Docket File
DCS MS-016

JUN 4 1984

Docket No. 50-336

LICENSEE: Northeast Nuclear Energy Company

FACILITY: Millstone Nuclear Power Station, Unit 2

SUBJECT: SUMMARY OF MEETING WITH NORTHEAST NUCLEAR ENERGY COMPANY ON SPENT FUEL DISPOSITION PLANS FOR MILLSTONE UNIT 2

A meeting was held with Northeast Nuclear Energy Company (NNECo) on May 17, 1984. The purpose of this meeting was for NNECo to present their plans for spent fuel disposition in order to receive staff comments. These comments would facilitate the NRC review of license amendments expected to be submitted later this year.

Background

Reference: Letter, W. G. Counsil to J. R. Miller, Spent Fuel Disposition Plans, March 30, 1984.

The referenced letter provides a general discussion for spent fuel disposition plans. The presentation made by NNECo and their vendor for the spent fuel racks (Combustion Engineering) expanded on the information contained in the referenced letter. Handouts provided at the meeting are attached, along with a listing of meeting attendees (Attachment 1).

Summary of Presentation

NNECo plans to submit two independent license amendment requests. The first request scheduled to be submitted in August 1984 concerns reracking of the fuel so that the current spent fuel capacity of 667 assemblies can be increased to 1042 assemblies. The increase in capacity is accomplished by replacing the current racks with free standing racks capable of storing fuel assemblies on a nominal center to center spacing of either 9.0 inches or 9.8 inches vs. the current spacing of 12.19 inches. The spent fuel pool would be divided into two regions with one region capable of storing 363 assemblies of high enriched fuel while the other region would contain storage spaces for 680 fuel assemblies which would be limited to assemblies that have sustained at least 85% of design burnup.

The second license amendment request which is to be completely independent of the first request is scheduled for submittal in September 1984. This request will be for fuel assembly consolidation which will effectively double the storage capacity of 1042 assemblies. Basically, after a minimum period of 5 years after discharge from the core, fuel pins would be pulled from the assembly and into an interim rod transfer canister. After the canister is filled it is lowered over a consolidated fuel storage box and pins are inserted into the box. The consolidated fuel can then be stored in the proposed storage racks.

OFFICE						
SURNAME						
DATE						

A brief presentation was made in each of the following areas concerning the acceptance criteria, calculational assumptions and computer codes to be used to justify reracking and pin consolidation:

Physics Analysis
Thermal Hydraulics
Seismic
Postulated Accidents
Radiological Considerations.

Additional details can be found in the handout and the referenced letter.

Information requested by the staff includes a list of all materials in the spent fuel pool, details of the surveillance program, method of venting the boraflex, and the thickness of material on either side of the boraflex. It was emphasized that the submittals by NNECo should be as complete as possible to minimize the amount of additional information requested.

Schedule and Conclusion

NNECo's schedule for implementing the rerack is the second quarter of 1985. A cold demonstration of pin consolidation is planned for the end of 1984 with a hot demonstration planned later. With the next refueling scheduled for the spring of 1985, Unit 2 will lose the reserve capacity necessary to discharge the entire core of 217 fuel assemblies. It was pointed out that, if this is the case, it violates a provision of the Nuclear Waste Policy Act which states "the Commission shall ensure maintenance of a full core reserve storage capability at the site of the civilian nuclear power reactor involved unless the Commission determines that the maintenance of such capability is not necessary for the continued orderly operation of such reactor."

Original signed by

D. B. Osborne, Project Manager
Operating Reactors Branch #3
Division of Licensing

Attachments:
As stated

cc w/attachments:
See next page

OFFICE	ORB#3:DL	ORB#3:DL	ORB#3:DL				
SURNAME	PMKreutzer	DBOsborne/pm	JRMiller				
DATE	6/ /84	6/4/84	6/4/84				

Attachment 1

List of Attendees

Nuclear Regulatory Commission

Dee Osborne	DL/ORB#3
K. L. Heitner	DL/ORB#3
Larry Kopp	DSI/CPB
Howard Richings	DSI/CPB
Fred Clemenson	DSI/ASB
John Minns	DSI/RAB
B. Turovlin	DE/CMEB
Harold Polk	DE/SGEB
Larry W. Bell	DSI/AEB
Walter Brook	DSI/CPB
Dick Clark	DL/ORB#4

Northeast Utilities

Thomas J. Mawson
Michael Cass
George Betancourt
Bob Skwirz

Combustion Engineering

J. E. Rogers
Allen R. Kasper
Michael J. Falzarano
Robert L. Mascardini

Consumers Power

Victoria J. MacDonald

MEETING SUMMARY DISTRIBUTION

Licensee: Northeast Nuclear Energy Company

*Copies also sent to those people on service (cc) list for subject plant(s).

Docket File
NRC PDR
L PDR
ORB#3 Rdg
ORB#3 Summary File
JRMiller
PMKreutzer
Project Manager
OELD
ELJordan
JMTaylor
ACRS-10
NRC Participants

cc:
Gerald Garfield, Esquire
Day, Berry & Howard
Counselors at Law
One Constitution Plaza
Hartford, Connecticut 06103

Mr. Charles Brinkman
Manager - Washington Nuclear
Operations
C-E Power Systems
Combustion Engineering, Inc.
7910 Woodmont Avenue
Bethesda, Maryland 20014

Mr. Lawrence Bettencourt, First Selectman
Town of Waterford
Hall of Records - 200 Boston Post Road
Waterford, Connecticut 06385

Superintendent
Millstone Plant
P. O. Box 128
Waterford, Connecticut 06385

U.S. Environmental Protection Agency
Region I Office
ATTN: Regional Radiation Representative
John F. Kennedy Federal Building
Boston, Massachusetts 02203

Northeast Utilities Service Company
ATTN: Mr. Richard R. Laudenat, Manager
Generation Facilities Licensing
Post Office Box 270
Hartford, Connecticut 06101

Regional Administrator
Nuclear Regulatory Commission
Region I
Office of Executive Director
for Operations
631 Park Avenue
King of Prussia, Pennsylvania 19406

Office of Policy & Management
ATTN: Under Secretary Energy
Division
80 Washington Street
Hartford, Connecticut 06115

Arthur Heubner, Director
Radiation Control Unit
Department of Environmental Protection
State Office Building
Hartford, Connecticut 06115

Mr. John Shedlosky
Resident Inspector/Millstone
c/o U.S.N.R.C.
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Niantic, CT 06357

Vice President - Nuclear Operations
Northeast Utilities Service Company
P. O. Box 270
Hartford, Connecticut

NRC/NORTHEAST UTILITIES
MILLSTONE UNIT NO. 2
SPENT FUEL DISPOSITION PLANS
MAY 17, 1984

1. INTRODUCTION

2. SPENT FUEL POOL RERACKING
   - RACK DESIGN CRITERIA
   - BUILDING ANALYSES

3. SPENT FUEL CONSOLIDATION
   - SYSTEM DESIGN
   - HARDWARE DESIGN AND FABRICATION
   - METHODS DEVELOPMENT AND TESTING
   - DESIGN AND ANALYSIS
   - EQUIPMENT DEMONSTRATION

4. LICENSING SCHEDULE

MILLSTONE UNIT NO. 2
SPENT FUEL DISPOSITION PLANS

PLANT: 2700 MW_{TH} PWR

CE NSSS

WATERFORD, CT

217 FUEL ASSEMBLY CORE

72 FUEL ASSEMBLIES DISCHARGED EACH RELOAD

376 SPENT FUEL ASSEMBLIES IN POOL

MILLSTONE UNIT NO. 2
SPENT FUEL DISPOSITION PLANS

- ORIGINAL SPENT FUEL STORAGE 301
- CURRENT SPENT FUEL STORAGE 667
- FULL CORE OFFLOAD CAPABILITY LOST FOLLOWING 1986 REFUELING

MILLSTONE UNIT NO. 2
SPENT FUEL DISPOSITION PLANS

NUCLEAR WASTE POLICY ACT

- PROVIDES FOR LONG-TERM STORAGE OF SPENT FUEL
- ESTABLISHES LIMITED INTERIM STORAGE CAPACITY
- DIRECTS THE DEVELOPMENT OF CRITERIA FOR USE OF INTERIM STORAGE

PROPOSED 10CFR PART 53

- REINFORCES LICENSEE RESPONSIBILITY TO PROVIDE SPENT FUEL STORAGE

MILLSTONE UNIT NO. 2
SPENT FUEL DISPOSITION PLANS

SPENT FUEL STORAGE CAPACITY INCREASE PLANS

1. RERACKING

2. FUEL ASSEMBLY CONSOLIDATION

SPENT FUEL POOL RERACKING

- TWO REGION STORAGE
- DUAL PITCH
- POISONED AND NON-POISONED
- FULL-CORE OFFLOAD CAPABILITY THROUGH 1993

SPENT FUEL ASSEMBLY CONSOLIDATION

- EFFECTIVELY DOUBLES STORAGE CAPACITY
- CAN BE CONDUCTED WITH PROPOSED RACK DESIGN
- PROVIDES MEANS FOR LIFE-OF-REACTOR SPENT FUEL STORAGE WITH NWPA
- DEVELOPED IN COOPERATION WITH EPRI

SCHEDULE

PROPOSED LICENSE AMENDMENTS:

- SPENT FUEL POOL RERACKING
  AUGUST, 1984

- SPENT FUEL ASSEMBLY CONSOLIDATION
  SEPTEMBER, 1984

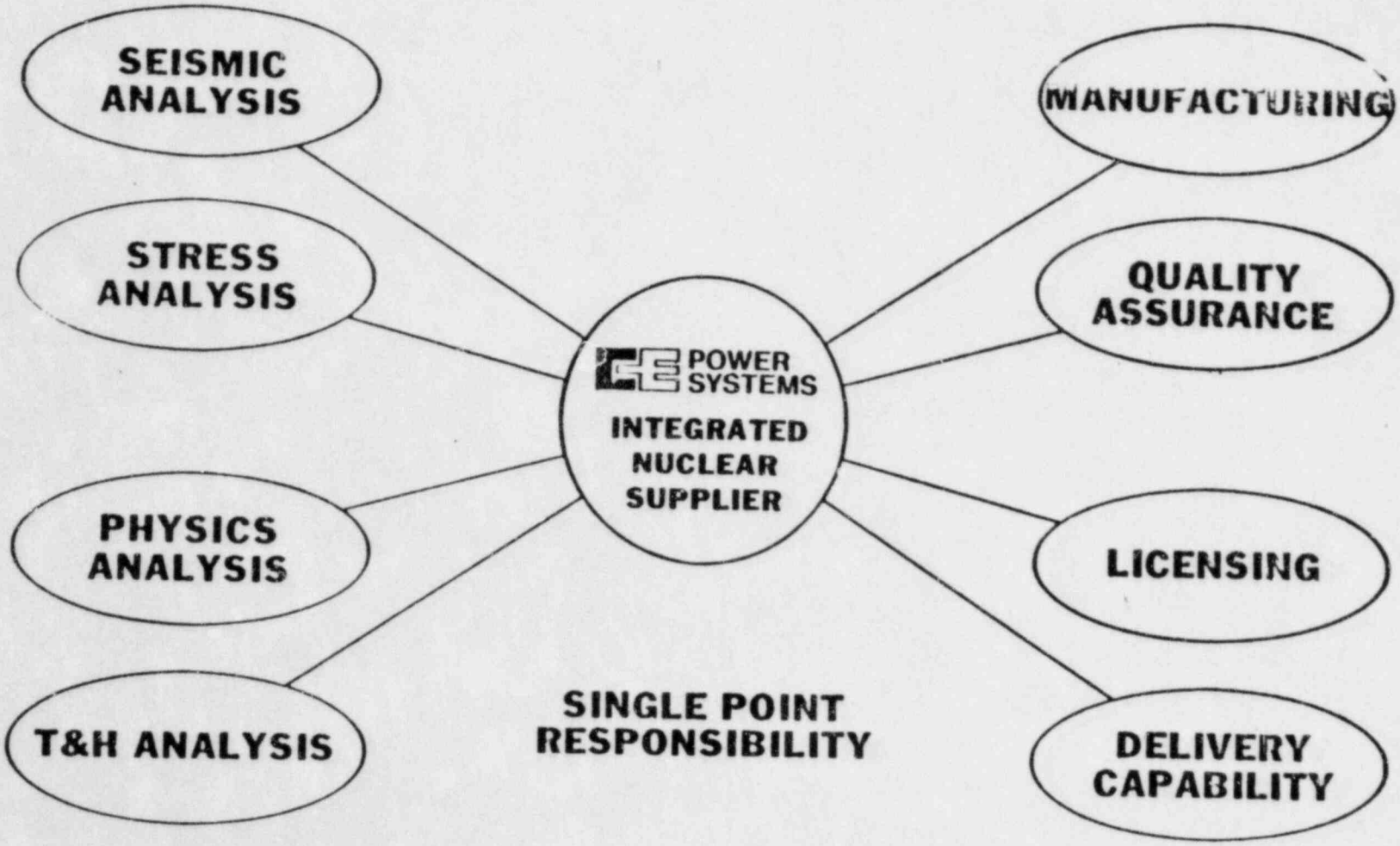
PROJECT IMPLEMENTATION:

