NRC SUMMARIES REQUIRED - YEAR 2002

DCP NO	TITLE	DEPT	ENGINEER
DCP 91-012	REPAIR/REPLACEMENT OF CONCRETE ENCASED SW PIPING TO/FROM CCHXs / NAPS / UNITS 1&2	INNS	MELNIK
DCP 91-114	SERVICE AIR PIC REMOVAL / NAPS / UNITS 1&2	ELEC	WALTON
DCP 95-005	INDEPENDENT SPENT FUEL STORAGE INSTALLATION / NAPS / UNITS 1&2	INNS	PRICE
DCP 95-010	ERFCS - SIMULATOR LINK FOR EMERGENCY EXERCISES / NAPS /UNITS 1&2	INNS	KOLONAY
DCP 95-127	CHARGING PUMP CASING REPLACEMENT / NAPS / UNIT 1	MECH	AVERY
DCP 96-005	P250 UPGRADE / NAPS / UNITS 1&2	INNS	MILLER
DCP 99-002	FUEL BUILDING TROLLEY ENCLOSURE - SUPERSTRUCTURE / NAPS / UNITS 1&2	INNS	ZALESIAK
DCP 99-010	REPLACEMENT OF SW LINES TO/FROM CHARGING PUMPS AND IA COMPRESSORS / NAPS / UNITS 1&2	INNS	MELNIK
DCP 99-124	RELOCATE RS PUMP TEMPORARY TEST DIKE PANEL STORAGE FOR INSTALLATION OF REACTOR HEAD STAND WATER SHIELDS / NAPS / UNIT 1	CIVL	MODZELEWSKI
DCP 99-172	SERVICE WATER CHEMICAL ADDITION PIPING & VALVE UPGRADE / NAPS / UNIT 1	MECH	AVERY
DCP 00-004	SERVICE WATER BLOWDOWN / NAPS / UNITS 1&2	INNS	MELNIK
DCP 00-111	LOOP ISOLATION VALVE - REMOVAL OF DISC PRESSURIZATION PIPING / NAPS / UNIT 1	MECH	CHAISSON
DCP 00-118	RESIDUAL HEAT REMOVAL HEAT EXCHANGER OUTLET FLOW TRANSMITTER REPLACEMENT / NAPS / UNIT 1	ELEC	VIA
DCP 00-119	RESIDUAL HEAT REMOVAL HEAT EXCHANGER OUTLET FLOW TRANSMITTER REPLACEMENT / NAPS / UNIT 2	ELEC	VIA
DCP 00-125	TURBINE GOVERNOR VALVE SERVO CARD ADJUSTMENT / NAPS / UNIT 1	ELEC	ROSSETTI
DCP 00-129	SAFEGUARDS EXHAUST DAMPER REPLACEMENT / NAPS / UNIT 1	MECH	CHAISSON
DCP 00-130	SAFEGUARDS EXHAUST DAMPER REPLACEMENT / NAPS / UNIT 2	MECH	CHAISSON
DCP 00-147	MFRV ACTUATOR AIR SUPPLY MODIFICATION / NAPS / UNIT 1	MECH	AVERY
DCP 00-171	CONTROL ROOM EMERGENCY AIR FILTERS 1-HV-FL-18 & 19 DELTA "P" INDICATION / NAPS / UNIT 1	MECH	HYBERG
DCP 00-172	CONTROL ROOM EMERGENCY AIR FILTERS 1-HV-FL-18 & 19 DELTA P INDICATION / NAPS / UNIT 2	MECH	HYBERG
DCP 01-128	REVISED SETPOINT FOR 1-CH-RV-1322 / NAPS / UNITS 1&2	MECH	LEE
DCP 01-132	REPLACE QS AND RS RTDs ASSOCIATED WITH CONTAINMENT INTEGRITY REANALYSIS / NAPS / UNIT 2	ELEC	ROSSETTI

NRC SUMMARIES REQUIRED - YEAR 2002

DCP NO	TITLE	DEPT	ENGINEER
DCP 01-136	REPLACE EXISTING BARTON FLOW SWITCHES MODEL 288A WITH BARTON MODEL 288C / NAPS / UNIT 1	ELEC	SMITH
DCP 01-137	REPLACE EXISTING BARTON FLOW SWITCHES MODEL 288A WITH BARTON MODEL 288C / NAPS / UNIT 2	ELEC	SMITH
DCP 01-141	REMOVE RCP THERMAL BARRIER CC PRESSURE INDICATORS / NAPS / UNIT 1	MECH	LEE
DCP 01-143	GENERATOR BREAKER G 12 PRESSURE SWITCH TEST & ISOLATION VALVES / NAPS / UNIT 1	MECH	BAIRD
DCP 01-146	FEEDWATER HYDRAZINE ANALYZER REPLACEMENT / NAPS / UNIT 1	ELEC	SMITH
DCP 01-148	1 A/B/C MAIN FEEDWATER PUMP SUCTION HEADER PRESSURE TRANSMITTER REPLACEMENT / NAPS /UNIT 1	ELEC	SAKSVIG
DCP 01-149	FEEDWATER HYDRAZINE ANALYZER REPLACEMENT / NAPS / UNIT 2	ELEC	SMITH
DCP 01-152	REMOVE RCP THERMAL BARRIER CC PRESSURE INDICATORS / NAPS / UNIT 2	MECH	LEE
DCP 01-155	02-CC-MAN-216BC TEST MANIFOLD REMOVAL / NAPS / UNIT 2	MECH	AVERY
DCP 01-156	REACTOR HEAD INSULATION SPLATTER SHIELDS / NAPS / UNIT 2	CIVL	COMPTON
DCP 01-157	REMOVAL OF 2-CN-83 FLASH EVAPORATOR BYPASS VALVE / NAPS / UNIT 2	MECH	HYBERG
DCP 02-101	REPLACE HIGH PRESSURE SWITCH ON CONTAINMENT AIR PARTICULATE RADIATION MONITOR / NAPS / UNIT 1	ELEC	SMITH
DCP 02-108	PERMANENT SCAFFOLD SUPPORTS INSIDE CONDENSER / NAPS / UNIT 2	CIVL	COMPTON
DCP 02-133	REPLACE TERRY TURBINE PUMP 1-FW-P-2 RESTRICTIVE ORIFICE / NAPS /UNIT 1	MECH	BAIRD

1. Design Change Title/Station/Unit	2. Design Change Number
Repair/Replacement of Concrete-Encased SW Piping to/from CCHXs/NAPS/Units 1 & 2	91-012

1.0 STATEMENT OF PROBLEM

The Service Water (SW) piping is experiencing internal wall degradation due to general corrosion and relatively rapid wall loss in localized areas due to microbiologically influenced corrosion (MIC). Since 1992, engineering personnel have been able to more accurately characterize MIC pitting depths and population densities in representative areas of the SW System. By using dynamic ultrasonic (UT) scanning techniques (obtained during performance of 0-PT-75.14) and physical hands-on measurements, Engineering has been able to calculate general and pitting corrosion rates.

Average rates of corrosion of the exposed piping to/from the component cooling heat exchangers (CCHXs) are estimated at 0-6 mils per year (mpy) for general corrosion wall loss and 1-20 mpy for pitting corrosion wall loss. The exposed piping to the CCHXs has been replaced downstream of valves 1-SW-MOV-108A and 2-SW-MOV-208A and upstream of valves 1-SW-247 and 1-SW-250 in 1997 per DCP 94-010. The wall thickness of portions of these pipes (lines 24"-WS-95, 96,101,102-151-Q3) between the Auxiliary Building wall E-E and the above valves was evaluated based on projected results of 0-PT-75.14 and found to be adequate through March 2001 (See JCO-92-05, Rev.3 dated 12-17-1998) with very small margin, therefore implementation of this DCP is planned to be completed prior to this projected date.

The repair/replacement of 24" pipes to CCHXs from the above valves up to 36" diameter main SW headers including encased in concrete portions of these pipes will conclude Phase I of the SW piping refurbishment and allow JCO-92-05 to be closed out. Previously completed DCPs under Phase I of SW piping refurbishment are:

91-009-1 Repair/Replacement of 24" SW Headers to/from Unit 1 RSHXs

91-010-2 Repair/Replacement of 24" SW Headers to/from Unit 2 RSHXs

91-011-3 Repair/Replacement of 24" Auxiliary SW Supply Headers

1. Design Change Title/Station/Unit	2. Design Change Number
Repair/Replacement of Concrete-Encased SW Piping to/from CCHXs/NAPS/Units 1 & 2	91-012

2.0 PROPOSED RESOLUTION

2.1 General Design Description

The repair/replacement of SW lines 24"-WS-95,96,101,102-151-Q3 to CCHXs from their connection to 36" main SW headers under the Service Building up to the first isolation valve within the Auxiliary Building includes two major tasks:

1. Repair of encased portion of 24" pipes, from 36" main SW headers up to the Auxiliary building E-E wall.

2. Replace exposed portion of the pipes, from Auxiliary Building E-E wall up to the first isolation valves 1-SW-MOV-108A, 2-SW-MOV-208A, 1-SW-247 and 1-SW-250. Note that there are several SW branches between the Auxiliary Building wall and the isolation valves. These branches will be replaced with AL-6XN pipe up to the first isolation valve or up to the first branch connection, see drawing N-91012-0-1FM078AC, sh.4, N-91012-0-1FM078G, sh.1 and N-91012-0-M -401, sh.1.

It will require significant effort and time to perform the above tasks. Since the repair/replacement cannot be performed during the 168 hour Action Statement (AS)allowed by TS Section 3.7.4.1.d, a one time TS amendment was requested from NRC to extend the 168 hour (7 day) action to 35 days for isolation of the 24" SW headers to the CCHXs (35 day exemption for each SW header, i.e. two 35 day AS). Two seven day AS for isolation of the headers and installation of the pipe plugs close to the 36" main SW headers and the plug removal are included in the 35 day AS. Note, that temporary TS Change Request for the SW Refurbishment was granted by the NRC by letter #97-429 dated 07/17/1997, see Appendix 1-1.

To provide two sources of SW supply to all other SW consumers except CCHXs, 10" diameter temporary SW lines will be installed from the temporary 18" bypass line between supply and return main SW header, in the area of manways. Installation of the bypass line guarantees availability of two SW headers for SW consumers during the repair/replacement work. See drawings N-91012-0-M-100A and N-91012-0-M-400A for SW piping configuration during repair of lines supplied from header A and drawings N-91012-0-M-100B and N-91012-0-M-400B for repair of lines supplied from header B.

1. Design Change Title/Station/Unit	2. Design Change Number
Repair/Replacement of Concrete-Encased SW Piping to/from CCHXs/NAPS/Units 1 & 2	91-012

The scope of this project includes refurbishment of the concrete-encased 24" SW headers (approximately 35-40 feet of encased portion for each SW pipe, four pipes total) and short sections (10-15 ft) of exposed portion of each SW pipe (four pipes total) up to first isolation valve on the header. Drawings N-91012-M-400A, N-91012-M-400B, N-91012-1FM078AA, N-91012-0-M-100A, N-91012-0-1FM078CA, N-91012-0-1FM078AB, 91012-0-M-100B, N-91012-0-1FM078CB show view of the SW piping to/from CCHXs and branches to/from charging pump coolers, air compressor coolers, SFP coolers and Unit 2 CR chillers during the refurbishment work under this project. Temporary pipes to the charging pumps, air compressors, SFP and Unit 2 CR chillers are branched from 10" lines which are connected upstream of the isolation valves on SW supply headers and downstream of the isolation valves on the SW return headers.

Inspection, repair and coating of 36" x 24" reducers and their welds to the main SW headers encased in concrete under the Service Building is also included in the scope of this DCP. This work will be done during either 168 hour main SW header TS AS.

For sequence of refurbishment see section 1.3 of SII.

The SW system design basis to supply cooling water to SR consumers during normal station operation and design basis accident will be maintained during implementation of SW piping repair/replacement under this DCP. This DCP does not change SW system configuration. Repair /replacement of deteriorated SW piping under this DCP will increase the SW system reliability.

2.2 Limiting Operating Conditions and Special Requirements for Implementation

This DCP will be implemented during a period when both Units are on-line in normal full power operation. Operation of the temporary 18" bypass line during this DCP implementation creates flow limitation during the DBA, which creates necessity to perform this repair/replacement during period of cool SW temperatures, i.e. from October to April. All limiting conditions and special requirements (including the above) are described in item 7 of the Safety Evaluation (attached) and Section 1.2 of the SII. Formal tracking of the limiting conditions will be controlled per DCP implementing procedures 0-TMOP-49.10, 0-TMOP-49.11 and 0-WP-M91012.

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Repair/Replacement of Concrete-Encased SW Piping to/from CCHXs/NAPS/Units 1 & 2	91-012

2.3 Refurbishment Requirements

Minimum wall thickness requirements for the encased in concrete portions of the 24" SW headers are shown on drawing N-91012-0-M-800. These thicknesses are based on code required stress analyses, allowance for metal loss in cleaning. An allowance (9 mils) for measurement accuracy is added in the inspection procedure, see Section 1.3 of SII. The table below provides a listing for each area with its corresponding minimum wall requirement and the inspection methodology, which will be used.

Pipe Section	Required Min Wall	Assessment Methodology
Concrete encased portion from the 36" header up to Aux. Building wall E-E	0.129"	Assessment will be performed in accordance with Sect. 1.3 of SII. All pits with remaining wall less than the pressure acceptance criteria (0.129" + inspection tolerance) will be marked for repair to surrounding wall thickness.
Concrete encased portion from the 36" header in the area of plug installation	0.289"	Assessment will be performed in accordance with Sect. 1.3 of SII. The wall will be repaired to achieve .289" thickness 2 1/2" above and below the plug.
Concrete encased portion of the pipe penetrating Aux. Building wall E-E,	0.289"	Assessment will be performed in accordance with Sect. 1.3 of SII. The wall will be repaired to achieve .289" thickness, approximately 3" north and south of the wall E-E.

For sequence and requirements to the pipe cleaning and coating see Section 1.3 of the SII. The possibility of internal protective coating failures which may result in the accumulating of coating debris forming flow obstructions in the heat exchangers has been investigated by Materials Engineering. The investigation concluded that the coating failures will not affect SW system and associated equipment performance. This conclusion was based upon:

- evaluation of the probable failure mode of the coating
- testing to assure successful coating application
- applicators' qualification requirements
- adequate quality control and surveillance to assure compliance with application procedures.

1. Design Change Title/Station/Unit	2. Design Change Number
Repair/Replacement of Concrete-Encased SW Piping to/from CCHXs/NAPS/Units 1 & 2	91-012

3.0 PROGRAM REVIEW

3.2 Technical Specifications

The Service Water System is required to operate in all modes of plant operation and under all accident conditions. Component Cooling Water System is also required to operate in all modes of operation. The SW System is governed during operating modes 1 through 4 by Technical Specifications 3/4.7.4.1 which states that at least two Service Water loops (shared between units) shall be operable when one or two units are in operation. The CC System in modes 1 through 4 is governed by TS Section 3/4.7.3.1 which requires three out of four CC subsystems to be operable.

Virginia Power Temporary Technical Specification Change Request No.345 was approved by NRC on July 17, 1997 (NRC Letter Serial# 97-429). Therefore, work on this DCP may proceed pending approval of the DCP by SNSOC. NRC approved the following actions:

1. Isolation of the 24" SW headers (24"-WS-95 and 24"-WS-102 & 24"-WS-96 and 24"-WS-101) to CCHXs requires special, one time, NRC approval which was granted by NRC. It is evaluated that 35 days are required for repair of one 24" supply and return SW header. Therefore two 35 days periods are required. The statement is included in the TS amendment that during these 35 days CCHXs will be considered operable even though they are supplied from one SW header. Note, that two separate 7 days AS on main SW headers per TS Section 3.7.4.1.d are included within these 35 days.

2. During the two 35-day periods when operating with one SW header supplying the CCHXs, no major maintenance or testing shall be planned on the main SW pumps. This is specified to ensure adequate flow capability is available in case of a spurious pump failure. To the maximum extent practical, routine periodic tests (e.g., quarterly pump tests) and preventative maintenance work (e.g., motor checks) will be scheduled prior to or following the 35-day periods. Certain tests will have to be performed during the 35-day periods (e.g., during Technical Specification required emergency diesel start tests, the associated SW pump is considered inoperable due to

its emergency power supply being inoperable). For tests which render a SW pump inoperable, the 72-hour action statement (included in the proposed new Technical Specification wording) will be entered to perform the test. If a SW pump on the header supplying the CCHXs becomes inoperable, an operable pump from the other header should be realigned to this header to maintain two operable pumps on the header supplying the CCHXs.

Both ASW pumps should be operable during beginning and end of the 35 day AS when TS AS per 3.7.4.1.d is entered for installation and removal of 24" valves and blind flanges on the lines to CCHXs.

3. NRC approved the temporary installation of crossconnect with manually operated valve between the main SW headers and defeating the automatic closing of SW MOVs to CCHXs (1-SW-MOV-108A,B and 2-SW-MOV-208A,B) on a CDA signal during the time of CCHX operation from one SW header. The crossconnect valve will be throttled to ensure normal SW pump operation at approximately 7400 gpm (SW pump discharge pressure 70 psig) and compliance of the SW system with GDC-5 (see below).

4. To satisfy the design basis requirement for the component cooling system (fast cooldown of one unit while maintaining normal loads on the other unit), SW temperature in the reservoir should not be above 75°F due to SW flow limitations. This factor limits implementation of the SW exposed piping repair/replacement to/from CCHXs to the time frame normally between October and April when the temperature in the SW reservoir can be maintained below 75°. If SW temperature is between 75°F and 78.5°F, CCHX will not be able to supply cooling water of sufficient low temperature to the RHR heat exchangers to meet the fast cooldown requirements of one unit while other unit is in operation. If the SW temperature exceeds 78.5°F, three SW pumps should be aligned to the header supplying the CCHXs while one SW pump operates on another header. This temperature limitation and SW pump realignment is required only during RHR operation, i.e. during an unplanned unit shutdown.

5. The following limiting conditions were included in probabilistic safety analysis (PSA) assumptions, and they will be implemented during time when CCHXs are supplied from one SW header: a) neither unit will have RHR in service while only one SW header is available to the CCHXs, i.e. the safety analysis assumes that both units are operating during one SW header operation, b) the only equipment

with less than two SW headers operable will be the CCHXs, c) the SW header supplying the CCHXs will always have two operable SW pumps, otherwise TS Action Statement per Section 3.7.4.1.a and/or 3.7.4.1.b is required. No planned outage will take place during the 35 day periods. In the event of unplanned Unit shutdown, Engineering will be notified as soon as possible to evaluate the best course of actions to place RHR in operation.

Four 168 hours TS Section 3.7.4.1.d Action Statements on the main service water headers will be required for installation and removal of plugs and blind flanges on 24" lines to CCHXs and crossconnects between supply and return headers and temporary bypasses. This crossconnect will prevent SW pump operation at near deadhead conditions during isolation of one out of two main SW headers to/from CCHXs and guarantee independent operation (redundancy) of two SW headers. SW header outages will be guided by the specially prepared procedures for this DCP. This procedure describes operator action in cases associated with all aspects of the header outages when all operating CCHXs are aligned on one SW header.

3.3 Fire Protection/Appendix "R"

SW system is discussed in Section 3.7.7 of Appendix "R" Report. Repair/replacement of SW headers and associated MOVs will be performed during TS Action Statements (35 day TS AS for each SW header). No permanent modification to SW system will be performed during this piping repair/replacement work. Therefore Appendix "R" description and safe shutdown components are not affected. Also, due to temporary character of SW piping repair (two TS AS for 35 day each) with removal of associated valves (1-SW-MOV-108A,B, 2-SW-MOV-208A,B, 1-SW-247, 1-SW-250) App.R drawing change is not required.

3.5 Station Security

The scope of this DCP involves installation of crossconnects on 18" diameter manways in the Auxiliary Building Tunnel and removal of 24" MOVs in the Auxiliary Building. Therefore, openings will be created inside the protected areas. Access to the Auxiliary Building will be possible through the SW Tie-in vault if manways are removed for ventilation or other purposes.

Based on the above scenario of repairs, the following security measures will be considered:

- Security officer will be notified prior to creating an opening in the SW Tie-in vault if the manways are to be removed. Security officer will be required during TS Action Statement on the main SW headers only.

Therefore, security officers may need to be posted based on construction activities in progress.

3.6 Electrical System Analysis

No permanent load changes or electrical system changes will be implemented by this DCP. The CDA initiated automatic isolation signals for motor operated valves 1-SW-MOV-108A&B and 2-SW-MOV-208A&B will be temporarily disabled as mentioned earlier in this DCP. In addition, some electrical raceway and cable rework may be required on a temporary basis to facilitate piping replacement (see SII section of this DCP). Based on this limited scope, there is no electrical system analysis impact due to this piping replacement.

3.7 Inservice Inspection/Inservice Testing

Exposed portions of 24" SW piping from the Auxiliary Building wall E-E up to the first isolation valves (including branches from these lines up to first isolation valve) will be replaced. Encased in concrete portions of these lines from the building wall up to 36" main SW headers will be repaired and coated with protective coating. Temporary 18" diameter crossconnects will be installed between the main SW headers utilizing 18" diameter manways located in the Auxiliary Building Tunnel. Ten inch diameter temporary lines to supply SW to charging pumps, Unit 2 CR chillers, Fuel Pool and IA compressor will be branched from the crossconnect. Also small bore carbon steel and 316L SS piping adjacent to 24" SW piping to/from CCHXs will be replaced with the AL-6XN piping. This repair/replacement is planned to be implemented with both Unit operating.

The SW (permanent and temporary) piping is subject to the examination per ASME Section XI, Division I, Subsection IWD. Weld inspection will be performed in accordance with ANSI B31.7-1969 including 1970 Addendum.

The piping is subject to visual examination VT-2 of IWA-2212 in conjunction with the system pressure test of IWD-5000. Hydrostatic test shall be 1.1 times the system design pressure of 150 psig, i.e. 165 psig

(Article IWD-5223). Test condition holding time should be per Article IWA-5213. Where practical, hydrostatic test may be substituted by testing in accordance with Code Case N-416-1 and NRC approval contained in NRC letter Serial No. 95-041 dated January 18, 1995. Note that use of this code case requires additional NDE of Class 3 welds and documentation on NIS-2 form, see References 6.6 and 6.7 and ER&D Section 2.3.16. All welded attachments to the pipe shall be VT-3 examined in accordance with Subsection IWF-2200 and IWD-2200. Pipe supports should be examined in accordance with IWF if support removal and reinstallation and new temporary support installation was performed.

No changes to the ISI plan, IWV program or IWP program are required. Requirements of VPAP-0307 are applied.

3.8 Seismic

The Service Water is a Safety Related Seismic Class 1 System and is designed in accordance with ANSI B31.7 code of 1969 with addendum through 1970, Class 3.

