

VIRGINIA POWER
NEW RADWASTE FACILITIES

SURRY POWER STATION
NORTH ANNA POWER STATION

8810130392 880907
PDR FOIA
MARTORABB-419 PDR

FOIA-88-419

B/1

NRE PURPOSE

TO PROVIDE PROVEN STATE-OF-THE-ART LIQUID AND SOLID RADWASTE
PROCESSING CAPABILITY IN SUPPORT OF THE NUCLEAR POWER STATIONS.

IMPROVED RADWASTE PROCESSING CAN:

- REDUCE VOLUMES
- REDUCE EFFLUENT RELEASES
- REDUCE PERSONNEL EXPOSURE
- REDUCE COST THROUGH INCREASED EFFICIENCY

NRF MAJOR GOALS AND OBJECTIVES

1. On-site storage requirements for all waste types and forms shall be one(1) year.
2. Liquid-waste discharges shall not exceed
0.1 Ci/year/site excluding tritium
50% of NPDES limits
3. Low specific active shipped off-site shall not exceed
8,000 CF/reactor/year(16,000 CF/year/site)
4. There shall be no inadvertent radioactive gaseous releases from the NRF.

ADDITIONAL NRF GOALS AND OBJECTIVES

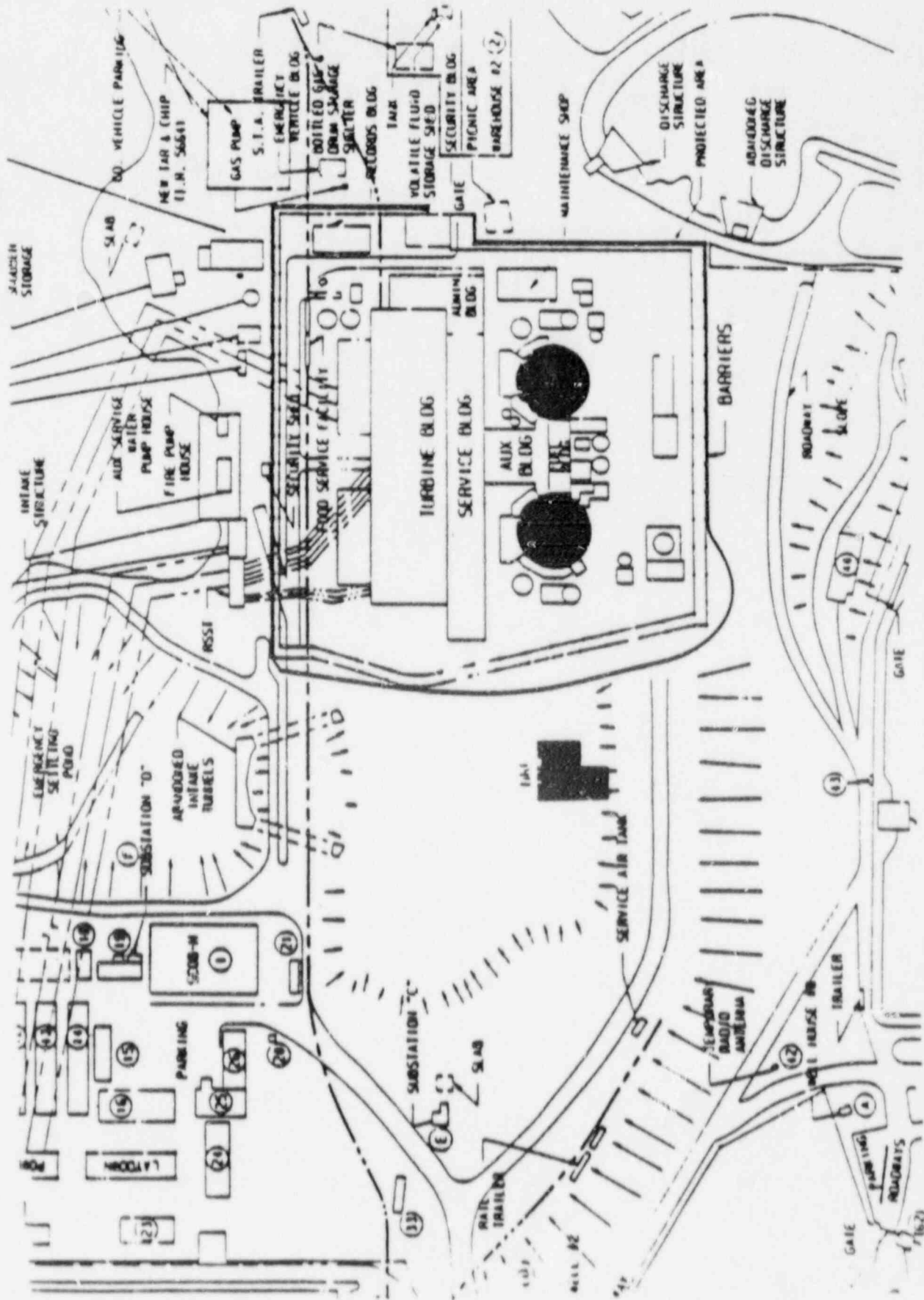
- MATERIALS IN NRF SHALL EFFECT EXISTING POWER STATION OPERATION.
- NO WASTE TREATED AND/OR VOLUME REDUCED BY THE NRF SHALL EXCEED CLASS C CLASSIFICATION CRITERIA.
- THE FACILITY DESIGN SHALL BE BASED ON SOUND ALARA PRINCIPLES.

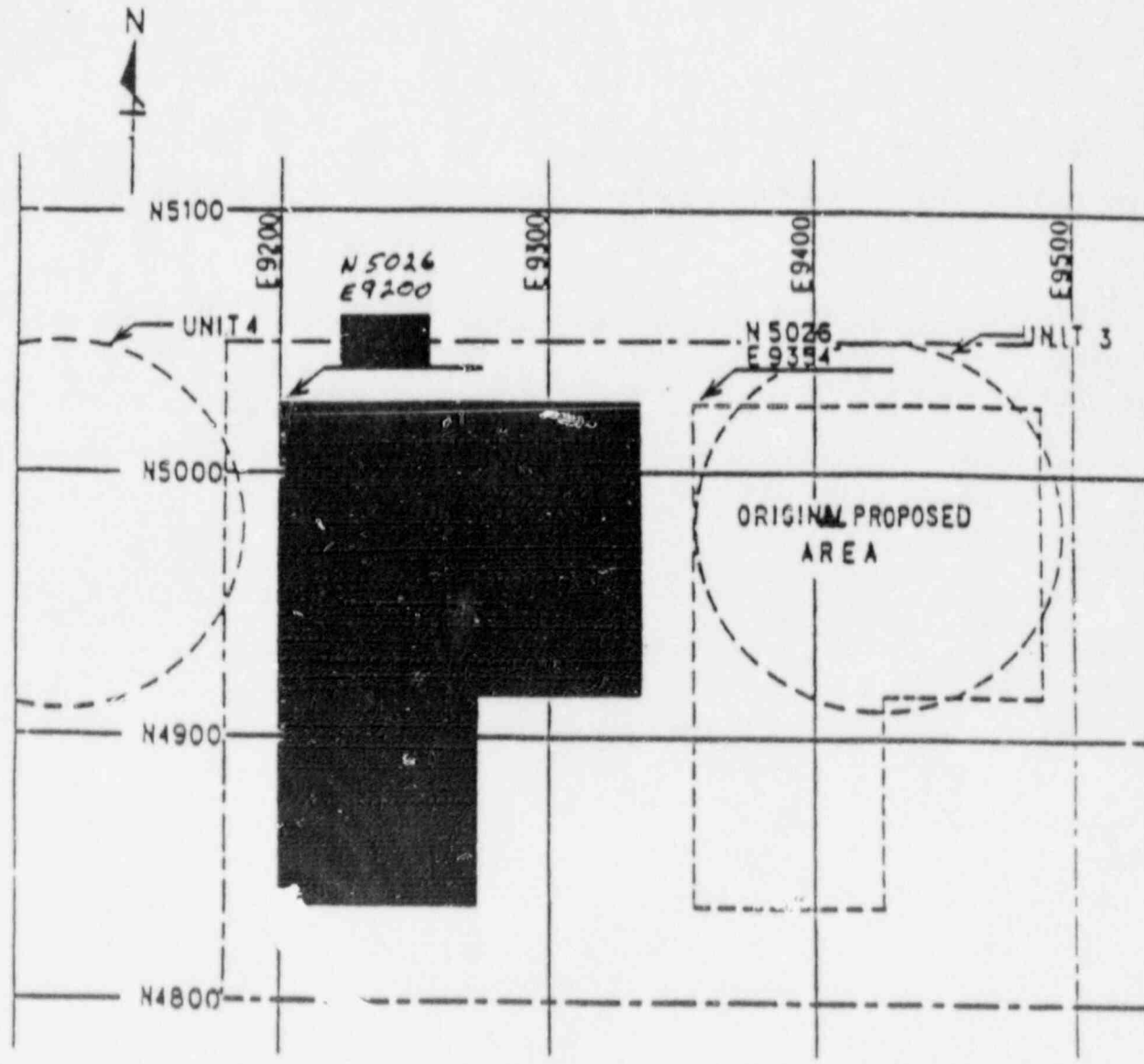
PROJECT SCOPE

- NRF BUILDING - JGC SCOPE
- IN-PLANT MODS - VP SCOPE (VIA SWEC)
- SITE INTERFACE TO NRF - VP SCOPE (VIA SWEC)
- MANNING/TRAINING - VP SCOPE (JGC ASSISTANCE)
- RADWASTE OPERATIONS TRANSITION - VP SCOPE

