

RIVER BEND STATION

TOUR DESCRIPTION – Instructor Elizabeth K. Ervin

See attached booklet for maps of the following areas:

Brown Warehouse 2nd Floor

Auxiliary Building

Standby Diesel

Reactor Building & Drywell

Turbine Building

Control Building

Off Gas Building

Fuel Building

Tunnel Layout



Photo from Training Center Auditorium. (Front row left to right: Pablo Mariaca, David Nick Harris, Elizabeth Ervin, Samantha Sabatino, Heather Daniell, Lisa Conchos, Tunji Adejumo, Jonathan Rogers; Back row left to right: Caleb Hampton, Daniel Forman, Luke Barousse, Joseph Napoletan, James Hankins)

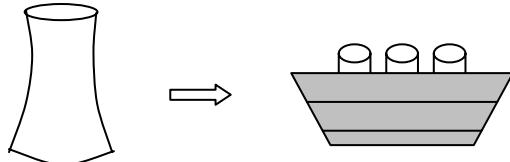
On this tour of River Bend Station (November 16, 2009), we first entered the Training Center Auditorium for orientation. River Bend has a boiling water reactor that was constructed from 1972 to 1985 for \$5 billion. Today, the cost would be \$15 billion, all by loans; thus, construction and licensure are current topics. The plant has 1000 MW electricity and 3000 MW thermal output. The 14' rods use hourglass-shaped fuel pellets. The 12' assemblies weigh 1500 pounds each in an 11x11 array. The reactor poisons include borated carbon and sodium pentylborate (?). Used fuel is accumulated in wet storage (water pool) and dry storage (helium backfilled ISFSI canisters). The plant has 550 full-time employees, including 100-120 engineers. 2,000 people work there during a refueling outage which, depending on power costs at the time, usually \$1 million per day or \$35,000 per hour.

We also met with the River Bend component of North America – Young Generation in Nuclear. Their goals are recruiting, retention, and knowledge transfer. They encouraged an overall questioning attitude.

After visitor security... after dosimetry... after x-ray... after explosive sniffing... after background radiation detection...

Mark took us on a driving tour. We saw the reactor emergency heat sink building (later from the inside) which contains a 30 day coolant water supply. We saw some external Hurricane Gustav damage and the dry storage containers along with numerous concrete barricades, wedge barriers, and guard towers. We saw three training buildings: off-secure, technical, and maintenance.

This plant has several cooling towers for political reasons rather than one big hyperbolic tower.



Locations via stairs or elevator are identified by elevation above ground level. The control room is at an elevation on 136' and has a watertight door for security. There were 4 large box panels and 1 horseshoe panel. We saw about 75% of rods full in. Operators, technicians, and managers have color-coordinated shirts so that everyone immediately knows each person's responsibility. Each operator works 5 to 6 weeks and then 1 week in re-training: 20 hours classroom and 20 hours scenario in simulator. We also saw the tech support center where four emergency scenarios are acted out per year as per federal law.

We went through an ear-popping airlock to enter the 1/4-pound of negative pressure Turbine Building. Radiation levels were 1 to 2 millirems per hour. We entered the walkway beside the refueling canal, where a water shield sits over the dry reactor head. We were at 185' elevation, or about 60-70' above the reactor itself. A polar crane (r, θ) is used to shoot the bundle into the core using a carousel during refueling. Hydrogen igniters were on the walls; in the event that the cladding and the cooling water reacted, a

hydrogen bubble can be prevented. A steam dryer and a separator were also present. We stood in on top of a grate over the emergency coolant supply and observed several relief valves.

We then saw the spent fuel pool. This wet storage site had rising bubbles, and a few of our dosimeters alarmed. We entered the Fuel building and the F Tunnel in its basement. In the Auxiliary Building, we saw demineralizers at 78' elevation, the suppression pool at 90' elevation, and the #12 Tunnel at 114' elevation.

The organization was exceptional. Throughout the plant, color-coordinated labels reveal equipment purpose to all personnel.

We returned to the off-secure training room for free gifts! We were also allowed to enter the control room simulator and saw coolant level autocorrection (as if Three Mile Island scenario).



Photo in control room simulator. (with Dan Forman, James Hankins, and Jonathan Rogers; red dots mean full in rods for this scenario.)