The SW pipes repaired or replaced by this DCP and temporarily installed 18" diameter crossconnects and 10" temporary piping are qualified to loading conditions which include Operational Basis Earthquake (OBE) and Design Basis Earthquake (DBE) in addition to normal operating conditions. During this repair/replacement work the part of the SW piping will be temporarily disassembled and some valves and expansion joints will be temporarily removed and blind flanges installed to facilitate repairs and maintain operating piping pressure boundary. The operating piping, including temporary piping, was analyzed for all these conditions and temporary supports were designed to ensure the piping structural integrity under normal operational and accident conditions.

Reference calculations:
CE-1421, Pipe Stress Analyses of Service Water Temporary Piping - Alignment A and B Header Replacement
CE-1455, Pipe Supports for Service Water Temporary Piping - Alignment A and B Header Replacement

3.13 Plant Flooding

The scope of this DCP involves installation of the 18" diameter crossconnects on the main SW headers utilizing manways in the Auxiliary

Building Tunnel and work inside the main SW headers for the 24" diameter plug installation. This will require removal of the 18" diameter manhole covers on the headers within the Auxiliary Building Tunnel. Also, 24" diameter MOVs 1-SW-MOV-108A,B and 2-SW-MOV-208A,B and valves 1-SW-247 and 1-SW-250 in the Auxiliary Building will be temporarily removed. To prevent possible flooding in the basement of the Auxiliary Building, appropriate valves on the SW pump discharge will be locked closed during TS AS 3.7.4.1.d.

3.22 Equipment Data System (EDS)

Temporary 18" diameter crossconnects with manually operated butterfly valves (one valve in each line) will be installed between the main SW headers utilizing 18" diameter manways located in the Auxiliary Building Tunnel. Ten inch diameter temporary lines for supply of SW to charging pumps, Unit 2 CR chillers, Fuel Pool and IA compressor will be branched from the crossconnect. Also small bore carbon steel and 316L SS piping adjacent to 24" SW piping to/from CCHXs will be replaced with the AL-6XN piping.

Therefore, temporary line and valve numbers will be added (EDS card No. 0000013383) and later deleted from EDS and new small bore line numbers will be permanently added to EDS (EDS card No. 0000013101).

To distinguish portions of existing 316L stainless steel (SS) lines from replaced with the AL-6XN portions, new portions were assigned numbers which differentiate from the existing line numbers by reference to design table 164 compared with 163 for the existing 316L pipes. For example, if the existing line number is 4"-WS-56-151-Q3, replacement portion number will be 4"-WS-56-164-Q3 (see drawings N-91012-0-1FM078AC, sh.4). EDS card No. 0000013101 reflects all the above changes.

3.23 ALARA Analysis

Service Water piping repair/replacement work under this DCP will require work in the Auxiliary Building tunnel and basement in the area of CCHXs, which are radiological, controlled areas (RCA). In order to minimize exposure to workers, the following ALARA considerations will be incorporated into this DCP:

1. Prefabrication of piping, use of mock-up and preparation for the repair work in a non-radiation area.

2. Where possible, work for cutting and welding pipe and preparation for the repair work has been selected in areas where radiation levels are relatively low.

3. Health Physics (HP) review of the work area and issuance of an RWP.

4. Briefing of personnel on the radiological condition of the work areas will be conducted prior to the performance of any work.

Radiation surveys of the intended work areas will be reviewed prior to and during implementation of this DCP and appropriate precautions taken. All hot spots are to be identified by HP prior to performing work. The total estimated time of 18500 hours is expected to be worked in radiation areas. The total anticipated exposure is calculated as shown below:

Exposure in the Auxiliary Building and Auxiliary Building Tunnel 18500 x .10 = 1850 mR, where 18500 - manhours estimate within the Auxiliary Building during the project implementation, .10 - dose rate in the area of CCHXs in the basement of Auxiliary Building (millirem/hour).

This calculation has been prepared in accordance with STD-GN-0020, "Design Change ALARA Dose Estimates".

All piping repairs/replacement will be performed on Service Water System. SW neither contains radioactive fluid nor does it pass through a neutron field capable forming activated corrosion products. Therefore, this design change does not adversely impact the radiological status of the surrounding areas.

3.24 Cumulative Effects on Plant Systems

Emergency supply (in case of unlikely event of loss of operational SW header during TS AS on the other SW header) will be provided utilizing fire protection water or primary grade water. Small amount of water for the charging pump coolers necessary in this case does not affect SR functions and any operational aspect of fire protection or primary grade water systems.

3.25 Recent NRC Concerns

NRC position on safety related piping repair was stated in Generic Letters 90-05 "Guidance for Performing Temporary Non-code Repair of the

ASME Code Class 1,2, and 3 Piping" and 91-18 "Information to Licensees Regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Nonconforming Conditions and Operability".

This Design Change implements NRC recommendations of the SW piping code repair described in these letters.

Previous NRC concerns associated with the SW system pertained to:

- the repeated isolation of the SW system, and

- the potential for flooding critical equipment via openings in the SW System of 18" and larger.

Some actions described in this DCP require prior NRC approval, see Section 2.1 for details. This DCP requires that certain contingency measures be put in place or verified prior to removing a header from service. These measures consist of ensuring that certain valves are tagged closed to prevent inadvertent actuation, a station operator be posted in Auxiliary Building basement, flood protection measures at the charging pump cubicles and an additional security officer at the SW Pumphouse when the manways are open.

3.26 Impact of/on Other Design Changes

This DC is a part of the SW system upgrade project (see page 2). Work on this DC will be performed after similar work on the Unit 1, Unit 2 and ASW is completed. Majority of lessons learned during implementation of DCP-91-009-1, 91-010-2, 91-011-3 and 94-010 were incorporated in this DCP. This DCP also replaces part of small bore SW lines from the 24" SW headers up to the first isolation valve with AL-6XN piping. This replacement is part of the planned future replacement of small bore SW piping with AL-6XN. Replacement of these portions of small bore SW lines eliminates future necessity for isolation of the main SW headers for the small bore piping replacement.

3.27 Summary of Equipment Added or Removed

Two manually operated 18" diameter butterfly valves 1-SW-1337 and 1-SW-1338 will be temporarily added for this DCP crossconnects between the supply and return main SW headers. Ten inch diameter temporary lines for

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supply of SW to charging pumps, Unit 2 CR chillers, Fuel Pool and IA compressor will be branched from the crossconnects (lines 10"-WS-J03,4,5,6-151-Q3). Also small bore carbon steel and 316L SS piping adjacent to 24" SW piping to/from CCHXs will be replaced with the AL-6XN piping.

The crossconnects and temporary 10" lines will function only during the time of this DCP implementation. The crossconnect lines (18"-WS-J01-151-Q3 and 18"-WS-J02-151-Q3) and valves and temporary 10" lines will be dismantled when work on this DCP is completed. Since these lines and valves are temporary, they are not included on the table below (Equipment Added/Removed).

MARK #	ADD/REM	FUNCTION
4"-WS-C50-164-Q3	Add	SYPB
4"-WS-C51-164-Q3	Add	SYPB
10"-WS-22-164-Q3	Add	SYPB
10"-WS-23-164-Q3	Add	SYPB
10"-WS-21-164-Q3	Add	SYPB
10"-WS-20-164-Q3	Add	SYPB
4"-WS-C52-164-Q3	Add	SYPB
4"-WS-C53-164-Q3	Add	SYPB
4"-WS-56-164-Q3	Add	SYPB
4"-WS-57-164-Q3	Add	SYPB
3/4"-WS-A40-164-Q3	Add	SYPB
3/4"-WS-A41-164-Q3	Add	SYPB
3/4"-WS-A42-164-Q3	Add	SYPB
3/4"-WS-A44-164-Q3	Add	SYPB
2"-WS-E88-164-Q3	Add	SYPB
2"-WS-E89-164-Q3	Add	SYPB
2"-WS-E87-164-Q3	Add	SYPB
2"-WS-E86-164-Q3	Add	SYPB
4"-WS-46-164-Q3	Add	SYPB
4"-WS-47-164-Q3	Add	SYPB
3"-WS-15-164-Q3	Add	SYPB
3"-WS-15-151-Q3	Rem	SYPB

3.35. Labeling

Temporary 18" diameter crossconnects with manually operated butterfly valves (one valve in each crossconnect) will be installed between the main SW headers. The lines and valves will be dismantled upon completion of the repair work. These valves will be labeled in accordance with attached Component Label Specification per VPAP-1409 (see Appendix 2-1).

3.40 Maintenance Rule

Equipment availability is managed in accordance with the maintenance rule (VPAP-2001). Configurations involving SW header outages are analyzed based on cooperation between the station planning and NA&F departments to ensure acceptability of the outages based on NRC temporary TS change approval.

4.0 REFERENCES

* indicates revision is required

4.1 Calculations

1. NE-0151, Rev.0, Add. 00A Revised Corrosion Rate Evaluation of North Anna Service Water System.

2. ME-0420, Rev.1 Add. B through J. Component Cooling Heat Exchanger Retubing/Replacement Study.

3. CE-1421, Rev.0 Pipe Stress Analyses of Service Water Temporary Piping - Alignment A and B Header Replacement

4. CE-1455, Rev.0 Pipe Supports for Service Water Temporary Piping - Alignment A and B Header Replacement

5. CE-1191, Rev.0 Analysis of Crossconnects between Supply and Return SW Headers at Aux. Bldg Manhole

6. ME-0573, Rev.0 Pipe 2000 Model to Support DCP 91-012

7. ME-0518, Rev.0 Sizing of Temporary SW line to Charging Pumps, Spent Fuel Pool and Unit 2 CR Chillers

8. CE-0915 Design of Plug Inside the 24" Dia SW Pipes for SW Preservation

4.2 Specifications:

1. NAS-1009 Specification for Installation of Piping and Mechanical Equipment
2. NAS-271 Specification for Field Fabrication and Erection of Piping
3. NAS-3014 Electrical Installation Specification
4. NAS-3012 Criteria Specification for Design and Identification of Electrical Cable Systems
5. NAS-3001 Specification for Outside Containment Protective Coatings
6. NAS-2016 Safety Related Standard Conduit Supports
7. NAS-1023 Anchor Bolt Installation
8. NAI-0014 Specification for Grouting and Concrete Repair
9. NAP-0022 Rubber Expansion Joints.
10. NAS-1023 Installation of Imbedment Plates Anchors Drilled in Concrete

4.3 NRC Correspondence

1. Virginia Power Letter Serial No. 96-599 dated 12-16-1996, Proposed Temporary Technical Specifications Change.

2. NRC Letter Serial No. 95-041 dated January 18, 1995 accepting use of Code Case N-416-1.

4.4 ASME Code Case N-416-1.

VIRGINIA POWER

ENGINEERING REVIEW AND DESIGN
- NUCLEAR POWER STATION

FOU 11

STD-GN-0001

1 Design Change Title Station Unit		2 Design Change Number
Service Air PIC Removal/NAPS/U1&U2		91-114-3
3. Preparing Engineer/Affiliation (Print) M.C.C. Walton / Va Power	4. Signature	5. Date 5/18/93
6. Reviewing Engineer/Affiliation (Print) PAUL A. PHELPS / VA. POWER	7. Signature Paul A. Phelps	8. Date 5-17-93

9 Engineering Review and Design.

1.0 STATEMENT OF THE PROBLEM

Pressure indicating controllers 1-SA-PIC-105, 1-SA-PIC-101, 2-SA-PIC-201, & 2-SA-PIC-205 are not being used in the new service/instrument air system configuration. The PICs are currently operating at a high setpoint so that the PCVs are not active in the system (they remain open). The PICs are still on the PM schedule even though they are not being used. PIC 1-SA-PIC-105 has recently failed a calibration procedure. These PICs need to be removed from the system since they are not being used anymore.

2.0 PROPOSED RESOLUTION

2.1 Executive Summary

PICs 1-SA-PIC-105, 1-SA-PIC-101, 2-SA-PIC-201, & 2-SA-PIC-205 are to be removed. Air supply lines to the associated PCVs shall be isolated and capped where appropriate. The input lines to the PICs shall be isolated, cut, & capped to prevent leakage. This will result in the associated PCVs being left in a failed open position.

2.2 Design Description

The PIC/PCVs were intended to control the backup of instrument air receivers with service air receivers. With the PICs actively set (about 90psig), 1-SA-TK-1 backs-up 1-IA-TK-1 and 2-IA-TK-1 via 1-SA-PCV-101 and 1-SA-PCV-105 respectively. Also, 2-SA-TK-1 backs-up 1-IA-TK-1 and 2-IA-TK-1 via 2-SA-PCV-201 and 2-SA-PCV-205, respectively. The pressure controllers associated with the PCVs were originally set to open at 90 psig decreasing IA Receiver pressure, but are currently set at 120 psig. Since IA pressure is nominally about 100 psig, the result is that these PCVs are always fully open such that Service Air is the primary source of Instrument Air pressure, and the Instrument Air Compressors load as necessary on decreasing IA pressure for additional IA supply. Hence the current operating philosophy is to use the Service Air receivers as the constant supply to the Instrument Air Receivers, instead of just providing back-up supply. Under this configuration, the PICs are no longer required to sense when SA Receivers need to back-up IA Receivers.

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Service Air PIC Removal/NAPS/U1&U2	91-114-3

9. Engineering Review and Design (continued)

Failure of one of the PICs has resulted in the re-appearance of the request to abandon the PIC/PCV pairs in place, in accordance with the current operating philosophy. See Appendix 4-6 for one occurrence of the abandonment request. This DCP will resolve the request by removing the PICs, which will disable the PCVs, leaving them in a failed open configuration. Although the PCVs will be disabled, they are not to be classified as abandoned in place. The PCVs will still provide a pressure boundary between the SA/IA tanks.

Because removing the PICs will result in the PCVs remaining in the open position, there will be no change in the system flow path as a result of this modification. The flow constant Cv will remain about the same for the failed open PCVs. All supply air to the PIC/PCVs will be isolated and capped where appropriate so that there are no supply air leaks. The input line to the PICs will be isolated, capped and removed.

Several suggestions/comments have been made in regards to the approach of disabling the PCVs vs. removing the PCVs entirely. While removal would be the most thorough option, it is not the most practical. Removal of the PCVs would entail significant tag-out requirements, including a service air to instrument air outage. Therefore, to avoid these obstacles, PCVs will be disabled. This approach will still leave open the opportunity to remove them as necessary in the future.

(2) ADDITION

2.3 **Special Implementation Requirements**

2.3.1 This DCP involves **SEISMIC, NON-SAFETY RELATED, NON-EQ** components.

2.3.2 Work under this DCP may be performed in any Unit mode.

2.3.3 Use IMP-C-MISC-05 to remove PICs 1-SA-PIC-101,2-SA-PIC-201,1-SA-PIC-105,2-SA-PIC-205.

2.3.4 The supply air lines to the PICs and PCVs should be isolated, capped and removed in accordance with NAI-0001.

2.3.5 When cutting the supply air lines for capping, allow enough tubing for cutting off the cap for possible future fittings.

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Service Air PIC Removal/NAPS/U1&U2	91-114-3

9. Engineering Review and Design (continued):

3.0 PROGRAMS REVIEW

3.8 Seismic

The PICs and PCVs are seismically mounted. The PICs and supply air lines will be removed from the mount on the PCVs. No seismic evaluation will be required because only a minor reduction of weight is occurring which does not adversely affect the current design. The reduction of weight will be a conservative change.

3.19 Setpoints, Instrument Accuracy and Scaling

This DCP requires the removal of the subject PICs from the setpoint document. These PICs no longer require calibration. See Appendix 4-2 for the Setpoint mark-up.

3.22 Equipment Data System (EDS)

The PICs being removed are described in EDS. Therefore EDS change forms are included in Appendix 4-4 to revise EDS as required by this modification.

3.23 ALARA Analysis

This DCP involves work in the Aux Building, which is a Radiological Controlled Area. The removal of each PIC and associated tubing is expected to take 16 man-hours for a 64 man-hour total for the DCP. Dose rate is relatively low for the area around the PICs (approx. 2 mrem/hour). This yields approximately .128 man-rem total exposure for this project.

3.27 Summary of Equipment Removed

This DCP will remove the PICs as described below, and there existing air supply lines.

Mark #	Mfg	Model
1-SA-PIC-105	Fisher	4181
1-SA-PIC-101	Fisher	4181
2-SA-PIC-205	Fisher	4181
2-SA-PIC-201	Fisher	4181

REPLACED 2

3.33 NCRODP Training Modules

NCRODP-17 (the volume on the Compressed Air System) requires

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9. Engineering Review and Design (continued)

revision as a result of this design change. The volume describes the PCVs as playing an active role in the system. The revision will explain that the PCVs have been left in the failed open (see Appendix 4-5).

4.0 FUNCTIONAL TESTING REQUIREMENTS/ACCEPTANCE CRITERIA

The PCVs shall be inspected for proper removal of the PICs, and the caps shall be leak tested by an in-service leak test. Acceptance criteria consists of proper removal as determined by Testing and no visible leaks by the caps. The PCVs shall be verified to be in the fully open position.

5.0 SYSTEM DESCRIPTION

With the PICs set to actuate @90psig, the service air receivers back-up the instrument air receivers which are fed by the instrument air compressors. The current setpoint of the PICs is 120psig, which is well above the 100psig operating pressure of the IA system. The PCVs therefore remain fully open. This DCP will keep the PCVs in the fully open position because they are direct acting "air to close." In this state SA receivers are the supply to the IA receivers, which are now backed up by the IA compressors.

6.0 REFERENCES

Memo from M. D. Sartain to M. W. Gettler dated June 4,1992
(Appendix 4-6)

NCRODP-17 Compressed Air System

Memo from S.L. Harvey to A.K. Al-Hamdani regarding "Abandon in Place" terminology.

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Service Air PIC Removal/NAPS/1&2	91-114

30. Field Change (continued)

3.0 Actual Changes to DCP Sections

3.1 Change the Drawing Revision Record to reflect drawing revisions: N91114-3-1FM082N Rev. 1 and N91114-3-1FK3C Rev. 1.

3.2 Add the following sentence to the end of section 2.2 of the ER&D:

The IA supply lines are to be cut and capped upstream of the isolation valves so that the isolation valves and the associated tubing and tubing support may be removed.

Added 13

3.3 Replace Section 3.27 of the ER&D with the following:

3.27 Summary of Equipment Removed

This DCP will remove the following componenets:

Mark #	Manufacturer	Model
1-SA-PIC-105	Fisher	4181
1-SA-PIC-101	Fisher	4181
1-IA-412	Hoke	3212G4B-1
1-IA-413	Hoke	3212G4B-1
1-IA-414	Hoke	3212G4B-1
1-IA-415	Hoke	3212G4B-1

Replaced 13

3.4 Add the attached EDSCR forms to Appendix 4.4. Added 13

3.5 Annotations reflecting these changes have been made in the color controlled copy.

J Sims 12/21/99

4.0 Security Review

A security review has been performed and it has been determined that no compensatory measures are required as a result of this change.

11715-FK-3C. Therefore, the replacement drawing will be added as Revision 8 and the previously issued drawing is superseded.

The DCP has been reviewed and there is no impact based on the latest revision of General Nuclear Standard GN-0001.

ORR #1 will stand as the final ORR. As this revision to the DCP is administrative in nature there is no additional ORR required.

2.0 Description of Change

2.1 The ER&D requires revision to reflect the restoration of the original design intent and the elimination of the revision (Field Change 2) which directed the removal the air tubing and isolation valves that were associated with the removed Service Air PICs.

2.2 The affected drawings are being revised to reflect the as-is condition and the Drawing Revision Record revised to reflect these revisions.

2.3 EDSCR forms were created to reflect the removal of the isolation valves. These forms are being deleted as the valves are remaining as originally designed.

3.0 Actual Changes to DCP

3.1 Delete the last sentence of ER&D section 2.2 Design Description (Field Change 2).

3.2 Replace section 3.27, Summary of Equipment Removed as follows:

Mark #	Manufacturer	Model
1-SA-PIC-105	Fisher	4181
1-SA-PIC-101	Fisher	4181
2-SA-PIC-205	Fisher	4181
2-SA-PIC-201	Fisher	4181

3.3 Delete the EDSCR forms added to Appendix 4.4 (Field Change 2).

1. Design Change Title/Station/Unit	2. Design Change Number
INDEPENDENT SPENT FUEL STORAGE INSTALLATION / NAPS / Units 1&2	**95-005**

1.0 STATEMENT OF THE PROBLEM

Discharged spent fuel assemblies from North Anna Units 1 and 2 are currently stored in the spent fuel pool common to both Units. The spent fuel pool is licensed for the interim storage of 1,737 fuel assemblies in high density storage racks. Based on the current fuel management strategy and refueling outage schedule, the spent fuel pool will lose the capacity for single unit full core discharge after the Unit 1 refueling outage scheduled for November 1998. Storage capacity will be completely exhausted one year later, therefore, additional spent fuel storage capacity is needed. To support the need for additional storage capacity, sealed surface storage casks (SSSCs) have been chosen for use at an Independent Spent Fuel Storage Installation at the North Anna site.

An application was submitted to the US Nuclear Regulatory Commission (US NRC) in May 1995 for a site-specific ISFSI license under 10 CFR Part 72. This license application included an Environmental Report, Safety Analysis Report and proposed Technical Specifications. Approval of the ISFSI license and Technical Specifications by the US NRC requires that they complete an Environmental Assessment and a Safety Evaluation Report. Once all NRC reviews have been completed and a license and Technical Specification have been issued, construction of the ISFSI can begin. The US NRC staff indicates that the approval of an ISFSI license should occur by the middle of 1997. Construction may proceed on an " at risk" basis once the Environmental Assessment has been approved.

Before construction of the ISFSI can begin, several permits are also needed from Louisa County, the most important being a Conditional Use Permit. Information regarding the Conditional Use Permit is contained in Appendix 4-11.

Approval of SSSC designs by the US NRC is done under a separate licensing action by the SSSC vendor. This involves the US NRC review and approval of a Topical Safety Analysis Report (TSAR). A facility using a cask design with an approved TSAR needs to reference the TSAR in their Safety Analysis Report and evaluate the use of that particular design in their facility.

Licensing by the US NRC and Louisa County, construction of the ISFSI, and procurement of SSSC's must be completed on a schedule to support loading of the first two SSSC's by November 1998. The North Anna ISFSI is designed to store all the anticipated spent fuel resulting from the operation of North Anna Units 1 and 2 after 1998 in excess of that which can be stored in the spent fuel pool. The Safety Evaluation 95-SE-OT-11 supporting filing for a license application is included in Appendix 4-10 and the Safety Evaluation for the construction of the facility has been included in Appendix 4-1.

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This DCP will include only the construction of the non-safeguards portion of the ISFSI, including the first storage pad, roads, perimeter fence, backup diesel, lighting and associated electrical and cask monitoring ductbanks. The ISFSI may have a total of three storage pads. This DCP provides for the construction of the first pad and facilities common to all three pads. Construction of the second and third storage pads, if needed, will be initiated by future DCP's. Construction of the safeguards portions of the ISFSI are covered under DCP 94-019. Modifications at the Station to support SSSC loading are being done under DCP 95-006. Furthermore, the design, fabrication, licensing, operations and maintenance of the SSSCs are outside the scope of this DCP.