PROPOSED NRF LOCATION

(NORTH ANNA)



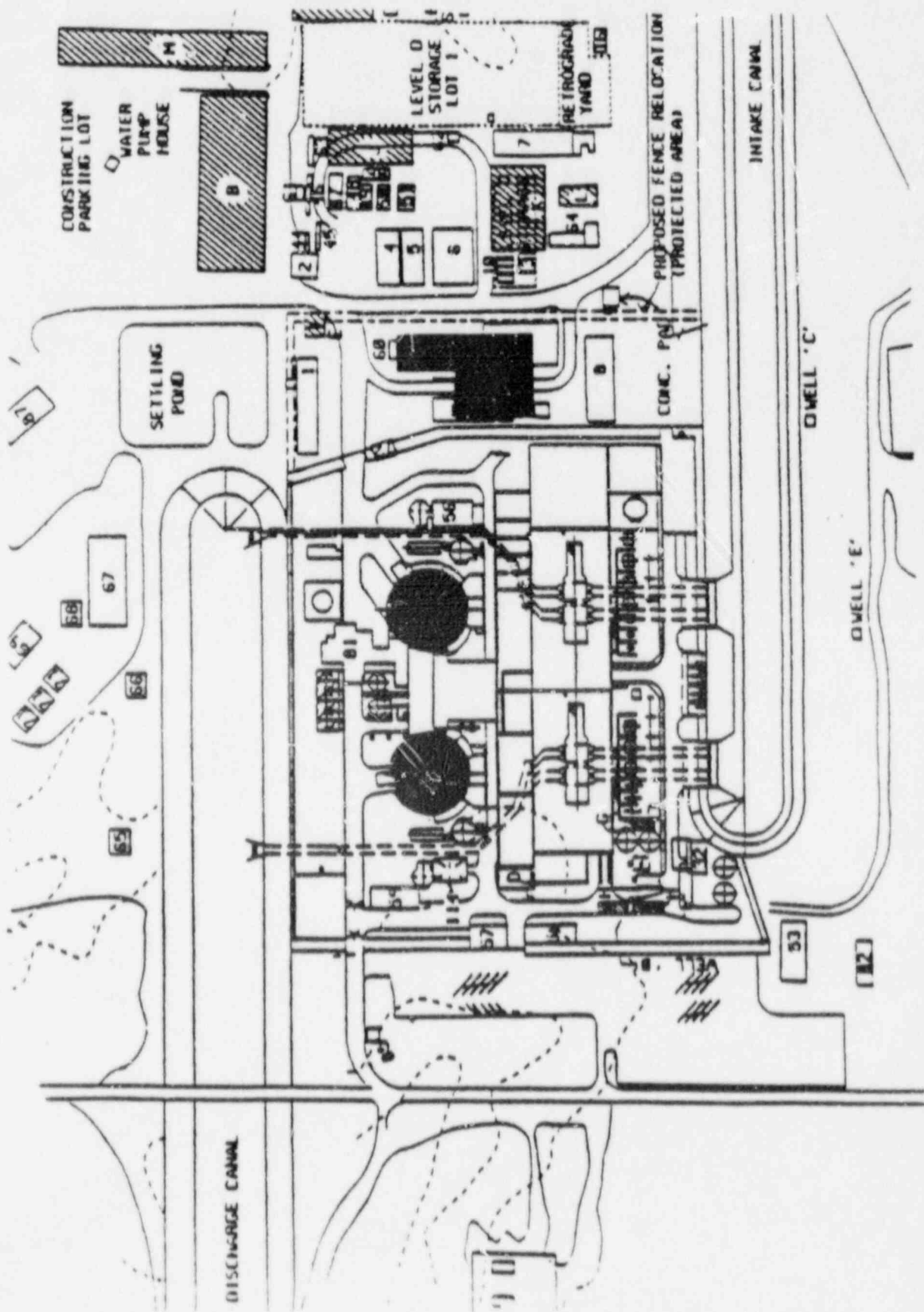


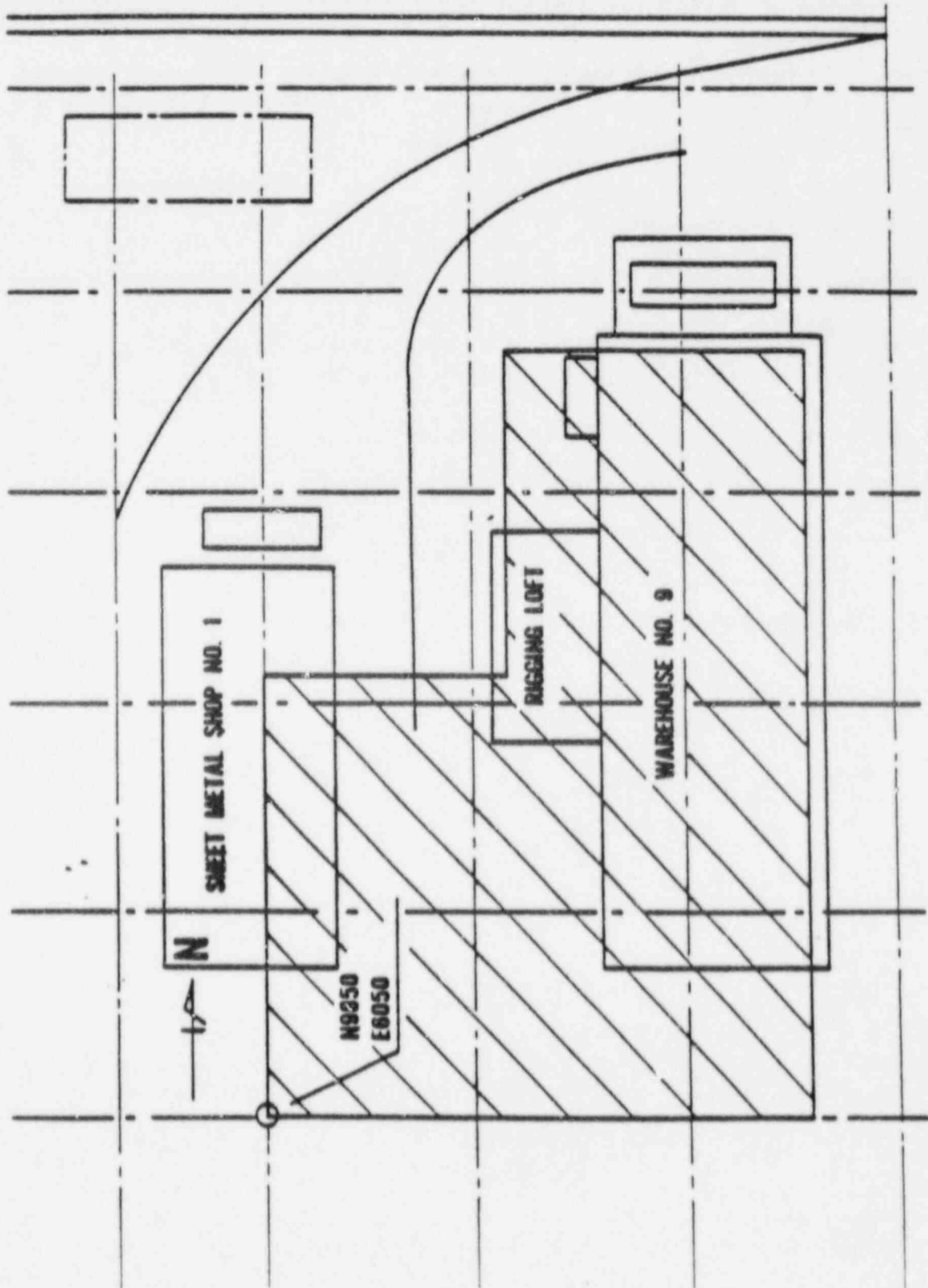
Proposed NRF Area

(North Anna)

