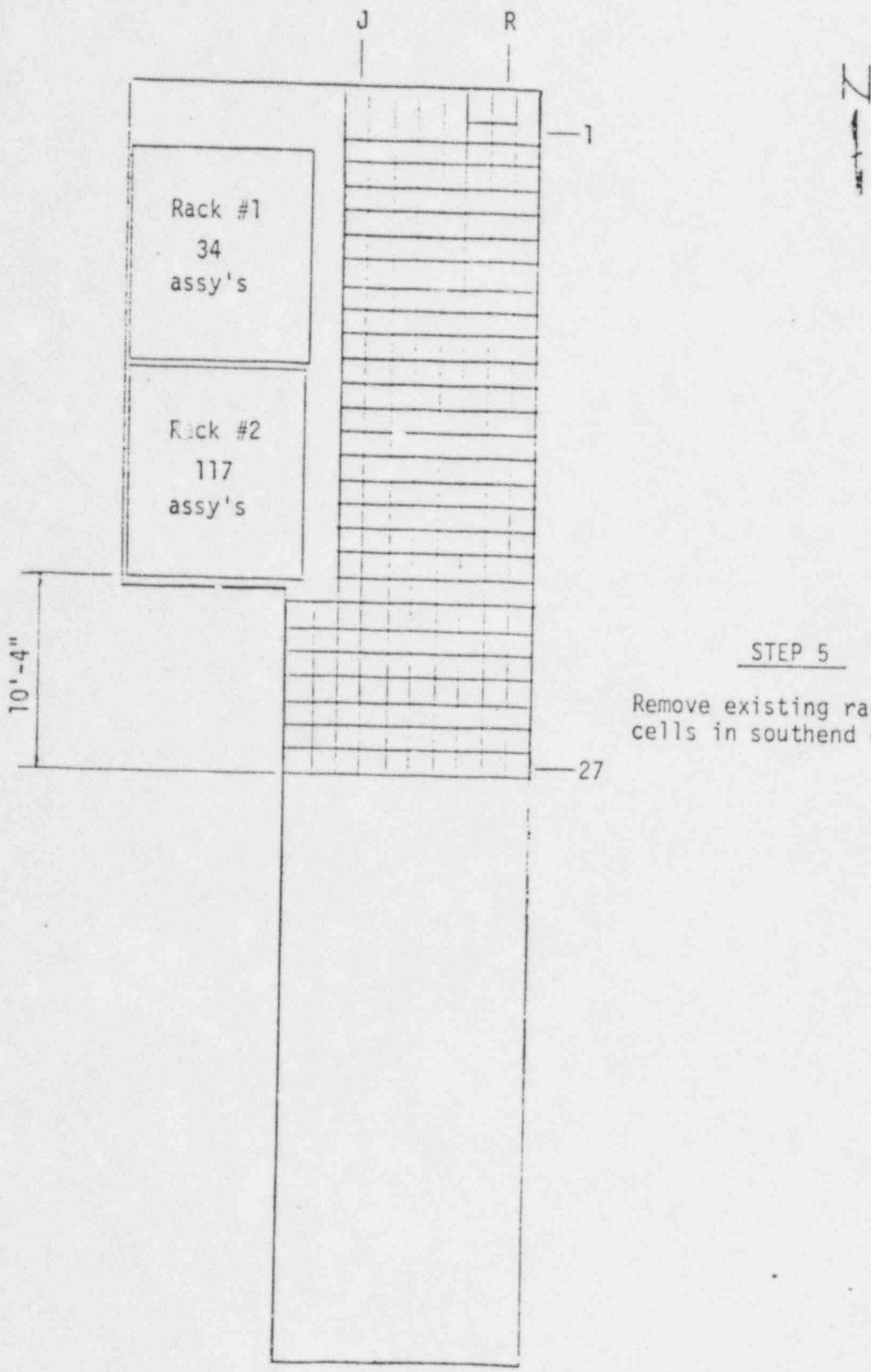
UNIT 1



STEP 4

Move fuel to Racks #1 and #2

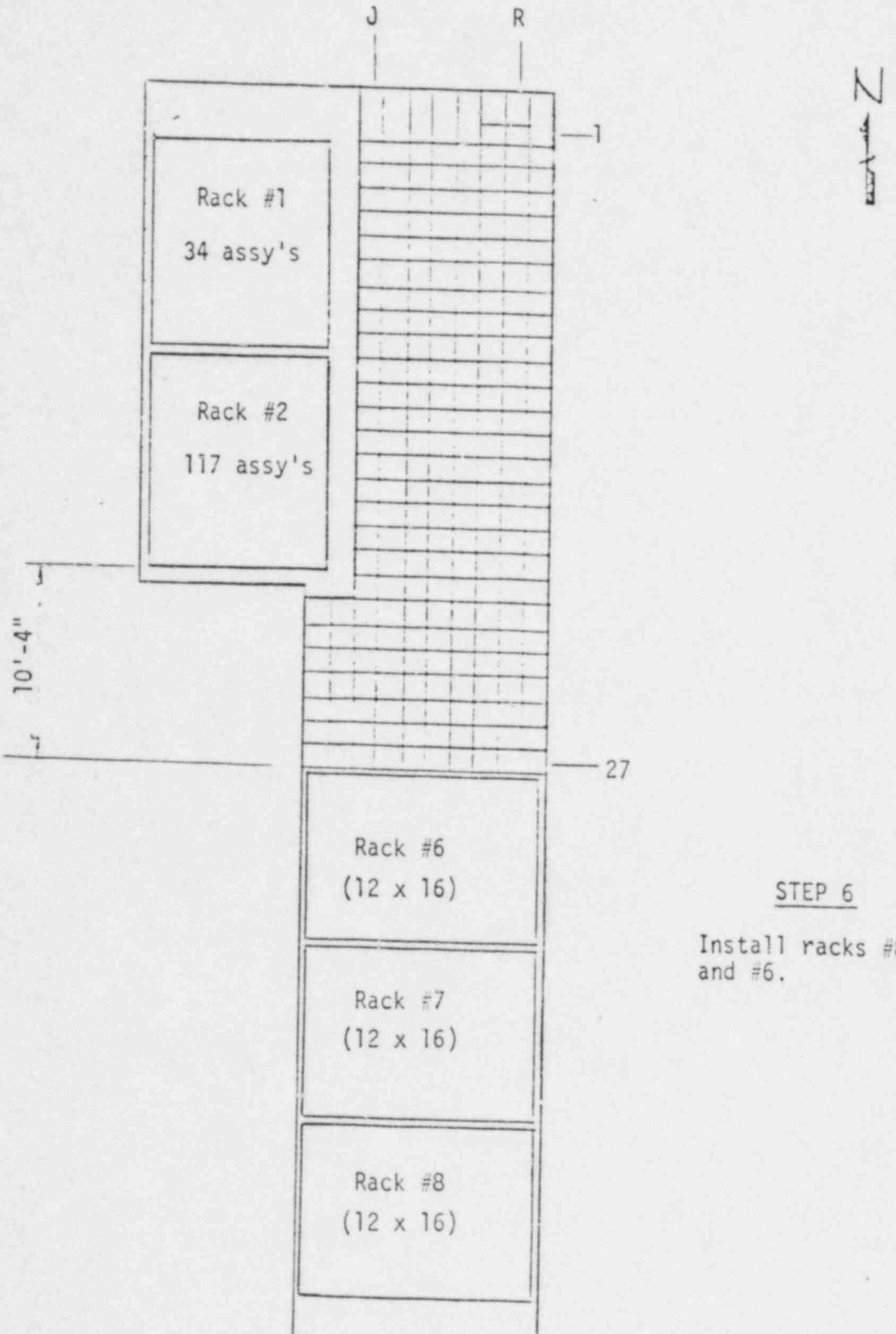
UNIT 1



STEP 5