2.0 PROPOSED RESOLUTION

2.1 Executive Summary

The spent fuel casks will be stored on reinforced concrete slabs which are two feet thick. The entire pad will be approximately 304 x 32 feet (with ramps). Load combinations and design limits for the reinforced concrete slab are in accordance with ANSI/ANS 57.9, Design Criteria for an Independent Spent Fuel Storage Installation (Dry Storage Type). Available strength of the concrete slab was calculated in accordance with ACI 349, Code Requirements for Nuclear Safety Related Concrete Structures. Construction of the slab will meet the requirements of ACI 301, Specifications for Structural Concrete for Buildings.

A protected area fence and nuisance fence will be installed around pad #1. The security-related equipment will be installed as part of DC 94-019, ISFSI Physical Security. An ISFSI perimeter fence will be installed around the entire perimeter of the facility.

Electrical service to the facility will be from a tap off of 34.5 Kv circuit 342, which originates from the North Anna switchyard. The feeder to the facility will be tapped to the existing overhead feeder #342 at the corner pole where the REC (Rappahannock Electric Co-op) circuit branches off to the In-Processing Center and will be routed overhead on the REC's poles to a point adjacent to the facility, where pole-mounted transformers will be installed. The 480V secondary from these transformers will be routed to a distribution panel located on the Diesel Generator Pad. A diesel generator will be installed to provide back-up power to the facility. The diesel generator will be sized to provide power to all three proposed storage pads. The diesel generator will be located inside the protected area fence of pad #1.

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A section of overhead line (34.5Kv) will have to be raised northwest of the facility along the plant entrance road to allow transporting of casks to the facility. This line belongs to Rappahanock Electric Co-op, and will be worked by them and/or Virginia Power per mutual agreement. The work associated with electrical service to the facility will be provided by a combination of Virginia Power and NSS personnel, as required.

Replaced Δ1

~~The helium pressure in each cask will be monitored by a system consisting of pressure switches on the casks wired to a Programmable Logic Controller(PLC) panel (0-FH-PNL-2) near the casks.~~ The PLC panel will transmit pressure switch status, via a fiber optic link, to an alarm panel (0-FH-PNL-2) located near the entrance to the facility. The alarm panel will display alarm information for each cask. The alarm will also be sent via the Security alarm system (DC 94-019) to Security, who will then contact Operations concerning the alarm.

Ductbanks will be constructed around the facility (both inside and outside the protected area fence at pad#1) to allow routing of cables in areas that may be subjected to vehicular traffic. Lighting will be provided that will maintain >0.2 footcandles in all areas inside the protected area fence. Provisions will be made (embedded junction boxes with cables installed) on the storage pad to allow the addition of lighting for illumination between the casks.

2.2 Design Description

2.2.1 Civil Engineering Design

Cask Storage Pads

The primary function of the concrete storage pads is to provide a uniform level surface for storing the casks. Each pad will be a reinforced concrete slab on grade with dimensions of 32 feet by 224 feet by 2 feet thick. Forty- foot long concrete ramps are required on each of the slabs to enable the cask transporter to gain access to the pad. The overall length of the pad will be 304 feet. Each pad is designed to support a total of 28 casks arranged in fourteen rows of two casks with a center-to-center spacing of 16 feet in both directions. Casks will be placed on the pad starting in the center and moving to the ends in a symmetrical manner. The concrete shall have a design compressive strength of 3000 psi in 28 days and reinforcing steel shall be No. 10 bars at 12 inches on-center, each way, top and bottom, with a minimum yield strength of 60,000 psi. Construction of the slabs will meet the requirements of ACI 301, "Specifications for Structural Concrete for Buildings".

The pads are designed to support TN-32 dry storage casks manufactured by Transnuclear, Inc.

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Load combinations and design limits for the reinforced concrete slab are in accordance with ANSI/ANS 57.9. Available strength of the concrete slab was calculated in accordance with the requirements and assumptions of ACI 349, "Code Requirements for Nuclear Safety Related Concrete Structures".

Foundation Design, Earthwork and Subsurface Exploration

The ISFSI pad will be supported on 18 inches of compacted crushed aggregate bearing on a stiff residual clay. The base of the two foot thick pad will extend at least 18 inches below grade. With all the storage casks in place on a pad the load to the subgrade will be approximately 1300 psf. The Factor of Safety (FS) against bearing capacity failure is in excess of 10. A Factor of Safety of 3.0 is normally used in the dead load plus live load case. Long term settlement is estimated to be less than one and a half inches (1½ in.).

Excavation and backfilling for structures and roadways, including ditching, shall be performed in accordance with Earthwork Specifications for North Anna ISFSI (Specification NAI-0019).

The subsurface investigation for the ISFSI facility was performed in June and July of 1994. Complete records of borings and a foundation report are available as "Report of Geotechnical Investigation Proposed ISFSI - North Anna Power Station January 1995" (Ref.6).

Site Layout and Drainage Design

A protected area fence and nuisance fence will be provided around pad #1. A manually operated 24-foot gate will be provided at the entrance to the pad #1 protected area. A 20-foot isolation zone will be provided around the outer perimeter of the protected area fence. A surface layer of lighter-colored stone will be placed in the isolation zone to increase detection by security cameras.

Drainage is provided by the installation of several drainage ditches around the site. These drainage appurtenances will accommodate the 100-yr. storm which is taken as local precipitation at a rate of 7.1 in/hr (t_c=16 min.). Where stormwater velocities in the drainage channels indicate that erosion would occur, the channels were paved in concrete.

Access roads into the site will be constructed at the location and according to the cross-sections and other details as show on the design drawings. Utilities located under new roadways, such as storm drains and electrical ductbanks will be designed such that loads imposed by the cask transporter will not overstress them. A road addition will be constructed to the northeast of the ISFSI site, to accommodate the turning radius required to traverse the main station access road. This roadway will be given a low-maintenance asphalt surfacing. A new railroad crossing will be provided to reduce impact as the transporter moves over the rails.

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The fire main supplying water to the NANIC has been reviewed for cask transporter loads and found not to be overstressed or showing an exceptional amount of vertical movement under load.

Utilities within the station along the cask transport route were evaluated and discussed in Section 4.3 of Reference 6.2.

2.2.2 Electrical Engineering Design

General

The construction of the ISFSI shall be in accordance with the 1993 (or latest applicable) edition of the National Electric Code. The design of the ISFSI is in accordance with the 1993 National Electric Code. This facility is not exempt from the requirements of the NEC as are other areas of the station. The electrical work shall also be in accordance with the NAS 3014 Installation Specifications.

Electrical Service

Electrical service to the facility will be from Virginia Power 34.5KV circuit 342, which originates from breaker 34202 in the North Anna switchyard. This circuit has two sources of power in the switchyard. The normal source is via 230-34.5KV transformer bank #3, which serves 34.5KV Bus #5. The alternate source is via transformer banks #4 and 4A, normally served from 34.5KV Bus #4. The feeder to the facility will originate from the corner pole where the REC circuit branches off to the In-Processing Center. The circuit will be extended to the facility via a fused tap, running overhead to the facility.

Near the ISFSI perimeter fence (not the protected area fence at pad #1) a 150KVA, 34.5KV-480V pole-mounted transformer bank will be installed to provide electrical service to the facility. The transformers will be connected grounded wye-grounded wye to provide a grounded 480V system at the facility. The cabling from the transformers will be routed underground to a main distribution panel that will serve the facility. This transformer bank will be capable of delivering less than 10KA of fault current so standard-rated distribution panels and equipment will be adequate.

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Electrical Distribution

The main distribution panel will be the normal source of 480V power for the facility and will contain a main breaker that will serve as the service disconnect for the facility. This panel will be located on the Diesel Generator Pad and will also serve as the normal source of power (via an automatic transfer switch) to an emergency 480V distribution panel serving security lighting and, through a transformer and distribution panel, miscellaneous 120V loads. The transfer switch will also be connected to a 80KW diesel generator (DG) and, upon loss of voltage from the normal source of power, will connect the emergency distribution panel to the running DG.

A pad will be constructed for the alarm panel with the necessary ducts and conduit stub ups for cabling into the panels. The pad will be sized for alarm panels for all three storage pads (See the following section for a discussion of the alarm panel.). The pad will also support an equipment rack and a load center that includes a transformer and small 120/240V distribution panel that will provide power to the alarm panel(s), local receptacles, and local lighting.

A canopy (approximate dimensions - 21'L x 10'W x 8'H) will be built over the alarm panel pad to limit equipment exposure to the weather. This should prevent the heat-related failures of equipment that have occurred in the equivalent panel at Surry. The Alarm and PLC Panels will be painted white to reduce solar gain. Lighting (fluorescent) will be installed under the canopy to allow inspection/viewing of the alarm panel. The lighting will be photocell controlled.

Inside the protected area fence, the diesel generator and associated power distribution and security panels will be installed. A rack will be installed to support the equipment, including the main (normal and emergency) distribution panel, the emergency 480V distribution panel, a 120/240V transformer and distribution panel, the DG automatic transfer switch, a security control panel, the lighting contractor, welding receptacle junction box,
PLC panel and miscellaneous receptacles. A canopy (approximate dimensions 18'L x 10'W x 8'H) will be installed over the panels. Photocell controlled lighting (fluorescent) will be provided under the canopy.

The diesel generator will be 80KW and will have sufficient capacity to provide emergency power for all three proposed storage pads. The DG will provide power via an automatic transfer switch to an emergency 480V

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panel upon loss of the normal power source. The transfer switch will contain the sensing and logic components to start the DG on loss of normal power and transfer the emergency panel to the running DG once correct voltage and frequency have been established. When normal power returns the transfer switch will transfer the emergency panel back to the normal source, after a time delay. The DG would then shutdown after another time delay. The DG will have a battery-powered cranking motor with a dedicated battery and charger.

The DG will have a 200 gallon (approximate) fuel storage tank, which would provide enough fuel for over 24 hrs. of operation for a fully loaded DG. Per Regulatory Guide 5.44, **Perimeter Intrusion Alarm Systems**, the DG must provide at least 24 hrs. of backup power for the intrusion detection system. This time is therefore assumed for the entire system (intrusion detection, lighting, etc). This would also be sufficient time to restore normal power to the facility through either the normal or backup power sources. (The DG could run for basically an unlimited time as long as fuel is available.) The tank will be internal to the DG skid and will be of double wall design with a leak detection system to alarm if fuel is detected in the space between the outer walls.

The DG will has a control panel which houses the necessary controls, switches, gages, lights, and alarm devices for operation. The DG will automatically shut down on conditions of overspeed, low oil pressure, high engine temperature, low coolant level or over voltage. Actuation of these shutdown functions, as well as other status and alarm conditions relating to DG protection are indicated locally by lights on the control panel. Actuation of any alarms will cause a common "DG TROUBLE" alarm to be sent to Security.

Cask Pressure Monitoring System

The helium pressure in the casks will be monitored by pressure switches installed on the casks. These pressure switches will be wired to the input modules of a Modicon Programmable Logic Controller (PLC) installed in an enclosure (0-FH-PNL-1) located on the Diesel Generator Pad as shown on drawing N-95-005-3-E-6003. A fiber optic link will connect the PLC, via modems, to a remote display. This display, consisting of a CRT monitor and associated controls, will be installed in an enclosure (0-FH-PNL-2) located on the Alarm Panel Pad as shown on drawing N-95-005-3-E-6002. The display will provide a message identifying, by cask number, any cask which has lost helium pressure. Testing capabilities will be available to provide for periodic testing of the alarm display and the communications link.

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The PLC panel will also send a common alarm to Security, who will then contact Operations concerning the alarm. This alarm will be sent via the Security alarm system (DC 94-019).

Use of the PLC and remote display arrangement greatly reduces the amount of ductbank and cabling which would otherwise be required if all pressure switches were directly wired to a remote annunciator panel.

The single remote display will provide all of the alarming requirements for future pads. Future Design Changes will have to install the necessary I/O modules to connect the cask switches; this remote I/O rack would then be connected to the PLC at pad #1 with a single instrument cable. The PLC would then provide alarming on the display unit for these pads as for pad #1.

All of the PLC equipment will be connected to DG-backed power. Power failure will be alarmed as part of the DG package. Once power is resumed to the PLC it will resume its monitoring of the cask switches; it will not require any rebooting.

Raceway

A ductbank system will be installed to enable the routing of cables from all three pads to the alarm panels and also to the DG-backed emergency 480V panel near pad #1. Because of the layout of the site provisions must be made in part for all three pads during the installation of pad #1. Manholes will be installed along the north access roads for pads #1 and #3 to facilitate cable routing to these areas. (Pad #2 will utilize the manhole near pad #1.)

Inside the protected area fence at pad #1 the majority of underground raceways will be in ductbanks. This will allow easier access for the transporter over to future pad #2. The areas where it is known that the transporter will not travel will be constructed of direct-buried conduit. Manholes/ handholes will be located around the area as required to route cables to the cask alarm switches, the DG, lighting, receptacles, and security equipment.

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Lighting

Area lighting will be provided around pad #1. The fixtures will be General Electric 1000W high pressure sodium floodlights, and will be mounted on 40' poles. The poles will be of hinged construction to allow maintenance of the fixtures without using a bucket truck. All lighting at pad #1 will be powered from the emergency 480V panel.

The lighting design will provide ≈11 footcandles average of light in the area of the pad while maintaining >0.2 footcandles in all of the secured area. A "Hand-Off-Auto" switch will be provided on the security power panel for lighting control. There will be photocell "Auto" control, along with a "Hand" (manual) override to switch the lights on when desired. The "Off" position of the switch will be alarmed to Security, indicating that the lights have been defeated. Provisions will be made (120V lighting circuits routed to junction boxes on the pad) to provide illumination between the casks if deemed necessary.

Grounding

Because of the ground current that exists (or can exist) near generation, transmission, and distribution lines/switchyards, it is necessary to ensure that the ground resistance in the area of the facility is maintained reasonably low to prevent the development of voltage gradients. Two ground loops will be established at the facility. Ground rods will be driven at 75' intervals around the ISFSI perimeter fence and the protected area fence, and interconnected with bare 4/0 cable. The fences will be connected to these loops at 75' intervals. Grounding of the underground raceways and manholes/handholes will also be provided. Grounding of equipment, electrical services, etc., will be in accordance with the National Electrical Code, which has separate requirements from the above.

Security - Non-Safeguards

Protected area and nuisance fences (8' high with 1' barbed wire, made from small link fabric) will be installed around pad#1. Installation of security equipment will be performed under DC-94-019, ISFSI Physical Security.

A Security Control Cabinet will be installed near pad #1 to house electrical equipment.

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2.3 Special Implementation Requirements

This work will be performed outside of the station radiological controlled area, at the location shown on drawing N-95005-3-C-001.

This DC will be worked in conjunction with DC 94-019, **ISFSI Physical Security**. That DC will install the security equipment for the ISFSI. As discussed above certain components installed under this DC are required by DC 94-019.

The only safety related components system associated with the ISFSI are the casks. The remainder of the components associated with the facility (pad, electrical service, alarm system) are non safety related. None of these components are required for the casks to perform their safety function. The concrete storage pads on which the casks rest are seismically designed.

The work performed under this DCP can be accomplished while the units are in any mode of operation. There are no outage requirements for implementing this DC. The Shift Supervisor will be notified prior to initiating work at the ISFSI site.

Soil samples for base-line health physics testing have been taken prior to clearing and site grading activities. The results of this testing are documented in Appendix 4.9. Upon completion of the fencing modifications Health Physics will install TLD's at various locations to provide area monitoring. Upon completion of ground water monitoring wells, Health Physics will collect base line samples and begin periodic monitoring of the wells.

Construction of ISFSI pad #1 will consist of the following general work activities, as shown on drawings N-95005-3-C-001 through N-95005-3-C-010, N-95005-3-S-101, N-95005-3-S-102, N-95005-3-S-001, and the electrical drawings. These items are not necessarily the sequence of construction.

1. Clear site, perform rough grading and place erosion and sediment controls.
2. Construct entrance road including earthwork, and associated drainage facilities (culvert, encasement, riprap protection,etc.).
3. Excavate for concrete pad and structural backfill. Excavation to be dewatered as required.

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4. Place and compact structural backfill for cask storage pad.
5. Prepare roadway subgrades and ditches within the ISFSI site.
6. Place and compact roadway subbase and base course.
7. Place reinforcement, embedded conduit, and concrete for pad #1.
8. Install area lighting poles, fixtures, controls, and associated foundations and wiring.
9. Install microwave and CCTV poles and associated raceway for pad #1.
10. Install fencing and associated grounding.
11. Install electrical equipment pads, electrical distribution panels and canopies.
12. Install Alarm and Security control panels.
13. Install underground raceway, including concrete ductbanks, conduit, pipe, and manholes/handholes.
14. Install the diesel generator, the diesel generator foundation and associated equipment.
15. Install cables for alarms, lighting, and power distribution.
16. Perform finish grading for all site areas including drainage appurtenances.

Add 2

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3.0 PROGRAMS REVIEW

3.1 Updated Final Safety Analysis Report (UFSAR)

A separate Safety Analysis Report has been developed for the ISFSI facility. This report is filed with licensing and will be issued once it and the new Technical Specifications have been approved by the NRC.
There is a minor modification to the UFSAR. Figure No. 1.2-1 in Section 1.2 should be revised to reflect the addition of the ISFSI on North Anna Power Station property.

3.5 Station Security

There may be a minor impact on Security at the NANIC in that additional truck traffic will be seen during construction operations. The implementation of DC 94-019 which is being performed in conjunction with this DC will have an impact on Station Security. Security equipment installed by this DCP are the fencing, the diesel and the lighting.

3.6 Electrical System Analysis

This modification will add approximately 125KVA to the Construction Power circuit. 150KVA will be assumed to be added for purposes of the electrical system analysis. Calculation EE-0008, North Anna Voltage Profiles, Rev.1, Add. C, has included this load and concluded that no impact to the Station's electrical distribution system will exist since this addition is bounded by other load removed from this circuit. The Electrical System Analysis Checklist is included as Appendix 4-3.

The DG being added will be 480V, 3-phase, and will be operated as a grounded system as required by the NEC. By design this load on the DG will be single phase (120/240V loading plus lighting). The majority of the load on the DG will be single phase lighting. The lighting cannot be balanced since there are 20 fixtures to distribute among the three phases. Miscellaneous 120V power will be provided via the 120V/208V, three phase system. The fault current (phase and ground) generated by the DG will be less than that available from the system (the normal source). The DG output breaker will be sized to coordinate with downstream breakers to ensure selective tripping should a fault occur while the DG is operating. A 150 ampere, sub feed circuit breaker in panelboard 0-FH-DB-4 will be used to match the rating of the Diesel Generator output breaker.

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All of the distribution equipment (distribution panels, cables, etc.) has been sized in accordance with the National Electric Code (NEC) to ensure proper ratings and to limit voltage drop.

3.8 Seismic

Load combinations and design limits for the reinforced concrete slab are in accordance with ANSI/ANS 57.9. The design earthquake used in the analysis was the design- basis earthquake (DBE) as described in Section 2.5.2.6 of the UFSAR and was included in the load combinations for the design of the concrete pad. Available strength in the concrete slab was calculated in accordance with ACI 349.

3.9 Human Factors

This DC will add control panels/operator interface devices (operator display) at the ISFSI. The ISFSI is not a normally manned area. The devices being used are standard devices used throughout industry. The function of each device and switch position will be clearly identified/labeled.

3.13 Plant Flooding

The ISFSI site is remote from the Power Station site and runoff from the ISFSI site will not flow towards or discharge into the North Anna Power Station yard area. Therefore there is no affect on structures, systems or components at the Power Station.

Stormwater drainage appurtenances will accommodate the 100-yr storm. The rainfall intensity for this storm is (7.1 in./hr.).

The ISFSI site is not located in the floodplain of a major river. The site grade elevation is 311 msl, approximately 46 feet above the Probable Maximum flood elevation of Lake Anna.

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3.19 Setpoints, Station Curves, Instrument Scaling and Instrument Uncertainty Calculations

No additions or changes to setpoint, station curves, instrument scaling or uncertainty calculations are required for this design change.

There will be pressure switches (2) on each of the casks to monitor helium pressure. The switch contacts will open if the cask helium pressure drops below a value specified by the cask vendor. These switches are adjusted as part of the cask loading, drying and sealing operations which will be controlled by station procedures. The switches will not be accessible after the casks are loaded and sealed, therefor no periodic calibration or maintenance activities are associated with these switches. Since the switches are components of the cask and accessible only while a given cask is being loaded or unloaded, mark numbers will not be assigned to these items.

The DG is provided with several automatic shutdown functions which serve to protect the DG from damage which might occur due to overspeed, loss of oil pressure or overheating. In addition, various local alarms are provided for indication of various conditions indicative of DG problems.
The setpoints for actuation of shutdown functions and alarms are selected by the manufacturer and are not intended to be adjusted by the user. A common " DG TROUBLE" alarm will be sent to Security whenever any DG shutdown function or alarm is activated. Identification of the specific alarm actuated will be indicated by a local control panel. The manufacturer's technical manual provides instructions for actions to be taken based on control panel alarm indications. No periodic calibration of the devices associated with the devices associated with the automatic shutdown functions or alarms is required.

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3.21 Radio Frequency Interference

The PLC and operator display in alarm panels 0-FH-PNL-1 and 0-FH-PNL-2 must be tested for RFI affects. By design these devices are not susceptible to RFI. However, as part of the testing associated with these systems, the susceptibility of this equipment to RFI should be verified. Refer to section 4.0 of this DC for required testing/acceptance criteria.

3.22 Equipment Data System (EDS)

The electrical equipment being installed under this DCP will be submitted under electronic EDSCR 000000 5313.

3.23 ALARA

No personnel dose is expected during construction of the first storage pad and the common ISFSI facilities.

An ALARA evaluation of the North Anna ISFSI is provided in Sections 7.1 and 7.3 of the North Anna ISFSI Technical Specifications and Safety Analysis Report (SAR). This evaluation includes a description of the ISFSI design features which will ensure that radiation exposures are ALARA. An evaluation is also provided in Section 7.4 of the North Anna ISFSI SAR to show that personnel exposure from construction of the second to the third storage pads will be 6.39 man-rem and 9.38 man-rem, respectively.

The Preliminary ALARA Evaluation and the ALARA Design Checklist are attached as Appendix 4.7.

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3.26 Impact On/Of Other Design Changes

DC 94-019, **ISFSI Physical Security** will be performing the necessary modifications to install the ISFSI security system and related equipment. No other Design Changes are affected by this DC.

3.27 Summary of Equipment Added or Removed

For a listing of equipment added or removed see Appendix 4.8.