PROPOSED NRF LOCATION

(SURRY)





NEW RADWASTE FACILITY

- RADWASTE CONTROL ROOM
- LIQUID WASTE PROCESSING EQUIPMENT
 - 30 GPM EVAPORATOR
 - 60 GPM DEMINERALIZER
- LAUNDRY WASTE PROCESSING EQUIPMENT
 - FILTER
 - EVAPORATION OPTION
- HIGH PRESSURE SHREDDER/COMPACTOR
- ASPHALT SOLIDIFICATION SYSTEM
 - EVAPORATOR CONCENTRATES
 - SPENT RESINS
- CONTAMINATED OIL SOLIDIFICATION
- HIC FILLING AND DEWATERING
- DECONTAMINATION EQUIPMENT/AREA
- HOT MACHINE SHOP (CAPABLE OF RCP WORK)
- RADIOCHEMICAL LABORATORY

- STORAGE FOR 1 YEAR
 - DAW
 - SOLIDIFIED WASTE
 - HIC's
 - SPENT FILTERS

- ALL REQUIRED PROCESS AND BUILDING AUXILIARIES

- RADIATION MONITORING SYSTEM

- FIRE PROTECTION SYSTEM

- RCA ACCESS CONTROL

NRF SYSTEM CONFIGURATION(1)

I. PROCESS SYSTEMS

1. LIQUID WASTE SYSTEM
2. DAW SYSTEM
3. SPENT RESIN HANDLING SYSTEM
4. DECONTAMINATION SYSTEM
5. BITUMEN SOLIDIFICATION SYSTEM

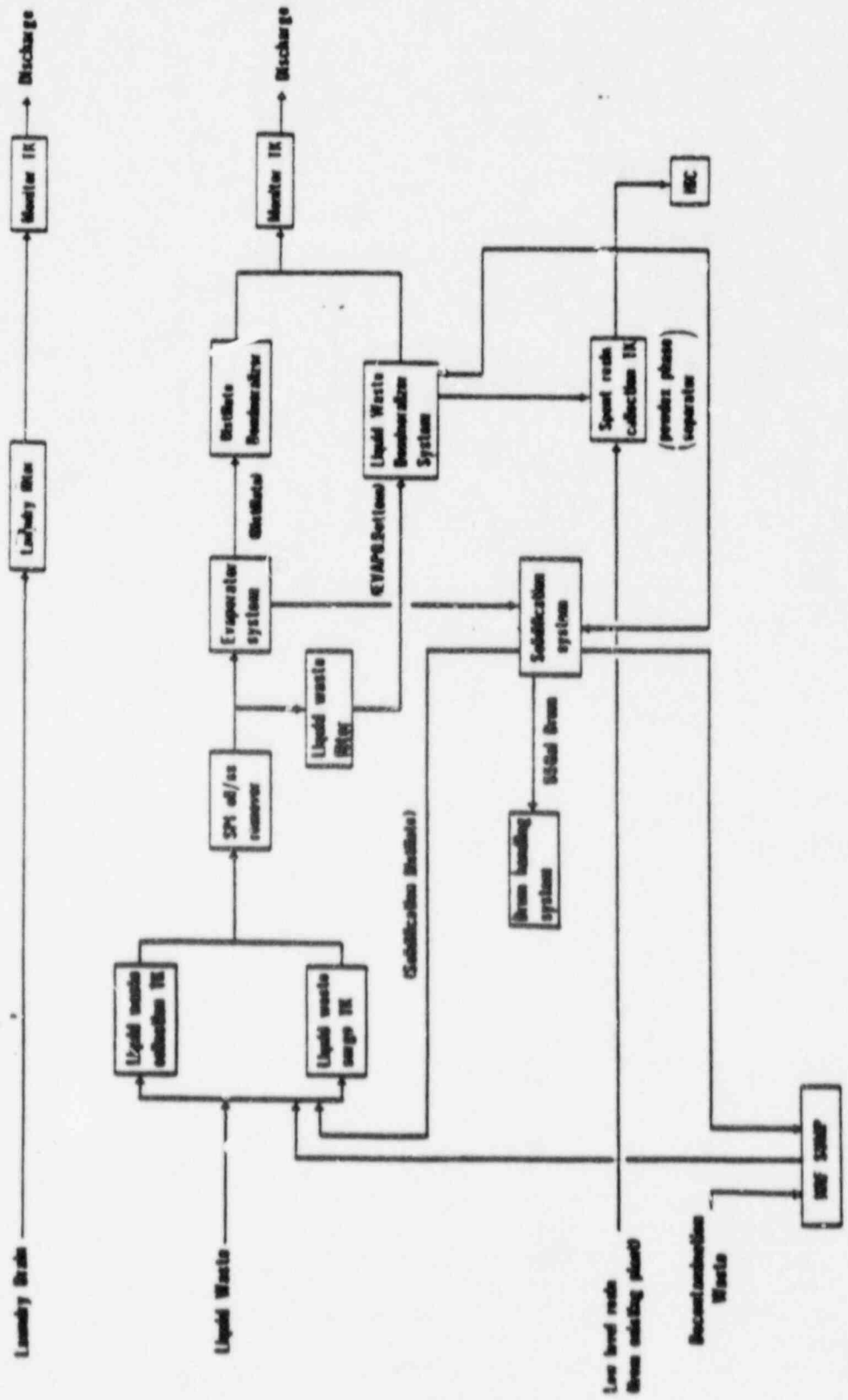
II. PROCESS AUXILIARY SYSTEMS

1. DEMINERALIZED WATER SYSEM
2. COOLING WATER SYSTEM
3. SEAL WATER SYSTEM
4. COMPRESSED AIR SYSTEM
5. RADIATION MONITORING SYSTEMS
6. DISTRIBUTED CONTROL SYSTEM(DCS)

NRF SYSTEM CONFIGURATION(2)

III. BUILDING AUXILIARY SYSTEMS

1. HVAC SYSTEM
 2. HOT WATER SYSTEM
 3. CHILLED WATER SYSTEM
 4. DOMESTIC WATER SYSTEM
 5. SANITARY SEWER SYSTEM
 6. BUILDING DRAINS
 7. MATERIAL HANDLING SYSTEM
 8. FIRE PROTECTION
 9. ELECTRICAL LIGHTING
 10. COMMUNICATIONS
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NRF WASTE DISPOSAL SYSTEM BLOCK FLOW

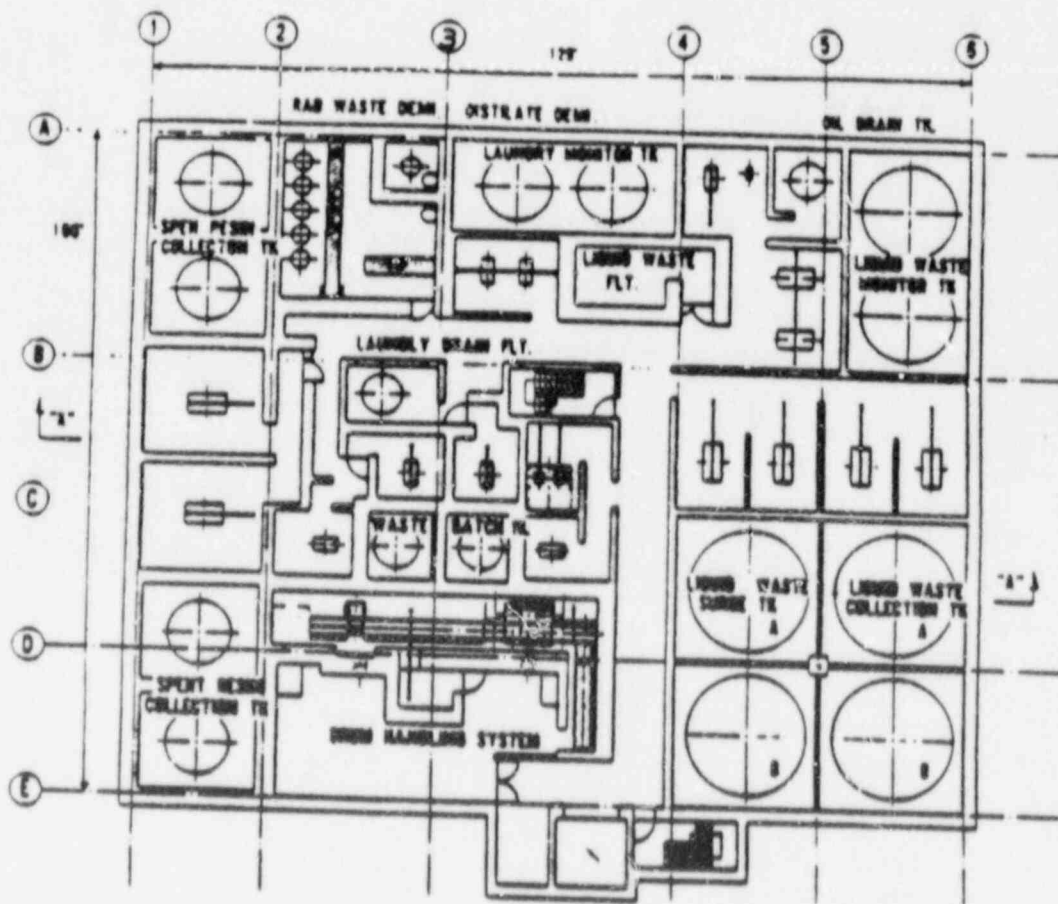


Figure 2.1-1. General Arrangement (BIF)