Remove existing rack grid and cells in southend of pool

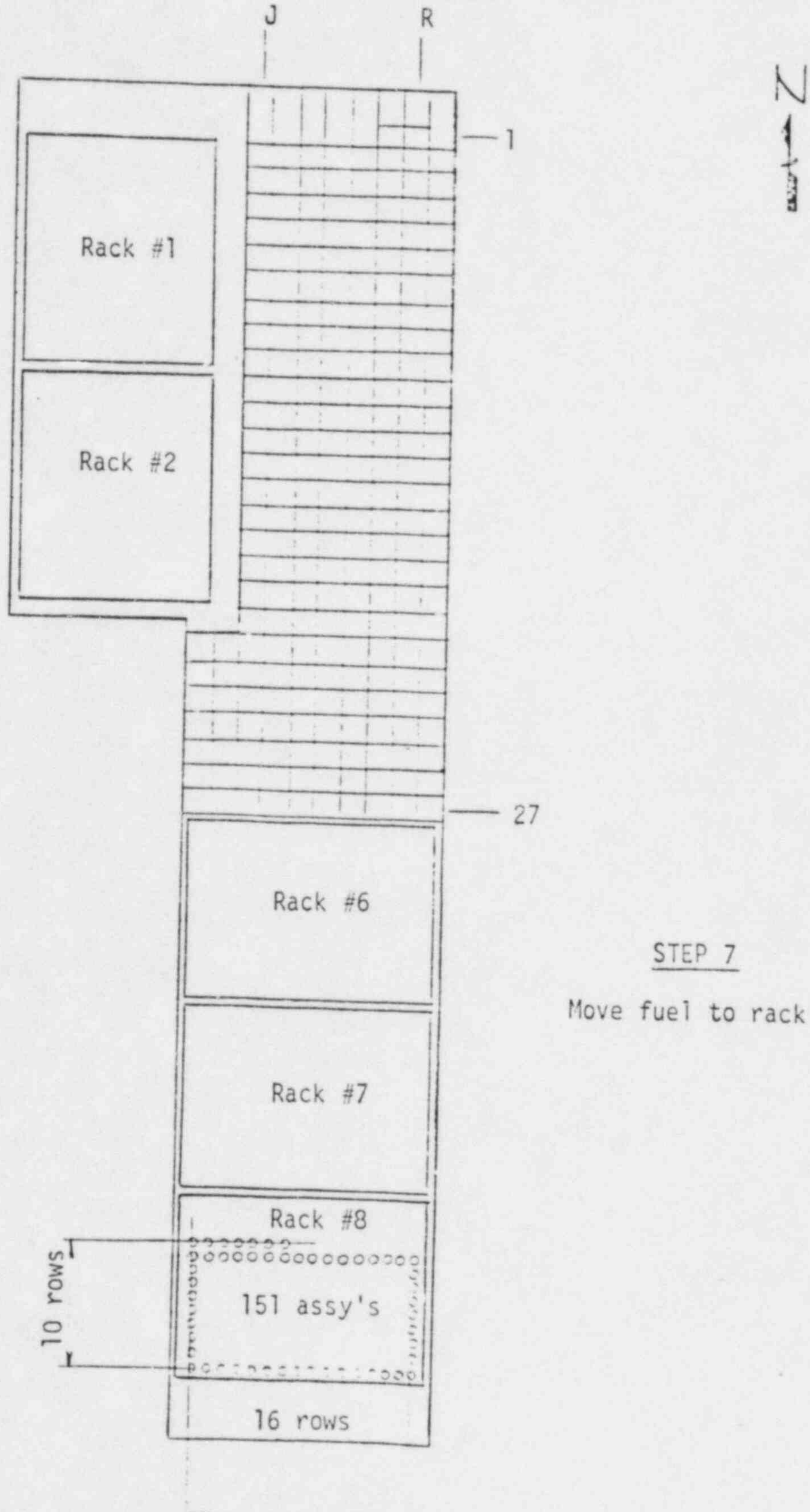
UNIT 1



STEP 6

Install racks #8, #7, and #6.