3.29 Installation Specifications

The following Specifications have been developed for the placing and testing of concrete and earthwork (excavation and backfilling):

NAI-0021, **Specification for Placing Reinforced Concrete, ISFSI Facility**
NAI-0022, **Specification for Concrete Testing and Inspection, ISFSI Facility**
NAI-0019, **Specification for Excavation, Fill Placement, Compaction, and Testing**
NAI-0024, **Specification For The Erection Of Structural and Miscellaneous Steel, North Anna ISFSI**

The following NSS Work Procedure will be used for installation of the fence:

G.P.-C-113, **Installation of the Chain Link Fence**

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3.31 **Environmental Impact (Non-radiological)**

This Design Change will disturb approximately eleven acres. During the construction process, removing trees, vegetation, and performing filling and grading operations could potentially cause soil erosion during times of intense precipitation. During site grading operations provisions for minimizing soil erosion will be satisfied by utilizing measures recommended by the Virginia Erosion and Sediment Control Handbook. Appropriate erosion and sediment controls will be installed or in effect during these construction activities. A temporary sedimentation basin will be provided in the swale to the west of the site since more than three acres of land are being disturbed (Va. E&S Minimum Std.#6), in accordance with Virginia Erosion and Sediment Control Law.

Louisa County is not considered in Tidewater Virginia so the impact of the Chesapeake Bay Preservation Act is not directly applicable to this project. The presence of Lake Anna would tend to trap most soil that would erode from this site during construction if it were not for the temporary sedimentation basin to be installed. The sedimentation basin will trap sediment from eroded soils during site clearing, filling, grading, and stabilization of the site until such time as substantial vegetative cover is established. The temporary sediment basin may be removed after this vegetative cover has been established, all drainage structures are in place and the swale has been stabilized with riprap. Removal of the sedimentation basin and restoration of the area are controlled by NAI-0019 and the land disturbance permit issued by Louisa County.

For long term site development earthen or concrete drainage ditches will be constructed to the slopes and dimensions of the design drawings such that adequate stormwater drainage capacity is available. In cases where average velocities in drainage structures exceed those which could cause erosion, the drainage channel will be lined with concrete, large size gravel, or riprap. There will be no other environmental impact as a result of this DC.

3.34 **Recommended Spare Parts**

A list of recommended spare parts for the DG is included in Appendix 4-12. This list is an excerpt from the DG manufacturer's technical manual which includes a complete parts catalog. This manual will be included in the VTM to be developed for the DG.

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3.35 **Labeling**

The equipment added by this DC will require labeling. This labeling will be performed in accordance with STD-GN-0036. The Component Label Information is included in Appendix 4-5.

3.37 Vendor Technical Manuals

New manuals will need be developed for the ISFSI Emergency Power Diesel Generator, the ISFSI Emergency Power Automatic Transfer Switch, the ISFSI Cask Pressure Monitoring System PLC Equipment, and the ISFSI Cask Pressure Monitoring System Modem. VTMCR forms are included in Appendix 4.6.

3.41 On-Site Excavations

There will be excavation work done on the ISFSI site in order to construct the pad and raceway system. An excavation plan, drawing N-95005-3-C-006 has been produced for excavation of the ISFSI pad. The excavation is approximately 3.5 feet deep and should not require any shoring.
Drawings have been reviewed and there do not appear to be any utilities in the ISFSI site area. However before excavating a Cutting, Digging, and Drilling permit is required and the area will be surveyed for underground utilities.

3.42 Other Concerns

Prior to proceeding with construction it will be necessary to obtain a land disturbing permit from Louisa County.

3.43 **Maintenance Rule**

The Maintenance Rule will be concerned with the operation of this facility due to the need to monitor the spent fuel. Guidelines similar to those being developed for Surry will need to be specified once facility operation begins.

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4.0 FUNCTIONAL TESTING REQUIREMENTS AND ACCEPTANCE CRITERIA

The following tests are required for this DC, in addition to the standard testing of electrical circuits/cables. The alarm panel will be checked/tested by Engineering at the panel shop prior to shipment to the Station.

1. Verify that the diesel generator starts on loss of normal power and assumes load. Verify that, upon return of normal power, the transfer switch returns to the source of power and the Diesel Generator (DG) shuts down. (The DG subsystems will be verified by the DG representative.)

2. Key a hand-held radio near panels 0-FH-PNL-1and 0-FH-PNL-2. Acceptance criteria is that no alarms are initiated by keying the radio.

3. Verify that lighting controls operate properly. Acceptance criteria is that all lights function (contractor is picked up) in the AUTO and HAND positions of the switch.

4. Verify that lighting levels are acceptable at night. Acceptance criteria is >0.2 foot-candle is maintained everywhere (including the fence perimeter) ,and that lighting distribution is acceptable to appropriate Security and Operations personnel.

5. Verify that the common alarm is actuated/received for all cask alarms. Acceptance criteria is that the common alarm is received and will remain on until the alarm is reset.

6. Functional testing of the completed systems will be performed as part of preparation for NRC mandated Dry-Run testing by use of the operational procedures developed for this DCP and DCP 95-006.

7. Final Acceptance Testing of the facility will be based on successful completion of the fuel cask placement at the facility.

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5.0 SYSTEM DESCRIPTION

The North Anna ISFSI is designed in accordance with the General Design Criteria set forth in 10CFR72, Subpart F. The storage pads which are the major part of the storage system being installed under this Design Change are passive components. As these storage pads are passive in nature, there are no operational constraints on the system(storage pads). For a full description of the transport and storage process refer to Chapter 4 of the North Anna Power Station ISFSI Technical Specifications and Safety Analysis Report.

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6.0 REFERENCES

6.1 Type 2 Final Report, North Anna Power Station, Independent Spent Fuel Storage Installation, IR 7273/NP 2884.

6.2 North Anna ISFSI, Technical Specifications and Safety Analysis Report.

6.3 North Anna ISFSI, Environmental Report.

6.4 North Anna Power Station, Updated Final Safety Analysis Report.

6.5 ANSI/ANS-57.9-1984, Design Criteria for an Independent Spent Fuel Storage Installation (Dry Storage Type)

6.6 10CFR72, Licensing Requirements for the Storage of Spent Fuel in an Independent Spent Fuel Storage Installation (ISFSI)

6.7 Reg Guide 3.60, Design of an Independent Spent Fuel Storage Installation (Dry Storage)

6.8 DC 94-019, ISFSI Physical Security / NAPS / Units 1&2.

6.9 Calculation CE-1181, Static and Dynamic Analyses for ISFSI Slab

6.10 Calculation CE-1186, Rev.0, ISFSI Pad Estimate of Settlement

6.11 Calculation CE-1183, Rev.0, Bearing Capacity of ISFSI Pad.

6.12 ANSI/ANS 2.19, Guidelines for Establishing Site Related Parameters for site Selection and Design of An Independent Spent Fuel Storage Installation(Water Pool), 1981.

6.13 Geotechnical Investigation Proposed ISFSI - North Anna Power Station, January 1995 -Virginia Power DE&S, Civil.

6.14 Calculation CE-1178, Rev.0, N. Anna ISFSI 10-yr Storm-Storm Drainage.

6.15 Calculation CE-1188, Rev.0, N. Anna ISFSI 100-yr Storm-Storm Drainage.

6.16 ACI 349-85, Code Requirements for Nuclear Safety Related Concrete Structures.

6.17 ACI 301-89, Specifications for Structural Concrete for Buildings.

6.18 Specification NAP-0086, Ready Mixed Concrete, ISFSI Facility.

6.19 Calculation CE-1238, Miscellaneous ISFSI Facility Structures.

PROGRAMS REVIEW CHECKLIST

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If the answer to a question is "yes", a review must be performed for that item in accordance with the directions provided in Attachment 4. The results of the review shall be documented in Section 3.0 of the ER&D. The referenced screening questions must all be reviewed and answered "no" before the question in this checklist can be answered "no". If one or more screening questions are answered "yes", then the question in this checklist must be answered "yes".

1. **Updated Final Safety Analysis Report (UFSAR)**

   List the UFSAR sections which cover the activities, structures, systems or components affected by the change.
   Station UFSAR Section 1.2.2

	Yes	No
Will the DCP (1) affect the description of any structures, systems, components or activities addressed in the UFSAR or (2) add any structures, systems, components or activities for which a description must be added to the UFSAR?	x	_

2. **Technical Specifications**

   List the Tech. Specs. which cover the activities, systems or components affected by the change.

   North Anna ISFSI Technical Specifications and Safety Analysis Report

	Yes	No
Will the DCP impact the Technical Specifications or involve technical specification requirements as indicated by a "yes" answer to one or more of the questions presented in Section 3.2 of Attachment 4?	—	x

3. **Fire Protection/Appendix "R"**

	Yes	No
Could the DCP impact the Appendix "R" program as indicated by a "yes" answer to one or more of the questions presented in Section 3.3 of Attachment 4?	—	X

4. **Equipment Qualification**

	Yes	No
Could the DCP impact the EQ program as indicated by a "yes" answer to one or more of the questions presented in Section 3.4 of Attachment 4?	—	x

1. Design Change Title/Station/Unit	2. Design Change Number
ERFCS-Simulator Link for Emergency Exercises / North Anna / Units 1 & 2	95-010

1.0 STATEMENT OF THE PROBLEM

The Emergency Response Facilities Computer System (ERFCS) is a network of computers with components located at the two nuclear stations and at the Innsbrook Technical Center. This network consists of interconnected computer systems, known as nodes, which are located at each ERFCS location and share data among themselves. The purpose of the ERFCS is to provide plant data at multiple locations during the course of a nuclear emergency. During emergencies, the ERFCS is designed to be the primary source of plant data for the recovery team.

Training for recovery team members includes emergency exercises where the emergency response facilities are activated for simulated emergencies. However, the ERFCS is not used for these exercises because there is not a means of making simulated emergency data available to the computer system. Simulated data is generated using the training simulator computers and then distributed by FAX to the various recovery team members as the exercises progress. Radiological and meteorological data are staged in each facility on preprinted forms. This method of data distribution presents the following two problems:

1. Progress of the exercise is impeded through time delays resulting from the need to collect exercise data from the simulator computer, FAX it to the various emergency response sites, and then distribute it to the various recovery team members.

2. As was noted by Emergency Planning in Reference 1, the current method of data distribution provides no training for recovery team members on the use of the ERFCS itself although the ERFCS is to be the primary source of plant information during real emergencies.

The purpose of this design change is to link the simulator and ERFCS computers. Linking these computer systems will allow the direct transmission of emergency exercise information between them and allow the ERFCS to be used during emergency exercises.

2.0 PROPOSED RESOLUTION

2.1 EXECUTIVE SUMMARY

During emergency exercises, the Emergency Response Facilities Computer System (ERFCS) is not used because exercise data is not available to it even though it is the primary source of plant data for recovery team members during actual emergencies. Instead exercise data is collected and distributed by FAX to team members as the exercise progresses. This results in coordination problems among emergency response sites in the dissemination of exercise data and provides no training on the use of the ERFCS under

simulated emergency conditions. Furthermore, persons participating in these exercises become trained to expect to receive data sheets.

The purpose of this design change is to provide a means of using the ERFCS during exercises. This is to be accomplished by providing a data link between the training simulator and the ERFCS computer systems to allow the ERFCS to receive and process exercise data for training purposes.

Plant data will continue to be processed while an exercise is in progress. Actual plant data will be available in the Control Room and at selected Technical Support Center (TSC) terminals while the remainder of the ERFCS is processing exercise data. Also the processing of exercise data at one station will not affect the processing or display of plant data at the other station.

This design change is based upon the engineering studies given in References 2 and 3.

2.2 DESIGN DESCRIPTION

In order to establish a data link between the ERFCS and the simulator computer, a link similar to that now used to connect the simulator computer to the ERFCS Local Emergency Operations Facility (LEOF) computer will be installed. This simulator to LEOF link is used for training purposes to drive ERFCS terminals in the simulator Control Room. However, this existing link is limited to displaying simulated data on the simulated Control Room terminals and some LEOF terminals.

The link in this design change will be between the simulator computer and the ERFCS Data Communications Processor (DCP). The DCP node of the ERFCS is connected to the Validyne I/O system which collects plant data and converts it to a form that can be processed by the DCP. The DCP converts the data into engineering units and then transmits it to other nodes in the ERFCS network for use by the recovery team members. This design change will establish a data link that will substitute simulator computer data for Validyne data. This data will be processed and distributed by the DCP and other ERFCS nodes in the same manner as if it originated with the Validyne system.

In order to allow the processing of plant data while an exercise is in progress, the redundant feature of the DCP and TSC Emergency Response Facility I/O (ERFIO) nodes will be utilized. These nodes consist of two computers each where one computer in each pair is available for use on a standby basis should the other computer fail. The redundant pairs will be split to allow one set of computers to continue to monitor the Validyne system to provide actual plant data in the Control Room and on selected TSC terminals. The remaining computers, which serve the LEOF at the site and the Central Emergency

Operation Facility (CEOF) and the Corporate Emergency Response Center (CERC) at Innsbrook will receive and display exercise data received from the simulator computer. Terminals displaying exercise data will indicate that simulator rather than plant data is being processed. This indication will be similar to the means now used to show that historical rather than real-time data is being displayed on a terminal. Control room CRT's which are not displaying actual plant data will be disabled so as to not show simulated data.

2.3 SPECIAL IMPLEMENTATION REQUIREMENTS

Implementation of this design change requires three tasks. They are as follows:

1. Installation of a data link between the simulator computer and the DCP computer.

2. Connection of the computers to the data link.

3. Modification of the ERFCS and simulator systems to accommodate this new link.

Installation of the data link has been done by the Telecommunication Department. This work was done under a Telecommunications work order (see Reference 4) which installed the modems and their connection using the station telephone (PBX) system.

Connection of the ERFCS and simulator computers to the data link involves installing one cable at each computer location to connect the computer to its respective modem.

The simulator computer is located outside of the plant protected area and is not covered under any plant controlled drawings. Installation of this cable will be performed by the Simulator Support Group.

Connection of the DCP to the data link involves installing a single cable under the TSC false floor. This area is within plant protected area and will affect plant controlled drawings. Therefore a scheduled cable will be used here. This cable will be installed using the route and pull ticket generated using the North Anna Cable and Raceway System (NACRMS).

This cable is to be installed in the cable trough under the DCP computer system. It will be necessary to break one cable sleeve seal in order to route the cable to the TSC modem cabinet. The connectors should be installed on the cable after the cable has been installed. Pin-outs for this cable are given in drawings in Attachment 4-5. The sleeve must be

resealed after installation of the cable has been completed. This sleeve is not an Appendix R fire barrier.

Paragraph Deleted

Installation of the data link must be first, followed by connection of the ERFCS to the data link.

Paragraph Deleted

This design change is non-safety related, non-EQ, and non-seismic.

The software portion of this DCP has been deleted under Field Change 1. The data link itself will remain in place. No special testing is required for the components already installed.

3.0 PROGRAMS REVIEW

3.3 FIRE PROTECTION / APPENDIX "R"

A single cable will need to be installed in the TSC. This circuit will add about three pounds of cable insulation to the TSC. The TSC is located in Fire Area 46.

An Appendix R Design Summary Sheet is given in Appendix 4-2 and an Appendix R Change Notification Form is given in Appendix 4-3 in accordance with STD-GN-0021 (Reference 7).

3.11 STATION COMPUTER SOFTWARE/HARDWARE

This area has been covered in Section 3.12. Therefore, the Programs Review Checklist for this item has been checked "No".

3.12 EMERGENCY RESPONSE FACILITIES (ERF) SYSTEM

The ERFCS will be modified in order to accommodate this design change. This modification will be carried out in accordance with STD-GN-0028 (Reference 6) in order to ensure the requirements of NUREG 0696 (Reference 8) are met. An ERFCS checklist is given in Appendix 4-4 in accordance with STD-GN-0028.

3.17 THE SIMULATOR

The simulator computer hardware will need to be modified to accommodate the data link to the ERFCS. A switch will be installed to allow the DCP to share the same simulator port as the LEOF. This work is to be performed by the Simulator Support Group.

Pagragaph Deleted

No simulated Control Room or Auxiliary Shutdown Panel changes are required by this design change.

3.37 VENDOR TECHNICAL MANUALS

No vendor technical manuals are affected by this design change. Therefore this item has been checked "No" on the Programs Review Checklist.

4.0 FUNCTIONAL TESTING REQUIREMENTS AND ACCEPTANCE CRITERIA

The functional testing of the new data link shall be performed after satisfactory equipment installation.

Testing is to include the following:

1. Cabling and wiring shall be tested and terminations verified to ensure conformance with design change drawings.

2. *Paragraph Deleted*

5.0 SYSTEM DESCRIPTION (OPERATIONAL)

This design change adds a data link between the ERFCS and simulator computer systems which will allow simulator-generated data to be transmitted to the ERFCS. This will allow the ERFCS to be used during emergency exercises for training purposes. The ERFCS will process simulator data in the same manner as it now processes plant data. Simulated emergency data will be

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processed and displayed on the ERFCS adding a greater degree of realism to emergency exercises than can now be achieved which should enhance emergency responder preparedness.

The system will have the capability to generate simulated MIDAS and ERDS data. The ERFCS will transmit the same data to the MIDAS and ERDS systems in exercise mode as it does in real time mode. The fidelity of this data will depend upon how well it is simulated on the simulator computer. The NRC may receive data through activation of the ERDS link while an exercise is in progress. The capability to use manually generated exercise data instead of ERFCS data for MIDAS will be retained.

Four CRT's will continue to display real-time plant data while an exercise is in progress. They are the Unit 1 and Unit 2 STA stations in the Control Room and the NRC and Emergency Admin Director stations in the TSC. Control room CRT's which are not displaying actual plant data will be disabled so as to not show simulated data.

In the event that it is necessary to prematurely terminate an exercise the ERFCS can be restored to normal operation within 15 minutes. This is much less than the one hour maximum time period allowed to make the ERFCS operational. Making the switch requires four steps:

1. All four CPU's of the DCP and TSC ERFIO are to be halted.

2. The simulation disk packs of the backup DCP and TSC ERFIO computers are to be replaced with operational packs.

3. The peripheral selector switches of the DCP and TSC ERFIO computers are to be reset from their simulation to their operation positions.

4. All four DCP and TSC ERFIO computers are then to be restarted.

Upon completion of the above four steps, the ERFCS will have been restored to its normal fully-redundant mode of operation. No changes are required at the LEOF and CEOF in order to switch modes.

The system is designed so that it is not possible to inadvertently switch from one mode to another. To change from operational to training mode requires the shutdown of the DCP and TSC ERFIO systems and the switching of disk packs. Even if the switch at the simulator computer which directs simulated data to the DCP is placed in the exercise position while the ERFCS is in operational mode, it will not produce any adverse effects. Operation of the simulator switch while an exercise is in progress will cause the display of exercise data to be interrupted but the display of real-time plant data in the Control Room and TSC will be unaffected.

6.0 REFERENCES

1 Memorandum, Mr. J. E. Collins to Mr. D. L. Benson, July 9, 1993.

2 "Emergency Exercises on TSC Terminals", Type I Engineering Study, North Anna Power Station, June 1990.

3 "Simulator Usage for Emergency Exercises", Type I Engineering Study, Surry and North Anna Power Stations, September 1993.

4 Memorandum, Mr. T. J. Kunsitis to Mr. Herb Finch, April 10, 1995.

5 "Station Software Control", VPAP-0306, Station Administrative Procedure, Virginia Power Company.

6 "Engineering Guidelines for the ERF Computer System", STD-GN-0028, General Nuclear Standard, Virginia Power Company

7 "Appendix 'R' Design Guidelines", STD-GN-0021, General Nuclear Standard, Virginia Power Company

8 "Functional Criteria for Emergency Response Facilities", NUREG 0696, U. S. Nuclear Regulatory Commission

9 "Emergency Response Facility Computer System (ERFCS)", VPAP-2602, Station Administrative Procedure, Virginia Power Company.

10 "Notifications and Reports", VPAP-2802, Station Administrative Procedure, Virginia Power Company.

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1.0 STATEMENT OF THE PROBLEM

The Emergency Response Facilities Computer System (ERFCS) is a network of computers with components located at the two nuclear stations and at the Innsbrook Technical Center. This network consists of interconnected computer systems, known as nodes, which are located at each ERFCS location and share data among themselves. The purpose of the ERFCS is to provide plant data at multiple locations during the course of a nuclear emergency. During emergencies, the ERFCS is designed to be the primary source of plant data for the recovery team.

Training for recovery team members includes emergency exercises where the emergency response facilities are activated for simulated emergencies. However, the ERFCS is not used for these exercises because there is not a means of making simulated emergency data available to the computer system. Simulated data is generated using the training simulator computers and then distributed by FAX to the various recovery team members as the exercises progress. Radiological and meteorological data are staged in each facility on preprinted forms. This method of data distribution presents the following two problems:

1. Progress of the exercise is impeded through time delays resulting from the need to collect exercise data from the simulator computer, FAX it to the various emergency response sites, and then distribute it to the various recovery team members.

2. As was noted by Emergency Planning in Reference 1, the current method of data distribution provides no training for recovery team members on the use of the ERFCS itself although the ERFCS is to be the primary source of plant information during real emergencies.

The purpose of this design change is to link the simulator and ERFCS computers. Linking these computer systems will allow the direct transmission of emergency exercise information between them and allow the ERFCS to be used during emergency exercises.

2.0 PROPOSED RESOLUTION

2.1 EXECUTIVE SUMMARY

During emergency exercises, the Emergency Response Facilities Computer System (ERFCS) is not used because exercise data is not available to it even though it is the primary source of plant data for recovery team members during actual emergencies. Instead exercise data is collected and distributed by FAX to team members as the exercise progresses. This results in coordination problems among emergency response sites in the dissemination of exercise data and provides no training on the use of the ERFCS under simulated emergency conditions. Furthermore, persons participating in these exercises become trained to expect to receive data sheets.

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The purpose of this design change is to provide a means of using the ERFCS during exercises. This is to be accomplished by providing a data link between the training simulator and the ERFCS computer systems to allow the ERFCS to receive and process exercise data for training purposes.

Plant data will continue to be processed while an exercise is in progress. Actual plant data will be available in the Control Room and at selected Technical Support Center (TSC) terminals while the remainder of the ERFCS is processing exercise data. Also the processing of exercise data at one station will not affect the processing or display of plant data at the other station.

This design change is based upon the engineering studies given in References 2 and 3.

2.2 DESIGN DESCRIPTION

In order to establish a data link between the ERFCS and the simulator computer, a link similar to that now used to connect the simulator computer to the ERFCS Local Emergency Operations Facility (LEOF) computer will be installed. This simulator to LEOF link is used for training purposes to drive ERFCS terminals in the simulator Control Room. However, this existing link is limited to displaying simulated data on the simulated Control Room terminals and some LEOF terminals.

The link in this design change will be between the simulator computer and the ERFCS Data Communications Processor (DCP). The DCP node of the ERFCS is connected to the Validyne I/O system which collects plant data and converts it to a form that can be processed by the DCP. The DCP converts the data into engineering units and then transmits it to other nodes in the ERFCS network for use by the recovery team members. This design change will establish a data link that will substitute simulator computer data for Validyne data. This data will be processed and distributed by the DCP and other ERFCS nodes in the same manner as if it originated with the Validyne system.