Photo of ½ control room simulator.



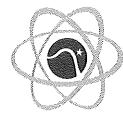
Photo of scenario actions via flowchart (with Lisa Conchos).

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Many thanks to Entergy!



RIVER BEND
STATION



RIVER BEND
STATION

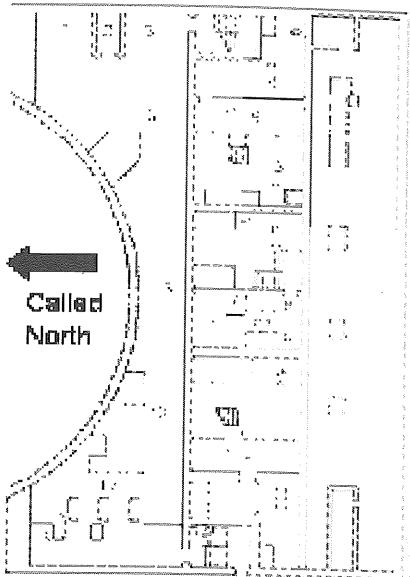
Site Maps

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Stairs	1	1	1	1	1
1					
1	1		2		5 GE Project Mgr
1					4
1					
1			5		3
Rest Rooms	7		6		2
	6				2
8					Stairs
8	8		5		5
8					5
9				10	10
8	8				11
8					5
13	8	8		12	Loft
				Stairs	Loft

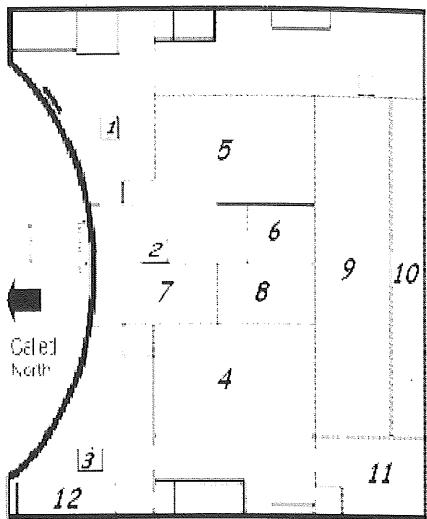
Brown Warehouse 2nd Floor

1. Fuel Services
2. MOV Group
3. MOV Engineering
4. FAC Engineering
5. NDE/QC
6. Valve Group
7. AOV Group
8. S&W
9. Plant Services
10. IST/LLRT
11. Electrical Equipment
12. HVAC Equipment
13. SRV Group



Auxiliary Building
El 70' -0"

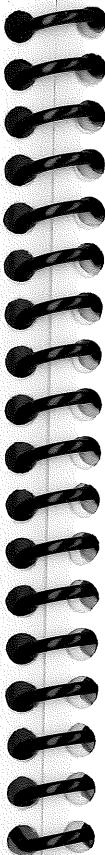
1. Hoist Area
2. Elevator
3. DFR-TK5A
4. CSH Pump
5. RHS Heat Exchangers
(A&C-West, B&D-East)
6. RHS Pump
(B-East, A-West, C-Middle)
7. ICS Pump
8. ICS Subsystem Fill Pump
9. ICS Gland Seal System
10. CCP Pumps
11. CSL Pump & Subsystem
Fill Pump
12. Stairwell
13. Crescent Area



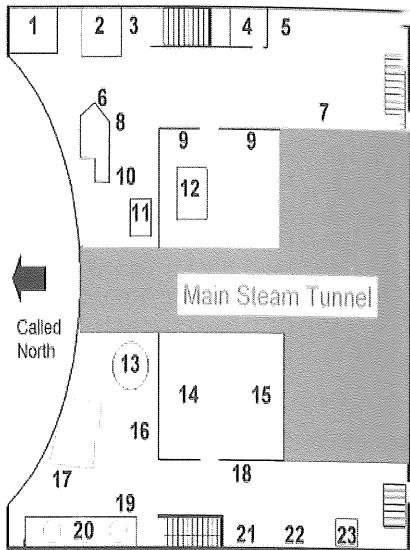
Auxiliary Building
El 95' 0"