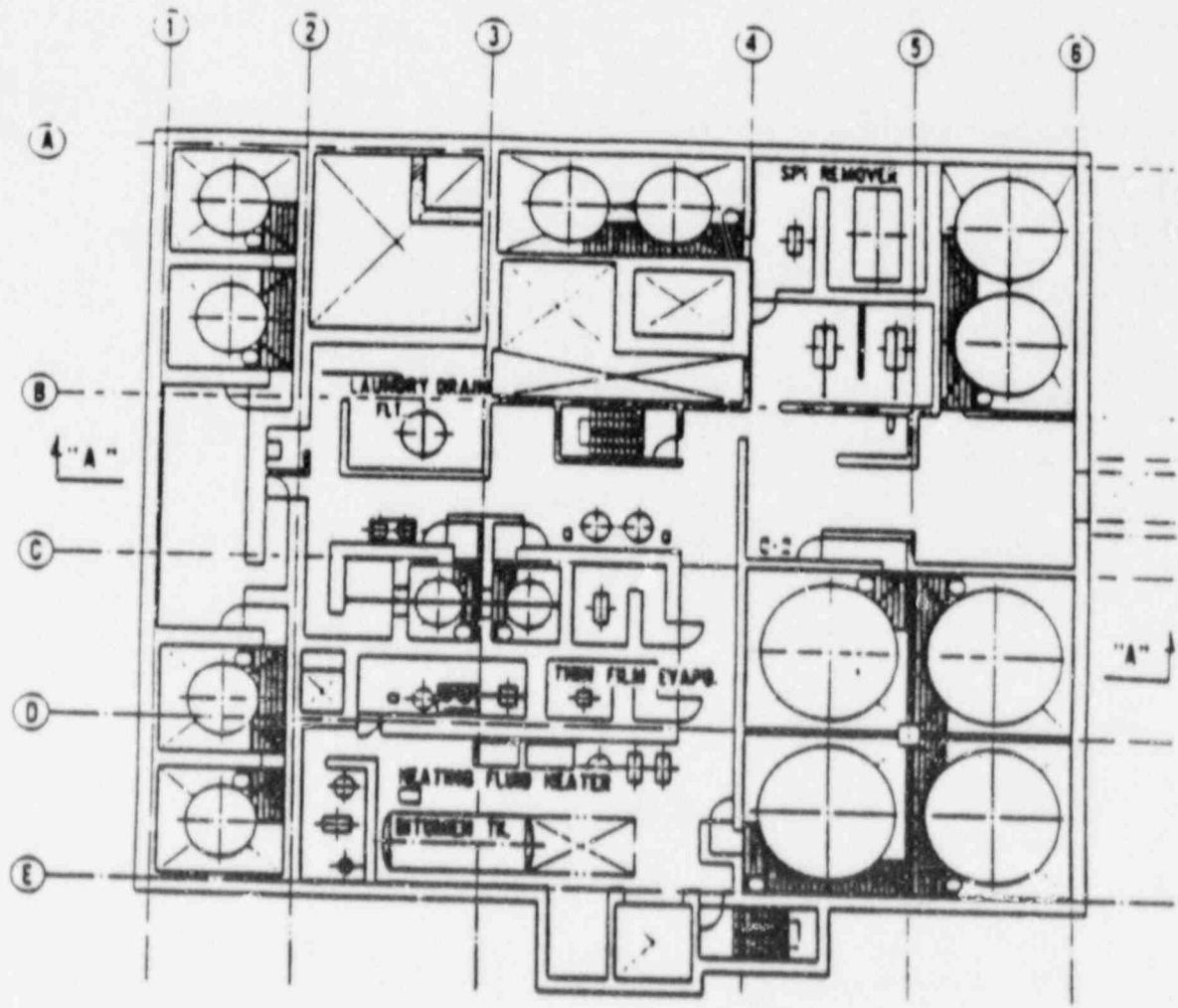


Figure 2.1-2. General Arrangement (MBIF)

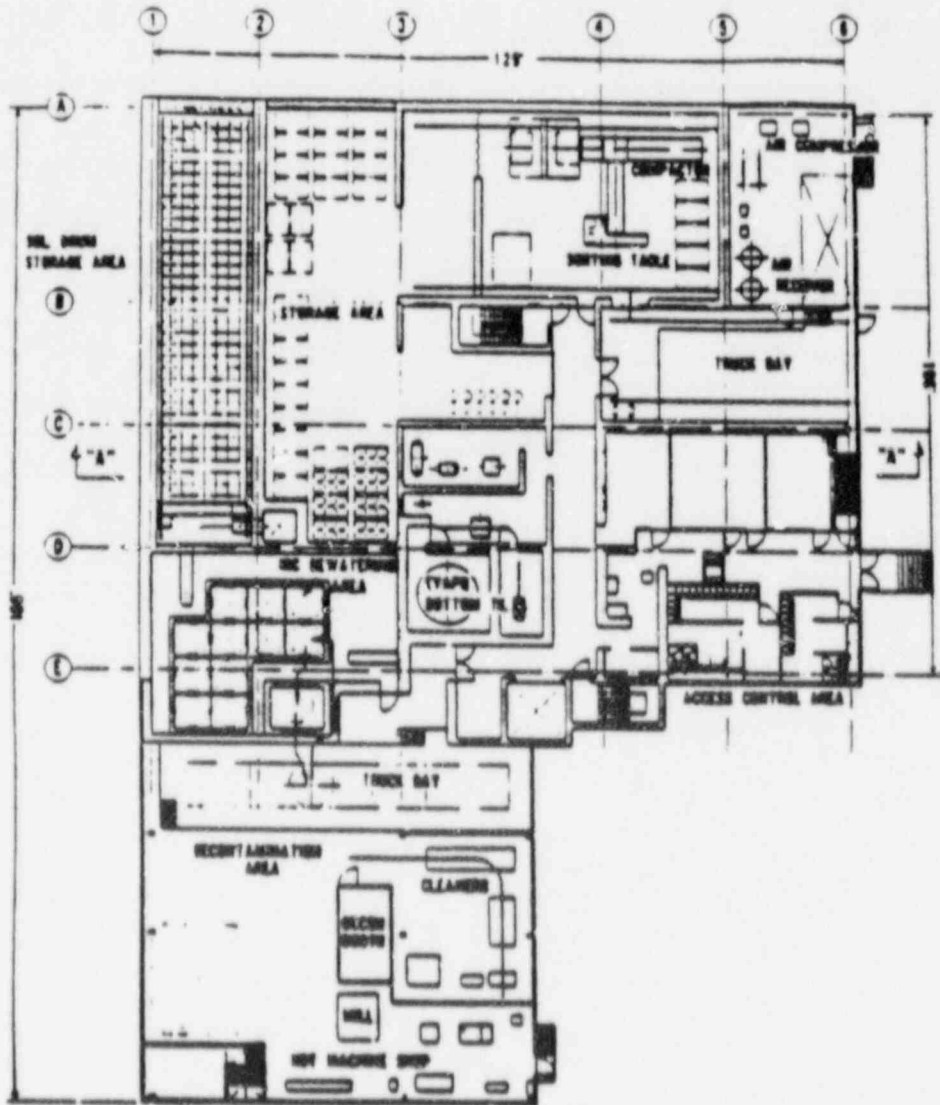


Figure 2.1-3. General Arrangement (1F)