In order to allow the processing of plant data while an exercise is in progress, the redundant feature of the DCP and TSC Emergency Response Facility I/O (ERFIO) nodes will be utilized. These nodes consist of two computers each where one computer in each pair is available for use on a standby basis should the other computer fail. The redundant pairs will be split to allow one set of computers to continue to monitor the Validyne system to provide actual plant data in the Control Room and on selected TSC terminals. The remaining computers, which serve the LEOF at the site and the Central Emergency Operation Facility (CEOF) and the Corporate Emergency Response Center (CERC) at Innsbrook will receive and display exercise data received from the simulator computer. Terminals displaying exercise data will indicate that simulator rather than plant data is being processed. This indication will be similar to the means now used to show that historical rather than real-time data is being displayed on a terminal. Control room CRT's which are not displaying actual plant data will be disabled so as to not show simulated data.

2.3 SPECIAL IMPLEMENTATION REQUIREMENTS

Implementation of this design change requires three tasks. They are as follows:

1. Installation of a data link between the simulator computer and the DCP computer.
2. Connection of the computers to the data link.
3. Modification of the ERFCS and simulator systems to accommodate this new link.

Installation of the data link has been done by the Telecommunication Department. This work was done under a Telecommunications work order (see Reference 4) which installed the modems and their connection using the station telephone (PBX) system.

Connection of the ERFCS and simulator computers to the data link involves installing one cable at each computer location to connect the computer to its respective modem.

The simulator computer is located outside of the plant protected area and is not covered under any plant controlled drawings. Installation of this cable will be performed by the Simulator Support Group.

Connection of the DCP to the data link involves installing a single cable under the TSC false floor. This area is within plant protected area and will affect plant controlled drawings. Therefore a scheduled cable will be used here. This cable will be installed using the route and pull ticket generated using the North Anna Cable and Raceway System (NACRMS).

This cable is to be installed in the cable trough under the DCP computer system. It will be necessary to break one cable sleeve seal in order to route the cable to the TSC modem cabinet. The connectors should be installed on the cable after the cable has been installed. Pin-outs for this cable are given in drawings in Attachment 4-5. The sleeve must be resealed after installation of the cable has been completed. This sleeve is <u>not</u> an Appendix R fire barrier.

Update of the ERFCS and simulator software requires modifying non-safety related quality (NSQ) software. This software update will be performed in accordance with VPAP-0306 (Reference 5). Although this software may be updated on a non-priority basis, it must be completed prior to the completion of this DCP in order to support testing of the link.

Installation of the data link must be first, followed by connection of the ERFCS to the data link. The final activity related to this design change is updating the ERFCS and simulator software.

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The administrative procedures defining operability of the ERFCS (VPAP-2602 - Reference 9) and reportability (VPAP-2802 - Reference 10) must be revised prior to the completion of this design change. These changes are needed to take credit for the ERFCS being operable when it is processing simulated data. These updates are necessary in order to avoid the system being considered down while it is in exercise mode which could result in an NRC reportable event. The revision of administrative procedures has been identified as a priority update in the Controlled Document Summary.

This design change is non-safety related, non-EQ, and non-seismic.

3.0 PROGRAMS REVIEW

3.3 FIRE PROTECTION / APPENDIX "R"

A single cable will need to be installed in the TSC. This circuit will add about three pounds of cable insulation to the TSC. The TSC is located in Fire Area 46.

An Appendix R Design Summary Sheet is given in Appendix 4-2 and an Appendix R Change Notification Form is given in Appendix 4-3 in accordance with STD-GN-0021 (Reference 7).

3.11 STATION COMPUTER SOFTWARE/HARDWARE

This area has been covered in Section 3.12. Therefore, the Programs Review Checklist for this item has been checked "No".

3.12 EMERGENCY RESPONSE FACILITIES (ERF) SYSTEM

The ERFCS will be modified in order to accommodate this design change. Software will be added under VPAP-0306 (Reference 5) in order to support linking the ERFCS to the simulator computer. This modification will be carried out in accordance with STD-GN-0028 (Reference 6) in order to ensure the requirements of NUREG 0696 (Reference 8) are met. An ERFCS checklist is given in Appendix 4-4 in accordance with STD-GN-0028. This software update will be done on a non-priority basis.

3.17 THE SIMULATOR

The simulator computer hardware will need to be modified to accommodate the data link to the ERFCS. A switch will be installed to allow the DCP to share the same simulator port as the LEOF. This work is to be performed by the Simulator Support Group.

The same software that is used to perform training on the LEOF can be used for this design change. No simulator software changes will be necessary to support this design change.

No simulated Control Room or Auxiliary Shutdown Panel changes are required by this design change.

3.37 VENDOR TECHNICAL MANUALS

No vendor technical manuals are affected by this design change. Therefore this item has been checked "No" on the Programs Review Checklist.

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4.0 FUNCTIONAL TESTING REQUIREMENTS AND ACCEPTANCE CRITERIA

The functional testing of the new data link shall be performed after satisfactory equipment installation.

Testing is to include the following:

1. Cabling and wiring shall be tested and terminations verified to ensure conformance with design change drawings.

2. Once software changes have been completed and the link has been installed, operability of the link will be tested by DE&S Computers and Programs using a software test plan developed in accordance with VPAP-0306 (Reference 5).

5.0 SYSTEM DESCRIPTION (OPERATIONAL)

This design change adds a data link between the ERFCS and simulator computer systems which will allow simulator-generated data to be transmitted to the ERFCS. This will allow the ERFCS to be used during emergency exercises for training purposes. The ERFCS will process simulator data in the same manner as it now processes plant data. Simulated emergency data will be processed and displayed on the ERFCS adding a greater degree of realism to emergency exercises than can now be achieved which should enhance emergency responder preparedness.

The system will have the capability to generate simulated MIDAS and ERDS data. The ERFCS will transmit the same data to the MIDAS and ERDS systems in exercise mode as it does in real time mode. The fidelity of this data will depend upon how well it is simulated on the simulator computer. The NRC may receive data through activation of the ERDS link while an exercise is in progress. The capability to use manually generated exercise data instead of ERFCS data for MIDAS will be retained.

Four CRT's will continue to display real-time plant data while an exercise is in progress. They are the Unit 1 and Unit 2 STA stations in the Control Room and the NRC and Emergency Admin Director stations in the TSC. Control room CRT's which are not displaying actual plant data will be disabled so as to not show simulated data.

In the event that it is necessary to prematurely terminate an exercise the ERFCS can be restored to normal operation within 15 minutes. This is much less than the one hour maximum time period allowed to make the ERFCS operational. Making the switch requires four steps:

1. All four CPU's of the DCP and TSC ERFIO are to be halted.

2. The simulation disk packs of the backup DCP and TSC ERFIO computers are to be replaced with operational packs.

3. The peripheral selector switches of the DCP and TSC ERFIO computers are to be reset from their simulation to their operation positions.

4. All four DCP and TSC ERFIO computers are then to be restarted.

Upon completion of the above four steps, the ERFCS will have been restored to its normal fully-redundant mode of operation. No changes are required at the LEOF and CEOF in order to switch modes.

The system is designed so that it is not possible to inadvertently switch from one mode to another. To change from operational to training mode requires the shutdown of the DCP and TSC ERFIO systems and the switching of disk packs. Even if the switch at the simulator computer which directs simulated data to

the DCP is placed in the exercise position while the ERFCS is in operational mode, it will not produce any adverse effects. Operation of the simulator switch while an exercise is in progress will cause the display of exercise data to be interrupted but the display of real-time plant data in the Control Room and TSC will be unaffected.

6.0 REFERENCES

1 Memorandum, Mr. J. E. Collins to Mr. D. L. Benson, July 9, 1993.

2 "Emergency Exercises on TSC Terminals", Type I Engineering Study, North Anna Power Station, June 1990.

3 "Simulator Usage for Emergency Exercises", Type I Engineering Study, Surry and North Anna Power Stations, September 1993.

4 Memorandum, Mr. T. J. Kunsitis to Mr. Herb Finch, April 10, 1995.

5 "Station Software Control", VPAP-0306, Station Administrative Procedure, Virginia Power Company.

6 "Engineering Guidelines for the ERF Computer System", STD-GN-0028, General Nuclear Standard, Virginia Power Company

7 "Appendix 'R' Design Guidelines", STD-GN-0021, General Nuclear Standard, Virginia Power Company

8 "Functional Criteria for Emergency Response Facilities", NUREG 0696, U. S. Nuclear Regulatory Commission

9 "Emergency Response Facility Computer System (ERFCS)", VPAP-2602, Station Administrative Procedure, Virginia Power Company.

10 "Notifications and Reports", VPAP-2802, Station Administrative Procedure, Virginia Power Company.

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CHARGING PUMP CASING REPLACEMENT / NAPS / UNIT 1	95-127

1.0 STATEMENT OF THE PROBLEM

The charging pump manufacturer, Ingersoll-Dresser Pump Company (Pacific Pump) has previously issued a bulletin advising owners of the pumps that have casings that are made of carbon steel cladded internally with stainless to inspect them for cladding cracks, erosion or damage when disassembled. Past inspections of the carbon steel charging pump casings at NAPS have discovered indications which were severe enough to warrant casing replacement, rather than repair the existing casing. As a result of these inspections, the existing pump casings for 1-CH-P-1A, 2-CH-P-1A, 1B & 1C were replaced with solid stainless steel casings. It has been requested to replace the remaining carbon steel casings for 1-CH-P-1B & 1-CH-P-1C. (REA 95-088)

2.0 PROPOSED RESOLUTION

2.1 Executive Summary

Due to the failure rate exhibited by previous pump inspections, the carbon steel pump casings associated with 1-CH-P-1B and 1-CH-P-1C will be replaced in lieu of performing further inspections. A solid, stainless steel casing manufactured by the original pump vendor, Ingersoll-Dresser (Pacific Pump), will be used to replace the existing casing. The replacement casing meets or exceeds the design requirements for the original casing. All nozzles and connections on the new casing are the same size and location, so no piping changes are required. The pump internals, which determine its performance capabilities, will be reinstalled in the new casing. Therefore, hydraulic operating conditions will remain unchanged.

The design change will also replace the discharge head and seal housings on 1-CH-P-1B & 1-CH-P-1C with components that are constructed of stainless steel which will eliminate the potential for differential thermal expansion between the casing and these components. The existing "1st generation" seal housings will be replaced with the upgraded "2nd generation" housing which will eliminate the need for external seal flush piping and associated heat exchangers. The discharge head and seal housings for 1-CH-P-1A were previously replaced under EWR 89-539. The seal coolers from all Unit 1 charging pumps will be removed and the service water lines will be capped.

Existing seal plates will be retained for use on the new seal housings and an additional seal retainer plate will be fabricated and installed on the pump seal plates to assist in seal alignment during seal reassembly. This will be performed on 1-CH-P-1B & 1C only.

To facilitate installation of the replacement casing in the existing cradle, the mounting holes in the casing feet may be slightly enlarged as approved by the pump vendor. Relocation of the alignment sleeve (boss) and keyway on the pump cradle is anticipated in order to ensure correct alignment between the pump and driver.

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CHARGING PUMP CASING REPLACEMENT / NAPS / UNIT 1	95-127

2.2 Design Description

The specifications and dimensions of the replacement casing have been compared to those of the existing casing with the following results:

Parameter	Existing	Replacement
Casing Material	A-266 CL-1, Clad 308SS	SA-182 F304
Nozzle Size-Suction	6"-150 lb., USAS B16.5	6"-150 lb., ANSI B16.5
Nozzle Size-Discharge	4"-1500 lb., USAS B16.5	4"-1500 lb., ANSI B16.5
Suct Press/Temp Rating	200 psi @ 300°F	220 psi @ 300°F
Disch Press/Temp Rating	2800 psi @ 300°F	2800 psi @ 300°F
Hydrostatic Test Press	4260 psi (Disch) 330 psi (Suct)	4960 psi (Disch) 375 psi (Suct)
ASME Code Class	Draft Code for Pumps and Valves, 1968	ASME III Class 2, 1971
ASME III N Stamp	No	No
Pump Weight	7500 lbs.	7500 lbs.
Centerline flange to flange dimension	40"	40"
Axial Distance between Mounting Bolt Holes	42"	42"
Tensile Strength, min.	60-85 KSI	75 KSI
Yield Strength, min.	30 KSI	30 KSI
Elongation, % min.	23 KSI	30 KSI
Reduction in area, % min.	38 KSI	50 KSI

This comparison indicates that the replacement casing meets or exceeds the design requirements.

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CHARGING PUMP CASING REPLACEMENT / NAPS / UNIT 1	95-127

The charging pump casings are a barrel type design with pressure boundary closure provided at the suction end by the radial seal housing, and at the discharge end by the discharge head and thrust seal housing. A balancing line is connected between the suction end of the pump casing and the discharge head to balance the axial thrust developed when the pump is in operation. The existing casing is made of carbon steel and is clad with stainless. These casings have a history of cladding cracking erosion and subsequent repairs. Ingersoll-Dresser no longer manufactures clad casings and has recommended use of stainless steel to avoid these potential problems. This casing replacement was previously performed on charging pumps 1-CH-P-1A (EWR 89-539), 2-CH-P-1A (DCP 94-183), 2-CH-P-1B (DCP 94-115) and 2-CH-P-1C (DCP 95-128).

The replacement case is superior to the existing case due to the improved resistance to corrosion exhibited by the solid stainless steel design. The dimensions of the new case are compatible with existing components. The hydraulic performance of the pump is determined by the design of the impellers and the intermediate cover. These components are compatible with the new case and will be installed in it. Therefore the pressure and flow produced by the pump will remain the same.

To facilitate installation of the replacement casing with the existing cradle, some small modifications may be required. The boss and keyway located on the pump cradle may be relocated such that the pin and key on the replacement pump casing will properly align with them. Following these actions, the bolt holes in the mounting feet may have to be elongated to allow them to line up with the bolt holes in the mounting cradle. The prospective modifications have been discussed with the pump manufacturer (DCP 94-115) who concurs that they will not have a detrimental affect on the operation of the pump.

Previous casing replacements for the Unit 2 charging pumps 2-CH-P-1A, 1B & 1C, did not include replacement of the A-266 carbon steel discharge heads or the A-276 Type 410 seal housings. As documented in Deviation Report N-95-1070, the coefficient of thermal expansion for the new stainless steel casings is higher than the coefficient of thermal expansion for the original carbon steel casings, the existing discharge heads, and the seal housings. The major concern associated with the differential thermal expansion is the potential to produce bending stresses in the discharge head and seal housing bolting which cause the combined stress to exceed code allowable values. Replacement of the discharge head and seal housings with those constructed of SA-182 F304 SS material is required to maintain the pump design in an acceptable configuration and limit the stress to within the basic allowable value.

The design change will involve replacing the existing carbon steel discharge heads on charging pumps 1-CH-P-1B & 1-CH-P-1C with SA-182 F304 stainless steel heads (A SS head was installed on 1-CH-P-1A as part of the casing replacement under EWR 89-539). The new SS discharge heads are exactly the same as the original CS heads except for

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CHARGING PUMP CASING REPLACEMENT / NAPS / UNIT 1	95-127

material composition. The new head material will then match that of the replacement casing.

The existing radial and thrust seal housings on the charging pumps are constructed of A276 Type 410 stainless steel alloy. The housings are 1st generation type seal assemblies which are equipped with external seal flush piping with heat exchangers. Additionally, this generation of equipment is provided with a two piece housing. The inner housing includes water cooling jackets and separate seal flushing connections. The replacement 2nd generation housings are constructed of SA-182 F304 stainless steel. This improved seal assembly is provided with a modified seal flush piping arrangement that eliminates the heat exchangers. The seal inlet and outlet connections are connected to special designed adapters installed between the balance line flanges. This arrangement allows the pump seal to operate satisfactorily without heat exchangers provided the seal cavities are continuously flushed with fresh pumpage. This design change will replace the existing seal housings for pumps 1-CH-P-1B & 1-CH-P-1C with 2nd generation seal housings. New seal flush adapters will be installed between the balance line flanges and ¾" SS tubing will be connected between the adapters and seal housings. 2nd generation seal housings and flush adapters were installed on 1-CH-P-1A as part of EWR 89-539, however, the seal coolers (1-CH-E-1A2A/B) were never physically removed from the pump skid. The piping between both seal coolers and the seal housings was removed but service water continues to flow through the coolers. As documented in EWR 89-539, these coolers were allowed to remain in the event a spare cooler was needed for one of the other charging pumps. This design change will remove all existing seal coolers (1-CH-E-1A2A/B, 1-CH-E-1B2A/B and 1-CH-E-1C2A/B) since they will no longer be required for charging pump operation. The ¾" SW supply and return piping will also be removed and the lines will be capped near the 2" SW header supply inside the charging pump cubicle.

Removal of the both seal coolers and associated ¾" SW piping is expected to have minimal impact on the resultant SW flow to the charging pump gearbox cooler or the SW system flow balance. SW cooling is provided from two SW supply headers to the parallel seal and gearbox cooler arrangement. Normal SW flowrate through both seal coolers and gearbox cooler for each charging pump is 18-24 psid as measured by flow switch 1-SW-FS-102A, 102B & 102C which equates to approximately 66-80 gpm (Appendix 4.2). Removal of the seal coolers may result in a slight increase in SW flow through the remaining gearbox cooler which is acceptable. Minimum flow for the gearbox cooler is 10 gpm (Appendix 4.2) and the maximum flow to avoid erosion concerns is 115 gpm (Appendix 4.3).

Existing flow switches, 1-SW-FS-102A, 102B & 102C measure differential pressure across the seal and gearbox coolers, gives local indication and provides control room annunciator alarms on low flow to the coolers at a setpoint of 3.5 psid which equates to the minimum flow of 16 gpm to the parallel cooler arrangement (10 gpm gearbox cooler and 3 gpm for

each seal cooler). Removal of the seal coolers in this design change will result in the flow switch measuring differential pressure across the gearbox cooler only. No significant change in SW flow to the cooler is expected due to the difference in cooler designs (gearbox cooler much larger) and difference in SW loads between the coolers (2" SW supply for gearbox vs ¾" SW supply for seal coolers). Therefore, the low flow setpoint for 1-SW-FS-102A, 102B & 102C will remain at 3.5 psid and will not be changed as a result of this design change. Maintaining the existing setpoint on the flow switch is conservative and the setpoint value still provides adequate equipment protection and indication of a low flow condition to the gearbox cooler. Annunciator alarm windows in the control room and simulator will require modification to eliminate reference to the seal coolers as part of the existing low flow alarm.

The existing A276 Type 410 SS alloy seal plates will be retained for use on the new seal housings as a cost savings benefit. As documented in Appendix 4.4, the pump manufacturer and Virginia Power Mechanical Engineering have concluded that the use of Type 410 SS seal plates on the 304 SS seal housings would not adversely impact the charging pump seal assembly or the operation of the pump itself.

Modification to the new seal plates will be performed in order to install an additional seal retainer plate. The retainer plate is used to secure the seal and maintain alignment until the seal is installed on the shaft sleeve and secured by the collar. Seal face tension is set by compressing the seal package using a single retainer plate and locking down the sleeve drive collar then releasing the retainer plate. The addition of a seal retainer plate 180° from the existing plate will ensure the seal spring stays evenly compressed until the collar can be secured. The function of the retainer plate is for installation only. The retainer plate can be rolled out of the way or entirely removed after set up of the seal is complete. The plate provides no safety related function. Installation of the second retainer plate has been approved by the pump vendor (Appendix 4.5) and it will not impact operation of the pump other than to enhance seal set up and performance. Installation of the second seal retainer plate will involve drilling a ¼" - 20 x ⅜ deep hole in the seal plate, 180° from the existing retainer plate. Structural integrity and pressure retaining ability of the seal housing will not be compromised by this modification.

2.3 Special Implementation Requirements

2.3.1 1-CH-P-1A, 1B & 1C are safety related, seismic and EQ related (EQ related because the motors are listed on the EQML). Implementation of this design change is considered non-EQ since it involves work on the pump. The pumps are located in the Auxiliary Building, 244' elevation.

2.3.2 The mode of operation for which this modification will be performed shall be determined by Operations.

2.3.3 The modification will require that applicable portions of the CVCS and SW system be tagged in accordance with OPAP-0010 in order to perform this work.

2.3.4 1-CH-P-1B & 1C ONLY Replace the pump casing, the pump's discharge head, radial seal housing and thrust seal housing in accordance with the pump manufacturer's instructions. Existing seal plates will be retained for use on the new seal housings. Any required removal/replacement of piping will be done in accordance with NAS-1009 and will be controlled by the ASME XI Repair & Replacement Program.

2.3.5 1-CH-P-1B & 1C ONLY Install new seal flush adapters between balance line flange connections. Field route as required new ¾" tubing and fittings to connect seal flush adapters with seal housings. Installation shall be performed in accordance with pump manufacturer's instructions and drawing N-95127-1-M-100. 1-CH-P-1A seal flush arrangement may be used as reference for installation on 1-CH-P-1B & 1C.

2.3.6 1-CH-P-1A, 1B & 1C Remove existing seal coolers 1-CH-E-1A2A/B, 1-CH-E-1B2A/B and 1-CH-E-1C2A/B and associated ¾" SW piping. Cap SW supply/return connections near 2" SW header using ¾" SWLD pipe cap.

2.3.7 1-CH-P-1B & 1C ONLY Drill and tap ¼" - 20 x ⅜ deep hole in seal plate, 180° from existing seal retainer plate screw and adjust for proper fit up of the retainer plate to sleeve slot.

2.3.8 1-CH-P-1B & 1C ONLY If necessary, the following modifications may be made to facilitate installation of the replacement casing in the existing cradle.

2.3.8.1 The alignment boss may be relocated to line up with the pin on the replacement casing with the casing aligned to the piping flanges. If the sleeve must be moved more than 9/16", consult Design Engineering.

2.3.8.2 The keyway block may be relocated in the lateral direction in order to align with the key attached to the pump casing. The clearance between the block and key shall be measured prior to relocating the block. The block shall then be relocated on the pump cradle the required distance for alignment while centering the key in the keyway block.

2.3.8.3 Linear length of the welds required to reinstall the alignment sleeve and keyway block must be equal to or greater than the length of weld prior to removal. Weld size shall be minimum ⅜" fillet.

2.3.8.4 The bolt holes in the casing mounting feet may be elongated in the lateral or axial direction 1/4 ± 1/32" to align the mounting holes with the cradle.

2.3.8.5 The inboard bearing housing may be redrilled and reamed for new dowels to ensure that alignment between the bearing housing and pump casing is maintained.

2.3.8.6 The existing notch located in the cradle end support plate may be enlarged with a 2" tall x ⅝" wide opening such that the casing drain line will not interfere with the support plate. Grind all edges to a smooth profile and provide ¼" minimum radii at corners.