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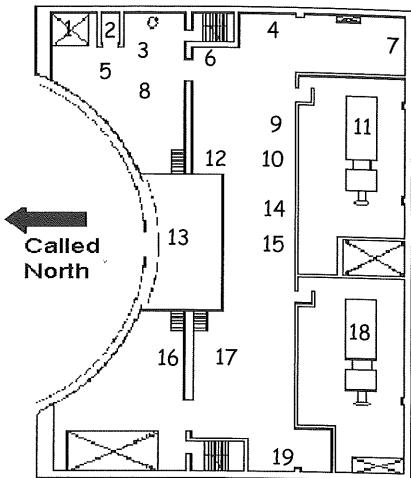
7



1. Unit Cooler 1HVR*UC4
2. Unit Cooler 1HVR*UC2
3. Unit Cooler 1HVR*UC3
4. RHR A
5. RHR B
6. RHR C
7. RWCU Pump Room
8. RCIC
9. D-Tunnel
10. Main Steam Tunnel
11. CRD Rebuild Room
12. CCP Heat Exchangers-E1 A, B & C



Auxiliary Bldg,
El 114'-0"

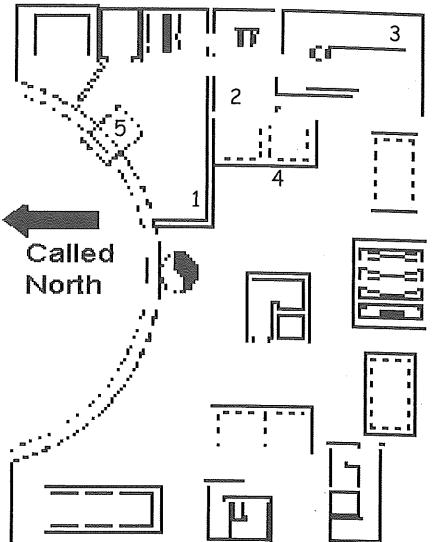


Auxiliary Building
EI 141" -0"

10

1. Hoist Area
2. Elevator
3. LSV*C3B & SVV-C4B
4. EHS*LDCB, EHS*MCC2D, EHS*MCC2B, NHS*MCC102B
5. CMS*PNL10B
6. EHS*MCC2K
7. RMS-CAB116
8. CPP*PNL102/ CMS*PNL12B
9. NHS*MCC2E,2F
10. HVR-FN16A,16B,7A,7B, HVR-F1C265
11. GTS*FLT1B, GTS*FN1B, GTS*FN2B
12. SVV-C4A, LSV*C3A
13. Steam Tunnel Access Plugs
14. HVR*UC11B, 11A
15. HVR-FN6A, 6B; HVR-F1C266; HVR-FLT7A; CMS*PNL12A; HVR*FN8
16. EHS*MCC2A, 2C
17. EHS*MCC2L, 2J; NHS-MCC102A
18. GTS*FLT1A; HVR-FN12; GTS*FN2A
19. EJS*LDC2A

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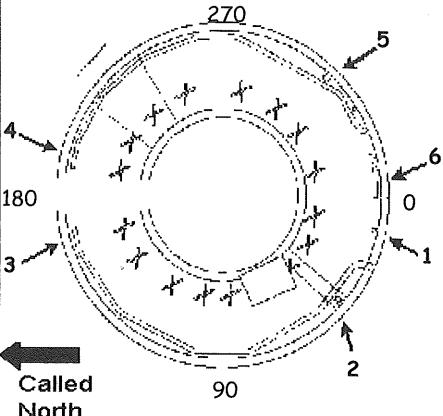
**Auxiliary Building,
Roof EI 170'-0"**

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Auxiliary Building,
Partial Roof
EI 185'-0"

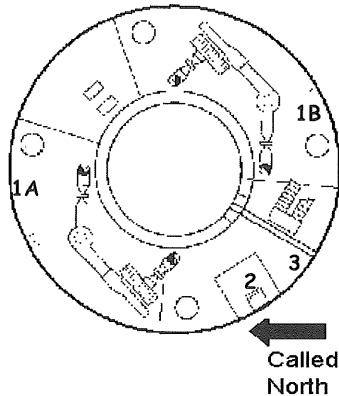
1. HVR-FN11B, HVR-FN11A
2. Radiation Monitor
RMS*RE125
3. HVR-FN14, 15; HVR-FLT6
4. Roof Area
5. JRB-DRA1 Personnel
Containment Airlock