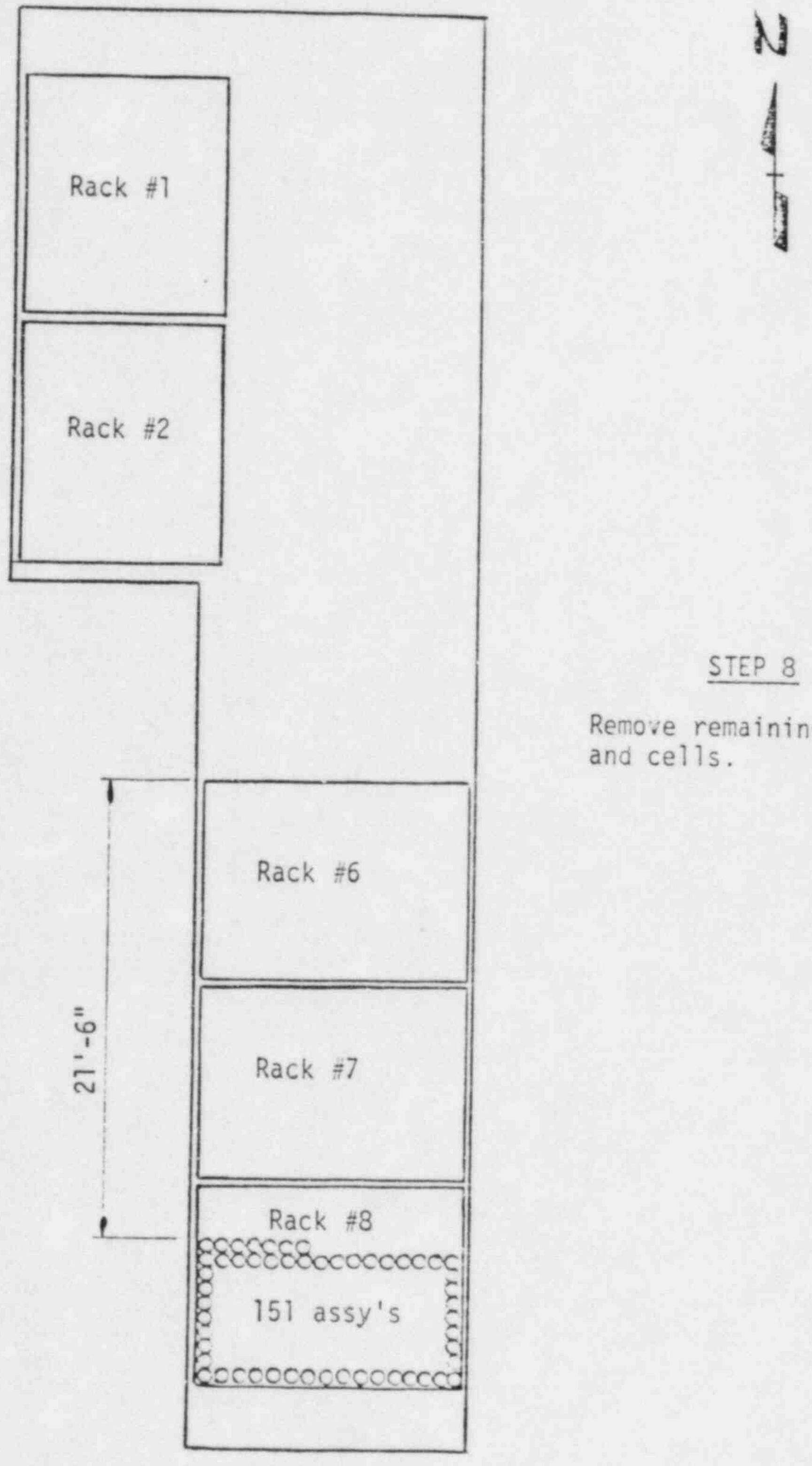
UNIT 1



STEP 7

Move fuel to rack #8

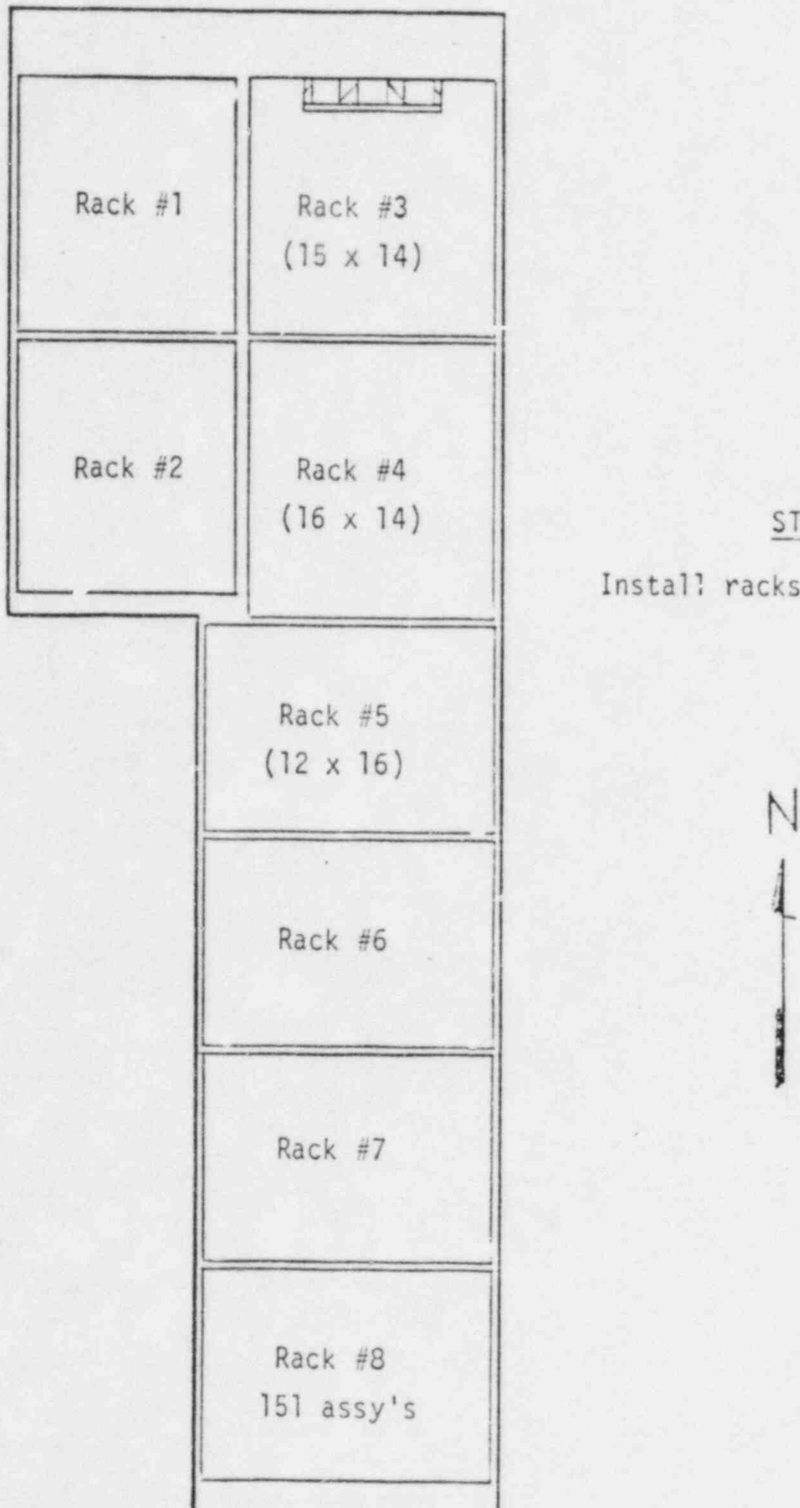
UNIT 1