- SPENT FUEL POOL RERACKING
  SECOND QUARTER, 1985

- SPENT FUEL ASSEMBLY CONSOLIDATION
  DEMONSTRATION

MAX-CAP

SPENT FUEL STORAGE RACKS



CE SPENT FUEL STORAGE RACKS

SALES TO DATE

ANO #1

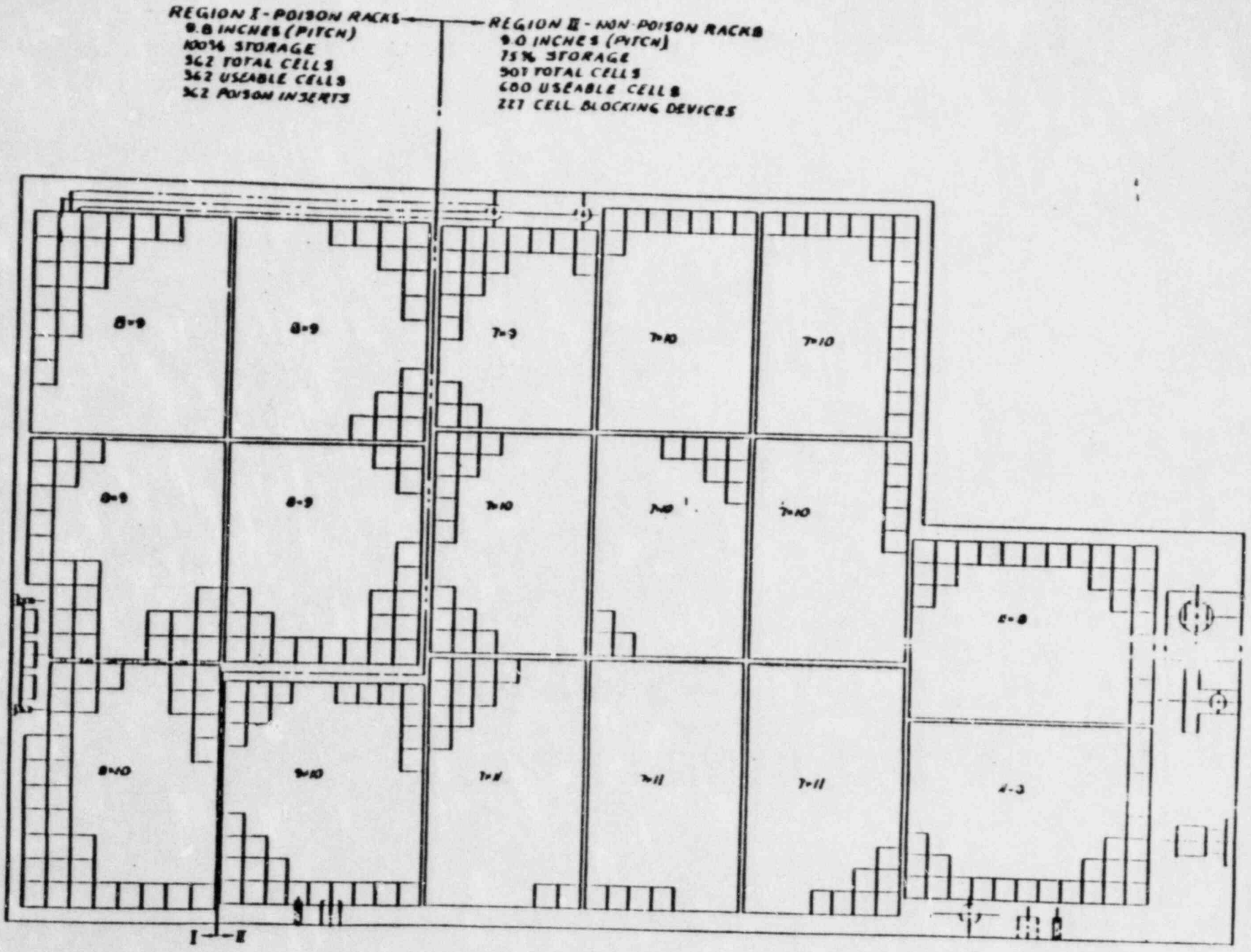
CUSTOMER	DUKE POWER	ARKANSAS P&L	NORTHEAST UTILITIES	FLORIDA P&L	FLORIDA P&L
PLANT NAME	OCONEE #3	ANO #2	MILLSTONE #2	TURKEY POINT #3 AND #4	ST. LUCIE #1
FUEL FABRICATOR	B&W	C-E	C-E	WESTINGHOUSE	C-E
TYPE OF RACK	FREE STANDING	FREE STANDING	WALL SUPPORTED	FREE STANDING	FREE STANDING
NO. OF STORAGE CELLS	480	484	667	1272	728
SCHEDULE DELIVERY	5/76	8/76	1/77	2/77-5/77	12/77
ACTUAL DELIVERY	5/76	8/76	12/76	2/77	12/77
INSTALLATION	COMPLETE	COMPLETE	COMPLETE	COMPLETE	COMPLETE

CE SPENT FUEL STORAGE RACK SALES

SALES TO DATE (CONT'D)

2 regions each

CUSTOMER	TVA	DUKE POWER CO.	ARIZONA PUBLIC SERVICE CO.	SKBF	FLORIDA POWER AND LIGHT
PLANT NAME	YELLOW CREEK #1 AND #2	OCONEE #1 & #2	PALO VERDE #1, #2, #3	SWEDISH CENTRAL UNDERGROUND FACILITY	ST. LUCIE 2
FUEL FABRICATOR	C-E	B&W	C-E	ASEA ATOM & W	C-E
TYPE OF RACK	FLOOR BOLTED	FREESTANDING	FREESTANDING	PWR & BWR FUEL CANISTERS	MAX-CAP FREESTANDING
SCHEDULED DELIVERY	12/5/80 TO 7/3/81	6/1/79 TO 8/1/79	5/1/80 TO 1/15/83	6/1/84 - 1/1/88	2/20/84 - 7/3/84
ACTUAL DELIVERY	COMPLETE	COMPLETE	COMPLETE	–	–
INSTALLATION	–	COMPLETE	–	–	–