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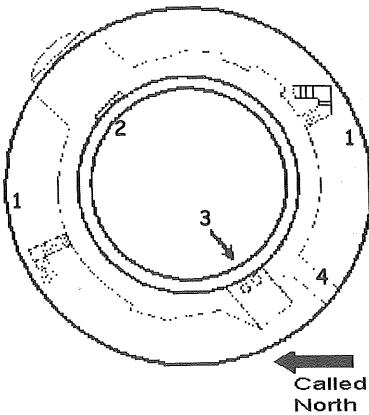
Reactor Building EI 70'-0"

1. RCIC Suction Strainer
2. LPCS Suction Strainer
3. RHR "A" Suction Strainer
4. RHR "B" Suction Strainer
5. HPCS Suction Strainer
6. RHR "C" Suction Strainer



Drywell EI 82'-0"

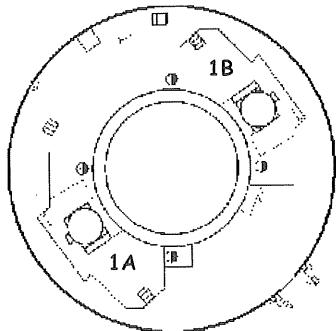
1. Recirc Pumps (A-West, B-East)
2. Indexing Mechanics
3. Control Rod Drive Removal



**Reactor Building
El 95'**

1. Suppression Pool
2. Equipment Hatch.
3. TIP Drive Area
4. RDS Transfer Tube

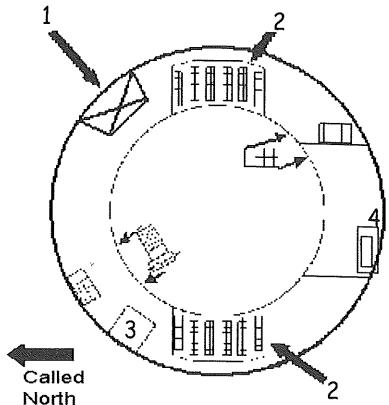
16



**Drywell
El 95'**

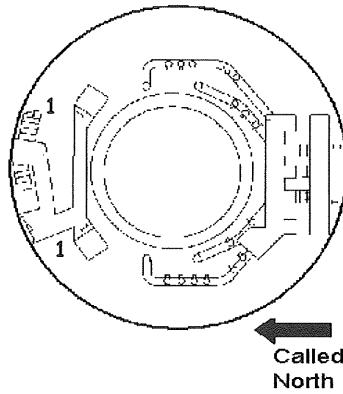
1. Recirc Pumps (A-West, B-East)

17



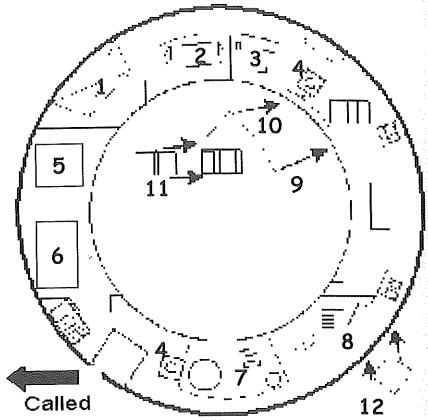
Reactor Building EI 114'

1. Hoist Space
2. C11*ACTD001 - HCUs.
3. Elevator
4. Entry to Steam Tunnel



**Drywell
EI 114'**

1. Stairs

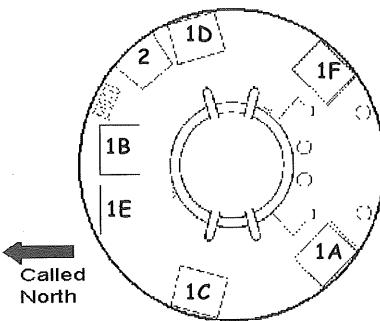


Reactor Bldg, El 141'