STEP 8

Remove remaining rack grid and cells.

UNIT 1



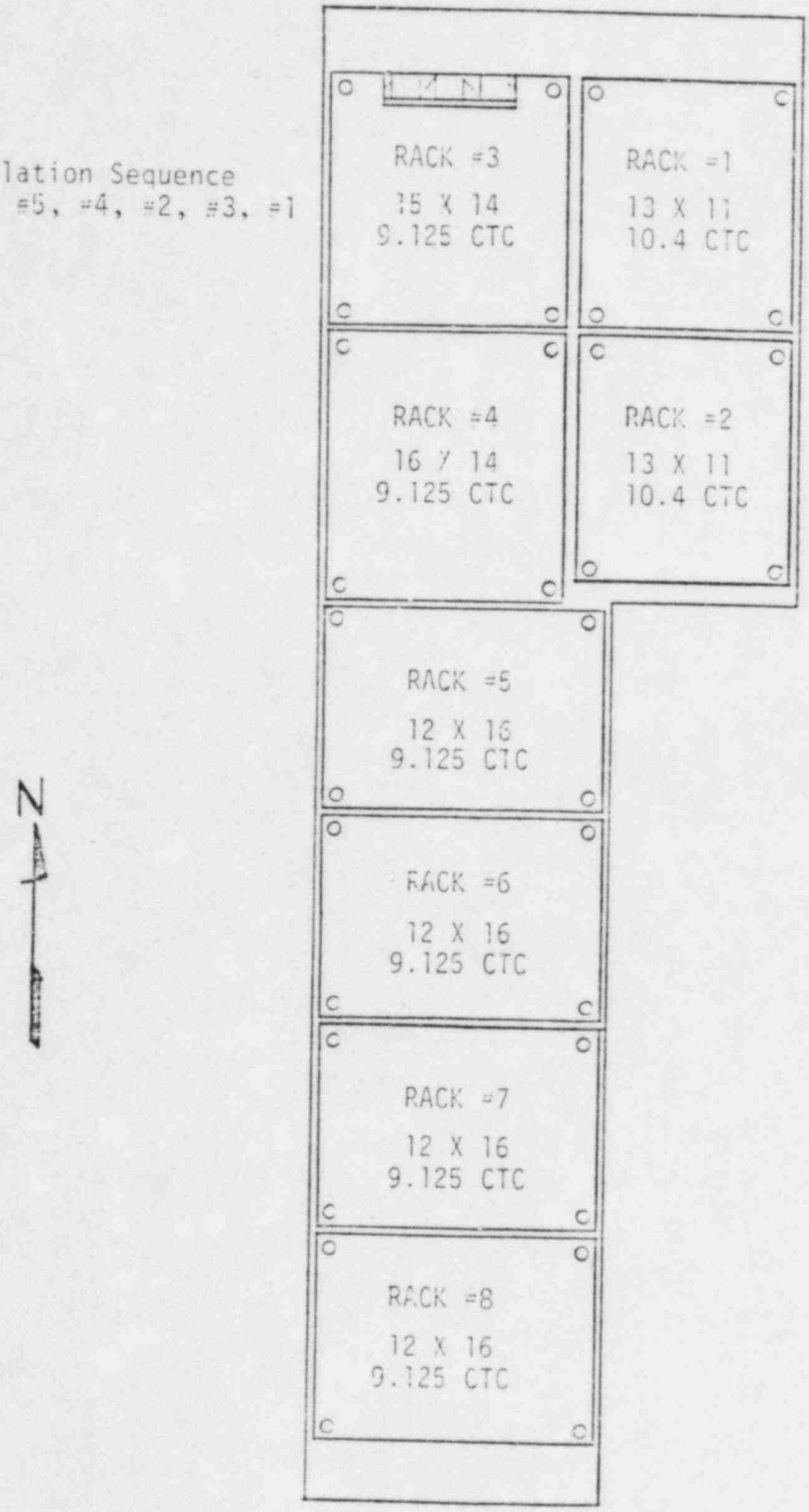
STEP 9

Install racks #5, #4, and #3.