2.3.8.7 If required, grind the cradle support end plate in the area near the casing foot to provide adequate clearance between the casing and cradle. A maximum of ½" may be removed along this region of interference to avoid undercutting the cradle support beneath the foot. Grinding shall be minimized and precautions taken to avoid grinding on the pump casing. No grinding on the pump casing is allowed.

2.3.8.8 All welding and NDE will be controlled under the existing ASME Section XI Repair and Replacement program.

2.3.8.9 Cold spring allowables for the suction and discharge piping shall not exceed the following:

	VERTICAL	AXIAL	LATERAL
Suction	0.25"	0.25"	0.25"
Discharge	0.375"	0.25"	0.75"

Reference: Technical Report CE-0013

2.3.9 All component label (tags) required for this design change and new annunciator windows for the control room and simulator shall be prepared and ready to install prior to commencement of this modification on each charging pump. New component label specifications are included in Appendix 4.13. Modified annunciator windows will be made in accordance with drawing N-95127-1-1ESK10B and installed prior to issuance of the Operational Readiness Review (ORR) for each applicable charging pump.

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3.0 PROGRAMS REVIEW

3.1 Updated Final Safety Analysis Report (UFSAR)

Elimination of the charging pump seal coolers and associated SW piping will not impact the design basis for the SW system as described in Section 9.2.1 of the UFSAR. Service water flow requirements during DBA conditions will not be affected since no significant change in SW flow to the charging pump gearbox cooler is expected. Therefore, no change is required for Table 9.2-1, Typical Service Water Equipment Flow Rates. Revision to the UFSAR is required to delete reference of the charging pump seal coolers. A UFSAR Change Request is included in Appendix 4.6. UFSAR Figure 9.2-4 will be revised as part of the drawing update revision for 11715-FM-78G.

3.2 Technical Specifications

The applicable charging pump will be taken out of service to perform the modifications of this design change. Technical Specification 3.1.2.2 and 3.5.2 require that a charging pump be operable during unit operation and Tech Spec 3.1.2.4 requires that at least two charging pumps be operable. The design change will be implemented on only one charging pump at a time. Operability of the two remaining charging pumps will be verified prior to performing this DCP. The activity will not result in the violation of any LCOs and plant safety will not be compromised.

3.3 Fire Protection/Appendix "R"

The CVCS and SW systems are Appendix "R" Safe Shutdown systems. The DCP will replace 1-CH-P-1B & 1C casing, discharge head and seal housings on a one-for-one basis with slight modification to the pump support cradle. The seal coolers will be removed from all Unit 1 charging pumps. Appendix "R" drawings 11715-DAR-78G and 11715-DAR-95B will be revised to reflect the removal of the charging pump seal coolers and associated SW supply/return piping. No combustibles are being added by this design change. Modification will not adversely impact the station's design basis for compliance with Appendix "R" to 10CFR50. An Appendix "R" Design Summary Sheet and Report Change Notice are included in Appendix 4.7.

3.7 Inservice Inspection

Cutting and reinstallation of the pump discharge piping and modification to the pump mounting arrangement shall be performed in compliance with ASME Section XI

requirements for repairs and replacements. Charging pump seal coolers and associated ¾" SW piping are identified ASME Section XI equipment and removal of this equipment will be controlled under the ASME Section XI requirements.

3.8 Seismic

A comparison has been made between the original Westinghouse Equipment Specification for the charging pumps, (ref. Westinghouse Equipment Specification No. 677125, "Auxiliary Pumps", Shop Order No. General 205) and the newly procured charging pump casing from Ingersoll-Dresser Pump Company. The replacement pump casing has been qualified to more stringent seismic requirements than the original pump and will be acceptable for use as a replacement. All resulting stresses have been maintained within the applicable allowable limits of the ASME B&PV Code, Section III. Ingersoll-Dresser states that allowable nozzle loads on the new casing are identical with those identified in Westinghouse-Pacific Pump design report K-318-1, Rev 5. Engineering Mechanics has reviewed the existing nozzle loads for the charging pump and has determined that these loads do not exceed the allowable nozzle loads of the new pump casing. (See Appendix 4.8).

The total weight of both pumps is identical (i.e. 7500 LBS). The nozzle configuration of both pumps is identical which will ensure similar nozzle reactions under all applicable load cases. Removal of the seal coolers and associated piping from each pump skid will result in an 80 pound (seal cooler weight is 40 lbs.) weight reduction to the pump skid arrangement. The weight decrease when compared to the 7500 lb. pump and 5800 lb. base weight, will not adversely impact the seismic integrity of the pump.

The original pump was designed to sustain seismic loads resulting from the simultaneous application of the following peak seismic accelerations at the center of gravity:

OBE Horizontal = $\pm$1.0g OBE Vertical = $\pm$0.67g

The newly procured pump was designed to sustain seismic loads resulting from the simultaneous application of the following peak seismic accelerations:

OBE Horizontal = $\pm$1.5g OBE Vertical = $\pm$1.0g
DBE Horizontal = $\pm$3.0g DBE Vertical = $\pm$2.0g

The original pump was required to have a natural frequency greater than 30 CPS, while the replacement pump is required to have a natural frequency in excess of 35 CPS. It can be seen by simple comparison that the replacement pump is at least as rigid as

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the original pump with additional conservatism to avoid adverse behavior from multi-modal effects.

In addition, a comparison between the original Westinghouse Equipment Specification for the charging pumps and the newly procured replacement parts (discharge head, seal housings) from IDP (Appendix 4.9). The replacement parts have been qualified to more stringent seismic requirements than the original pump and will be acceptable for use as replacements.

3.9 Human Factors

The design change removes the seal coolers from the Unit 1 charging pumps. Flow switch 1-SW-FS-102A, 102B & 102C sense service water flow through the associated charging pump's seal and gearbox coolers and on low flow ΔP, contacts close to annunciate the associated window in the Main Control Room. No change to low flow setpoint is required due to the expected minor change in SW flow following seal cooler removal. The existing annunciator windows will require revision to delete reference of the seal coolers from the windows in order to reflect actual plant configuration following implementation of this design change. Removal of the seal coolers from the charging pumps will not affect the operation of the flow switch or any associated electric circuitry. A human factors analysis has been performed and the proposed modification is in compliance with NUREG-0700, STD-GN-0005 and STD-GN-0036.

3.12 Emergency Response Facilities (ERF) System

1-SW-FT-109A & 1-SW-FT-109B measure combined SW discharge flow from the charging pump seal and gear box coolers and provide inputs to the ERF computer. Elimination of the Unit 1 charging pump seal coolers will not add or delete inputs to the Validyne multiplexor system, modify drawings on the ERF Design Drawing List or modify the subject instruments in any way. Elimination of the seal coolers will not affect the computer input description for the flow transmitters. A review of STD-GN-0028 has determined that the proposed modification does not impact the ERF system.

3.13 Plant Flooding

Pump casing, discharge head and seal housing replacement will require removal of removable blocks affecting flooding concerns associated in the charging pump cubicle. Though the pump will be inoperable for this modification for which the flooding concerns are not applicable, assurances that the blocks are caulked 44" from the

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bottom and floor plugs are installed in the cubicle will be verified under 0-MOP-49.30 following replacement of the blocks.

3.14 Heavy Loads

Safe Load Paths and procedures which meet the requirements of NUREG-0612 have already been addressed in appropriate maintenance procedures for transport/handling of the charging pump casing.

3.15 Post Accident Monitoring (RG 1.97)

1-SW-FT-109A & 1-SW-FT-109B measure combined SW discharge flow from the charging pump seal and gear box coolers and are Reg Guide 1.97 components. However, removal of the charging pump seal coolers will not affect the instrumentation associated with the transmitters. The modification does not impact the Station's compliance with Reg. Guide 1.97 and no revision to the Reg. Guide 1.97 Technical Report is required.

3.17 The Simulator

The design change will require modification of the annunciator windows associated with flow switches 1-SW-FS-102A, 102B & 102C. As stated in section 3.9, reference to the charging pump seal coolers must be deleted from the annunciator window in the Main Control Room to reflect actual plant configuration following implementation of the design change. A corresponding change must also be made to the simulator annunciator windows. The setpoint for 1-SW-FS-102A, 102B & 102C will not be changed. No simulator software changes are involved with this design change.

3.18 Nuclear Plant Reliability Data System (NPRDS)

This DCP will replace components that fall within the scope of NPRDS. The existing carbon steel/stainless steel lined casing is an identified component associated with NPRDS reliability ratings. The data base will be updated as required to reflect this rating.

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3.19 Setpoints, Station Curves, Instrument Scaling and Instrument Uncertainity Calculations

Mark number descriptions for 1-SW-FS-102A, 102B & 102C will require revision to delete reference of the seal coolers due to the elimination of the coolers as part of this design change. The setpoint for the flow switch will remain the same and no actual setpoint change is involved with the DCP. Also a review of the North Anna Setpoint Document discovered that components 1-SW-FSL-101A, 101B & 101C do not exist and should therefore be removed from the setpoint document. A Setpoint Change Request is included in Appendix 4.15.

3.22 Equipment Data System (EDS)

Removal of the seal coolers and associated piping from all Unit 1 charging pumps will require deletion of these mark number components from the SW system data base. An electronic Equipment Data System Change Request has been completed to reflect changes generated by this DCP. (Reference EDSCR # 0000006887)

3.23 ALARA

The scope of this work will be controlled under a RWP.

3.24 Cumulative Effects on Plant Systems

Removal of the charging pump seal coolers and the resultant effect on the remaining gearbox cooler and the SW system were reviewed. Elimination of the seal coolers may result in a slight increase in SW flow through the associated gearbox cooler but this flow will not exceed the maximum tube side flow to avoid erosion concerns. Small changes in SW flow through the gearbox cooler will not significantly alter the thermal balance across the gearbox cooler. Existing thermal balance concerns (subcooled oil) associated with the gearbox coolers have been identified under REA 96-122 and plan to be resolved under DCP 96-178.

Any changes in SW flow to the charging pump coolers will not adversely impact flow throughout the remaining SW system and this design change will have no impact on the SW system flow balance alignment. Since the SW load on a seal cooler is minor (5-10 gpm), removal of the seal coolers will have no profound impact on the SW system flow balance when compared to the significant flow demands of the CCHX's (7000 gpm) and RSHX's (20,000 gpm).

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3.27 Summary of Equipment Added or Removed

MARK #	ADD/REM	MFG	MODEL	LOCATION	FUNCTION
1-CH-E-1A2A	REM	BORG WARNER	NX-0500-FW	AUX BLDG	SEAL COOLER
1-CH-E-1A2B	REM	BORG WARNER	NX-0500-FW	AUX BLDG	SEAL COOLER
1-CH-E-1B2A	REM	BORG WARNER	NX-0500-FW	AUX BLDG	SEAL COOLER
1-CH-E-1B2B	REM	BORG WARNER	NX-0500-FW	AUX BLDG	SEAL COOLER
1-CH-E-1C2A	REM	BORG WARNER	NX-0500-FW	AUX BLDG	SEAL COOLER
1-CH-E-1C2B	REM	BORG WARNER	NX-0500-FW	AUX BLDG	SEAL COOLER
¾"-WS-C66-153A-Q3	REM			AUX BLDG	SW SUPPLY PIPE
¾"-WS-C67-153A-Q3	REM			AUX BLDG	SW SUPPLY PIPE
¾"-WS-C68-153A-Q3	REM			AUX BLDG	SW SUPPLY PIPE
¾"-WS-C69-153A-Q3	REM			AUX BLDG	SW RETURN PIPE
¾"-WS-C70-153A-Q3	REM			AUX BLDG	SW RETURN PIPE
¾"-WS-C71-153A-Q3	REM			AUX BLDG	SW RETURN PIPE
¾"-WS-C72-153A-Q3	REM			AUX BLDG	SW SUPPLY PIPE
¾"-WS-C73-153A-Q3	REM			AUX BLDG	SW SUPPLY PIPE
¾"-WS-C74-153A-Q3	REM			AUX BLDG	SW SUPPLY PIPE
¾"-WS-C75-153A-Q3	REM			AUX BLDG	SW RETURN PIPE
¾"-WS-C76-153A-Q3	REM			AUX BLDG	SW RETURN PIPE
¾"-WS-C77-153A-Q3	REM			AUX BLDG	SW RETURN PIPE

3.28 System and Plant Design Basis Documents

The ability of the charging pumps to meet design performance is not affected by this design change. Review of SDBD-NAPS-SW also determined that the design basis associated with the SW system is not affected by this modification. Required service water flow/cooling capacity will be maintained for the charging pumps during normal and DBA conditions. However, reference to the seal coolers is mentioned throughout the DBD which will require revision. A SDBD Change Request is included in Appendix 4.10.

3.30 Removable Blocks and Other Barriers

Removal/installation of any blocks or shielding protection shall be controlled under the applicable requirements delineated in the appropriate maintenance procedures.

3.33 NCRODP Training Manuals

The design change will require revision of training manuals NCRODP-13-NA, Service Water System and NCRODP-41-NA, Chemical & Volume Control System to reflect removal of the charging pump seal coolers and changes to the SW system. A change request is included in Appendix 4.11 and 4.12.

3.35 Labelling

Removal of the charging pump seal coolers will require new component labels on associated SW valves, transmitters and flow elements to delete reference of the seal coolers from the mark number -description. Component Label Specifications are included in Appendix 4.13.

3.37 Vendor Technical Manuals (VTM)

Installation of the new stainless steel discharge heads and 2nd generation seal housings will be annotated in VTM 59-W896-C0002 for the Unit 1 charging pumps. Elimination of the seal coolers will also be noted in the VTM to reflect field condition of the charging pumps. A VTM Change Request is included in Appendix 4.14.

4.0 FUNCTIONAL TESTING REQUIREMENTS AND ACCEPTANCE CRITERIA

The existing pump internal rotating element will be installed in the replacement pump casing. Since the internal rotating element will not be disassembled or modified, the pump hydraulic characteristics are unaffected by replacement of the pump case, discharge head and seal housings. Therefore, there is no requirement to run a full head curve verification upon completion of this modification.

The following testing is required as Post Maintenance Testing by the Work Order.

1. Post Maintenance External Leakage Test; PMT-LKT-MM-0001. Acceptance Criteria: No leakage.

2. Post Maintenance Vibration Analysis; PMT-P-PA-001.

3. Pump Operability Test; 1-PT-14.2 or 14.3.

4. Verify required SW flow to charging pump gearbox cooler during performance of 1-PT-212.25, 212.26 or 212.27.

5. A system pressure test of the affected ¾" SW joints (Q3) shall be performed. (Piping one inch NPS and less is exempt from hydrostatic testing per ASME Section XI). Acceptance criteria is no leakage.

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5.0 SYSTEM OPERATION

Replacement of the pump casing, discharge head and seal housings will not affect pump or system operation. Seal housing upgrade will eliminate the need for the charging pump seal coolers and consequently the need for service water cooling to the heat exchangers. Service water will continue to supply the cooling medium to the gearbox coolers. Operation of the charging pump and service water system will not be affected by this modification.

6.0 REFERENCES

6.1 EWR 89-539 "1-CH-P-1A Casing, Head and Seal Housing Replacement"

6.2 DCP 94-115-2, DCP 94-183, DCP 95-128, DCP 95-216.

6.3 DCP 94-160, DCP 94-161, "Revise SW Flow Switch Setpoints"

6.4 DCP 79-S09, "SW to Charging Pumps Modification"

6.5 REA 95-088

6.6 Safety Evaluations 89-SE-MOD-187, 94-SE-MOD-028, 95-SE-MOD-14, 96-SE-MOD-021, 96-SE-MOD-022.

6.7 Westinghouse Specifications: 677125, Rev. 0 & 678815, Rev. 2.

6.8 ET CME 95-0056, "Evaluation of NAPS Charging Pump Coolers"

6.9 MCT-4098, Memorandum B.K.Day to R.C. Sturgill dated September 29, 1993

6.10 Potential Problem Report 95-017

6.11 Deviation Report N-95-1070

6.12 Civil Engineering Technical Report CE-0079, Rev 1

6.13 Vendor Drawing 11715/12050-2.32-7A

6.14 NCRODP-13-NA, Service Water System

6.15 NCRODP-41-NA, Chemical & Volume Control System

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P250 Upgrade / NAPS / Units 1 and 2	96-005

1.0 STATEMENT OF PROBLEM

The Unit 1 and 2 PRODAC computers (P250's) have been in service since approximately 1975. It has become increasingly difficult to keep these machines in service for two reasons: 1) the equipment age makes them increasingly susceptible to failure; and 2) the shrinking installed base of similar equipment makes services harder to find.

Unavailability of the P250s has been a serious problem since 1994, especially for the Unit 1 machine. Frequent P250 failures place a significant burden on plant operations and maintenance personnel and have the potential to compromise unit capacity factor.

Given this small and shrinking base of equipment, hardware, software and training services are virtually non-existent.

According to the Edison Electric Institute (Reference 6.1), only two other P250 systems remain in service other than the four at Virginia Power nuclear power plants. All others have either been replaced or are being replaced. Virginia Power has taken two approaches to maintaining the hardware availability of our P250's: (1) actively scavenging equipment retired by other utilities as they have replaced their P250's and (2) replacing peripherals as possible using modern third party parts: such as the disk replacement with solid state memory and the programmer's console replacement with a personal computer. These options have been effectively exhausted and the age of the machines requires that the P250s finally be replaced.

2.0 PROPOSED RESOLUTION

2.1 EXECUTIVE SUMMARY

A Type 2 Study (Reference 6.2) was prepared to study the problem of the aging of the plant computers. This study recommended a phased approach to replacement.

Phase I will install a computer system and related equipment which are capable of performing certain key functions when a P250 computer is not operating properly. This new system is capable of operating in parallel with the existing P250 computers.

Phase I will also replace the existing four personal computers now used in the main control room. Newer, more powerful computers will be used to provide operators with an interface to the information available on the new computer system. The operators will continue to have access to the information now available on the control room personal computers.

Phase II will complete replacement of the P250 computer systems. The remaining P250 hardware will be demolished and additional hardware will be added to complete the replacement.

The most critical P250 software, as determined by Operations, will be converted to run on the replacement system in Phase I. During Phase I this software will be running on both systems. The remainder of the software will be converted in Phase II. All software development will be done under VPAP-0306 (Reference 6.7).

Acceptance of this approach and approval of the costs of the project were given by CRCCB on July 25, 1996.

This DCP addresses the presently known work required to support only the Phase I, P250 Backup portion of this project. A future DCP will be developed to address Phase II.

This work will be done with the units at power, but may be done with the unit offline. However, it will be necessary to have the P250 computers out of service during various stages of the implementation process. Efforts will be made to avoid having both P250 computers down simultaneously. Normal compensatory measures will be taken using 1/2-AP-42 (Reference 6.9) when the computers are not operational. Steps will be taken to avoid interfering with work, such as taking flux maps, which requires use of the P250 computers.

2.2 DESIGN DESCRIPTION

During Phase I, a backup computer system for each unit will be installed. This backup system will include plant monitoring software, RTP I/O equipment, and a Validyne interface. The vendor is SAIC in Huntsville, Alabama and Marietta, Georgia. The equipment was purchased under Specification NAP-0085 (Reference 6.17). The system will be factory tested prior to delivery and installation at the plant.

Two DEC Alpha computers will be used to backup the P250 computers. One Alpha will backup each P250. Therefore, most critical functions will be available on both the P250 and Alpha computers providing a high degree of availability during Phase I. DEC currently quotes a mean time between failure (MTBF) greater than 1.6 years for its Alpha computers (Reference 6.63).

In Phase I, the database for each backup computer (Alpha) will consist of approximately 1600 points from the existing Validyne data acquisition system used on the ERFCS for the entire station. These Validyne points include approximately 250 P250 inputs per unit. Another 350 P250 points per unit

will be obtained from inputs paralleled from the P250 through the new RTP I/O data acquisition system. These points are listed in Appendix 4-13. Thus between the Validyne and the new RTP I/O systems, a large number of the P250 I/O will be available to the new computers.

The remaining inputs will be picked up in Phase II. A major portion of the existing P250 points not available to the new PCS in Phase I will be secondary plant flows, pressures, levels and temperatures, motor bearing and stator temperatures and opposite unit data.

2.2.1 ALPHA COMPUTER

Two Alpha computers will be installed in the TSC computer room and powered from the TSC inverter. These systems will have sufficient memory and disk storage space for their current P250 replacement role. Furthermore they may be expanded in the future as needed. However, the Alphas installed in Phase I are sized to be adequate for Phase II also.

Each backup PCS Alpha will be supplied with two ethernet link interfaces. One link will be used for communication with the Validyne and RTP I/O equipment while the other will be used for communication with the station local area network (LAN). Segregating these links by function will optimize performance while minimizing interference between I/O and man-machine interface functions.

The existing control room personal computers (PC's) will be replaced with newer systems by this DCP. The PC's located on the operator bench board and in the shift supervisor console will be replaced in the control room of each unit for a total of four control room PC's. The new PC's will be used for communicating with the new computers. They will also be available for any of their current functions. The operating system of these computers will be upgraded from Windows 3.1 to Windows NT. A trackball will be added in order to make best use of the Windows format of the new plant computer interface software. The bench board mountings will be modified as necessary to accommodate the new PC equipment. Connectors will also be installed on the control room section of the station LAN near the flux map panels to allow the hookup of portable personal computers by Reactor Engineering personnel when needed for testing purposes.

Similar personal computers will be installed in the simulator control room, and their operating systems will be upgraded from Windows 3.1 to Windows NT. No other simulator updates are required for Phase I.

Finally, a personal computer based engineering work station will be provided in the Technical Support Center programmer's room. This computer will provide all of the function of the control room workstations in addition to being used for system maintenance purposes.

2.2.2 RTP I/O EQUIPMENT FOR EXISTING P250

Each Alpha will receive field inputs from Real Time Products (RTP), I/O data acquisition equipment located in the existing P250 cabinets. This equipment will be used to collect approximately 240 analog, 16 pulse, and 176 digital readings from existing P250 inputs on each unit. These points are listed in Appendix 4-13. This data collection will be in parallel to that of the P250 so the information will be available on the old and new systems. The RTP equipment includes some spare capacity. This equipment will be located in spare space within the P250 cabinets.

2.2.3 VALIDYNE SYSTEM INTERFACE

Each Alpha computer will also receive all Validyne data acquisition system analog and digital inputs from both units into its data base via a new interface supplied by SAIC. The interface will be installed in the TSC computer room in proximity to each new Alpha. The data will be supplied from Validyne digital buffers to an existing Validyne master receiver (presently used for GETARS on one unit) and to a new Validyne master receiver supplied by SAIC on the other.

2.2.4 RECONFIGURATION / RELOCATION OF EXISTING VALIDYNE SUBBUFFERS

In order to reduce cost and optimize use of existing Validyne equipment, several Validyne digital buffers will be relocated from their present locations and relocated to the TSC computer room The buffers which are being relocated are in positions where their signal splitting functions are not being utilized. They can be eliminated from their current positions without any adverse impact on the Validyne system. Moving these buffers will not require pulling any new fiber optic cable.