1. Hoist Space
2. Rx Water Cleanup
Backwash Receiving Tank
3. WCS-P5A&B
4. HPU Controller -
Recirc Flow Control Valves
(A-West, B-East)

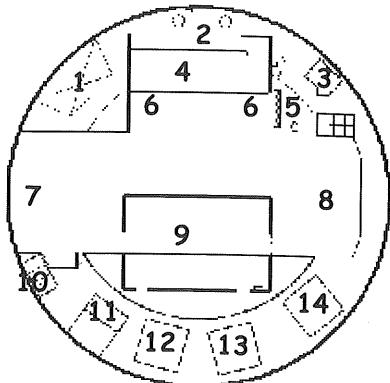


5. Fuel Transfer Pool
6. Fuel Storage Racks
7. SLS Pumps & Tank Area
8. Stairs
9. 146' Elevator
10. 151' Elevator
11. 156' Elevator
12. Platform



Drywell El 141'

1. DRS-UC1A,B,C,D,E,F
2. Hoist Area



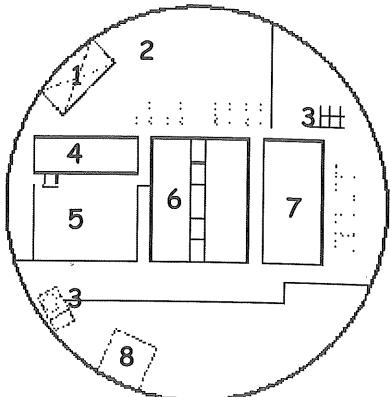
**Reactor Building
EI 162'**

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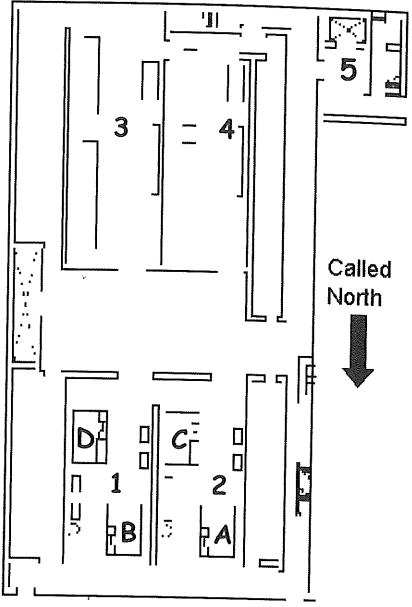
1. Hoist Space
2. RWCU Precoat Pump & Tank
3. Airlock to Auxiliary Building 170' Elevation
4. RWCU Valve Nest Room
5. Chemical Sample Area
6. Filter Demineralizer
7. Dryer Storage
8. Separator Storage
9. Upper Fuel Pool Valve Room, 174' Elevation
10. Stairs
11. Elevator
12. HVR*UC1A
13. HVR*UC1B
14. HVR*UC1C



←
Called
North

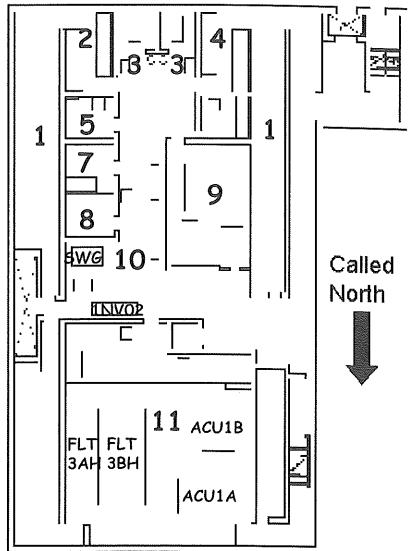
Reactor Building El 186'

1. Hoist Space
2. Carousal Storage Area
3. Stairs
4. Upper Fuel Transfer Pool
Fuel Transfer Tube
5. Dryer & Fuel Storage Pool
6. Reactor Cavity
7. Dryer Storage
8. Elevator



Control Building
El 98'

1. HVK*CHL1B & 1D;
HVK*P1B, 1D, 3B, 3D
2. HVK*CHL1A, 1C;
HVK*P1A, 1B, 3A, 3C
3. ENS*SWG1B,
EJS*LDC1B,
EHS*MCC8B, 14B,
SCV*PNL8B1, 14B1
4. ENS*SWG1A,
EJS*LDC1A,
FHS*MCC8A, 14A,
ENB*SWG1A,
SCV*PNL8A1, 14A1
5. Elevator