INSTALLATION PLAN

UNIT 2

Rack Installation Sequence
#8, #7, #6, #5, #4, #2, #3, #1



RADIOLOGICAL CONSIDERATIONS

EXPOSURE CONTROL FOR DIVERS

- SPENT FUEL PLACEMENT MAXIMIZES WORKING DISTANCES
- INSTALLATION PLAN MINIMIZES FUEL MOVEMENT
- 10 FT. DISTANCE FROM SPENT FUEL MAINTAINED
- EXTRA PERSONNEL MONITORING - EXTREMITIES / MULTIPLE WHOLE BODY
- UNDERWATER RADIATION SURVEYS
- CLOSE H.P. OBSERVATION DURING DIVING ACTIVITIES
- (DIRECT DECONTAMINATION) CONTAMINATION CONTROL - PROTECTIVE CLOTHING, LOW PRESSURE HOSEDOWN
- EXTRA DOSIMETRY RECORD KEEPING

RADIOLOGICAL CONSIDERATIONS

PROJECTED RERACKING EXPOSURES

- PROJECTIONS BASED ON PREVIOUS OCONEE EXPERIENCE AND FOLLOWING ASSUMPTIONS:

  1. 151 SPENT FUEL ASSEMBLIES PRESENT
  2. 302 SPENT FUEL MOVES
  3. 8 RACK MODULES INSTALLED

- ESTIMATED ALARA DOSES - PERSON REM:

HOIST AND CRANE INSTALLATION/REMOVAL	4.03
POOL CLEANUP OPERATIONS	1.27
IN-POOL FUEL TRANSFERS	1.01
RACK REMOVAL AND INSTALLATION	7.30
RACK DECON AND DISPOSAL	0.69
TOTAL	14.30

RADIOLOGICAL CONSIDERATIONS

SPENT FUEL POOL CLEANUP

- SPENT FUEL POOL COOLING SYSTEM DEMINERALIZER AND FILTERS
- PORTABLE, AUXILIARY SYSTEM USED AS BACKUP
- WEEKLY SAMPLING OF POOL WATER
- DIVER WORKING AREAS CLEANED WITH PORTABLE VACUUM SYSTEM
- FLOATING SKIMMER USED TO MINIMIZE FLOATING CRUD

RADIOLOGICAL CONSIDERATIONS

INCREASES IN OCCUPATIONAL DOSE

- OVERALL EXPOSURE INCREASE DUE TO ADDITIONAL STORED FUEL ESTIMATED TO BE LESS THAN 1% OF THE ANNUAL STATION DOSE.

- EXPOSURE INCREASE FROM DIRECT RADIATION NEGLIGIBLE DUE TO WATER DEPTH

- EXPOSURE INCREASE FROM CONTAMINATED WATER NEGLIGIBLE DUE TO CIRCULATION SYSTEM

- EXPOSURE INCREASE DUE TO RESIN/FILTER CHANGES NEGLIGIBLE DUE TO NO INCREASE IN FUEL MOVEMENT ACTIVITY

RADIOLOGICAL CONSIDERATIONS

FUEL RACK DISPOSAL OPTIONS

A. DECONTAMINATION FOR SALE AS SCRAP

B. SHIPMENT TO LOW LEVEL WASTE BURIAL SITE

C. LONG TERM ON-SITE STORAGE

UNIT 1 RACKS ~14,000 FT^3 STAINLESS STEEL

CONSTRUCTION ACCIDENTS

- UNIT 2 RERACKING PERFORMED IN DRY POOL WITH NO FUEL IN POOL
- AS DISCUSSED IN THE INSTALLATION PLAN FOR UNIT 1, FUEL WILL BE POSITIONED SUCH THAT NO LIFTS WILL BE MADE OVER FUEL
- LIFT RIGGING, HOISTS, AND CRANES SHALL BE DESIGNED AND OPERATED IN ACCORDANCE WITH ANSI B30.9, B30.11 AND B30.20 RESPECTIVELY
- IN ADDITION, A DROP RESULTING IN BREACHING 151 FUEL ASSEMBLIES WAS POSTULATED. THE EXCLUSION AREA BOUNDARY DOSE, TAKING NO CREDIT FOR VENTILATION SYSTEM (FILTRATION) IS WELL BELOW 10CFR100 LIMITS.

McGuire Units 1 & 2

Fuel Pool Rerack Construction Accident Analysis

METEOROLOGY	
. 2 Hour Accident X/Q	9.0E-4 s/m^3
SPENT FUEL RADIOACTIVITY BASES	
. Conservative case maximum assembly inventory	FSAR Table 15.5-3
. Peaking factor	1.2
. Decay Periods	61[(1)]/65 days 90/1 year
. Gas Gap Fractions	
for Kr85	0.3
for other Nobles and Iodines	0.1
RADIOACTIVITY RELEASE BASES	
. Number of fuel assemblies damaged	151
. Release quantity of gap activity	100%
. Spent Fuel Pool water iodine removal	100
. Filtration	None
DOSE BASES	
. Receptor breathing rate	3.47E-4 m^3/sec
DOSE CONSEQUENCES	
. Whole Body	0.3 Rem
. Thyroid	70 Rem

[(1)]Corresponds to one refueling batch.