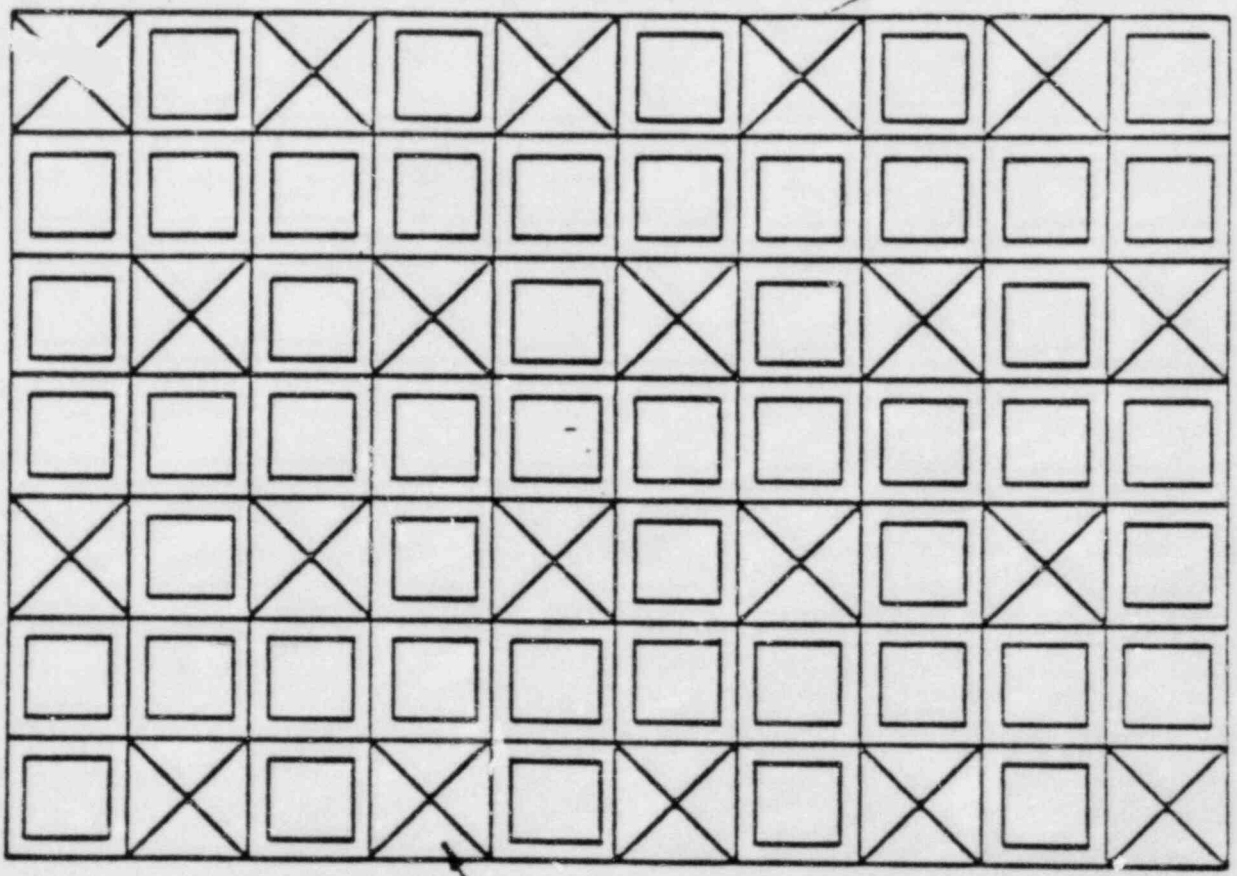


SPENT FUEL STORAGE MODULE INSTALLATION

FIGURE 11

PMAX-CAP™
POOL ARRANGEMENT OF REGION II

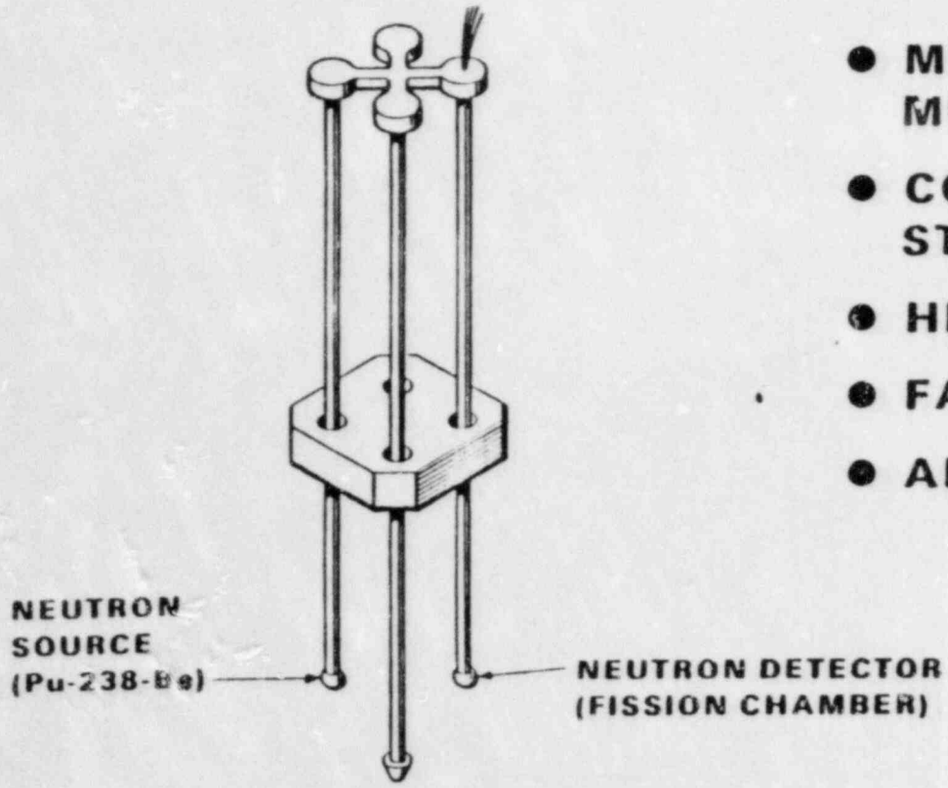
cell



CELL BLOCKING DEVICE

GE POWER SYSTEMS	P MAX-CAP™ REGION II SPENT FUEL STORED IN 3 OF 4 CAVITIES	Figure 4

NEUTRON REACTIVITY MONITOR



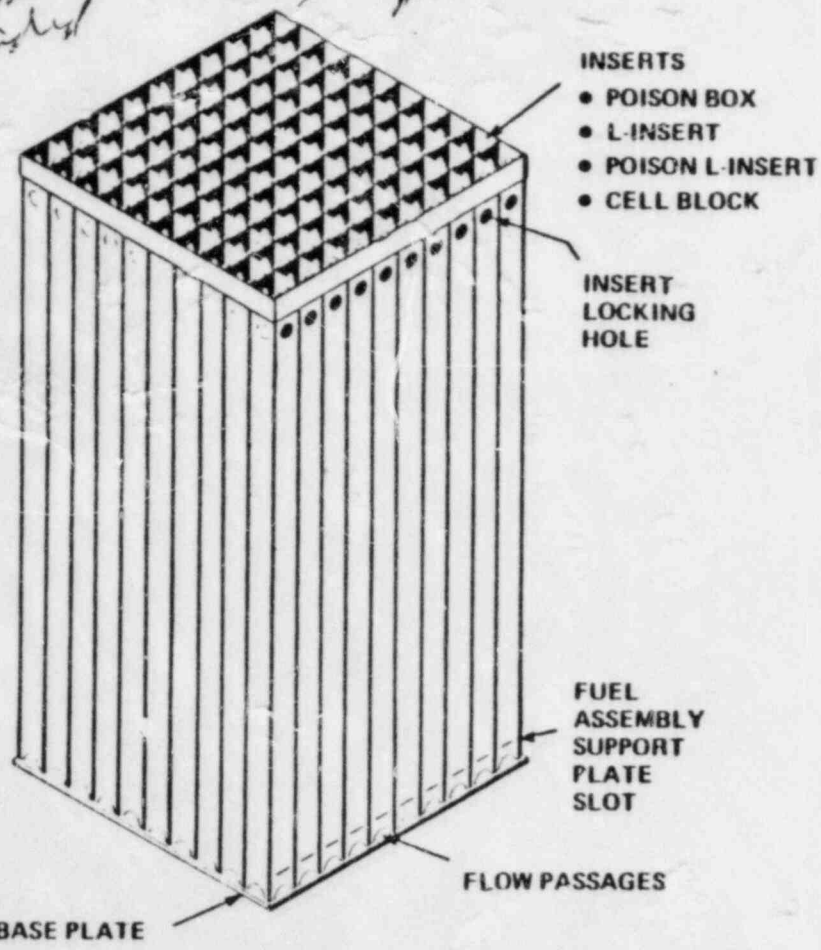
- MEASURES NEUTRON MULTIPLICATION
- COMPARE TO DEPLETED STANDARD
- HIGH ACCURACY
- FAST OPERATION
- ALL PWR FUEL