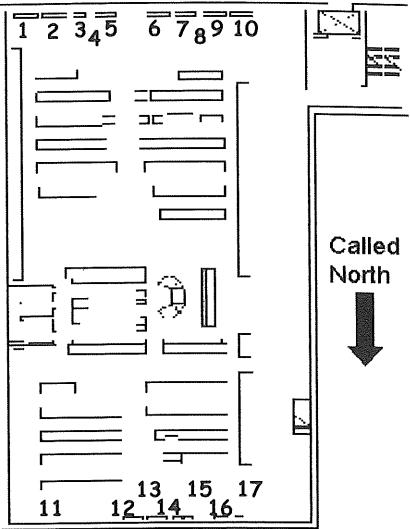


Control Building
El 116'

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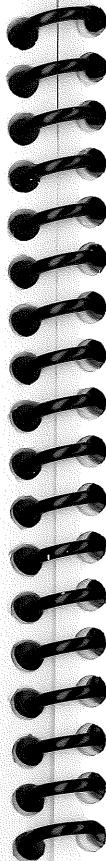
1. Cable Chase
2. ENB BAT Room
3. RPS, C71*BUSA, B
4. ENB BAT Room 1A
5. ENB*INV01B;
ENB*CHG113
6. ENB*CHG1A,
ENB*INV01A
7. E22*S001 BAT
8. E22*S001CGR
9. HPCS & SWGR,
HPCS*MCC
10. BYS*1NV02, BYSCH1D,
BYS*SWG01D,
NHS-MCC10L1,L2
NHS*10A2, 10B2
11. HVC*FLT3AH, 3BH;
HVC*ACU1A,
HVC*ACU1B,
HVC*PNL1A, 1B

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Control Building
EI 136'

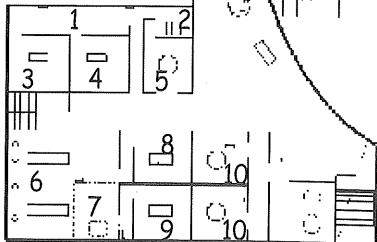
30



1. VBS*PNL01B
2. ENB*PNL02B
3. SCM-PNL01B
4. ICS-PNL01B
5. VBN-PNL01B1
6. VBN-PNL01A1
7. VBN-PNL02
8. SCM-PNL01A
9. ENB*PNL02A
10. VBS*PNL01A
11. SCA-PNL10B2
12. BYS-PNL02B2
13. BYS-PNL02A2
14. SCI-PNL02
15. SCI-PNL01
16. H13-P576
17. SCA-PNL10A2

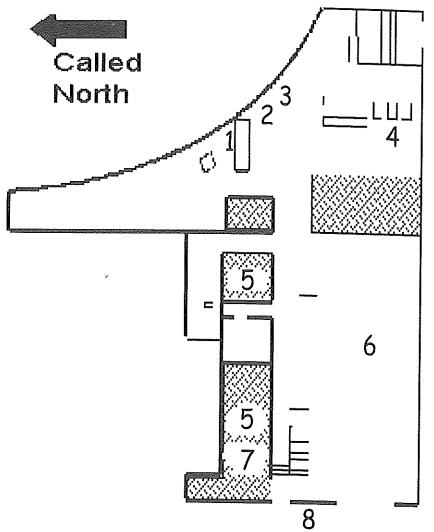
31

Called
North



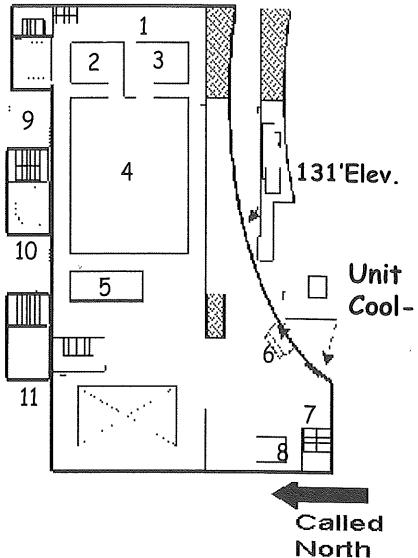
Fuel Building
El 70'