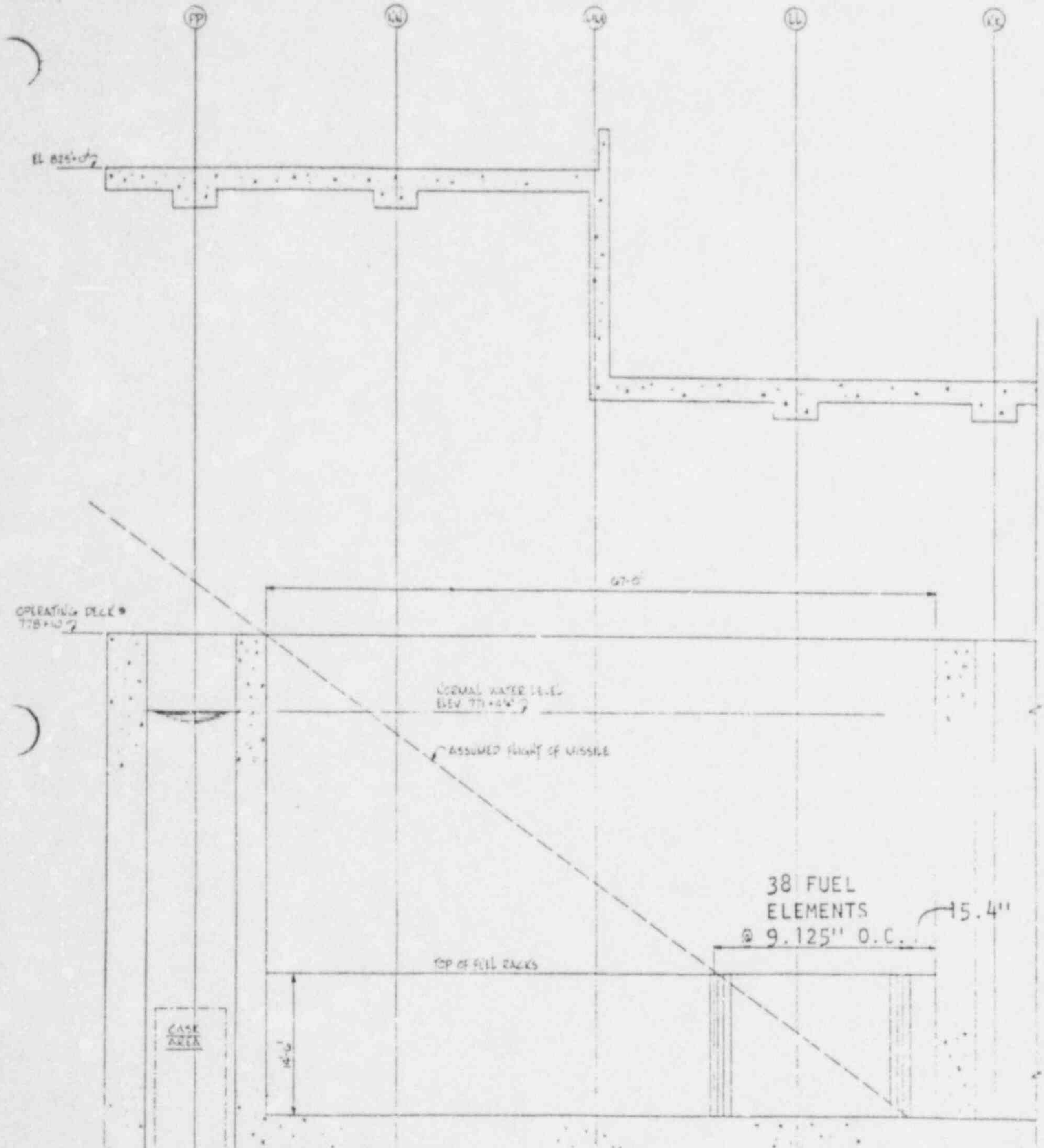
CASK/HEAVY LOAD ACCIDENT

- NO CHANGES WILL BE MADE TO THE PHYSICAL STRUCTURE AND LAYOUT OF THE POOLS AS A RESULT OF THE PROPOSED RACK REPLACEMENT

CONCLUSION: THE ANALYSIS AND CRITERIA DESCRIBED IN THE FSAR REMAIN VALID.

NATURAL DISASTERS

- AN ANALYSIS HAS BEEN PERFORMED TO DETERMINE THE POTENTIAL CONSEQUENCES IN TERMS OF THE MAXIMUM NUMBER OF FUEL ASSEMBLIES WHICH MAY BE DAMAGED UNDER THE MOST CONSERVATIVE COMBINATION OF MISSILE TYPE AND TRAJECTORY, SHOULD A TORNADO PROPELLED MISSILE ENTER THE SPENT FUEL BUILDING
- A TOTAL OF 38 FUEL ASSEMBLIES IN REGION II (CONTROLLING CASE) CAN POTENTIALLY SUFFER A TOTAL LOSS OF INTEGRITY DURING A TORNADO MISSILE IMPACT
- THE RADIOLOGICAL CONSEQUENCES OF A TORNADO MISSILE IMPACT WILL BE MITIGATED BY LIMITING THE AGE OF FUEL DISCHARGED TO REGION II TO A MINIMUM 16 DAY DECAY PERIOD



TORNADO MISSILE STUDY

McGUIRE NUCLEAR STATION

McGuire Units 1 & 2

Tornado Missile Impact on Spent Fuel Pool

METEOROLOGY	
. Atmospheric dilution for tornado conditions	8.1E-5 s/m^3
SPENT FUEL RADIOACTIVITY BASES	
. Conservative case maximum assembly inventory	FSAR Table 15.5-3
. Peaking factor	1.2
. Decay Period	16 days
. Gas Gap Fractions	
for Kr85	0.3
for other Nobles and Iodines	0.1
RADIOACTIVITY RELEASE BASES	
. Number of fuel assemblies damaged	38
. Release quantity of gap activity	100%
. Spent Fuel Pool water iodine removal	100
. Filtration	None
DOSE BASES	
. Receptor breathing rate	3.47E-4 m^3/sec
DOSE CONSEQUENCES	
. Whole Body	9.54E-1 Rem
. Thyroid	2.67E+2 Rem

SAFETY ANALYSIS - LOSS OF FORCED COOLING

Design Basis - Spent Fuel Pool Cooling System is designed to Seismic Category 1, Quality Group C requirements and is redundant in active components such that:

- Cooling system complies with Standard Review Plan 9.1.3 design guidance.
- Complete loss of forced cooling highly unlikely.