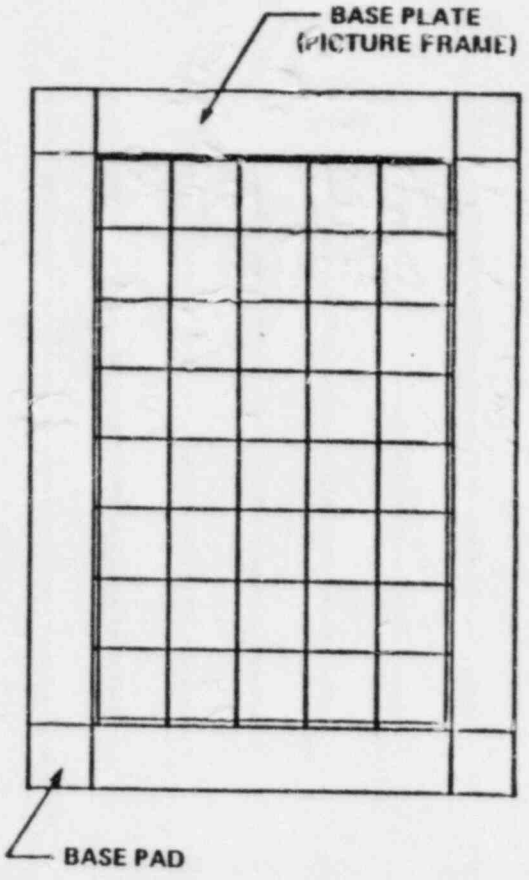
St Lucie + Arizona

MAX-CAP
SPENT FUEL STORAGE RACK MODULE

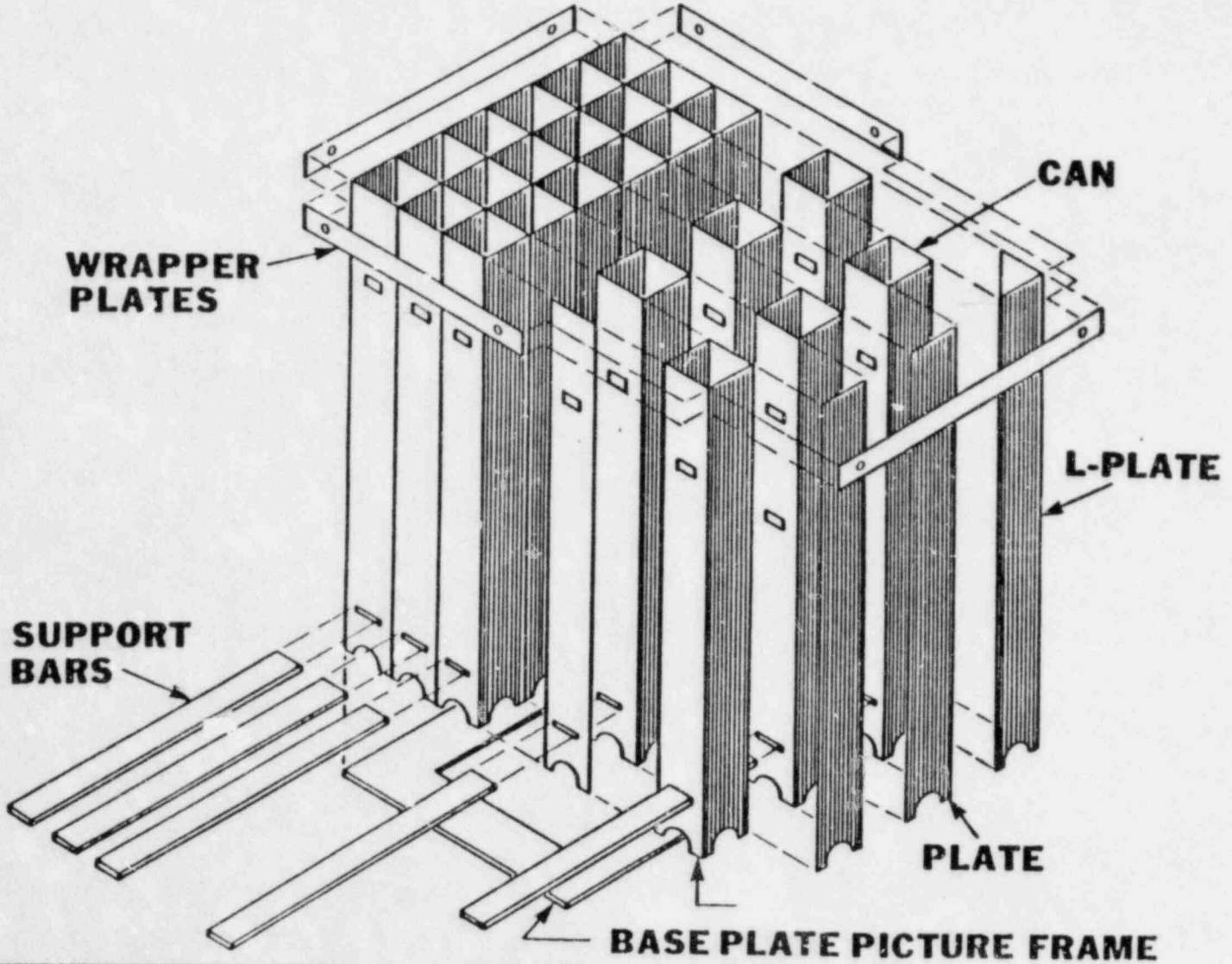
removable panel assembly in position

no lid in position

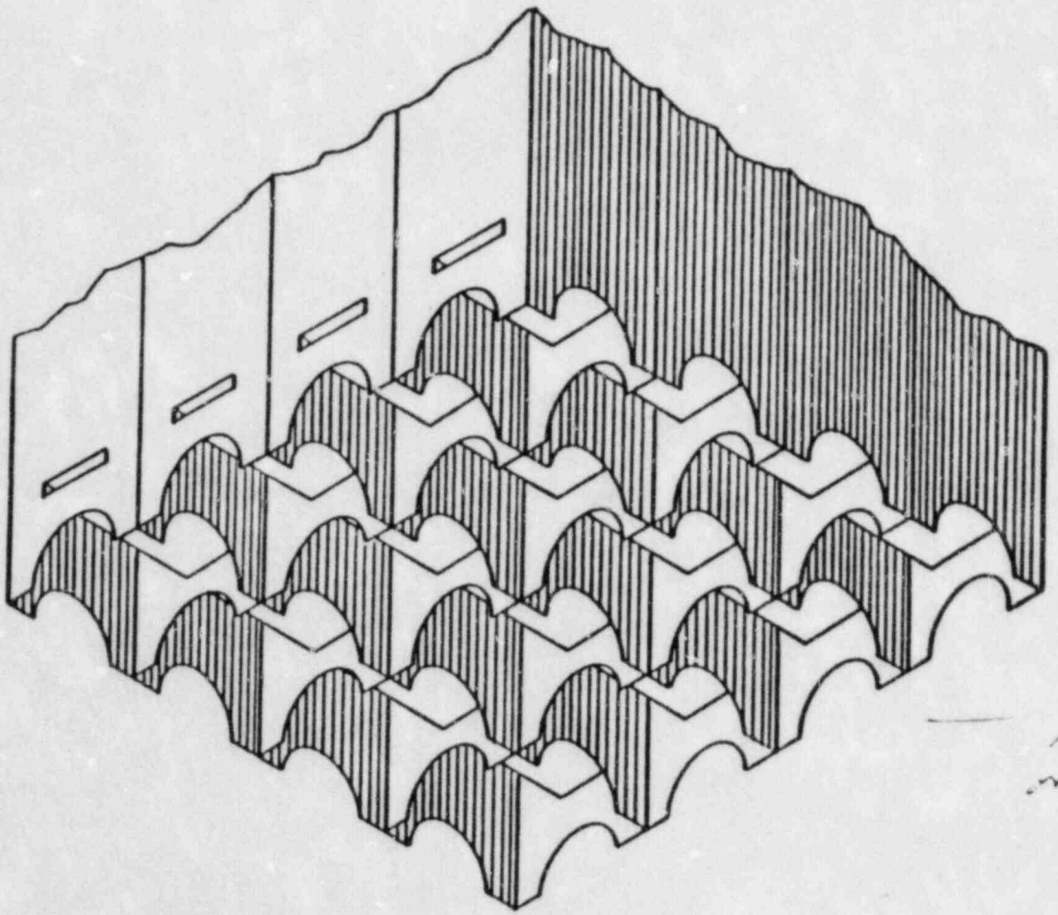




MAX-CAP MODULE CONSTRUCTION



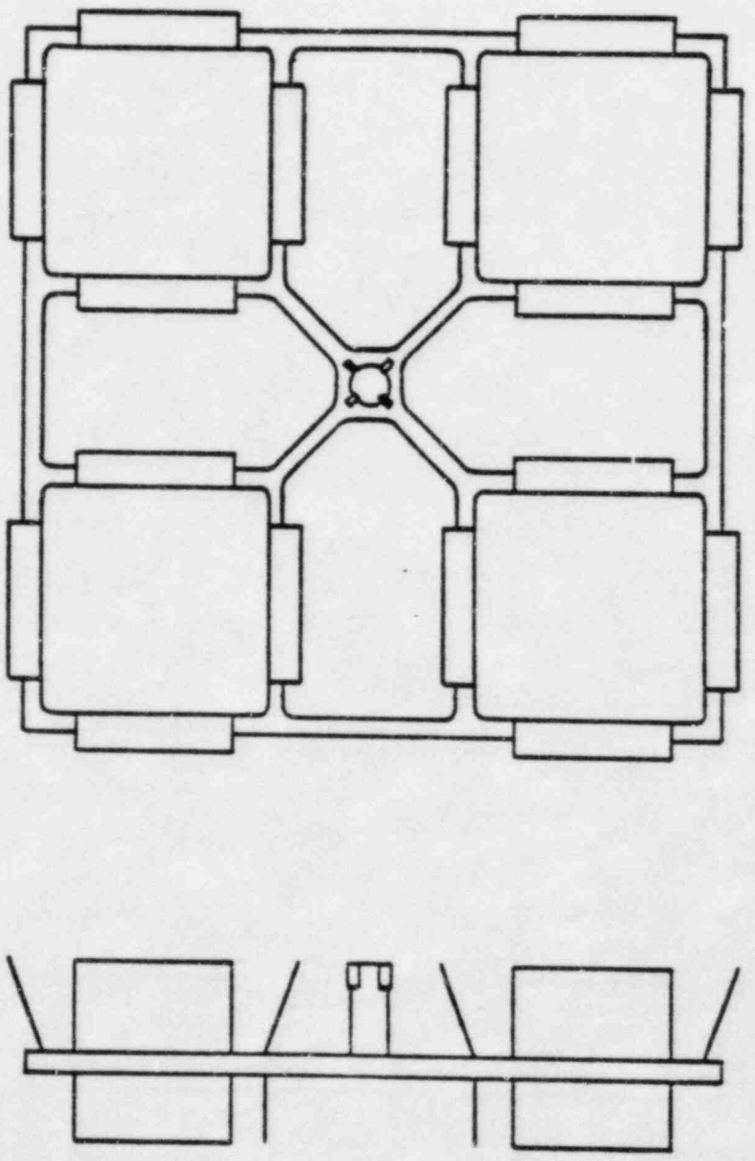
MAX-CAP MODULE
FLOW PASSAGES



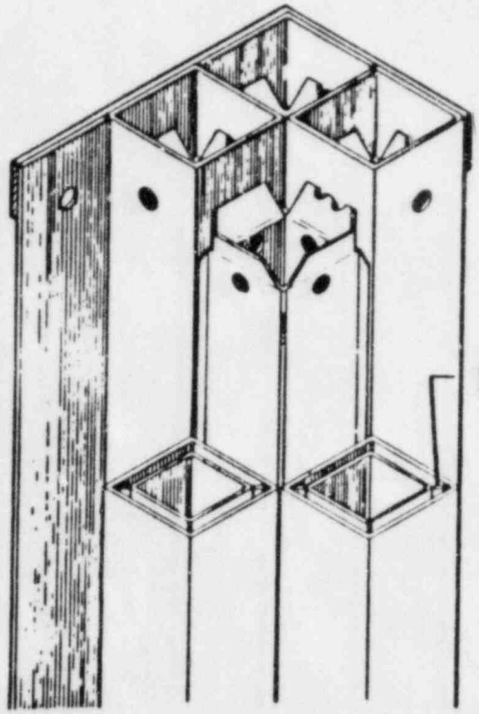
rests on wrapper

MAX-CAP SPENT FUEL LOADING FUNNEL ASSEMBLY

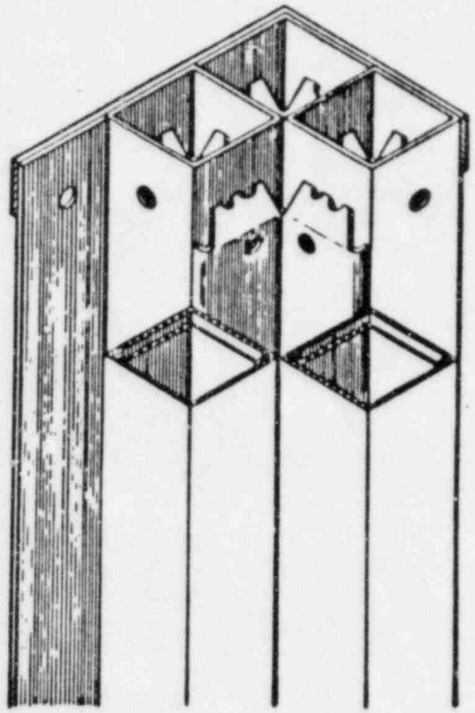
may be applicable to both regions



MONOLITH FUEL RACK AND REMOVABLE INSERTS



STAND OFF



POISON BOX INSERT

L INSERT

(Poisoned or Non-Poisoned)

used at Millstone
every location at
Region 1

Arizona used

MAX-CAP SPENT FUEL RACK PHYSICS ANALYSES

CRITERIA

$K_{Eff} < 0.95$ For All:

- Conditions
- Accidents
- Tolerance Cases

REGIONAL ANALYSIS

- REGION I - New Fuel
- REGION II Credit for Reactivity Depletion of Irradiated Fuel

CODES

- CEPAK - Nuclear Cross Sections
- DOT - 2D Transport
- KENO - 3D Monte Carlo

PHYSICS CALCULATIONAL CONSERVATISMS

- INFINITE LATTICE CONFIGURATION
- PURE WATER AT 68°F
- FRESH FUEL ASSEMBLY AT MAXIMUM ENRICHMENT (REGION I)
- MAXIMUM REACTIVE CONFIGURATION
- TARGET CALCULATIONAL - KEFF ≤ 0.92
- NO POISONS - CEA'S, ETC.

~ burnup in fractional units

~~not~~ worst case allowance

MAX-CAP SPENT FUEL RACK
THERMAL HYDRAULIC ANALYSES

CRITERIA

Clad Surface Temperature $< 650°F$

Bulk Temperature $< 150°F$

CODE

FLASH-6 -Film Coefficients

MAX-CAP SPENT FUEL RACK SEISMIC ANALYSES

CRITERIA

- Rack Loads Are Compatible With Installation
- Fuel Is Not Damaged
- Racks Are Reusable

CODES

- SAPIV - Dynamic Characteristics
- CESHOCK - Non Linear Effects

POSTULATED ACCIDENTS

- COMPLETE LOSS OF POOL COOLING
- SAFE SHUTDOWN EARTHQUAKE
- DROPPED FUEL ASSEMBLY

LOSS OF POOL COOLING

- MUST RESTORE POOL COOLING WITHIN A DEFINED INTERVAL -TYPICALLY, 24 HOURS, OR
- CONSIDER THE EFFECTS OF BULK POOL BOILING ON THE DESIGN, INCLUDING
  - A. THERMAL STRESSES
    - RACKS AND POOL STRUCTURE
  - B. FUEL INTEGRITY
  - C. CRITICALITY SAFETY

SAFE SHUTDOWN EARTHQUAKE

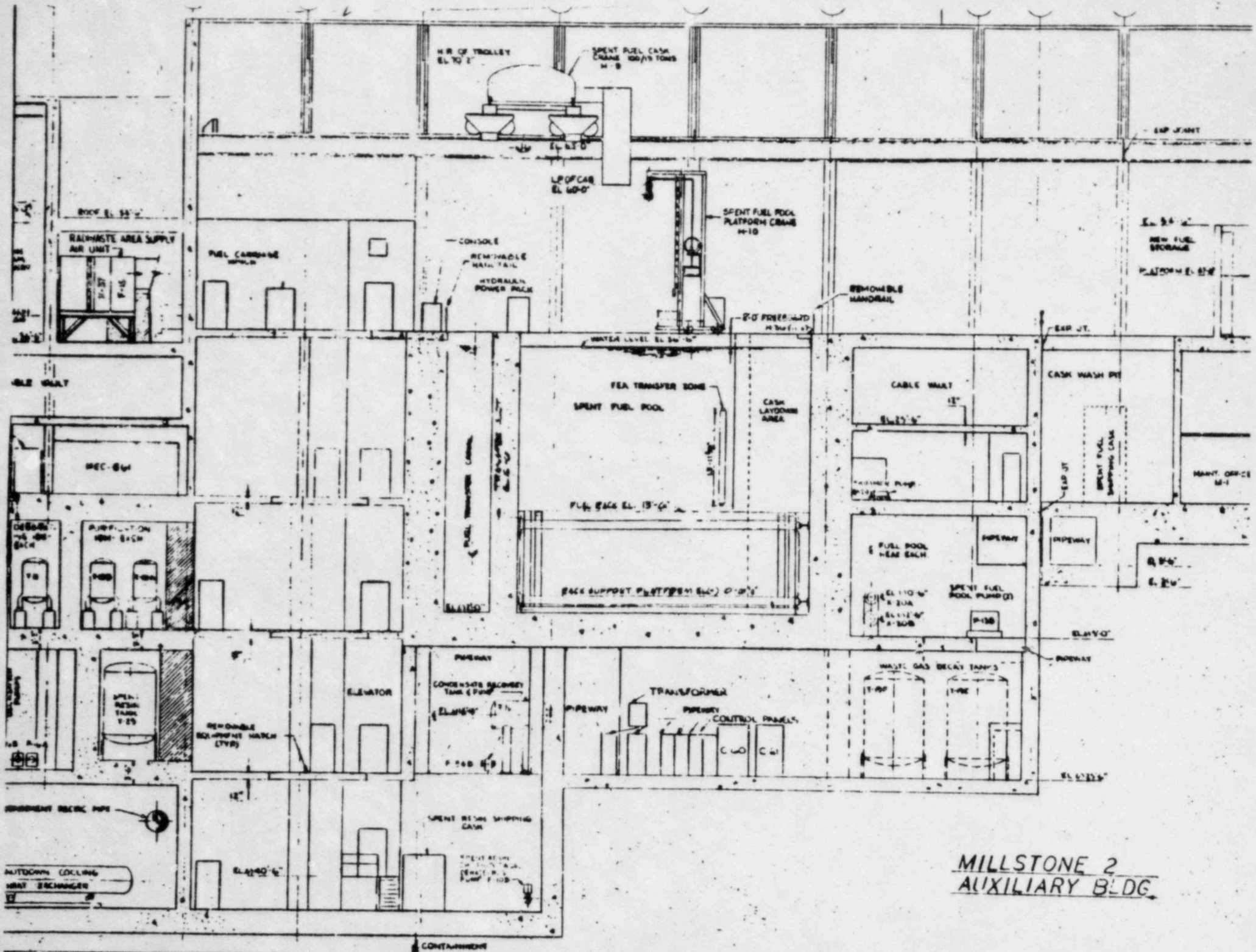
- SEISMIC LOADINGS MUST BE PROPERLY DEVELOPED CONSIDERING NONLINEARITIES IN FUEL/RACK/POOL SYSTEM RESPONSE
- MINIMUM REQUIRED STORAGE CELL SPACINGS FOR CRITICALITY SAFETY MUST BE MAINTAINED
- DESIGN MUST PRECLUDE TRANSFER OF UNACCEPTABLE LOADS TO POOL FLOOR OR WALLS
- IMPACT LOADS TO FUEL ASSEMBLIES MUST BE LIMITED TO PRESERVE FUEL STRUCTURAL INTEGRITY

DROPPED FUEL ASSEMBLY ACCIDENT

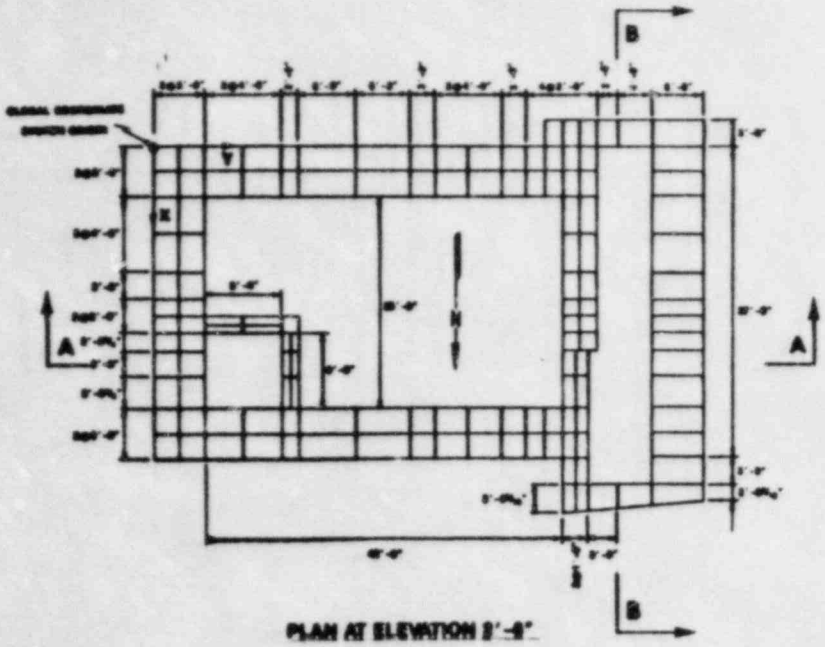
- MAINTAIN MARGINS TO CRITICALITY BY PRECLUDING DAMAGE TO STRUCTURALLY SIGNIFICANT PORTIONS OF THE RACK ASSEMBLY
- ENSURE THAT CRITICALITY SAFETY MARGINS REMAIN ACCEPTABLE WITH DROPPED FUEL ASSEMBLY RESTING HORIZONTALLY ON TOP OF MODULE
- PRECLUDE DROPPING FUEL ASSEMBLY BETWEEN MODULES AND POOL WALL