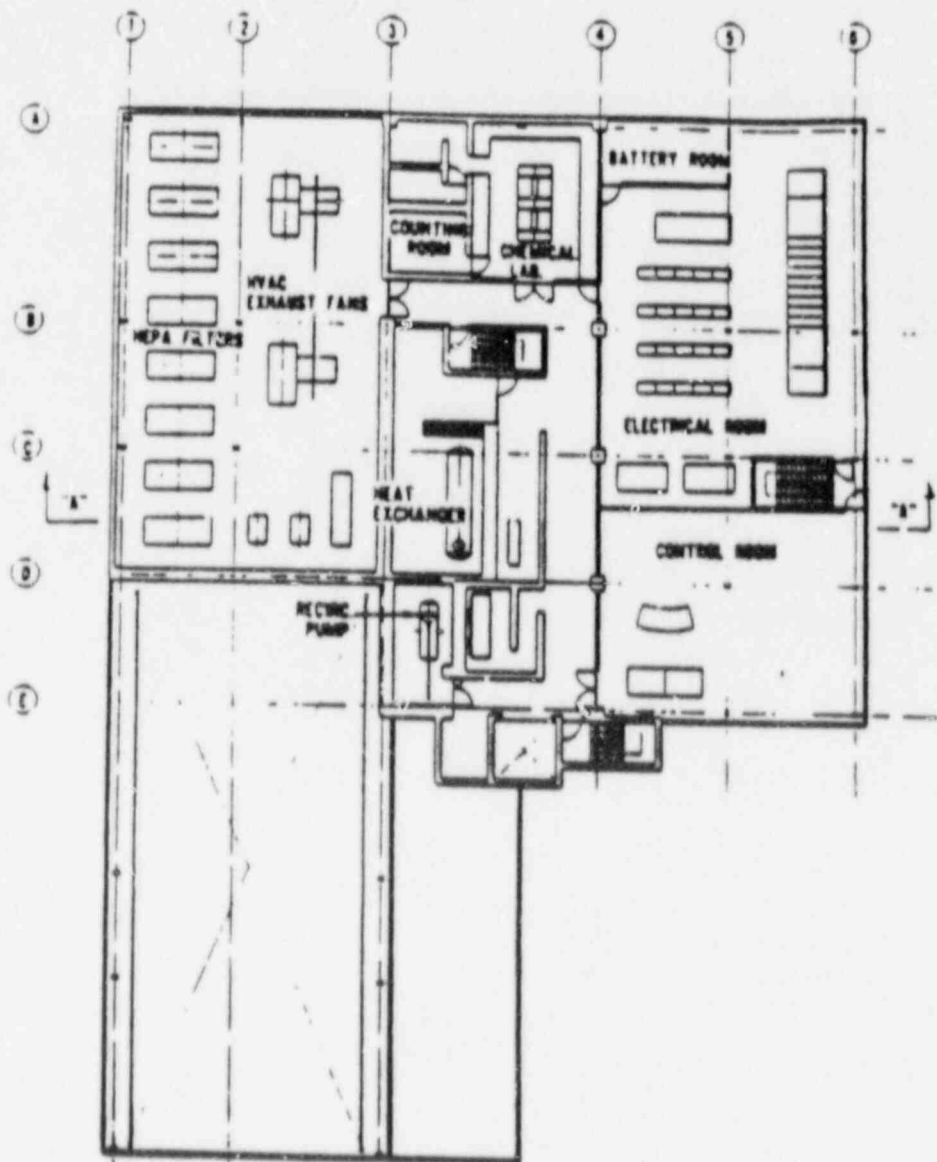


Figure 2.1-4. General Arrangement (2F)

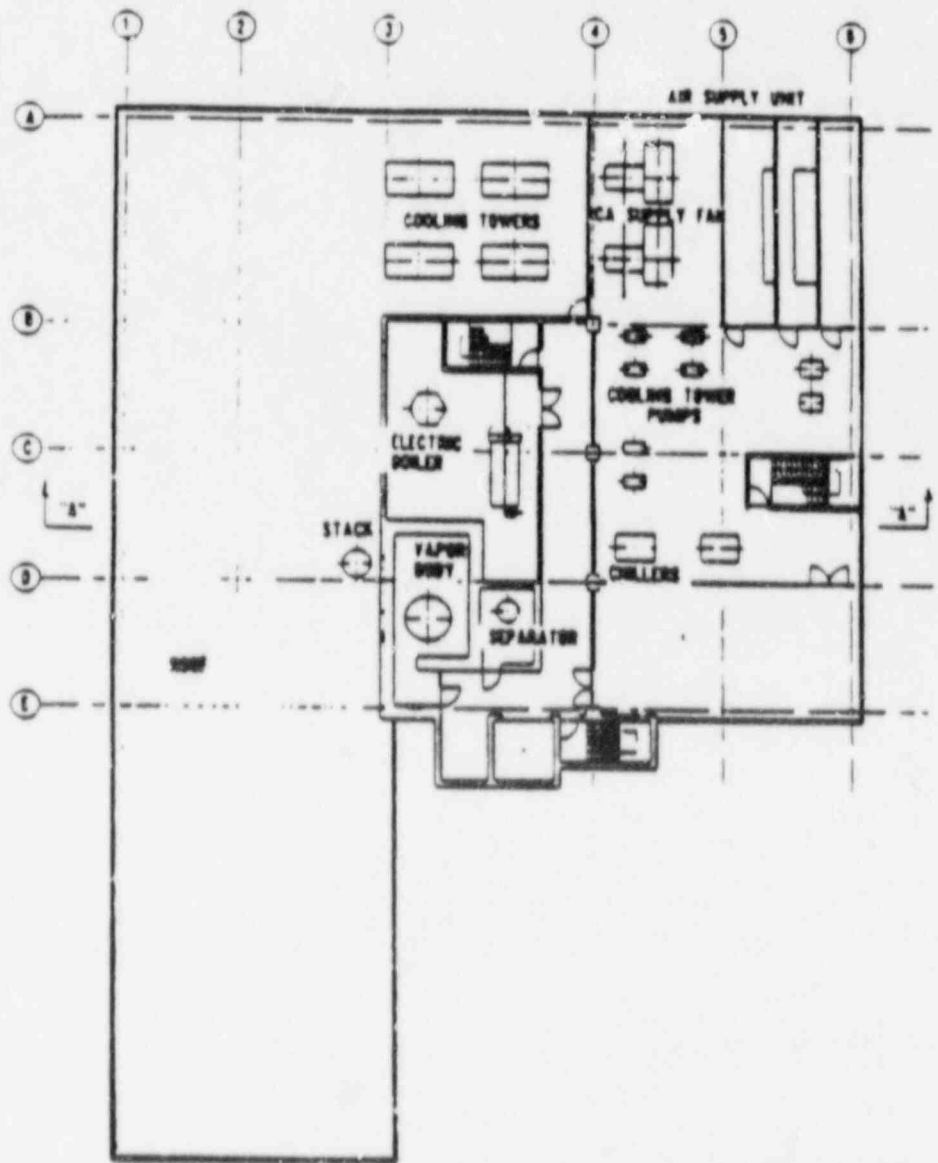


Figure 2.1-5. General Arrangement (3F)