The following Table 2-1 lists the buffers which will be relocated by this DCP. In order to maintain operability of the ERFCS system, work shall be performed on only one train of the Validyne system (A or B) at any one time.

TABLE 2-1		
Buffer	Unit	Present Location
Buffer 1A2	1	01-EI-CB-301A
Buffer 1A3	1	01-EI-CB-301A
Buffer 1B2	1	01-EI-CB-301B
Buffer 1B3	1	01-EI-CB-301B
Buffer 2A2	2	02-EI-CB-301A
Buffer 2A3	2	02-EI-CB-301A
Buffer 2B2	2	02-EI-CB-301B
Buffer 2B3	2	02-EI-CB-301B

2.2.5 ADDITIONAL MODIFICATIONS AND CONSIDERATIONS

The addition of parallel adapter cards to the P250 input multiplexor boards will require a minor modification to the doors of the P250 I/O cabinets. The installation of the input adapters between the existing P250 input card and the ELCO connector on the cable from the rear of the cabinet will extend the edge of the ELCO connector several inches further out from the chassis in the P250 racks. With connectors adapters installed the ELCO connectors will extend out to far to allow the cabinet doors to close as presently installed. The existing doors will be shimmed out to allow space for the adapter cards to be installed.

2.2.6 APPLICATION SOFTWARE

The most critical P250 software will be converted to run on the new plant computer system. This new software will be running in parallel to the P250 software so the new system can perform its P250 backup functions. This software will be developed, documented, and tested in accordance with VPAP-0306 (Reference 6.7).

2.2.7 ELECTRICAL DESIGN

Power circuits for new equipment will be provided from existing circuit breakers in the TSC Distribution Panel, 1-EP-CB-135; Inverter Panel in 1-EI-CB-18A and Inverter Panel in 2-EI-CB-18A. Surge and circuit breaker protected plug-in strips will be provided in the existing racks, except the Unit 1 and Unit 2 processors and consoles will be plugged directly into receptacles. Personal computers in the control room are powered from lighting panels 1C1,

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2C1 and 1TSC1.

Spare circuit breakers will be used to serve new loads.

All work will be performed in accordance with NAS-3014 (Reference 6.16). The disconnection and reconnection of electrical equipment will be done in accordance with GMP-E-143 (Reference 6.14) or 0-EPM-2802-01 (Reference 6.15).

2.3 SPECIAL IMPLEMENTING REQUIREMENTS

Prior to beginning work all required tags must have been obtained. All necessary tags must be hung before each work evolution begins. When starting systems up for the first time following modifications made by this DCP only one breaker should be energized at a time. Verification that no problems have resulted needs to be made before proceeding on to the next breaker.

This DCP has been developed for implementation with the units in power operation. Extreme caution needs to be exercised while work is in progress to preclude adversely impacting station operation.

All work will be performed in accordance with NAS-3014 (Reference 6.16). The disconnection and reconnection of electrical equipment will be done in accordance with GMP-E-143 (Reference 6.14) or 0-EPM-2802-01 (Reference 6.15).

This design change will require outages of the P250 computer which may last for several days. While the P250 is down, 1/2-AP-42 (Reference 6.9) will be in effect. It must be noted that the Hathaway annunciator system should not be taken out of service while the P250 is unavailable as this will place the unit / plant into alert status. Work should be scheduled so that only one P250 is down at a time. Scheduled flux maps, RCS leak rate calculations, and any other work requiring the P250 computers should be done just prior to extended P250 outages to the extent practical. If desired, the P250 computers may be cross connected to permit calorimetric calculations to be done on the other unit while a P250 is unavailable. Cross connection should be done under procedure IMP-C-P250-01 (Reference 6.10). The calculation of shift average power will not be available while the P250 is out of service. No nuclear instrumentation system (NIS) work should be scheduled for the period when the P250 is down.

The Operations Shift Supervisor needs to be notified as soon as practical prior to the commencement of any work. The Operations Shift Supervisor must be made aware that entry into 1/2-AP-42

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(Reference 6.9) may be necessary. The Shift Technical Advisor needs to be notified prior to any work which could affect the operability of the Validyne I/O system. Validyne work needs to be scheduled such that no more than one train is inoperable at any time. The primary ERFCS should be monitoring the available Validyne train while work is in progress.

Work should begin in the emergency switchgear and instrument rack rooms in order to remove the Validyne buffers which will be used for the plant process computer. The STA needs to be notified prior to the initiation of this work. Fiber optic jumpers removed when the Validyne buffers are relocated may be used in the TSC. This is an alternative to making up new jumpers. Once the Validyne equipment has been removed, the cable tags on the remaining Validyne equipment will need to be reviewed. New tags will need to be generated where the from and to equipment has changed. During portions of the work on the "A" train of the Validyne equipment, GETARS will be unavailable.

Caution needs to be exercised to avoid eye injury when disconnecting and handling fiber optic circuits. Looking directly into laser light on any energized fiber optic circuit is to be avoided.

When terminating 100/140 micron fiber optic cables for the Validyne system, the procedure in Appendix 4-14 should be used. Caution needs to be exercised when handling exposed fiber to avoid puncture wounds. Short jumpers may be made entirely of optical fibers and furcation tubing provided the jumper is located entirely within a cabinet or conduit nipples. Caution needs to be exercised to avoid damaging the optical fiber when routing it within cabinets or through conduit.

The next priority should be placement of the computers in the TSC. The computers will be used to verify the proper operation of equipment added in later stages. The system terminals and keyboards for these computers may be placed on top of the computer cabinets.

Before placing the Validyne cabinet 1-EI-CB-78PC1 in the TSC some preliminary work needs to be done. The receptacles for printers PRT2, PRT4, and PRT5 need to be removed first. This activity is shown on drawings N-96005-3-1FE27NA and N-96005-3-1FE27NB (References 6.35 and 6.36, respectively). Other TSC receptacles listed in Section 3.27 for demolition may be removed at this time.

Cabinet 1-EI-CB-78PC1 should be installed and grounded. At the same time power circuits for it and for other TSC equipment should be worked as the work schedule permits. Temporary power for GETARS should be installed per N-96005-3-E-1406 (Reference 6.58) to allow GETARS to remain functional as long as practical.

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The B Validyne train should be worked first along with the Unit 2 Alpha computer. This is to keep the GETARS system available as long as possible. It should be noted that when the Validyne equipment now serving GETARS is removed, GETARS will be out of service and its function lost until it can be performed on the new plant computer system. If necessary, temporary terminals, using personal computers, may be established as noted below in order to perform transient analysis on the new computer system. The STA needs to be notified prior to the interruption of the Validyne system and the loss of GETARS. Fiber optic jumpers obtained when removing buffers from the emergency switchgear room may be used in the TSC when installing Validyne equipment. By supplying temporary power and working the B Validyne train and Unit 2 Alpha first, the period of time when either GETARS or the new Transient Response Analysis system is unavailable will be minimized.

The installation of ethernet coax cable in the TSC will be done by NSS under the direction of NIT. NIT will determine the cable route and install cable terminations. These cables include a link to the station local area network (LAN) and to the Validyne system for each Alpha CPU for a total of four cables. If desired by NSS, NIT will terminate the time synchronization cable between the RTP I/O systems. Telecommunications shall also provide the telephone link for the time synchronization interface to the National Institute of Standards and Technology. Ethernet coax connectors, terminators, and tee connectors will be supplied by NIT.

The termination of the fiber distributed data interface (FDDI) links between the Alpha CPU's and the RTP I/O equipment will be done by NSS under the direction of the Telecommunications Department.. This link will use an unscheduled fiber optic cable installed under DCP 95-264 (Reference 6.59). Connectors for this cable will be installed by the Telecommunications Department. Connectors, jumpers, and fiber optic termination panels for these circuits will be supplied by the Telecommunications Department.

When working in the TSC, holes left in false floor tiles should be patched. If patching is not practical the tiles should be replaced.

If necessary, temporary work stations on the Alpha host using personal computers may be added over the course of construction. Cables used in connecting these temporary work stations must either be plenum rated, run in conduit, or not run under the computer room false floor. Station service outlets should be used to power these temporary work stations. UPS or vital power should not be used. These temporary work stations must be removed prior to the completion of this DCP. NIT should be contacted to use the station LAN for temporary work stations. Connectors added to the LAN by NIT for temporary work stations need not be removed once their use has been

completed.

This is to be followed by installation of the I/O equipment in the P250 racks. This may require moving energized power supplies used for monitoring Technical Specification significant inputs. Although the power supplies are to be moved while energized, caution needs to be exercised so as to not cause loss of indication through loss of a power supply. Preparations should be in effect to invoke 1/2-AP-42 (Reference 6.9) should the P250 computer be lost while work is in progress.

The outages of the P250 computer will require the action statement of Technical Specification 3.1.3.2.c be entered since the P250 computer provides the automatic rod deviation monitor function described in this section. The action statement requires additional rod deviation surveillances which are covered by 1/2-AP-42 (Reference 6.9). The provisions of Technical Specification 3.0.4 do not apply.

Due to the age of the P250 components caution needs to be exercised when working in the P250 cabinets. Cables and components should not be moved or touched any more than is necessary in order to avoid damage to the system.

Prior to connecting the RTP I/O equipment, emergency condensate storage tank level indication (1-CN-LT-100A and 2-CN-LT-200A) must be removed from the P250 computer. This is necessary to preserve electrical isolation for RG 1.97. Determination will require work in the Unit 1 and 2 rack rooms. This work must be coordinated with Operations in order to minimize adverse impact on station operation. No more than one protection cabinet should be open at a time.

Removal of the cross connected analog rod position indication (IRPI) points needs to be performed on the other unit before I/O equipment can be installed on a given unit. This is necessary to allow proper calibration of the IRPI points. P250 IRPI indication will be lost while this work is in progress which may require compensatory measures by Operations. This work is shown on drawings N-96005-3-1FE7BG, N-96005-3-2FE7BG, N-96005-3-1FE7BJ, and N-96005-3-2FE7BJ (References 6.46, 6.47, 6.48, and 6.49, respectively).

The routing of cable between the P250 computer rooms will require running a cable through penetrations between Appendix R fire areas. Fire watches need to be posted in accordance with TR 7.2.A of the Technical Requirements Manual (TRM) whenever fire barriers are breached. In addition, fire barrier penetrations shall be repaired in accordance with GMP-035 (Reference 6.13). These penetrations cross the control room pressure boundary. Caution will need to be exercised to avoid unnecessarily breaching the pressure boundary. The sealing material should not need to be

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removed in order to route cables through it. If the planned method of routing the cable through the MCR pressure boundary penetration (without removing the sealant) is not possible, Project Engineering or the DEO shall be contacted. This work needs to be coordinated with Operations so that control room delta pressure is monitored while work is in progress and no other pressure boundary breaches are open at the same time. The penetrations need to be resealed afterwards in accordance with the Technical Requirements Manual. This work should not require entering the action statement of Technical Specifications 3.7.7.1.

Work in the P250 computer rooms is shown on drawings N-96005-3-E-8900, N-96005-3-E-8901, N-96005-3-E-8902, and N-96005-3-E-8903 (References 6.37, 6.38, 6.39, and 6.40, respectively). Before any work begins in either P250 room, the cards to which parallel connections will be made must be identified. The ability to perform a Calorimetric for the unit whose P250 will be worked on using the cross tie cable to the opposite unit must be confirmed. It will be necessary to verify all points used in the cross-connected calorimetric are indicating properly on the P250 which will perform the calorimetric calculations. Work to (1) relocate existing equipment in the P250 cabinets, (2) verify the ability of new components and connections to be installed, and (3) mount new components in the existing P250 racks will occur next. The demolition of the RAD units should be done first. Contact with the disk controller unit, located in the upper RAD cabinet, must be avoided while work is in progress. It needs to be noted that the entire RAD cabinet cannot be powered down without taking the P250 computer offline.

The RTP remote nodes must not be energized while circuit cards are being installed or removed.

Connection of the I/O equipment to the P250 computer points will cause loss of signal while the intermediate connectors are being installed. The shift supervisor and STA need to be notified prior to this work being done so as to prepare for extended outages with adequate compensatory measures. Proper operation of the points on a connector need to be verified before proceeding to the next connector. The requirements of 1/2-AP-42 (Reference 6.9) will need to be invoked while this work is in progress.

At a minimum, all IRPI and 7300 analog P250 input points must be recalibrated when connected to the new computer system. Other points may need recalibration depending upon the results of testing. In all cases recalibration should be done using the computer calibration Procedure ICP-CM-1-CP-1 (Reference 6.11). The bench board IRPI indicators will also need to be recalibrated following connection of these points to the RTP I/O equipment. This recalibration should be done in accordance with ICP-RP-1/2-RPI (Reference 6.12).

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During the tie in evolution, the project team will support work in progress. This support will be to assure that in the event return of the P250 to service is needed, installation can be terminated in an orderly manner and configuration of the P-250 for return to operable status begun with minimal delay. It should be noted that depending on installation conditions, returning the P250 to service can require several hours, especially if an ORR is required.

This design change requires that the four personal computers in the control room be upgraded with new computers provided by this project. This work needs to be coordinated with Operations, Telecommunications, and NIT so as to minimize interference with plant operations. To the extent practicable, mounting brackets should be prefabricated outside of the control room. Some drilling of the bench board cabinets will be required in order to install the computer mounting supports. All applications software must be transferred from the old computers to the new and verified before they can be placed in service. The existing annunciator response printers need to be disconnected from the existing bench board computers and connected to the new computers installed under this DCP. The computers removed from the control room need to be turned over to NIT for relocation or lease termination. This work should be scheduled to be completed when the work in the TSC and P250 computer rooms is completed.

Work needs to be scheduled such that only one personal computer is taken out of service at a time. Provisions need to be made for operators to have access to the annunciator response procedures and for shift supervisors to have access to the equipment status log while their personal computers are being replaced.

The shift supervisor and control room operators must be notified when work on the rod monitoring and axial flux difference annunciator system inputs from the plant computer is in progress since alarms may result. As has been noted in the Controlled Document Summary, the annunciator ESK drawings and the annunciator procedures associated with this work are priority documents. If it is determined that a jumper is desired to bypass the annunciator changes made by this DCP, the jumper must be added and later removed in accordance with VPAP-1403 (Reference 6.5). The jumper itself is independent of this design change and may remain in place after the DCP has been closed out.

Ethernet connectors will need to be added to the control room section of the station LAN to allow the connection of portable personal computers near the Unit 1 and 2 flux map panels. This work is shown on drawings N-96005-3-V-110268, Sheets 1 and 2 (References 6.50 and 6.51, respectively) to be done by NSS under the direction of NIT. The cable connectors will be installed by NIT. The final locations for these connectors are to be determined by Reactor Engineering.

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Reconfiguring the Validyne multiplexers must be coordinated with the Nuclear Engineering - I&C / Computers Group to ensure the ERFCS data base is updated when the multiplexers are modified. The Nuclear Engineering - I&C / Computers Group needs to be contacted when this work has been completed. Spare cards located in unallocated multiplexer slots may be removed and returned to stock provided they are first successfully tested. 1

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3.0 PROGRAMS REVIEW

3.1 UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR)

This DCP will affect the description of the plant computer given in Section 7.7.1.10 of the UFSAR. The modifications to the UFSAR are given in Appendix 4-2.

This update also eliminates mention of the calculation reactor coolant average loop temperature setpoint and pressurizer level controller setpoint. While the original Westinghouse software performed these calculations, they were never used for formal setpoint supervision. Therefore, reference to them in the UFSAR is being eliminated.

3.2 TECHNICAL SPECIFICATIONS

This design change will require that the P250 be taken out of service for extended periods of time. This has the potential for an impact on Technical Specifications compliance since the P250 computer is used to verify Technical Specifications compliance. However, procedure 1/2-AP-42 (Reference 6.9) will be used when the P250 is out of service. This procedure provides adequate compensatory measures to continue Technical Specifications surveillance with the computer out of service. Since required surveillance will be maintained without the computer, this design change will not have a Technical Specifications impact.

The outages of the P250 computer will require the action statement of Technical Specification 3.1.3.2.c be entered since the P250 computer provides the automatic rod deviation monitor function described in the Technical Specifications. The action statement requires additional rod deviation surveillances which are covered by 1/2-AP-42 (Reference 6.9). The provisions of Technical Specification 3.0.4 do not apply. Therefore, this item has been checked "Yes" on the Programs Review Checklist.

The inoperability of each P250 for extended periods (between 12 hours and 72 hours) to perform tie in of the new computer inputs, will result in the shift average power and all other Calorimetric functions being unavailable from the P250 computer. The exception to this is a cross tie Calorimetric run approximately every 24 hours using the cross tie cable and the opposite unit P250. Without the shift average power calorimetric, it may be advisable to reduce power by one or more megawatts (management decision) in order to assure license power maximums are not violated.

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3.3 FIRE PROTECTION/APPENDIX "R"

This DCP adds combustible material to the TSC and to the P250 computer rooms. Combustible material is removed from the Emergency Switchgear Rooms. The TSC and Emergency Switchgear rooms are not of concern with regards to the Appendix R Report for North Anna in accordance with Revision 9 of STD-GN-0021 (Reference 6.28). However, the combustible material does need to be noted for the P250 computer rooms which are in the same fire area with the main control room (Area 2). This material will be contained within the existing P250 cabinets.

This design change also replaces the main control room personal computers. However, the net result is no significant change in combustible material as the amount removed is approximately equal to the amount added. The only additional combustible material is from four trackballs for the main control room personal computers and ethernet cable extensions for the control room portion of the station LAN.

Plenum-rated cable will be used in the control room and in the TSC. It will be used in a non-safety related application outside of containment. Its use meets the requirements of ET CEE 95-032 (Reference 6.18). Cable that is not IEEE-383 or plenum rated will be run entirely in conduit or within metal enclosures. 

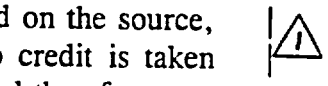
The routing of cable between the P250 computer rooms will require the breaching of penetrations between Appendix R fire areas. The breaching of fire barriers will require fire watches to be posted per TRM TR 7.2.A and penetrations shall be sealed in accordance with GMP-035 (Reference 6.13).

An Appendix R Design Summary Sheet is given in Appendix 4-3 and an Appendix R Change Notification Form is given in Appendix 4-4 in accordance with STD-GN-0021.

3.6 ELECTRICAL SYSTEM ANALYSIS

The P250 replacement computer will be powered from the existing P250 inverter panels, 1-EI-CB-18A and 2-EI-CB-18A (via the inverters or associated by-pass transformers), the existing TSC distribution panel (1-EP-CB-135), the existing TSC lighting panel (1TSC1) and existing Control Room Lighting Panels 1C1 and 2C1.

1-EI-CB-18A

The measured loading on P250 inverter 1-EP-INV-02 on July 10, 1996 was 4527 volt amperes (VA). The loads being added to this power supply by this DCP are the True Time Clock, the RTP Controller, four RTP I/O chassis, and an RTP relay output module. These impose a additional load of 3034 VA on the power supply. The total load on the source, inverter, will be approximately 7562 VA (75.6% of 10 KVA rating). No credit is taken for the removal of the RAD unit since it has been removed from service and therefore was not in operation when load measurements were obtained. 

Based on the above the loading of the inverter is acceptable.

A review of DC battery calculation EE-0009, Revision 1, Addendum D (Reference 6.23) for Unit 1 indicates that the current loading assumes that the P250 inverter is fully loaded to 10 KVA. Therefore, based on the load additions identified above, the planned loading on the batteries is acceptable.

The By-Pass Transformer for the inverter is rated at 15 KVA. It is fed from MCC 1H1-1/H1L. It is modeled at 100% loaded with 20% diversity in the S.E.L.L. Therefore, based on the planned loading identified above, loading on the bypass transformer is acceptable.

Additionally, any impact on the Station GDC-17 voltage profiles caused by the load additions are bounded based on current loading assumptions.

2-EI-CB-18A

The measured loading on P250 inverter 2-EP-INV-02 on July 10, 1996 was 5056 VA. The loads being added to this power supply by this DCP are the RTP Controller, four RTP I/O chassis, and an RTP relay output module. These impose a additional load of 1818 VA on the power supply. The total load on the source, inverter, will be approximately 6874 VA (68.7% of 10 KVA rating). Credit is not being taken for the removal of the RAD unit since it has been removed from service and therefore was not in operation when load measurements were obtained.

Based on the above the loading of the inverter is acceptable.

A review of DC battery calculation EE-0009, Revision 1, Addendum C (Reference 6.23) for Unit 2 indicates that the current loading assumes that the P250 inverter is fully loaded to 10 KVA. Therefore, based on the load additions identified above, the planned loading on the batteries is acceptable.

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The By-Pass Transformer for the inverter is rated at 15 KVA. It is fed from MCC 2H1-1/E2L. It is modeled at 100% loaded with 100% diversity in the S.E.L.L. Therefore, based on the planned loading identified above, loading on the bypass transformer is acceptable.

Additionally, any impact on the Station GDC-17 voltage profiles caused by the load additions are bounded based on current loading assumptions.

1-EP-CB-135

The calculated loading of the TSC Distribution Panel is 57.6 KVA (SWEC Calculation 14938.70-E-1, Rev. 0 - Reference 6.24). The TSC UPS is rated at 125 KVA and is modeled in the S.E.L.L as 100% loaded. A net additional load of 0.138 KVA will be realized as a result of the combination of loads added and deleted by this DCP (i.e. addition of sub-buffers, master receivers, interfaces, and CPUs and deletion of printers, disc drives, and GETARS). Loading on the TSC UPS, regardless of the source being utilized (battery, 14G3-5, or 24G2-12) remains acceptable.

Additionally, any impacts on the Station GDC-17 voltage profiles resulting from the load changes remains bounded by prior analysis.

1TSC1

One receptacle circuit will be utilized to the lighting panel for the Engineers Console. Local impact of this change has been determined to be acceptable (Drawing N-96005-3-1LPTSC1 - Reference 6.52)

1C1 and 2C1

A one for one change out of Personal Computers (PC s) will occur in the control room under this DCP. Existing PC s affected are currently powered from the Control Room Lighting Panels 1C1 and 2C1 respectively. The load impact of these change has been determined to be acceptable (Drawings N-96005-3-1LP1C1 and N-96005-3-2LP2C1 - References 6.53 and 6.54, respectively).

STD-EEN-0026

In accordance with standard STD-EEN-0026 (Reference 6.31), an Electrical Systems Analysis Checklist has been completed and is included as Appendix 4-5 in this DCP and a Station Electrical Load List Change Notice is provided as Appendix 4-6.

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3.8 SEISMIC

The four personal computer units to be installed in the Unit 1 & 2 control room are non-safety related and functionally non-seismic. The only seismic requirements are that the personal computer equipment not seismically interact with neighboring safety related equipment. To prevent seismic interaction, seismic restraints will be added on the Unit 1 & 2 bench boards and at the Unit 1 & 2 shift supervisor shift console area.