1. TFB-RAK5, SCF-PNL38A
2. SFC-P3A, SFC-P3B
3. SFC-P2A
4. SFC-P2B
5. SFC Backwash Tank Room
6. C11-PC001A, C11-PC001B
7. Unit Cooler
8. SFC-P1A
9. SFC-P1B
10. SFC Heat Exchangers



1. SSR-PNL120
2. NHS-MCC8L1 & L2
3. NHS-MCC8A & 8B
4. ENS*SWG3A & 4A
NNS-SWG5A
5. SFC Filters
6. Fuel Building Truck Bay
7. SFC Demin
8. PCM1B at Exit

Fuel Building
El 95'

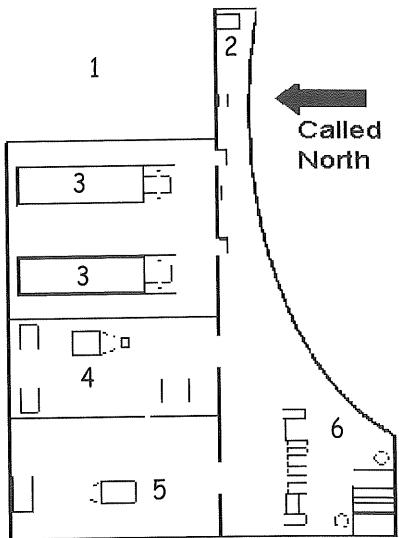


Fuel Building
El 113'

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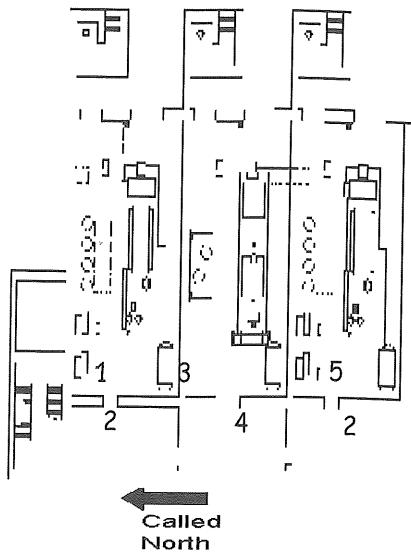
1. F42-PNLP003 & 1 (FTS PNL)
2. Cask Pool
3. Lower Fuel Transfer Pool
4. Fuel Storage Pool
5. New Fuel Storage Pool
6. Lower Personnel Airlock
7. Upper Annulus Access
8. HVF-UC4(EL 125')
9. Cask Washdown Area (113')
10. Cask Washdown Area (104')
11. Cask Washdown Area (95')

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Fuel Building
El 148'

1. Spent Fuel Cask Crane Area
2. Radiation Monitors (RMS*RC5A & B)
HVF*DMO13 & 15
3. HVF*FLT2A & B
HVF*FN7A & 7B
4. NHS-MCC8C & D
HVF-UC7 & 8
HVF-UC6
5. HVF-UC5
HVF-FN8A
HVF-DMP12 & 14
HVF-ACU1
6. NJS-LDC1LM

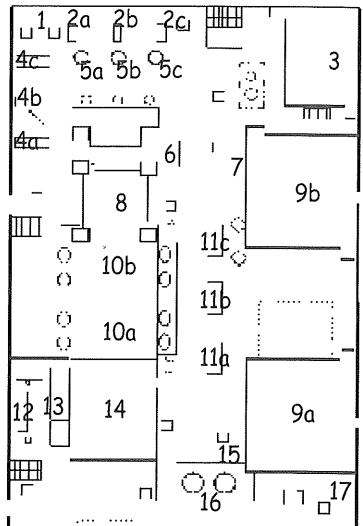


**Standby Diesel
Generator Building
EI 98'**

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1. Div II Diesel
2. Diesel Control Panels EGS*PNL3A, 3B; EGS*PNL1A, 1B
3. Div III Diesel
4. HPCS Control Panel E22*S001
5. Div I Diesel