Loss of Cooling Analysis assumptions:

- Adiabatic treatment of fuel pool coolant mass.
- Maximum design basis heat loads.
- Design basis initial pool temperatures.

Additional Considerations:

- Redundant Seismic Category 1, Quality Group C makeup systems are provided.

TABLE 6.3-1

Time to Boiling Following Loss of Forced Cooling
Under Design Basis Conditions for McGuire Units 1 & 2 Spent Fuel Pools

Heat Load (10^6 BTU/HR)	Initial Pool Temperature (°F)	Heat Up Time (HRS)
18	120	13.8
18	140	10.8
41.6	140	4.7

SAFETY ANALYSIS - FUEL HANDLING ACCIDENT

Design Basis - Radiological consequences of a fuel handling accident calculated in accordance with Regulatory Guide 1.25:

- Analysis unchanged from that presented in McGuire FSAR Section 15.5.9.

McGUIRE RERACK PROJECT SCHEDULE

- Begin Unit 2 Rack Removal/Installation 08-01-84
- Complete Unit 2 Rack Installation 12-31-84
- Projected Unit 2 Refueling Outage 02-01-85

- Begin Unit 1 Rack Removal/Installation 08-01-85
- Complete Unit 1 Rack Installation 03-01-86
- Projected Unit 1 Refueling Outage ~ 04-86

McGUIRE RERACK LICENSING SCHEDULE

FORMAL APPLICATION	2/14/84
NRC COMPLETE PRELIMINARY NO SIGNIFICANT HAZARDS CONSIDERATIONS REVIEW	3/14/84
FINAL NRC SUBMITTAL	3/15/84
PUBLIC NOTICE PUBLISHED IN FEDERAL REGISTER	4/01/84
LICENSE AMENDMENT APPROVED BY NRC	8/01/84

DUKE POWER COMPANY
MCGUIRE NUCLEAR STATION

Attachment 2

No Significant Hazards Consideration Evaluation

Attachment 2

NO SIGNIFICANT HAZARDS CONSIDERATION EVALUATION

Duke Power Company (Duke) has made the determination that this amendment request involves a No Significant Hazards Consideration by applying the guidance presented in 10 CFR 50.92. This ensures that operation of the facility in accordance with the proposed amendment would not:

1) Involve a significant increase in the probability or consequences of an accident evaluated; or
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.

To put the matter in perspective, necessary background is first provided. Thereafter, a discussion of each of the significant hazards considerations is provided.

McGuire Nuclear Station was designed and constructed with two spent fuel storage pools--one associated with each unit. The design capacity of each pool is 500 spaces (approximately 2 1/2 cores). The McGuire Final Safety Analysis Report addresses the safety implications of these pools to include relevant parameters associated with criticality, structural integrity, and cooling (Safety Evaluation, Docket Nos. 50-369/370). The evaluation found the environmental and safety impacts of such storage to be acceptable.

On April 17, 1977, President Carter issued a policy statement on commercial reprocessing of spent nuclear fuel which effectively eliminated reprocessing as part of the relatively near term nuclear fuel cycle. On October 18, 1977, the GESMO proceedings were deferred indefinitely. The combined effect of this national policy was to leave operating nuclear plants, like McGuire, without a repository for the spent fuel previously generated or being generated. Thus, Duke is forced to do additional reracking of the McGuire spent fuel pools to further increase its storage capacity.

With this application, Duke Power is requesting approval to use Westinghouse designed/constructed two region poison racks to increase each McGuire spent fuel pool capacity to 1463 spaces - 286 spaces in Region 1 and 1177 spaces in Region 2. This modification would extend the McGuire fuel storage capability from the current 1990 date to the year 2010.

The increase in McGuire spent fuel storage capacity would be accomplished by replacing the existing 15.50 inch center-to-center high density non-poison racks with 10.40 and 9.125 inch center-to-center neutron absorbing racks in Region 1 and Region 2 respectively.

Duke's analysis summary of the proposed amendment request is set forth in Attachment 1. Such analysis addresses the areas addressed in the NRC's Guidance on Spent Fuel Pool Modifications dated April 14, 1978 (revised January 18, 1979).

The following evaluation demonstrates by reference to the analysis summary contained in Attachment 1 that not one of the three significant safety hazards consideration guidelines are met. Each of the three standards is discussed below.

First Standard

> Operation of the facility in accordance with the proposed amendment would not involve a significant increase in the probability or consequence of an accident previously evaluated.

The analysis of this proposed reracking has been accomplished using current NRC Staff accepted Codes and Standards. The results of the analysis meet the specified acceptance criteria set forth in these standards. In addition, Duke has reviewed NRC Staff Safety Evaluation Reports for prior PWR rerackings involving two region poison racks to ensure that there are no identified concerns not fully addressed in this submittal.

From our analyses and SER reviews, Duke has identified the following potential accident scenarios: 1)spent fuel cask drop; 2) loss of spent fuel pool forced cooling; 3) seismic event; 4) spent fuel assembly drop; 5) natural disaster; and 6) construction accident. The probability of any of the first five accidents is not affected by the racks themselves; thus, reracking cannot increase the probability of these accidents. As for the construction accident, the proposed McGuire reracking will not involve an increase in probability of any previously evaluated construction accident as accepted construction standards and procedures will be employed.

The consequences of the spent fuel cask drop accident have been evaluated with conclusions on page 48 of Attachment 1. The cask handling crane stops and administrative controls will continue to be used to prevent heavy loads and casks from being moved into the fuel pool area. Thus, the consequences of this type accident will not be significantly increased from previous analyses as described in the McGuire FSAR Section 9.1.2.3.2.