MILLSTONE UNIT 2

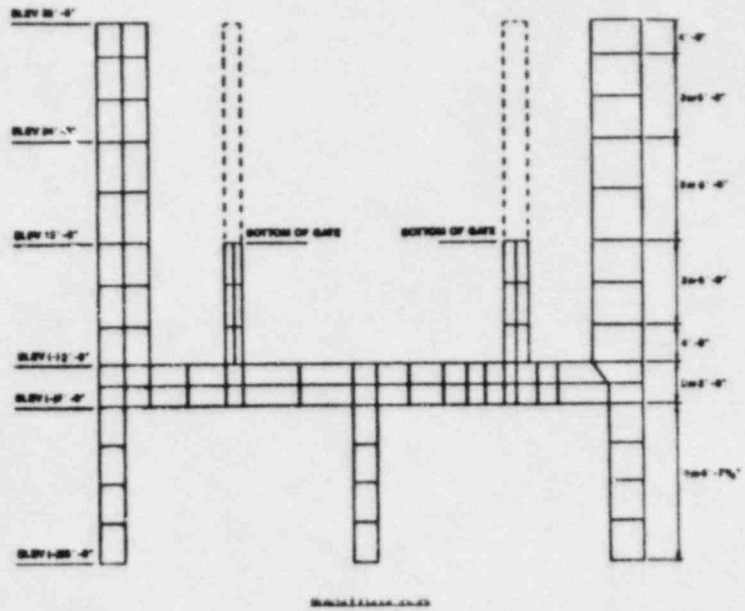
SPENT FUEL POOL / AUXILIARY BUILDING ANALYSIS

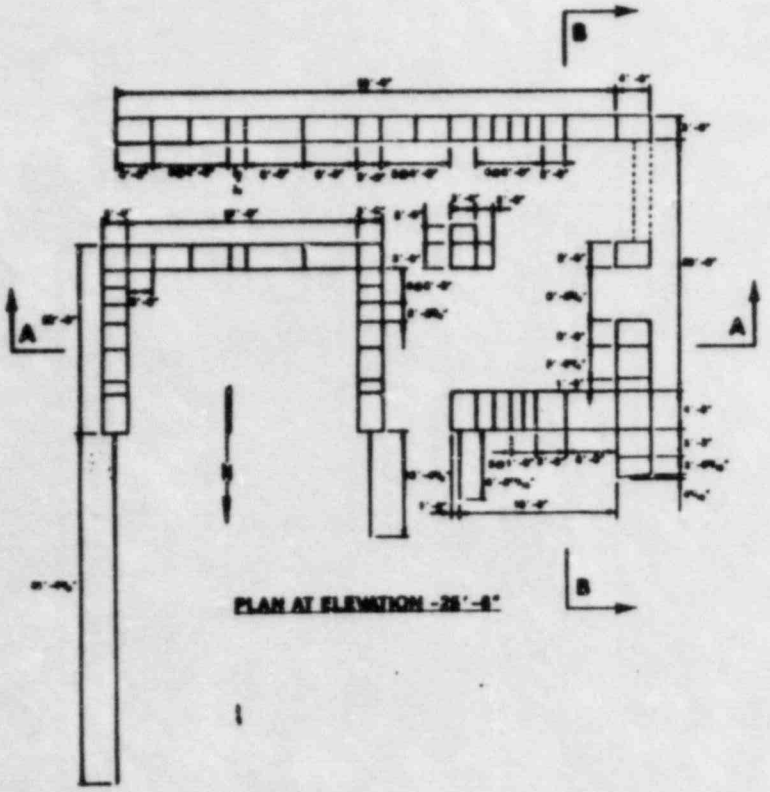


MILLSTONE 2
AUXILIARY BLDG

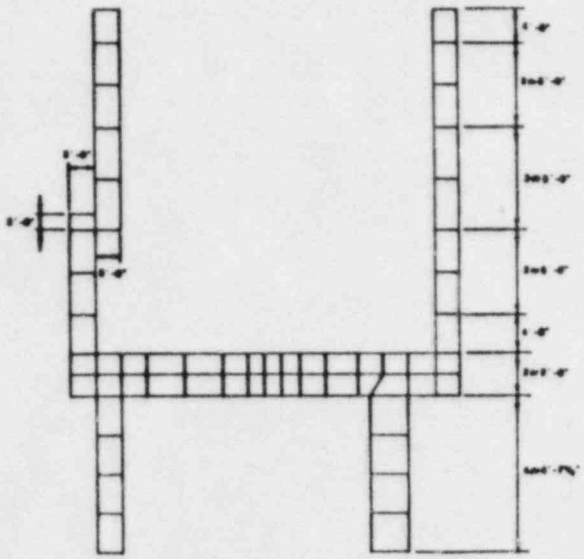


PLAN AT ELEVATION 2'-9"

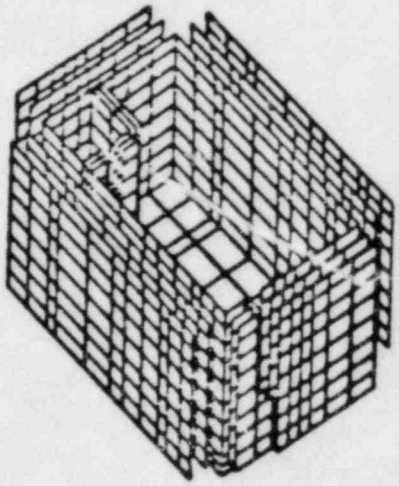




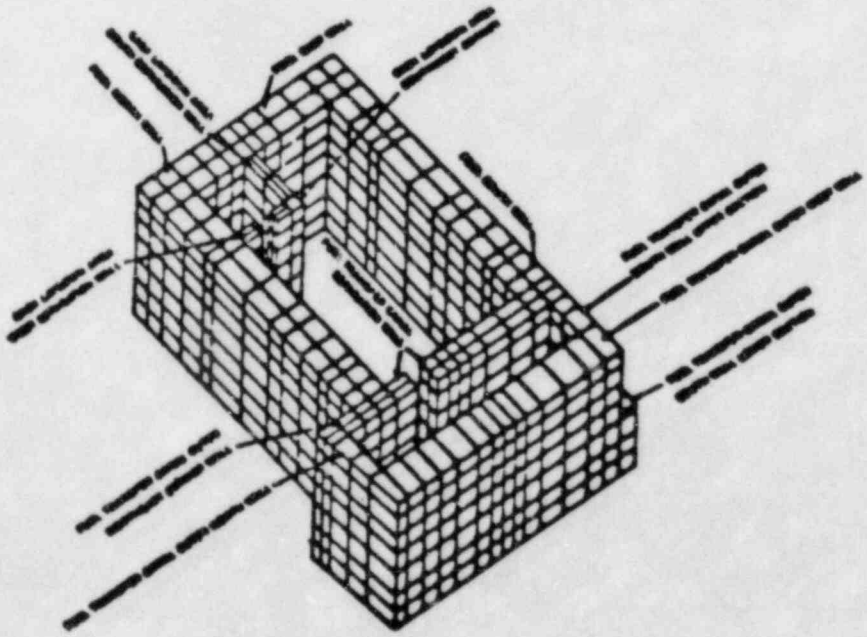
PLAN AT ELEVATION -28'-6"