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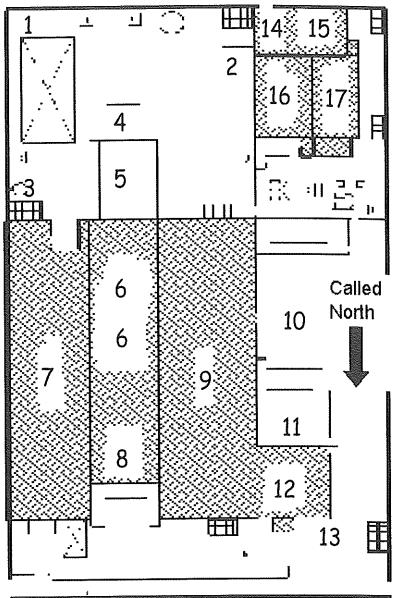


Turbine Building
EI 67'

42

1. HVN-P1A&1B;
HVT-UC7&UC8
2. CCS-E1A,1B,1C
3. URC Room
4. SWP-P4A,4B,4C;
HVN-CHL1A,1B,1C
5. CCS-E1A,1B,1C;
CNM-P1A,1B,1C
6. H2 Seal Oil Unit
7. HVT-UC3C;
HVT-UC5A&5B;
NHS-MCC1C1&1C2;
NHS-MCC1D1*1D2
8. Condenser Recycle Valve Room
9. FWS Heater Bays
10. CWS-CND1A&1B
11. FWS-P1A,P1B,P1C
12. Sample Room, HVT-C9&UC10
13. EHC Power Unit Spongeball
Pumps Panels
14. Main Steam Lowpoint Drain Room
15. NHS-MCC1G&H;HVT-UC3A&3B
16. Lube Oil Tanks & Filters
17. IAS-C1A,1B,1C

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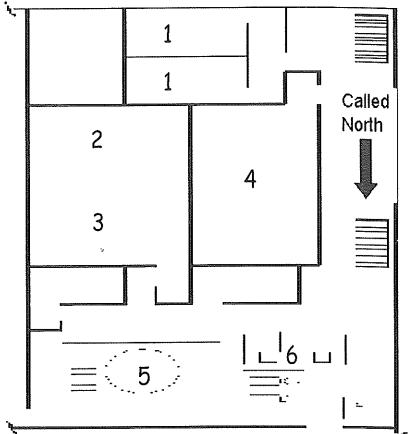
Turbine Building
EI 123'

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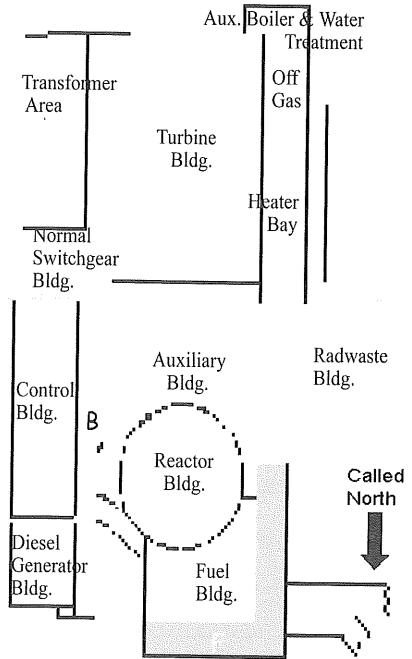
1. HVT-UC24B
2. HVT-UC24D
3. HVT-UC24A
4. Exciter
5. Generator
6. Low Pressure Turbine
7. MSR Bay 1
8. High Pressure Turbine
9. MSR Bay 2
10. HVT-UC23A&B;
NHS-MCC1M;
HVT-UC25A; HVT-FN1C;
HVT-FN3A
11. ASR-AG1
12. TME-EV1
13. NHS-MCC1L
14. Desiccant Dryers
15. Dryer Regeneration Skids
16. H2 Recombiner Room
17. Charcoal Adsorber Vault

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OffGas Building EI 123'

1. Offgas Dryer Units
2. Offgas Cooler Condenser
3. Offgas Preheater Recombiners
4. Offgas Adsorber Vault
5. Glycol Cooling Skid
6. Offgas Adsorber Vault Refrigerant Machines



Tunnels