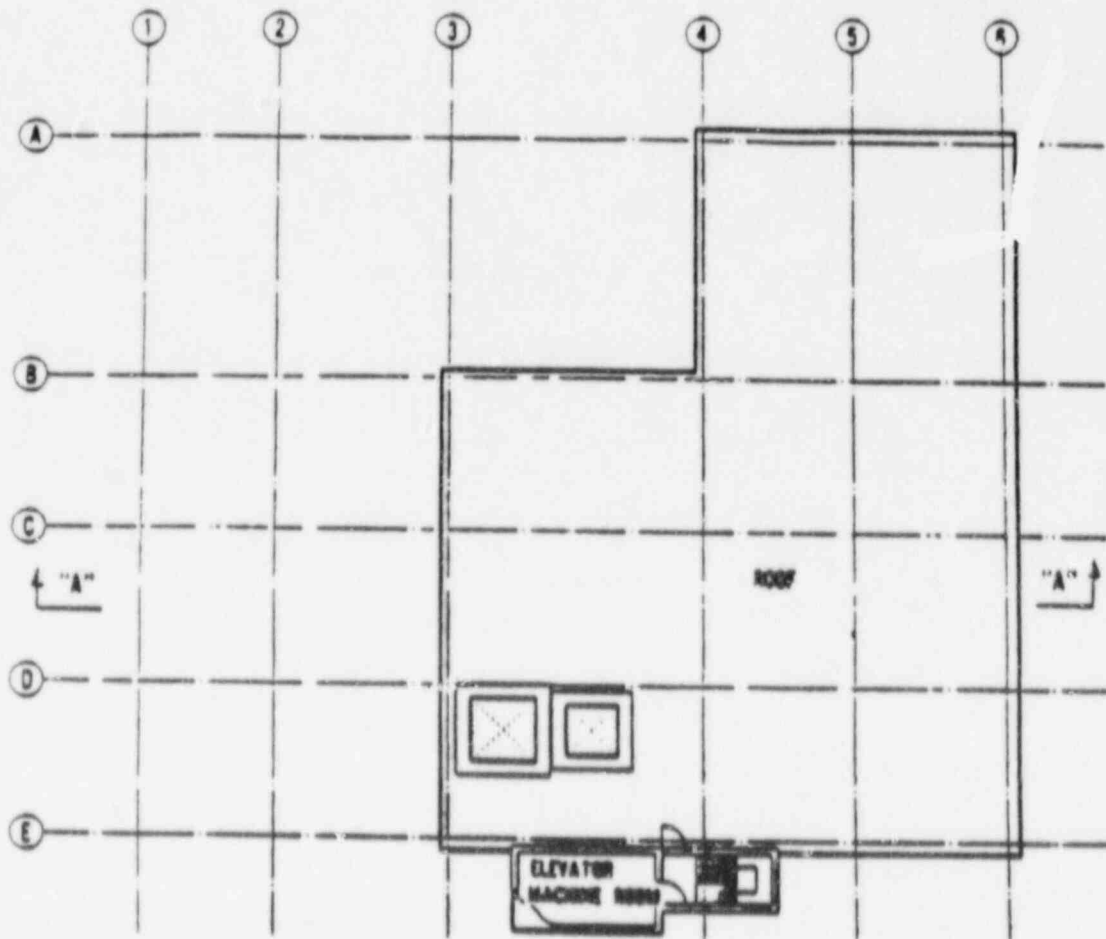


Figure 2.1-6. General Arrangement (RF)

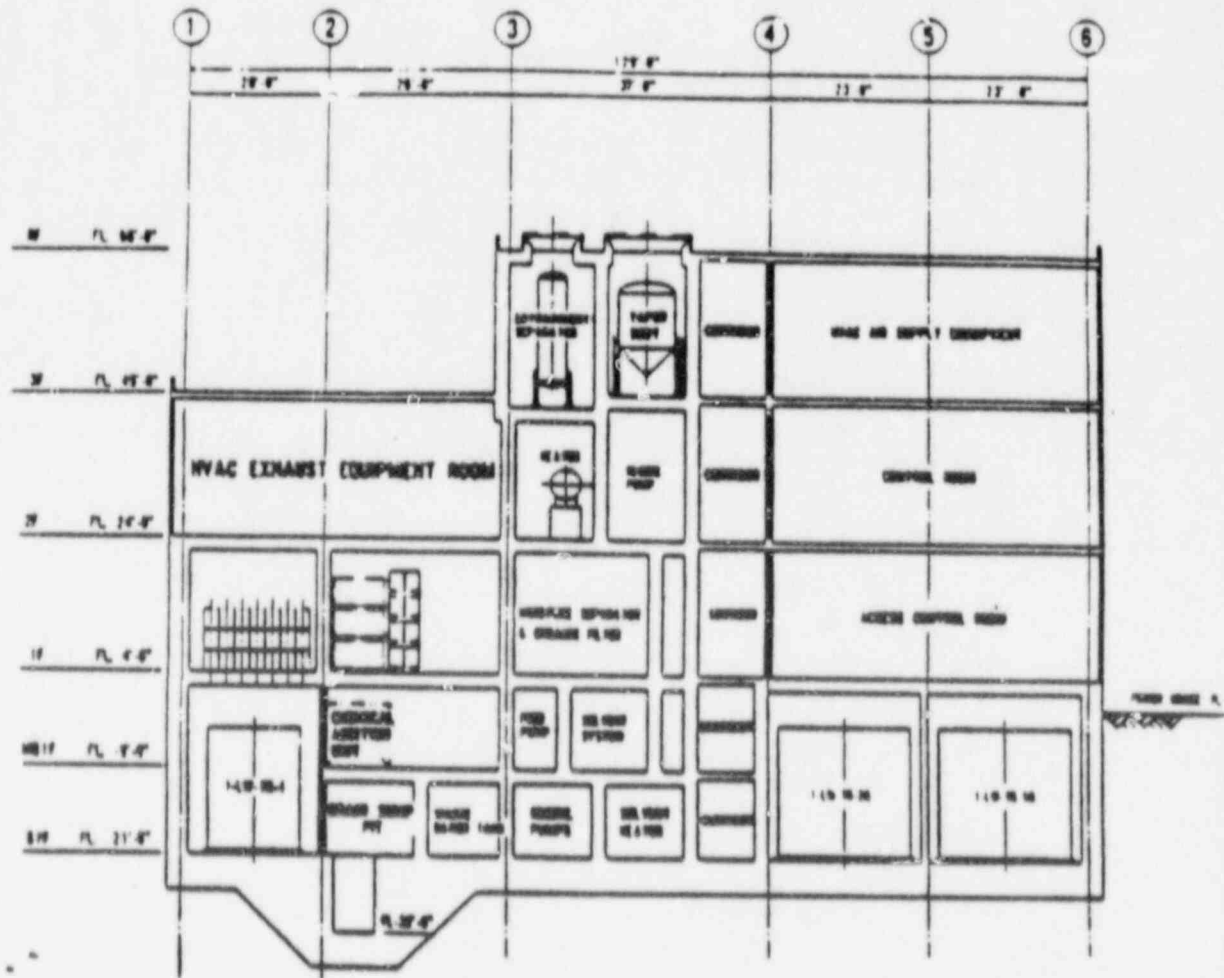


Figure 2.1-7. General Arrangement (Section)

NRF INTERFACES

- LIQUID WASTE TRANSFER
- LAUNDRY WASTE TRANSFER
- UTILITY TIE-INS (ELEC., WATER, FIRE, ETC.)
- FINAL LANDSCAPING
- COMPOUND SECURITY FENCE

NRF DESIGN BASIS

- FACILITY DESIGNED IN ACCORDANCE WITH THE FOLLOWING KEY DOCUMENTS
 - 10CFR20
 - 10CFR50
 - 10CFR61
 - 40CFR190
 - RG 1.143
 - RG 1.140
 - RG 8.8
 - RG 1.109
 - RG 1.21

- SPECIFIC KEY TITLE 10CFR SECTIONS
 - 10CFR20.101
 - 10CFR20.103
 - 10CFR20.105
 - 10CFR50, APP.A - CRITERION 60
 - 10CFR50, APP.A - CRITERION 64
 - 10CFR50, APP.I
 - 10CFR50.34(A)
 - 10CFR50.36(A)

- ALL STATED DESIGN BASIS CONDITIONS IN THE UFSAR FOR EACH STATION ARE MAINTAINED

TABLE 3.1-2

INDUSTRY AND FEDERAL REGULATIONS, CODE AND GUIDES

<u>Document</u>	<u>Description</u>
Title 10 CFR Part 20	"Standards for Protection Against Radiation"
Title 10 CFR Part 20 Appendix B	"Concentrations in Air and Water Above Material Background."
Title 10 CFR Part 20.101	"Radiation Dose Standards for Individuals in Restricted Areas." Limits exposure of personnel to below prescribed limits.
Title 10 CFR Part 20.103	"Exposure of Individual to Concentrations of Radioactive Materials in Air in Restricted Areas." Limits exposure of personnel from inhalation or absorption to limits described in Part 20, Appendix B, Table I. Assessment of intake of radioactive material is given in RG 8.9.
Title 10 CFR Part 20.105	"Permissible Levels of Radiation in Unrestricted Areas."
Title 10 CFR Part 20.106	"Radioactivity in Effluents to Unrestricted Areas." Limits exposure to personnel in unrestricted areas to the limits of Part 20, Appendix B, Table II.
Title 10 CFR Part 20.302	"Method for Obtaining Approval of Proposed Disposal Procedures." Requires that proposed procedures for disposal should include a description of material to be disposed of and procedures to minimize risk to unexpected or hazardous exposures.
Title 10 CFR Part 30	"Domestic Licensing of Production and Utilization Facilities."
10CFR50 App. A, Criterion 60	"Control of Releases of Radioactive Materials to the Environment."
10CFR50 App. A, Criterion 64	"Monitoring Radioactivity Releases." Requires monitoring of effluent discharge paths and plant environs for radioactivity from normal operations, operational occurrences, and postulated accidents. <i>16.</i>

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TABLE 3.1-2 (Continued)