SECTION B-B



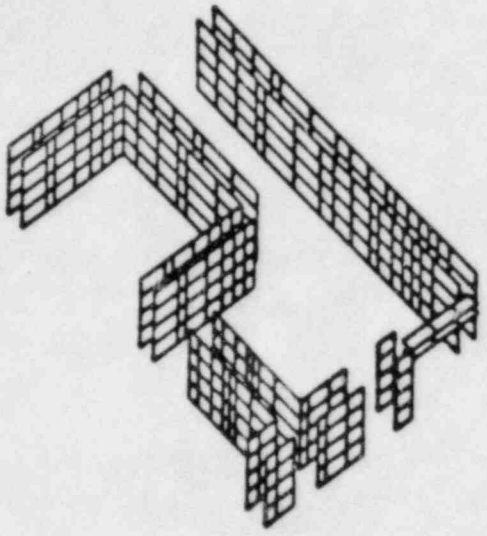
POOL SURFACE MEMBRANES



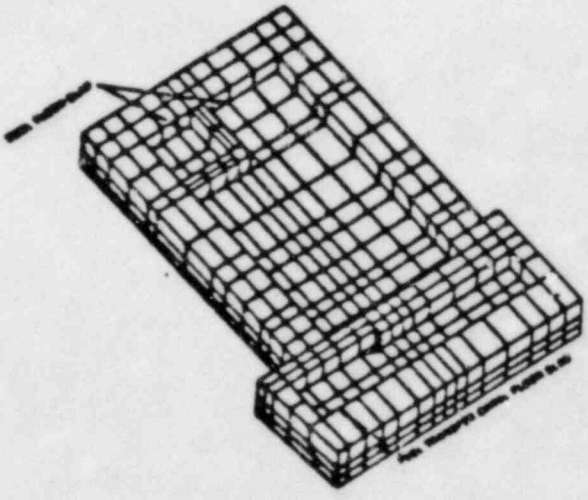
UPPER PORTION OF POOL WALLS

MILLSTONE POINT - UNIT 2

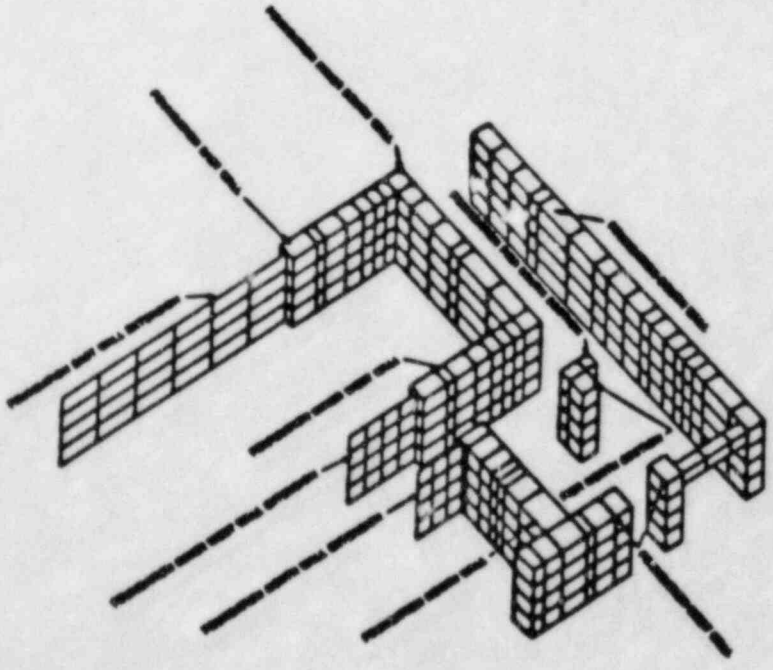
SPENT FUEL STORAGE FACILITY FINITE ELEMENT MODEL



FOUNDATION SURFACE MEMBRANES



POOL FLOOR SLAB

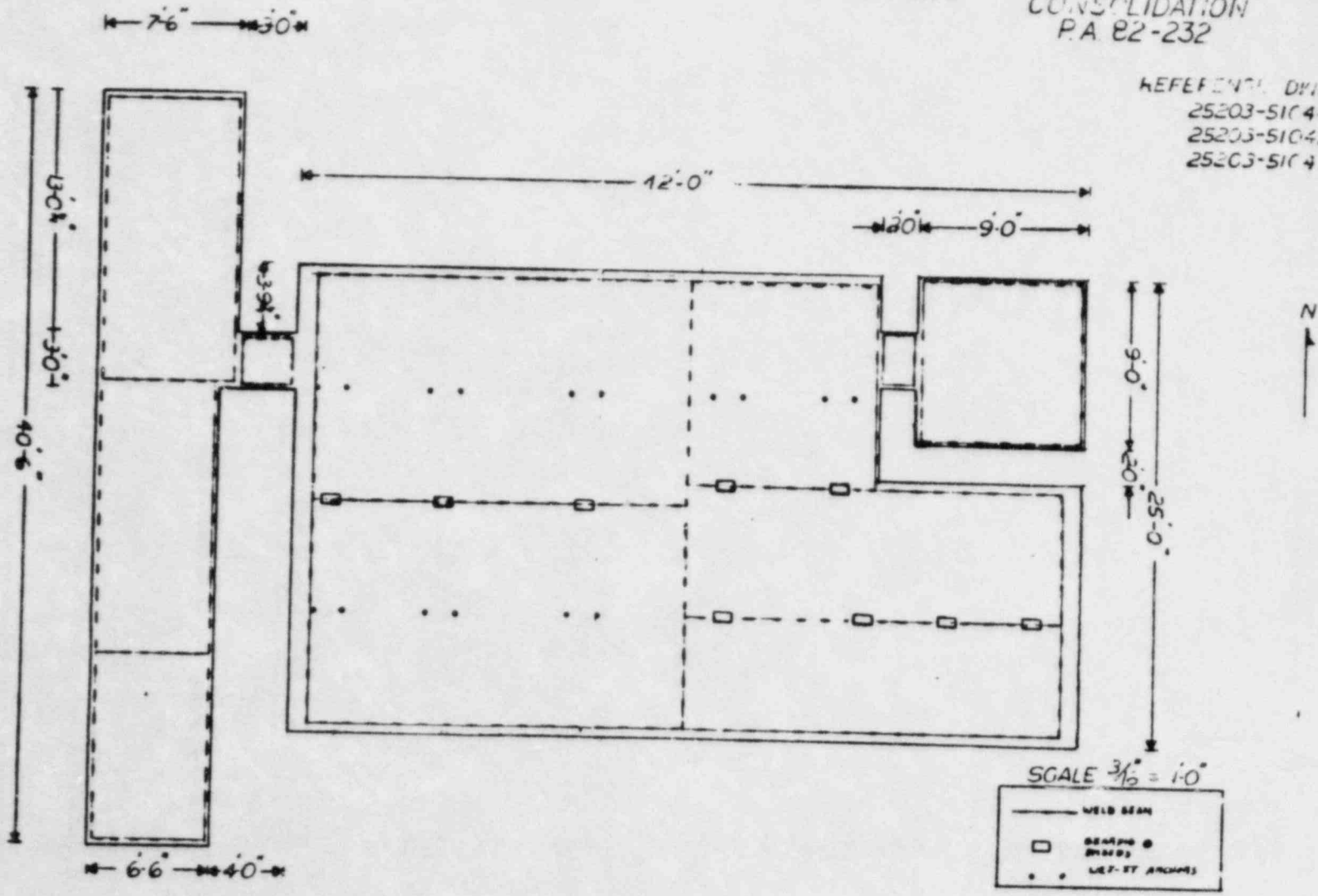


FOUNDATION WALLS

MILLSTONE 2 - S.F.P.
FLOOR GENERAL ARRGMT.

MILLSTONE 2 — SPENT-FUEL-POOL CONSOLIDATION P.A. 82-232

REFERENCE DWGS.
25203-51044
25203-51045
25203-51047



FUEL CONSOLIDATION DEMONSTRATION PROGRAM

1.0 SYSTEM DESIGN

2.0 HARDWARE DESIGN & FABRICATION

3.0 METHODS DEVELOPMENT & TESTING

4.0 DESIGN & ANALYSIS

5.0 EQUIPMENT DEMONSTRATION

work done in cask loading area / consolidated storage box

1.0 SYSTEM DESIGN

- CONSOLIDATION CONCEPT
- CONSOLIDATION PROCEDURES

2.0 HARDWARE DESIGN & FABRICATION

- CONSOLIDATION WORKSTATION & TOOLING
- CONSOLIDATED FUEL STORAGE BOX
- SPENT FUEL STORAGE RACKS
- REACTIVITY MONITOR

3.0 METHODS DEVELOPMENT & TESTING

- STORAGE BOX LOADING CONFIGURATION TESTING
- SEISMIC & STRUCTURAL
  - FORCED VIBRATION TESTING OF STORAGE BOX
  - STORAGE BOX/RACK/POOL MODELING
- CRITICALITY
  - MODIFY & BENCHMARK CODES
- THERMAL HYDRAULICS
  - HEATED FLOW TESTS & CODE MODEL DEVELOPMENT

4.0 DESIGN & ANALYSIS

CRITICALITY, T&H, RADIOLOGICAL

RACK/POOL SEISMIC & STRUCTURAL

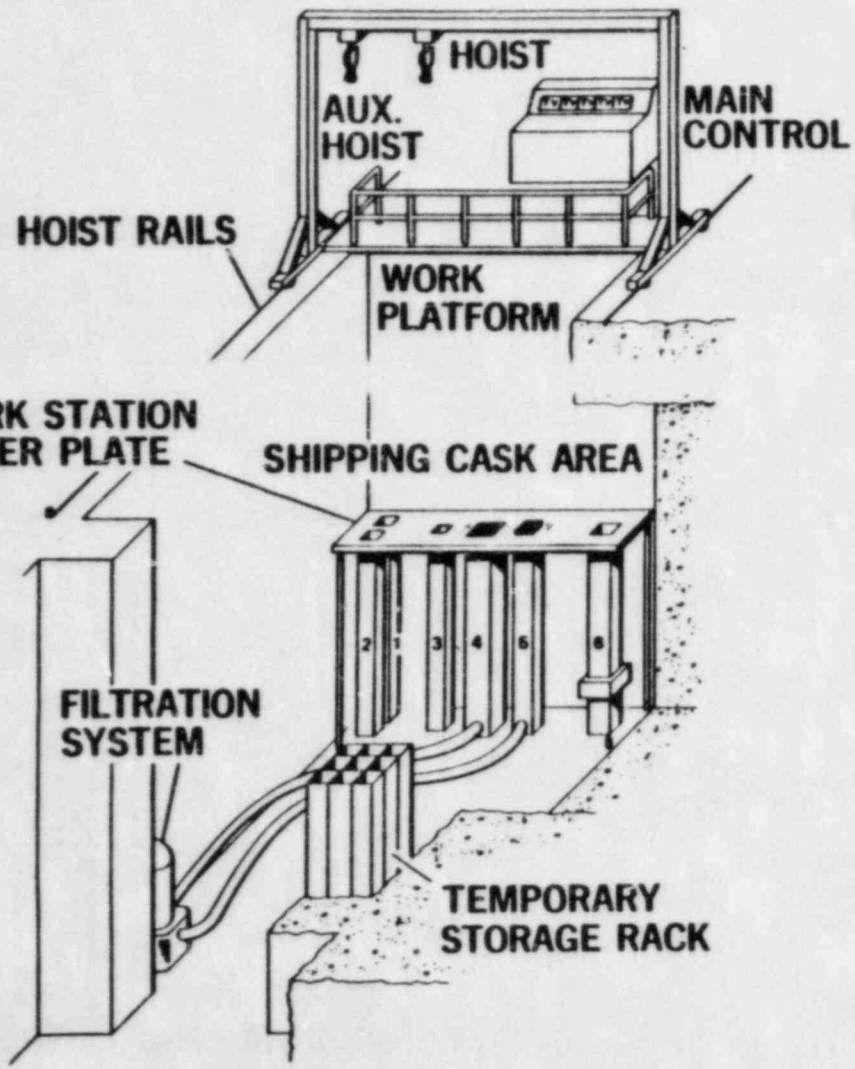
POOL COOLING & PURIFICATION

SAFETY ANALYSIS REPORT

5.0 EQUIPMENT DEMONSTRATIONS

COLD SYSTEM CHECKOUT (C-E WINDSOR)

HOT DEMONSTRATION only 8>



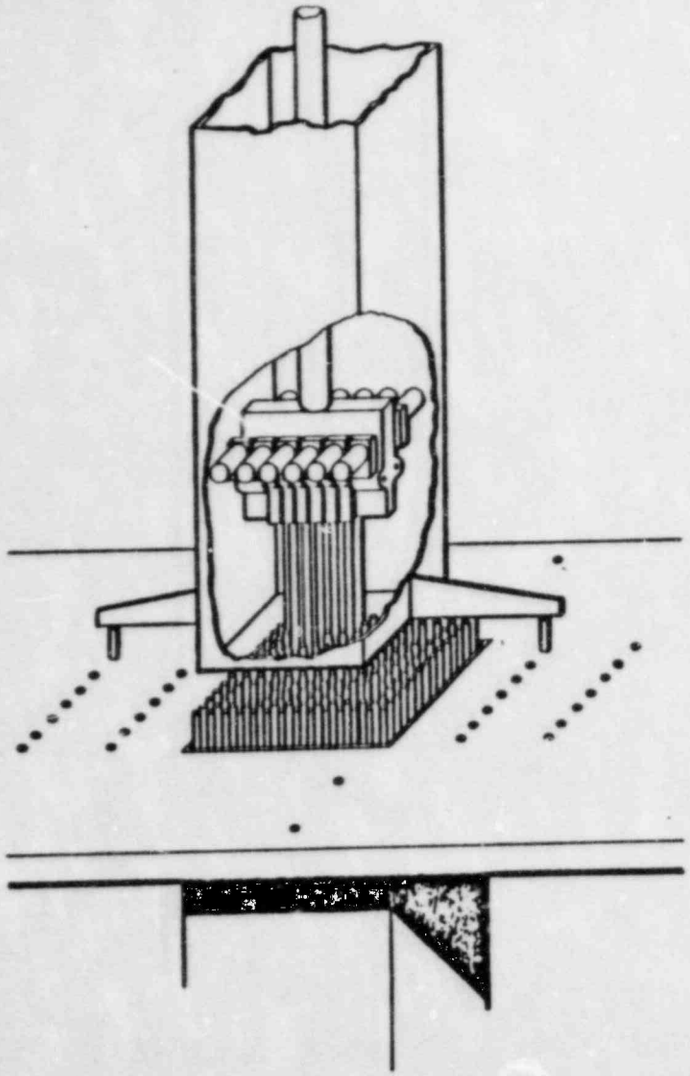
FUEL CONSOLIDATION EQUIPMENT LAYOUT

1. DAMAGED FUEL ROD STORAGE STATION
2. END FITTING STORAGE STATION
3. CONSOLIDATION STATION
4. INTERIM ROD TRANSFER STATION WITH FILTRATION SYSTEM
5. FUEL ASSEMBLY WORK STATION WITH FILTRATION SYSTEM
6. GRID CAGE COMPACTION STATION

Show to available

NEW TOOLING TO INCREASE TRANSFER SPEED AND FUEL ROD PACKING

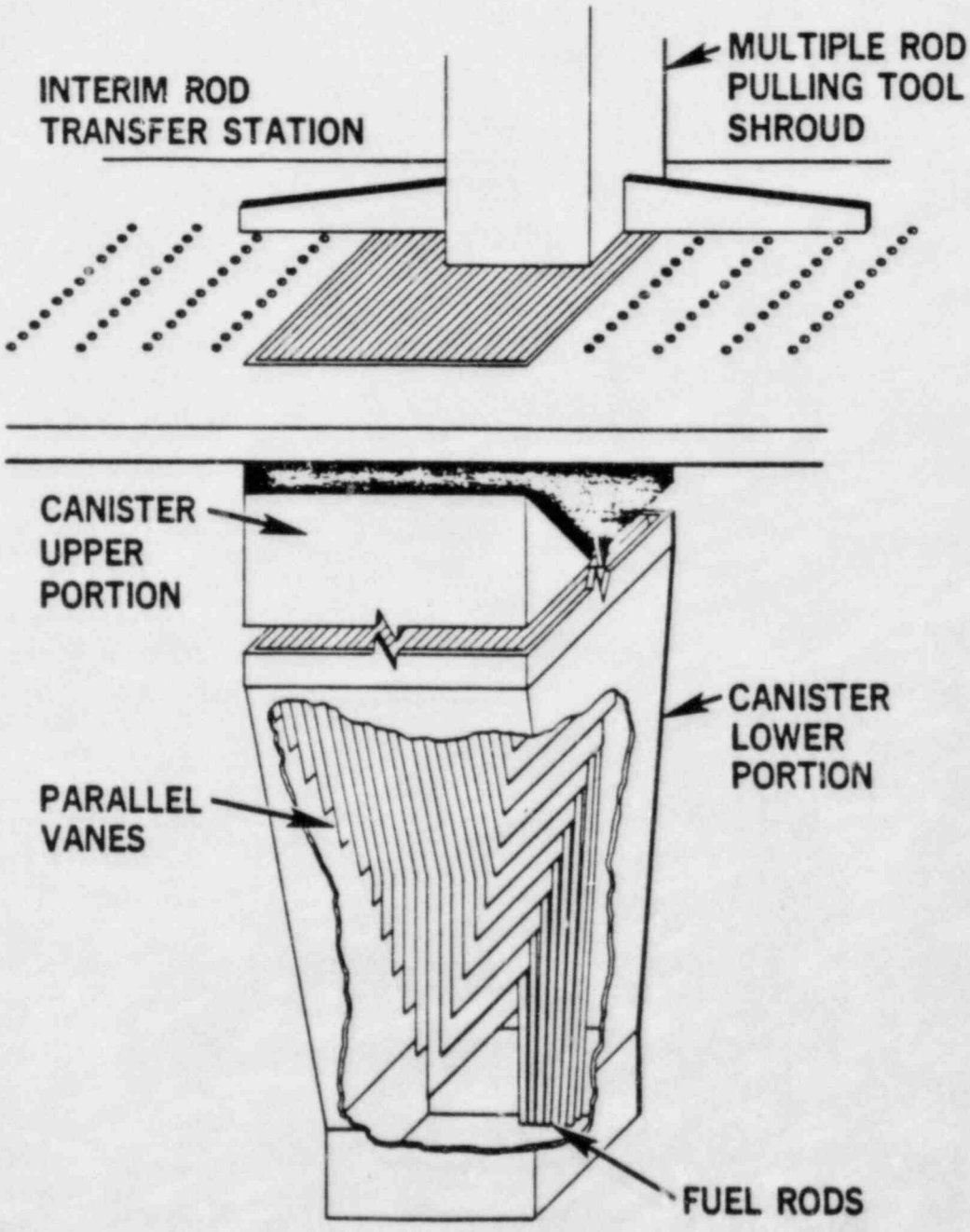
- ID GUIDE TUBE CUTTER
- MULTIPLE ROD PULLER
- INTERIM TRANSFER CANNISTER
- NON-FUEL COMPACTOR