The consequences of the loss of spent fuel pool forced cooling accident have been evaluated (page 52 of Attachment 1). As indicated in Table 6.3-1 (page 53 of Attachment 1) there is ample time to effect repairs to the cooling system or to establish a makeup flow before boiling occurs. The consequences of this type accident will not be significantly increased from previously evaluated accidents by this proposed reracking.

The consequences of a seismic event have been evaluated. The racks were evaluated against the appropriate NRC Standards. The results of the seismic and structural analysis show that the proposed racks meet all of the NRC structural acceptance criteria and are consistent with results found acceptable by the NRC Staff in all previous two region poison rerack SERs. Thus, the consequences of seismic events will not significantly increase from previously evaluated seismic events.

The consequences of a spent fuel assembly drop accident are described on page 54 of Attachment 1. The radiological consequences for this type accident are unchanged from previous analyses presented in the McGuire FSAR Section 15.5.9, and K_{eff} is shown to be always less than the NRC acceptance criteria of 0.95. Thus, the consequences of this type accident will not be significantly increased from previously evaluated spent fuel assembly drop accidents.

The consequences of a construction accident are described on page 46 of Attachment 1. Since there will be no fuel assemblies in the Unit 2 fuel pool during rack installation, there will be no radiological consequence of any construction accident. The likelyhood of a construction accident is minimized through use of accepted construction practices. The consequences of a postulated construction accident in the Unit 1 spent fuel pool are well below 10 CFR 100 limits, and are bounded by the natural disaster analysis results.

The consequences of a natural disaster are described on page 49 of Attachment 1. Analyses have shown that the maximum doses due to tornado missile damage in Region 1 are below 10 CFR 100 limits. Radiological consequences in Region 2 will be kept below 10 CFR 100 limits by administrative controls on fuel placement and decay. The consequences of this type accident will not significantly increase from previously evaluated natural disaster analyses.

It is shown that the proposed McGuire spent fuel pool reracks will not involve a significant increase in the probability or consequences of an accident previously evaluated.

Second Standard

> Operation of the facility in accordance with the proposed amendment would not create the possibility of a new or different kind of accident from any accident previously evaluated.

Duke has evaluated the proposed reracking in accordance with "NRC Position for Review and Acceptance of Spent Fuel Storage and Handling Applications", appropriate NRC Regulatory Guides, appropriate NRC Standard Review Plans, and appropriate Industry Codes and Standards. In addition, Duke has reviewed previous NRC Safety Evaluation Reports for two region poison rerack applications. In Duke's analysis and review of NRC evaluations and Industry Standards and Codes, Duke finds that the proposed reracking does not in any way create the possibility of a new or different kind of accident previously evaluated.

Third Standard

> Operation of the facility in accordance with the proposed amendment would not involve a significant reduction in a margin of safety.

The issue of margin of safety when applied to a reracking modification will need to address the following areas (as established by the NRC Staff Safety Evaluation review process):

1. Nuclear criticality considerations

2. Thermal-hydraulic considerations

3. Mechanical, material, and structural considerations

The margin of safety that has been established for nuclear criticality considerations is that the neutron multiplication factor in the spent fuel pool remains less than or equal to 0.95, including all uncertainties, under all conditions. The criticality analysis for the proposed modification is discussed on pages 14-16 of Attachment 1.

The methods utilized in the analysis conform with ANSI N18.2-1973, "Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants"; ANSI N210-1976, "Design Objectives for LWR Spent Fuel Storage Facilities at Nuclear Power Stations"; ANSI N16.9-1975, "Validation of Calculational Methods for Nuclear Criticality Safety"; NRC Standard Review Plan, Section 9.1.2, "Spent Fuel Storage", and the NRC guidance, "NRC Position for Review and Acceptance of Spent Fuel Storage and Handling Applications".

The results of this analysis indicate that K_{eff} is always less than 0.95 including all uncertainties at a 95/95 probability/confidence level, thus meeting the acceptance criteria for criticality. The proposed rerack therefore does not involve a significant reduction in the margin of safety for nuclear criticality.

For consideration of thermal-hydraulics, the areas of concern when evaluating if there is a significant reduction in margin of safety are: 1) maximum fuel temperature, and 2) the increase in temperature of the water in the pool. The thermal-hydraulic evaluation is described on pages 17-19 of Attachment 1. Results of these analyses show that fuel cladding temperatures under abnormal conditions are sufficiently low to preclude failures and that boiling does not occur in the water channels between the fuel assemblies nor within the storage cells. Additionally, the existing spent fuel cooling system will provide the capacity to maintain an acceptable temperature range for normal and abnormal heat loads. The cooling system is described in the McGuire FSAR Section 9.1.3.2. Thus, there is no significant reduction in the margin of safety from a thermal-hydraulic standpoint or from a spent fuel cooling standpoint.

The mechanical, material, and structural considerations of the proposed rerack are described. The racks are designed in accordance with "NRC Position for Review and Acceptance of Spent Fuel Storage and Handling Applications" dated April 14, 1978 and revised January 18, 1979. The racks are designed to Seismic Category 1 requirements and are classified as ANS Safety Class 3 and ASME Code Class 3 Component Support Structures. In addition, the racks are designed to withstand the loads which may result from fuel handling accidents and from the maximum uplift force of the fuel handling crane. The materials utilized are compatible with the spent fuel pool enrichment and the spent fuel assemblies. The structural considerations of the racks provide for a sufficient margin of safety against tilting that the racks do not impact each other nor impact the pool walls, and that sufficient clearance is provided to prevent the racks from sliding into pool floor obstructions. Structural integrity of the pool structure is maintained with additional dead load, live load, thermal load, wind load, and seismic load considerations; thus, the margin of safety is not significantly reduced by the proposed rerack.

It has been shown that the proposed McGuire spent fuel pool rerack modification does <u>not</u>:

1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or
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.

As such, Duke has determined and submits that the proposed rerack described herein does <u>not</u> involve a significant hazard.