<u>Document</u>	<u>Description</u>
Title 10 CFR Part 50 Appendix I	"Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion As Low As is Reasonably Achievable for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents."
Title 10 CFR Part 50.34(a)	"Design Objectives for Equipment to Control Releases of Radioactive Material in Effluents - Nuclear Power Reactors." Requires that guides set out in Part 50, Appendix I, be observed.
Title 10 CFR Part 50.36(a)	"Technical Specifications on Effluents from Nuclear Power Reactors." Requires that semiannual effluent reports be submitted to the NRC in addition to requirements of Parts 20.016 and 50.34(a).
Title 10 CFR Part 50.59	"Changes, Test and Experiments"
Title 10 Part 61	"Licensing Requirements for Land Disposal of Radioactive Waste."
Title 10 CFR Part 71.5	"Transportation of Licensed Material." Implements DOT requirements in Title 49 CFR Parts 170 through 189.
Title 40 CFR Part 190	"Environmental Radiation Protection Standards for Nuclear Power Operations." Limits annual dose to any member of public to 25 millirems. This includes contributions from entire plant, including I-129 and Kr-85.
Title 49 CFR Parts 170-189	Lists guidelines and procedures for transportation of LLW; including categorizations, packaging, labeling, and transportation dose rates.
R.G. 1.22	"Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials and Liquid and Gaseous Effluents from Light-Water Cooled Nuclear Power Plants." Requires that wastes be sampled to determine isotopic concentrations.
R.G. 1.109	"Calc. of Annual Doses...Evaluating Compliance with 10 CFR Part 50 Appendix I."
T. C.R.G. 1.110	"Cost-Benefit Analysis for Radwaste Systems for Light-Water-Cooled Nuclear Power Reactors." ^{4/1}

TABLE 3.1-2 (Continued)

<u>Document</u>	<u>Description</u>
R.G. 1.112	"Calculation of release of Radioactive Material in Liquid and Gaseous Effluent from Light-Water-Cooled Reactors."
R.G. 1.120	"Fire Protection Guidelines for Nuclear Power Plants."
R.G. 1.140	"Design, Testing, and Maintenance Criteria for Normal Ventilation Exhaust System Air Filtration and Absorption Units of Light-Water-Cooled Nuclear Power Plants."
R.G. 1.143	"Design Guidance for Radioactive Waste Management Systems, Structures and Components Installed in Light-Water-Cooled Nuclear Power Plants."
R.G. 8.8	"Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations will be As Low As Reasonably Achievable."
BTP ESTB 11-3	"Design Guidance for Solid Radioactive Waste Management System Installed in Light-Water-Cooled Nuclear Power Plants."
<i>T. G.</i> ANS-40.35	"Volume Reduction of Low-Level Radioactive Waste" <i>166</i>

Design Conditions

<u>Wastes</u>		North Anna	Surry
• Liquid Waste			
Quantity	[gal/Day]	15,000	15,000
Specific Activity	[μ Ci/cc]	2.2 E-3	2.5 E-2
Boron Content	[ppm]	300	300
• Laundry Waste			
Quantity	[gal/Day]	5,000	9,395
Specific Activity	[μ Ci/cc]	1.9 E-5	5.0 E-5
• Spent Resin Quantity			
High Active Resin	[cf/Year]	800	800
Low Active Bead Resin	[cf/Year]	1,920	1,920
Low Active Powdex Resin	[cf/Year]	3,350	—
• Oily Waste			
Quantity	[gal/Year]	4,760	4,211
• COMPACTABLE DAW			
Quantity	[cf/Year]	50,000	50,000
• NON-COMPACTABLE DAW			
Quantity	[cf/Year]	6,000	6,000

Results of Treatment by NRF System (2)

1. No. of Generated Drums	North Anna	Surry
(1) Oily Waste (No. of Drums)	119	105
(2) Solidified Waste(No. of Drums)		
○ Concentrate	195	235
○ Sludge	10	117
○ Bead Resin	272	279
○ Powdered Resin	205	—
(Total)	(682)	(631)

2. DAW(North Anna/Surry)	North Anna	Surry
○ Compacted DAW(ft ³ /y)	6,000	6,000
(LSABOXs)	(84)	(84)



Station: SPS & NPS
 Subject: Station Liquid Effluent Radwaste Disposed
 Date: 5/25/88

3 BY W.M.C.

SURRY POWER STATION

YEAR	LIQUID PARTICULATE ACTIVITY - C/LOTR				TOTAL CURIES	RADWASTE DISPOSED, FT.
	FIRST	SECOND	THIRD	FOURTH		
1980	-	2.35E+0*	-	5.76E+0*	7.59E+0	7.10E+4
1981	-	2.86E+0*	-	7.07E+0*	9.93E+0	9.91E+4
1982	+	6.33E+0*	-	3.55E+0*	9.22E+0	7.69E+4
1983	+	6.92E+0*	-	4.49E+0*	(M) 1.14E+1	1.09E+5
1984	-	3.92E+0*	1.94E+0	3.94E+0	9.87E+0	3.34E+4
1985	2.71E+0	2.17E+0	1.61E+0	2.06E+0	8.55E+0	7.15E+4
1986	2.12E+0	2.38E+0	2.55E+0	1.72E+0	8.77E+0	2.26E+4
1987	1.05E+0	1.68E+0	1.45E+0	9.91E-1	5.17E+0	1.82E+4

3YR AVE = 7.5 G

NORTH HANNA POWER STATION

1980	1.41E+1	6.62E-1	1.69E-1	7.78E-2	1.05E+0	9.32E+3
1981	6.90E-2	2.53E-1	1.04E-1	2.51E-1	6.76E-1	1.07E+4
1982	3.15E-1	4.96E-1	4.59E-1	1.40E-1	1.32E+0	1.49E+4
1983	2.73E-1	3.24E+0	7.36E-1	1.63E+0	(M) 5.88E+0	1.98E+4
1984	1.40E+0	1.88E+0	6.63E-1	5.25E-1	4.47E+0	3.18E+4
1985	6.34E-1	2.40E-1	1.96E+0	7.31E-1	5.06E+0	2.30E+4
1986	7.93E-1	1.52E-1	7.67E-2	4.19E-1	9.41E-1	1.87E+4
1987	6.52E-2	3.88E-1	4.59E-1	4.16E-1	1.33E+0	1.73E+4

3YR AVE = 2.4 G

* JAN. THROUGH JUNE
 * JULY THROUGH DEC.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34