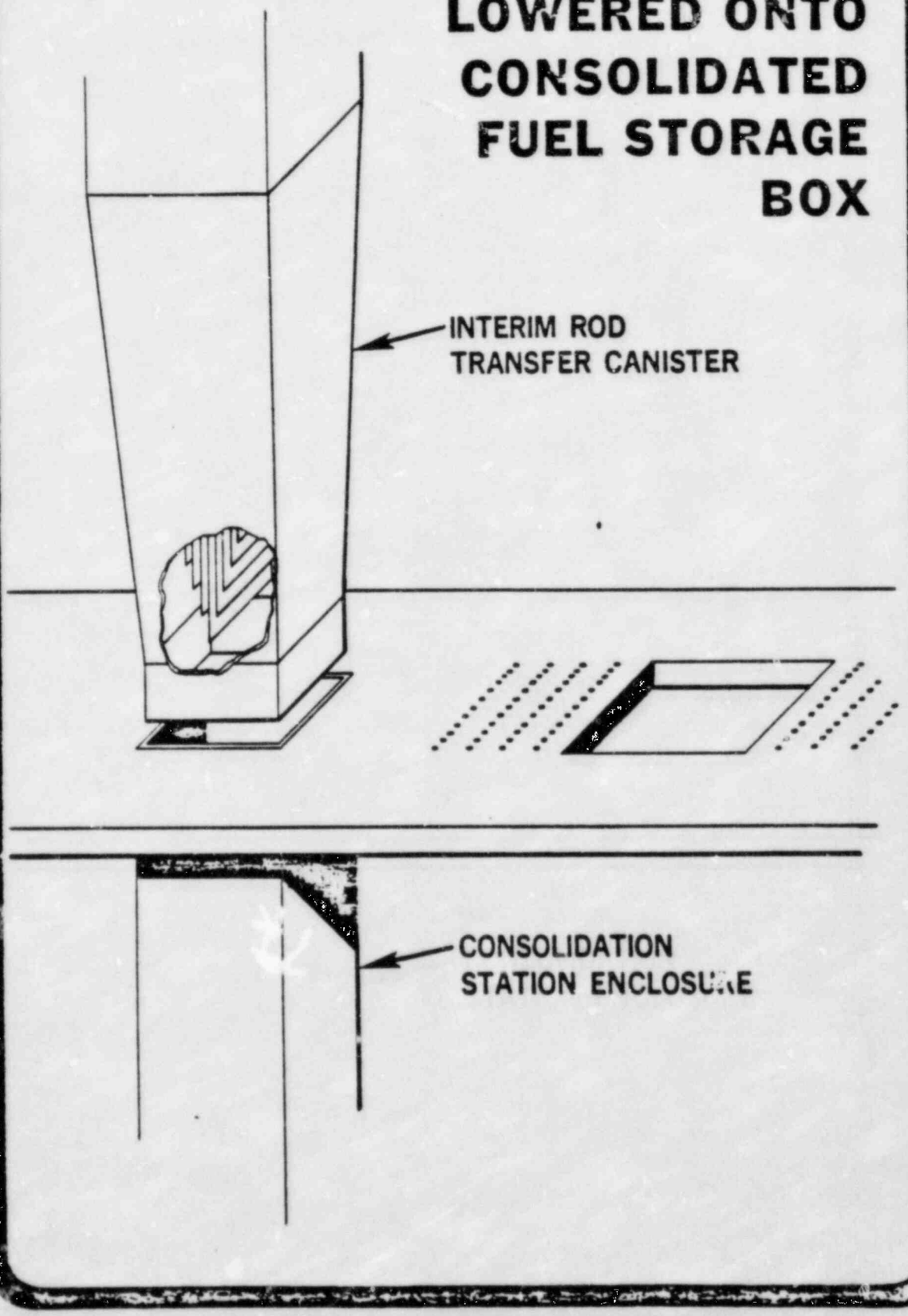
MULTIPLE ROD PULLER

- CONCEPT APPLIES TO PWR/BWR FUEL
- SPEEDS CONSOLIDATION OPERATION
- SEPARATE CONTROL FOR EACH JAW
- FULLY ENSHROUDED AND VENTED TO EXHAUST