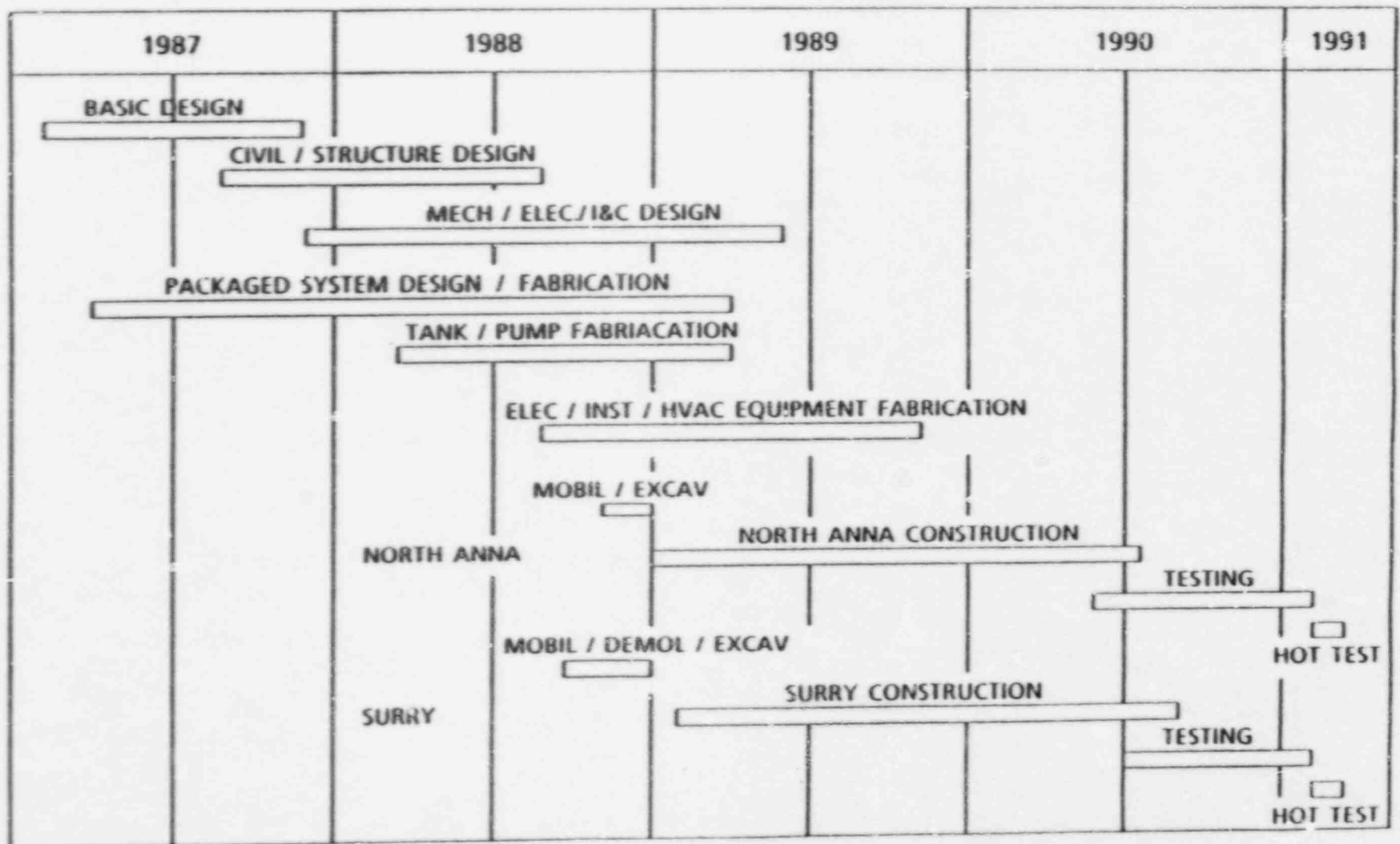
NRF WASTE FORMS

- LSA BOXES
 - COMPACTED DAW
 - MISC. UNCOMPACTABLE WASTE & COMPONENTS
- HIC'S
 - DEWATERED LOW ACTIVITY RESIN
 - DEWATERED HIGH ACTIVITY RESIN (LESS THAN HIC LIMITS)
 - MISC. HOT DAW
- CEMENT SOLIDIFIED LINERS
 - HIGH ACTIVITY RESINS (GREATER THAN HIC LIMITS)
 - PRIMARY FILTERS
- BITUMEN DRUMS •
 - LOW ACTIVITY RESIN
 - EVAPORATOR CONCENTRATES
 - SLUDGES
- APPROVED ATI TOPICAL EXPECTED

WASTE CLASSIFICATION

- FACILITY GOAL: NOTHING GREATER THAN CLASS C
- CLASSIFICATION SYSTEM UNCHANGED (RADMAN)

CONTRACT PERFORMANCE SCHEDULE



NOTIFICATION TO NRC OF
RADWASTE PROCESSING CHANGES

- INITIAL BRIEFING
 - OVERVIEW
 - ACTION PLAN

- LICENSE REQUIREMENTS
 - OL NORTH ANNA
 - UNIT 1 LICENSE CONDITION 2.B(3)e
 - UNIT 2 LICENSE CONDITION 2.G
 - NO PARTICULAR TIME FRAME IDENTIFIED
 - PROPOSE VIA TECH SPEC REPORTING REQUIREMENT
 - OL SURRY
 - NO LICENSE CONDITION REQUIREMENT

- TECH SPEC REPORTING REQUIREMENTS
 - NORTH ANNA
 - NORTH ANNA UNIT 1 - TS 6.16
 - NORTH ANNA UNIT 2 - TS 6.15
 - REQUIRED FOR CHANGES TO SOLID WASTE SYSTEMS
(WILL ALSO INCLUDE LIQUID EFFLUENTS)
 - SURRY
 - SURRY UNITS 1 AND 2 - TS 6.9
 - REQUIRED FOR CHANGES TO LIQUID, SOLID & GASEOUS SYSTEMS
 - SUBMITTAL SCHEDULE KEYED TO SNSOC APPROVAL

SAFETY EVALUATION

- 10CFR50.59 REVIEW
 - PROCESSES
 - STRUCTURES
 - POTENTIAL ACCIDENTS/RELEASES
 - COMPARISON TO UFSAR RELEASES
 - COMPARISON TO EXISTING RADWASTE SYSTEMS
 - COMPARISON TO APP.1 EVALUATION

- ENVIRONMENTAL REVIEW (NON-RADIOLOGICAL)
 - PER NAPS ENVIRONMENTAL PROTECTION PLAN (EPP)
 - EVALUATE POTENTIAL "UNREVIEWED ENVIRONMENTAL QUESTION"
 - AIR QUALITY IMPACT
 - WATER QUALITY IMPACT (NPDES)
 - GROUND WATER IMPACT
 - EVALUATION PROCESS APPLIED TO BOTH SURRY AND NORTH ANNA
 - RADIOLOGICAL IMPACT EVALUATED BY 10CFR50.59

- BOTH 10CFR50.59 AND ENVIRONMENTAL EVALUATION TO BE SUBMITTED FOR SNSOC APPROVAL AS PART OF NRF SAFETY ANALYSIS REPORT

TECH SPEC REVISIONS

- NO CHANGES REQUIRED FOR NORTH ANNA
- SURRY TS REQUIRE CHANGES ONLY BECAUSE SPECIFIC MARK NUMBERS* OF EFFLUENT MONITORS ARE SPECIFIED
- SINCE EFFLUENT MONITORING MUST BE IN ACCORDANCE WITH APPROVED STATION PROCEDURES, NRF EFFLUENTS WILL BE CONTROLLED AS PER TS

*NOTE: A PROPOSED TS CHANGE REQUEST (INITIATED INDEPENDENT OF NRF PROJECT) WOULD ELIMINATE THE SUBJECT MARK NUMBERS AT SURRY. IF THIS IS APPROVED, NO CHANGES TO TS WOULD BE REQUIRED FOR EITHER NORTH ANNA OR SURRY.

CONTROLLED DOCUMENT REVISIONS

- UPDATED FSAR
 - FOLLOWING COMPLETION OF FACILITY (2/91)
 - PER ANNUAL UPDATE REQUIREMENT (6/92)
 - POSSIBLE EARLY, STANDALONE UPDATE

- OFF-SITE DOSE CALCULATION MANUAL (ODCM)
 - CHANGES APPROVED BY SNSOC
 - CHANGES SUBMITTED VIA SEMI-ANNUAL EFFLUENT REPORT
 - CHANGES ADMINISTRATIVE IN NATURE (SAMPLING LOCATIONS)
 - NO CHANGES TO METHODOLOGY OR PARAMETERS

- PROCESS CONTROL PROGRAM (PCP)
 - CHANGES APPROVED BY SNSOC
 - CHANGES SUBMITTED VIA SEMI-ANNUAL EFFLUENT REPORT
 - ADDITION OF APPROVED PCP FOR BITUMEN SOLIDIFICATION
 - POSSIBLE ADDITION OF APPROVED PCP FOR WASTE OIL SOLIDIFICATION

NRF SECURITY REQUIREMENT

- PROTECTED AREA NOT REQUIRED
 - NO "SPECIAL NUCLEAR MATERIAL"
 - NO SAFETY RELATED EQUIPMENT

- GENERIC LETTER 81-38 REQUIREMENTS FOR STORAGE FACILITY (INCLUDES PROCESSING)
 - ON PLANT SITE
 - PHYSICAL SECURITY
 - . FENCE
 - . LOCKED AND ALARMED GATES/DOORS
 - . PERIODIC PATROL (IF NECESSARY)
 - RADIOLOGICAL PROTECTION PROVISIONS
 - . UNRESTRICTED AREA - OUTSIDE NRF FENCE
 - . RESTRICTED AREA (NON-RCA) - NRF FENCE REQUIRED
 - . RESTRICTED AREA (RCA) - ACCESS CONTROL SYSTEMS REQUIRED
 - SHOULD NOT REQUIRE USE OF PUBLIC ROADS

- TRANSFER TRENCH REQUIRES COMPLIANCE WITH SECURITY PROGRAM

- VEHICLE TRANSPORT BETWEEN NRF AND STATION MUST COMPLY WITH STATION SECURITY PROGRAM

NRF LICENSING PLAN SCHEDULE

- VA. POWER COMPLETE SAR - 6/88
- SNSOC REVIEW & APPROVAL - 7/88
- INDEPENDENT REVIEW & APPROVAL - 8/88
- (START OF CONSTRUCTION - 9/88)
- SUBMITTAL OF TS REPORTING REQUIREMENTS - 2/89
- SURRY TS CHANGE (IF REQUIRED) - 1/90
- (COMPLETION OF FACILITY - 2/91)
- SUBMITTAL OF ODCM & PCP REVISIONS - 8/91
- SUBMITTAL OF UFSAR UPDATE - 6/92 (LATEST)