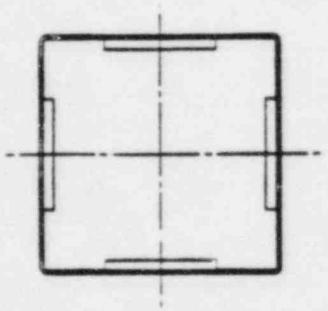
INTERIM ROD TRANSFER CANISTER

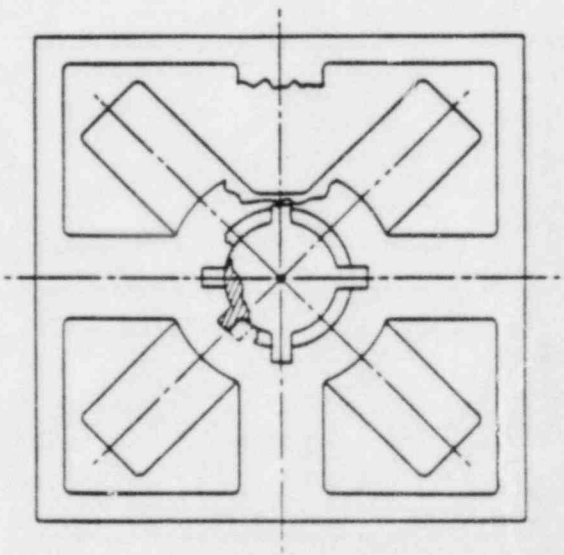


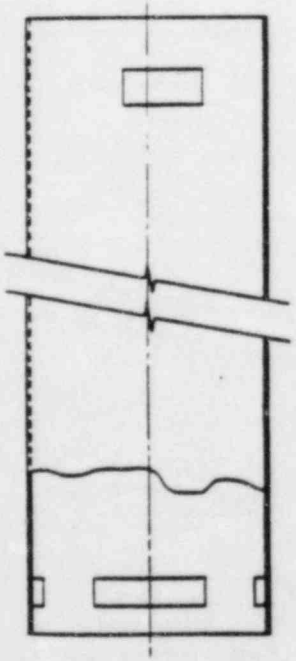
TRANSFER CANISTER LOWERED ONTO CONSOLIDATED FUEL STORAGE BOX

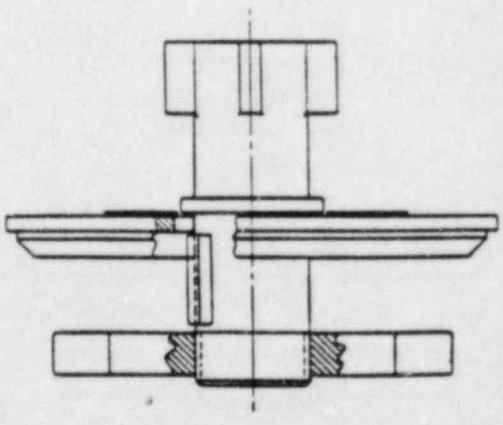


CONSOLIDATED FUEL STORAGE BOX AND COVER ASSEMBLY

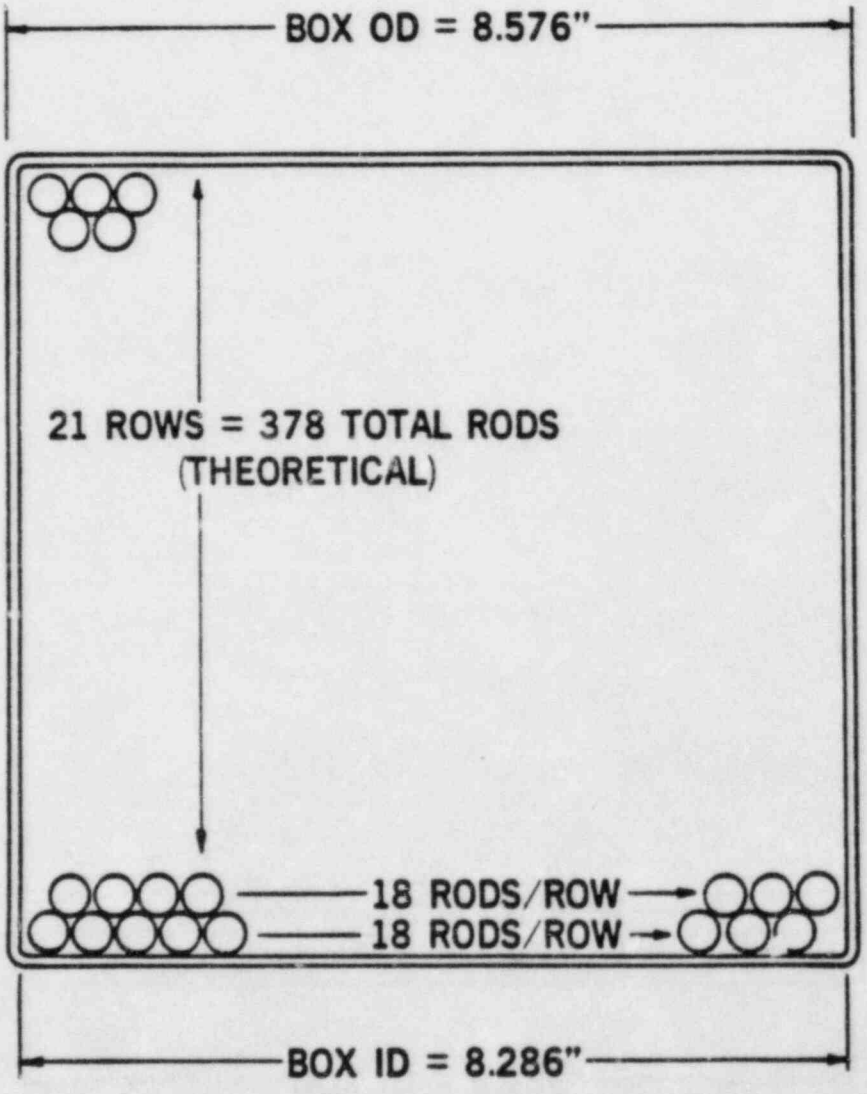


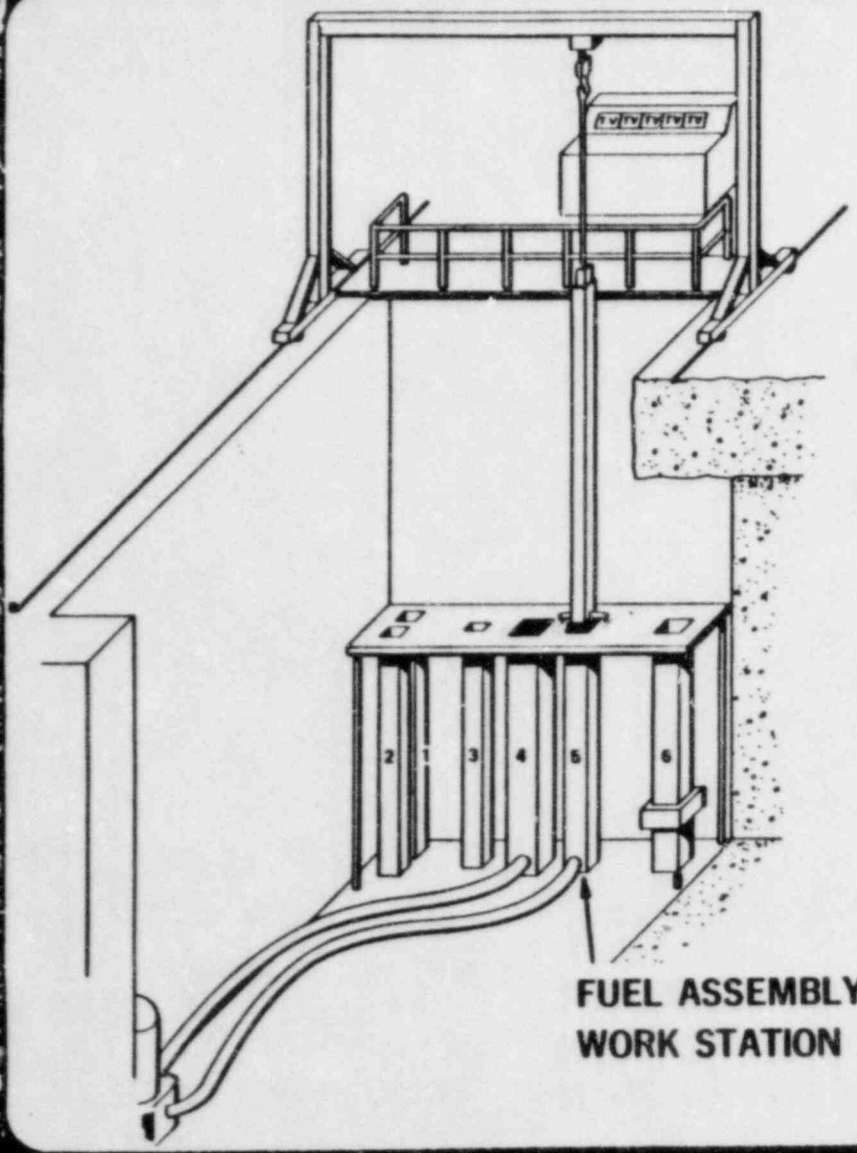






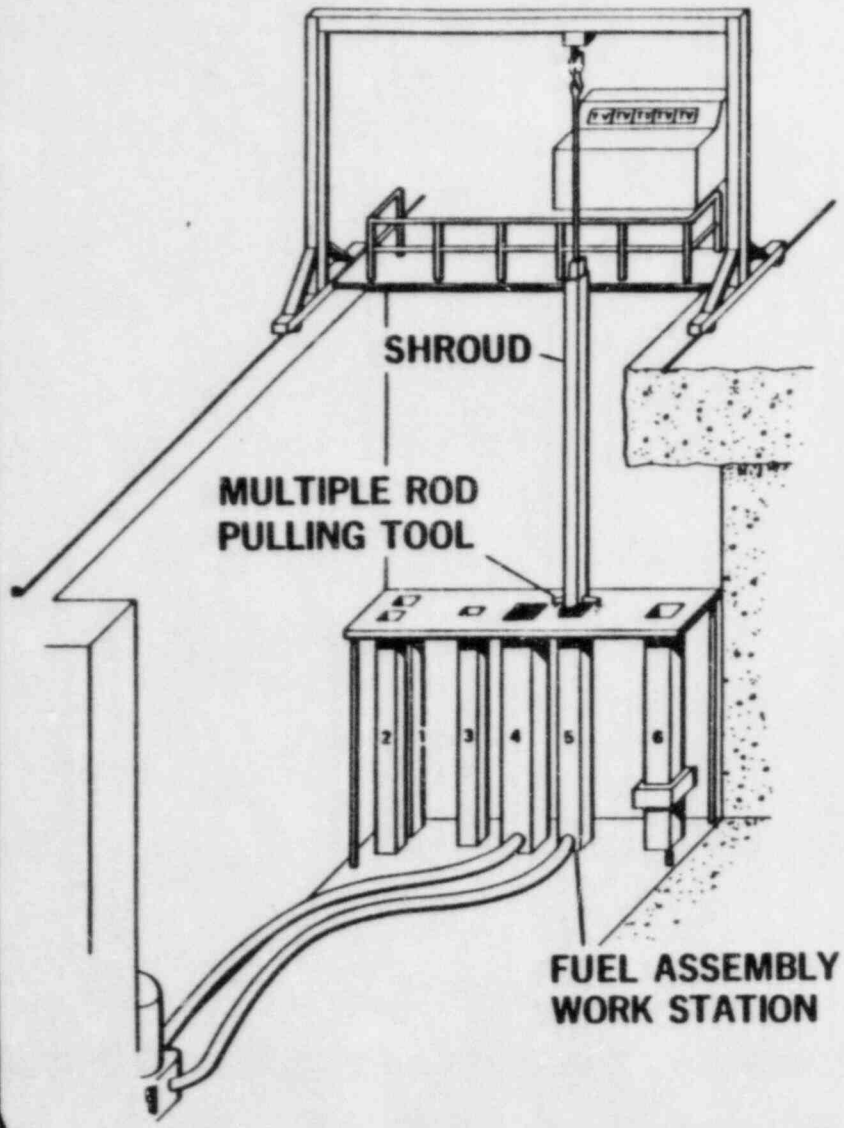
CONSOLIDATED FUEL STORAGE BOX





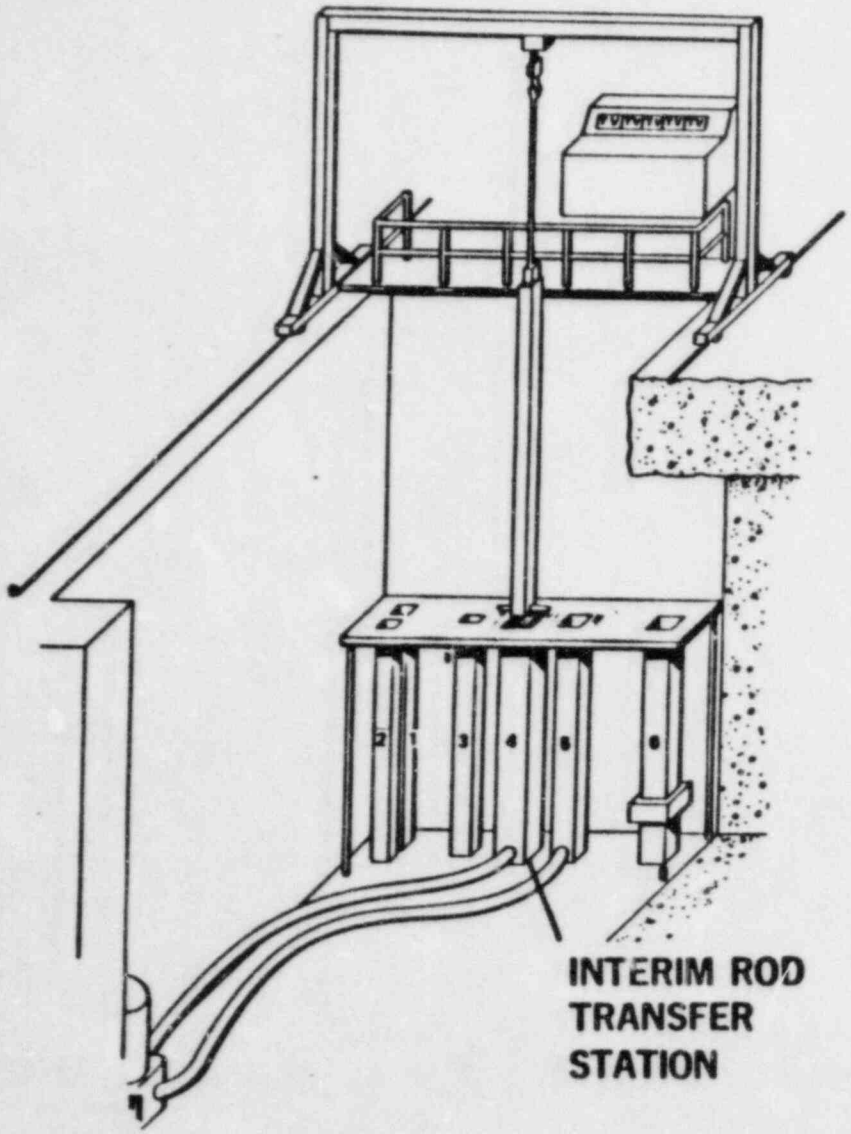
UPPER END FITTING REMOVAL

- UNTORQUE RECONSTITUTIBLE ASSEMBLIES
- CUT GUIDE TUBES FOR NON-RECONSTITUTIBLE ASSEMBLIES

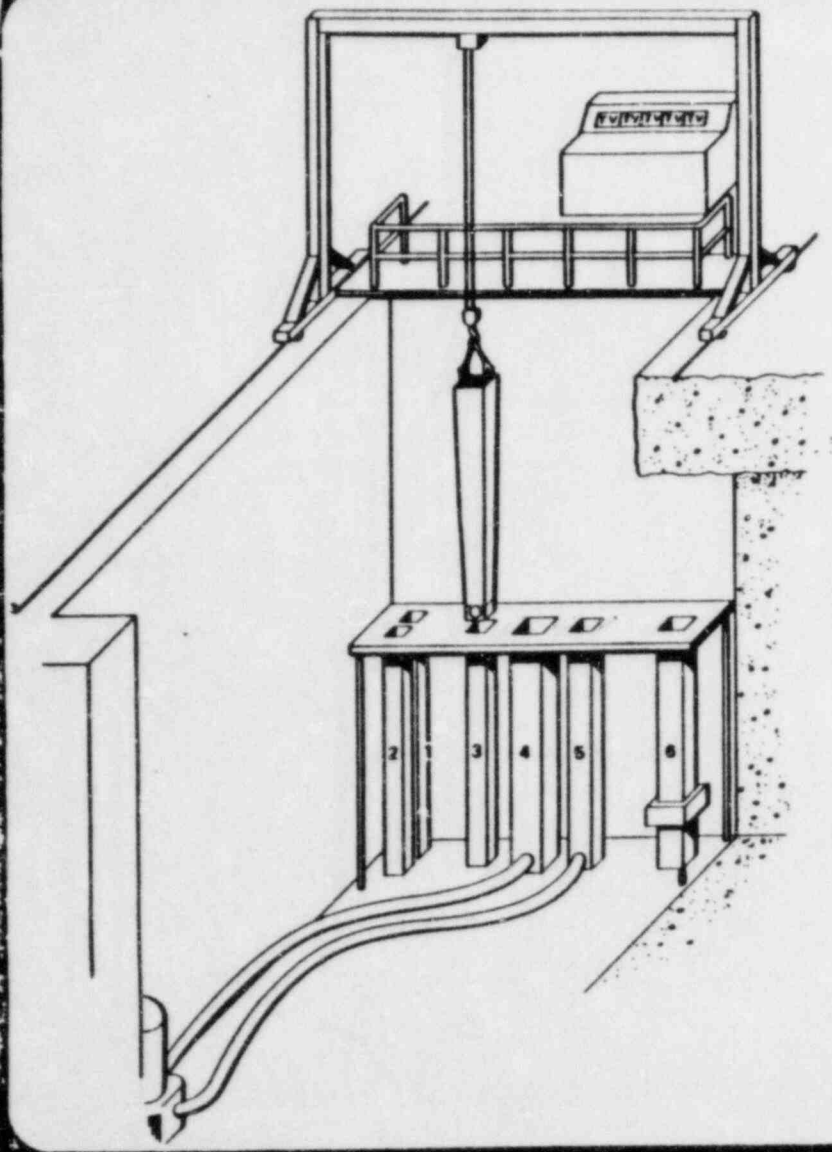


FUEL ROD PULLING

- POISON PINS REMOVED WITH SINGLE ROD PULLER
- MULTIPLE ROD PULLER FOR FUEL
- PULL FORCE LOAD LIMITED
- POISON PIN STORAGE



MULTIPLE ROD PULLING TOOL INSERTING RODS INTO INTERIM ROD TRANSFER CANISTER



CONSOLIDATED FUEL STORAGE BOX LOADING

- STORAGE BOX LOADED IN ONE TRANSFER
- TRANSFER CANNISTER BASE LOWERED WITH RODS INTO STORAGE BOX