The Computer room P-250 multiplexer cabinet doors (1-EI-CB-18A,B,C & 2-EI-CB-18A,B,C) will be modified to allow additional space for multiplexer cards and prevent seismic interaction with surrounding safety related equipment.

The seismic qualification for the control room is documented in Addendum OA to Calculation CE-0775, Rev. 0 (Reference 6.22). The seismic qualification for cabinet doors (1-EI-CB-18A,B,C & 2-EI-CB-18A,B,C) is documented in Calculation CE-1310, Rev. 0 (Reference 6.25). Seismic restraints are shown in drawings N-96005-3-S-001, N-96005-3-S-003, and N-96005-3-S-004 (References 6.55, 6.56, and 6.57, respectively)

The aforementioned work is applicable only to Phase I of this project.

3.9 HUMAN FACTORS

This design change will replace the existing control room personal computers with newer models. Similar hardware functionality will be provided and a trackball will also be added. These new computers will be capable of displaying the same information as is presently available to operators. Mounting of the bench board personal computers will be done in accordance with the human factors requirements used to install the original personal computers (EWR 90-024 - Reference 6.60) and also given in Reference 6.26. An inspection of the two desk top computer monitors installed on the Shift Supervisors' Console was performed. Engineering Transmittal CEP 97-014 (Reference 6.20) documents the results of the inspection. The purpose of the engineering transmittal was to document a limited human factors review of the two desk top computer monitors installed on the Shift Supervisors' Console at North Anna Power Station. This review was limited to the impact of the monitors to the Control Room equipment layout and the operator's ability to view existing control and display panels that are potentially blocked from the operator's view. The conclusion documented in the engineering transmittal was as follows:

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Based on the following:

1. An inspection of the two desk top computer monitors installed on the Shift Supervisors' Console, and

2. A review of the Unit SRO duties identified in OPAP-0007 (Reference 6.8), and

3. A review of the applicable sections of NUREG-0700 criteria included as Attachment C to ET CEP 97-014 (Reference 6.20),

The two desk top computer monitors installed on the Shift Supervisors' Console at North Anna Power Station, do not adversely affect the Control Room equipment layout and the Unit Senior Reactor Operator's ability to view existing safety related control and display panels.

These new computers will have the capability of displaying data from the Alpha computers. This will give operators the ability to utilized the new software of the replacement computer systems. The displays will be designed using current Virginia Power and vendor standards for man-machine interface. The development of displays is independent of this design change. Displays will be reviewed for human factors compliance as they are installed in accordance with VPAP-0306 (Reference 6.7).

This review will use the following NUREG-0700 guidance:

1. Information Display Guidelines:
1.1 General Display Guidelines
1.2 Display Formats
1.3 Display Elements
1.4 Data Quality and Update Rate
1.5 Display Devices

2. User-System Interaction
2.1 General User Input Guidelines
2.2 User Input Formats
2.3 Cursors
2.4 System Response
2.5 Managing Displays

2.6 Managing Information
2.7 Prevention/Detection/Correction of Errors
2.8 System Security

3. Process Control & Input Devices
3.1 General Control Guidelines
3.2 Input Devices
3.3 Conventional Control Devices
3.4 Control-Display Integration

4. Alarms

5. Analysis and Decision Aids

6. Inter-Personnel Communication

7.3.3 Workplace Design Environment Illumination

8. Local Control Stations

No emergency procedures are affected by this DCP as indicated in the Controlled Document Summary.

One personal computer display station will be installed in the Technical Support Center programmer's room. This display station will have the same color graphic capabilities as those in the control room. Its intended purpose is for maintenance of the upgrade computer system.

Labeling for this DCP was done in accordance with STD-GN-0036 (Reference 6.30). The control room work space modifications done by this design change conform to NUREG-0700 (Reference 6.33) and STD-GN-0005 (Reference 6.27).

Access to the existing P250 computer will not be altered by this DCP.

3.11 STATION COMPUTER SOFTWARE/HARDWARE

This design change will add two new DEC Alpha computers to the station to act as backup

plant process computers. One computer will be dedicated to each unit. These computers will share data with the existing P250 computers and the ERFCS. This sharing of data will be accomplished by modifying the P250 I/O hardware and the Validyne multiplexer system. Additionally the GETARS computer system will be removed by this DCP and its function will be performed by the DEC Alpha computers.

The software on these new computers will be implemented using the vendor's plant process computer software. This software has the capability to trend any points on the new systems. However, it should be noted that a majority of existing P250 inputs will not be available on the DEC Alpha computers in Phase I. The remainder of points will be added in Phase II. Applications software added in this phase includes the following:

1. Calorimetric
2. RCS leakrate
3. Flux Mapping
4. Rod Position Monitoring
5. Axial Flux Difference Programs
6. Transient analysis (GETARS replacement) software
7. Quadrant Power Tilt Ratio

Following the implementation of this DCP, the above software, with the exception of transient analysis software, will be available simultaneously on the P250 and Alpha systems. This new software will be added in accordance with VPAP-0306 (Reference 6.7).

The personal computers in the control room and simulator will have their hardware and software upgraded by this design change. The operating system of these computers will be upgraded from Windows 3.1 to Windows NT.

3.12 EMERGENCY RESPONSE FACILITIES (ERF) SYSTEM

While this design change affects the Validyne system which provides data to the ERFCS, it does not affect it any way which changes the input characteristics of any ERFCS inputs with the exception of six analog and six digital points whose hardware addresses are being changed. It also neither affects any ERFCS hardware nor changes the Regulatory Guide 1.97 status of any ERFCS inputs. 1

The hardware addresses of the six feedwater temperatures (F1FW001A, F1FW002A, 1

F1FW003A, F2FW001A, F2FW002A, and F2FW003A) and six feedwater recirculation control valve positions (S1FW012D, S1FW013D, S1FW014D, S2FW012D, S2FW013D, and S2FW014D) are being changed to separate analog and digital input cards in the affected multiplexers in order to eliminate a problem with crosstalk between analog and digital input cards. This change will not affect the processing and display of this data but will require an update to the ERFCS data base in order to be implemented. Therefore, the ERF item has been checked "Yes" on the Programs Review Checklist and an ERF Design Checklist has been included as Appendix 4-16. 1

3.15 POST-ACCIDENT MONITORING (REG. GUIDE 1.97)

Five RG 1.97 Category 1 and 2 variables will be affected by this design change. They are Unit 1 & 2 containment sump level alarm (1-DA-LT-DA110A-1 and 2-DA-LT-DA210A-1), Unit 1 & 2 emergency condensate storage tank level (1-CN-LT-100A and 2-CN-LT-200A), and Unit 1 service water discharge temperature (1-SW-TE-108A). These points are currently monitored by the P250 computer and are scheduled for inclusion on the Alpha RTP I/O system in Phase I. Therefore, in accordance with the RG 1.97 isolation study (Reference 6.3), the issue of channel isolation must be considered.

The containment sump level is RG 1.97 variable B-12 and is Category 2. The P250 inputs a level alarm which is derived from the level indication. The level alarm is isolated from the level indication by relays. Therefore, adequate isolation exists between the RG 1.97 variable and the P250 input where further isolation is not necessary. This input is documented on test loop diagrams 11715-DA-001 and 12050-DA-001 (References 6.41 and 6.42, respectively).

Service water discharge temperature (Variable D-30, Category 2) is monitored using a dual-element resistance temperature device (RTD). One element is used for control room indication and the ERFCS, while the other element is only used as an input to the P250 computer. RG 1.97 monitoring is on the circuit used for control room and ERFCS indication. Since the P250 input is taken from the other circuit using a separate RTD, adequate isolation exists. No further isolation is necessary. This input is documented on test loop diagram 11715-SW-050 (Reference 6.43).

Emergency condensate storage tank level indication (Variable A-9, Category 1) is shared among the control room indication, ERFCS, and P250. Addition of this point to the new Alpha RTP I/O system will add a new device to the circuit. Therefore, in order to ensure that isolation is not compromised, this point will be removed from the P250 computer and not added to the Alpha

RTP I/O system. This point will be available to the Alpha system using the Validyne interface since it will remain an ERFCS input. The P250 computer is not used for RG 1.97 display purposes. The Special Instructions section includes instructions to determinate this point from the P250 before the RTP I/O equipment is connected. This is to preclude an inadvertent breach of isolation during the construction process. This input is documented on test loop diagrams 11715-CN-071 and 12050-CN-069 (References 6.44 and 6.45, respectively).

Although no RG 1.97 instruments will be affected by this design change, Question 15 of the Programs Review Checklist has been checked "Yes" because this design change deletes P250 inputs. Attachment 7.1 of STD-GN-0035 (Reference 6.29) is in Appendix 4-11 while Attachment 7.2 is in Appendix 4-12.

3.16 HEATING, VENTILATION AND AIR CONDITIONING (HVAC)

This DCP makes heat load changes to the P250 computer rooms and the TSC. These changes result from the addition and deletion of electrical equipment in these areas. These changes are documented in Engineering Transmittal CME 97-0013 (Reference 6.19, 6.20).

In the TSC the addition of computer equipment is more than offset by the removal of the GETARS equipment. Additionally, credit is taken for the deletion of the ERFCS disk drives from their electrical panels. The net result is a decrease in the TSC of 3.625 BTU/hr (1.062 KW)

In the P250 computer rooms there will be an increase in heat load. An additional 6.259 BTU/hr (1.834 KW) will be added to the Unit 1 P250 computer room while an additional 6.205 BTU/hr (1.818 KW) will be added to the Unit 2 P250 computer room

These minor changes will not adversely impact the HVAC systems in any of these areas.

In the control room, the existing personal computers will be replaced with newer models. This will result in no change to the heat load in this area.

This design change will require the routing of a cable through a control room pressure boundary penetration. It is expected that this cable can be routed without the need to remove the penetration sealing material This work will be done in accordance with the Technical Requirements Manual and should not require entering the action statement of Technical Specifications 3.7.7.1.

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P250 Upgrade / NAPS / Units 1 and 2	96-005

3.17 THE SIMULATOR

Two new personal computers will be provided for the simulator to replace the two Unit 1 PC's. These computers are the same type as being installed in the actual control room. Track balls will be added in a similar manner as in the control room. Additionally, the operating systems of these computers will be upgraded from Windows 3.1 to Windows NT.

These new computers will have access to the Alpha computers via the North Anna network which will give them the capability of displaying actual plant data. However, they will not be capable of displaying simulated data. This is consistent with the current use of the PC's in the simulated control room. Full plant computer emulation will not be provided until Phase II when the P250 computers are eliminated.

3.19 SETPOINTS, STATION CURVES, INSTRUMENT SCALING AND INSTRUMENT UNCERTAINTY CALCULATIONS

Installation of new I/O cards in parallel with the existing P250 analog input cards will result in a decrease in signal level to the computer for some analog inputs. The affected inputs are analog rod position signals from the IRPI system and analog signals from the Westinghouse 7300 Process Instrumentation cabinets. Based on an expected input impedance of 14 megohms for the new I/O cards, the approximate reductions will be 0.3 % for IRPI signals and 0.2% for signals from the 7300 racks. These changes will require that the affected P250 points be recalibrated after installation of the new cards.

Installation of the new cards will have no effect on indicators, recorders or other instrumentation in any loops providing signals to the P250, with one exception. Signals to the control room IRPI indicators will be slightly reduced. Based on an expected input impedance of 14 megohms for the new I/O cards, the approximate reduction in signals to the indicators will be 0.08%. This effect can be eliminated by recalibration. (Reference 6.21)

Instrument uncertainties will not be affected by this DCP. The existing uncertainty applicable to P250 analog points is +/- 0.25%. The new system has an applicable uncertainty of +/- 0.1% for inputs in the 40 mV to 10.24 V range and +/_ 0.25% for the 0 to 10mv range.

3.21 RADIO FREQUENCY INTERFERENCE

This design change will install electronic equipment. However, this equipment is not safety

related. Additionally, it is not located where it will interfere with any safety related equipment that is RFI sensitive. The equipment will be grounded in accordance with STD-EEN-0225 (Reference 6.32). Furthermore this equipment has been used on other nuclear power plants of similar design to North Anna. Other installations include Sequoyah, H. B. Robinson, Shearon Harris, D. C. Cook, Seabrook, Callaway, Wolf Creek, and Beaver Valley. This equipment has been placed in service and has neither caused nor been adversely affected by radio frequency interference problems.

3.22 EQUIPMENT DATA SYSTEM (EDS)

This design change will add mark numbered components in the plant. These items are detailed in Section 3.27. The corresponding EDSCR forms for the above items have been electronically filed in EDSCR No. 8112, 8162, 8627, 8635, 8935, 9146, 9703, and 9751. 1

The following mark numbers will be removed from EDS:

1-EI-PRNT-1 and 2-EI-PRNT-1.

These mark numbers are being replaced by numbers more consistent with those used on other plant computer system related components. New labels will be generated for these devices.

3.24 CUMULATIVE EFFECTS ON PLANT SYSTEMS

This design change will have minor effects on electrical and HVAC systems. These effects have been addressed in Sections 3.6 and 3.16, respectively.

3.25 RECENT NRC AND INDUSTRY CONCERNS

In August 1996, a P250 replacement computer system similar to that being installed at North Anna was being installed at Salem Unit 2. It used similar parallel connectors to allow both its P250 and new computer system access to plant data. Instead of RTP I/O equipment as at North Anna, the Salem system is based on Westinghouse's WDPF data highway system. Testing of the system revealed that when sections of the WDPF system were powered down, control room indicators sharing the same instrument loops gave incorrect readings. The root cause of the problem was traced to the WDPF I/O equipment monitoring the instrument loop as its impedance changed considerably when powered down. The change was large enough to affect the loop calibration.

The RTP I/O equipment purchased for North Anna does not share this same characteristic. There is no change in impedance large enough to affect loop calibration when the equipment is powered down. Also testing performed at North Anna (Reference 6.21) has shown that control room instrumentation will not be adversely affected by the presence of equipment added by this design change. Therefore, the above problem is not a concern for North Anna.

3.26 IMPACT ON/OF OTHER DESIGN CHANGES

Two spare cables, previously installed by DCP 95-264 (Reference 6.59), will be used by this DCP. These unscheduled fiber optic cables will be terminated by this design change. This design change will also replace the control room bench board personal computers installed by EWR 90-024 (Reference 6.60).

3.27 SUMMARY OF EQUIPMENT ADDED OR REMOVED

This design change will modify the existing plant computer system hardware. Mark numbers for components installed and removed by this design change are listed below.

Component label specifications, for components installed by this design change, are given in Appendix 4-9. Mark numbers for these components have been requested by electronically filed EDSCR's as noted in Section 3.22. Some of this equipment is being relocated from elsewhere in the plant Also two TSC Validyne cabinets are receiving mark numbers. However, these components are receiving mark numbers for the first time. The control room printers connected tho the operator personal computers are being relabelled as noted in Section 3.22. The status as to whether equipment is new, existing, relabelled, or relocated is given in the tables below.

The components added and deleted by this design change are shown in Appendix 4-15.

3.30 REMOVABLE BLOCKS AND OTHER BARRIERS

The routing of cable between the P250 computer rooms will require the breaching of penetrations between Appendix R fire areas. Also new cable will need to be routed through penetrations in the control room pressure boundary. This work will be done in accordance with station procedures (See Sections 2.3 and 3.3).

3.33 NCRODP TRAINING MODULES

The "Plant Process Computer" NCRODP training module (Reference 6.34). will need to be updated to include the new process computer information. The revised training module is in Appendix 4-7.

3.34 RECOMMENDED SPARE PARTS

An initial set of spare parts has been purchased for this project. These spares will be used to support installation activities and site acceptance and site availability testing. The spare parts are listed in Appendix 4-8.

3.35 LABELING

This DCP will add components with new mark numbers to the plant. Labelling specification sheets are given in Appendix 4-9 and are in accordance with STD-GN-0036 (Reference 6.30) and VPAP 1409 (Reference 6.6).

3.36 ABANDONMENT OF EQUIPMENT

Cables for the RAD's shall be spared.

3.37 VENDOR TECHNICAL MANUALS (VTMs)

The installation of the P250 upgrade will require the addition of new vendor technical manuals for the computer hardware and software installed by this design change. Enough manuals will be obtained to bring the total number to four in accordance with ENAP-0020 (Reference 6.4). The VTM update form is given in Appendix 4-10. The following manuals will need to be added to a new vendor technical manual for the backup computer system:

1. SAIC Database Development System User Guide (Reference 6.61)
2. Database Reference Manual (Reference 6.62)
3. Hardware Configuration Manual (Reference 6.63)
4. Factory Acceptance Test Procedures (Reference 6.64)
5. Factory Acceptance Test Report (Reference 6.65)
6. Site Acceptance Test Report (Reference 6.66)
7. Factory Acceptance Test Plan (Reference 6.67)
8. Site Acceptance Test Plan (Reference 6.68)
9. Site Acceptance Test Procedures (Reference 6.69)

10. Detail Design (Reference 6.70)
11. Detail Design Appendix A - SDS (Reference 6.71)
12. Satellite Display Station / Data Views Manual (Reference 6.72)
13. System Administrator Manual (Reference 6.73)
14. Hardware Maintenance Manual (Reference 6.74)
15. Software Configuration Management Manual (Reference 6.75)
16. Validyne Interface Assembly Manual (Reference 6.76)

3.38 REACTIVITY MANAGEMENT

Several computer codes being installed under Phase 1 are considered as important to reactivity management. These codes will receive the proper reactor engineering review and approval prior to installation as required by VPAP-0306 (Reference 6.7).

3.43 MAINTENANCE RULE

The P250 computer has been identified as a Maintenance Rule item according to the expert panel. The computer upgrade in this DCP will not change the P250 system function and will not impact the Maintenance Rule scope. Neither shall its performance criteria nor its risk ranking be affected by the upgrade done in this design change.

The P250 outages needed to install the back up computer do not adversely impact Maintenance Rule compliance since the outages are planned. There are no unavailability criteria related to the P250, only reliability criteria. A reliability incident occurs only when the P250 fails and cannot be brought back during the shift However, planned outages are not considered failures.

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4.0 FUNCTIONAL TESTING REQUIREMENTS AND ACCEPTANCE CRITERIA

The functional testing of the new plant process computer system shall be performed after equipment installation. Testing shall be in accordance with the Final Design Testing Procedure which will be generated and approved by the Station Testing department.

Testing will be required at various points during installation to return equipment to service after modification.

Testing is to include the following:

1. Each train of the Validyne will be functionally tested or verified prior to being returned to service with the existing ERF computers and following initial startup with the new Alpha computers.

2. Recalibration of paralleled P250 inputs connected to the 7300 or IRPI systems will be required. Recalibration will be performed in accordance with the appropriate instrumentation calibration procedures and be used as the basis for test acceptance of these points.

3. The following tests shall be performed for each data base input:

   a. Ability to properly read and display a process analog or pulse input. Comparisons between the P250 and the backup system shall be made by printing P250 inputs or displaying ERFCS inputs and comparing them to inputs called up on backup system displays. In general, discrepancies from the P250 or ERFCS greater than 2% shall be referred to Engineering for further evaluation. However, more conservative tolerances may be applied in specific cases.

   b. Ability to properly read and display a process digital input. Comparisons between the P250 and the backup system shall be made by printing P250 inputs or displaying ERFCS inputs and comparing them to inputs called up on backup system displays. Any discrepancies in point state shall be referred to Engineering for further evaluation.

4. Each contact closure output shall be tested to verify that its state can be changed under computer control. This testing may be performed as part of Site Acceptance Testing with the system vendor.

5. Test plans shall be developed for each software package to be run on the new plant computer. These test plans shall be developed, reviewed, approved, and executed in accordance with VPAP-0306 (Reference 6.7).

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a. This testing shall verify the adequacy of the new software to perform the Technical Specifications surveillance now performed by the P250 computers.

b. Testing of the transient analysis software may be done independently of other software testing if desired. This independent testing may be used to restore as quickly as possible the transient analysis capabilities lost when GETARS is taken out of service.

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5.0 SYSTEM DESCRIPTION (OPERATIONAL)

This DCP modifies the plant process computer in order to provide a backup system. This system consists of two computers, one for each unit, and process I/O equipment. This system will provide features not currently available on the existing P250 process computers. Furthermore the new system will provide the essential P250 functions when the P250 is out of service, minimizing the need to enter 1/2-AP-42 (Reference 6.9). The new system will operate in parallel with the P250 computers until the next phase of the P250 replacement project. This subsequent phase will eliminate the P250 computers and use the new system as a foundation for the final upgrade.

This design change will also replace the existing GETARS analog transient system. The GETARS computer will be removed and its function will be totally supplied by the new process computer system.

The new system will receive process data from two sources. It will utilize the existing Validyne system which is used for the ERFCS, ICCM, and GETARS systems. Additionally, a subset of the P250 input points will be monitored in parallel to the P250 computers using new I/O equipment.

The Validyne system will give each unit's new process computer access to the data of both units. The points currently available to the ERFCS, GETARS, and ICCM will be available to both new computers.

The new computer system is designed to operate continuously. Periodic and remedial maintenance procedures are given in the vendor technical manuals.

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P250 Upgrade / NAPS / Units 1 and 2	96-005

6.0 REFERENCES

6.1 Computer Survey, Edison Electric Institute, 1990

6.2 "P250 Computer Backup Device", North Anna Power Station, Type 2 Study, NP-2883, IR-7387A, February 1995

6.3 "Regulatory Guide 1.97 Isolation Devices", Type 2 Engineering Study, NP-2653, North Anna Power Station, September 18, 1992

6.4 ENAP-0020, "Installation/Procurement Specification Development and Control", Department Administrative Procedure, Virginia Power Company

6.5 VPAP-1403, "Temporary Modifications", Virginia Power Administrative Procedure

6.6 VPAP-1409, "Station Labeling", Virginia Power Administrative Procedure

6.7 VPAP-0306, "Station Computer Software", Virginia Power Administrative Procedure

6.8 OPAP-0007, "Control Room Activities", Virginia Power Department Administrative Procedure

6.9 1/2-AP-42, "Loss of Prodac-250 Computer", North Anna Power Station, Abnormal Procedure

6.10 IMP-C-P250-01, "Prodac P-250 Computer System", Instrument Maintenance Procedure, North Anna Power Station

6.11 ICP-CM-1-CP-1, "Computer Input and Computer Input Field Mounted Devices", Instrument Calibration Procedure, North Anna Power Station

6.12 ICP-RP-1/2-RPI, "Rod Position Indication", Instrument Calibration Procedure, North Anna Power Station

6.13 GMP-035, "Sealing Fire Stops With Bio-Fireshield Novasit K-10 Mortar, Pyrocrete 241, 3M CP-25WB Caulking Compound or Hilti FS-One Sealant", General Maintenance Procedure, North Anna Power Station

6.14 GMP-E-143, "Installation of Electrical Systems", General Maintenance Procedure, North Anna

Power Station

6.15 0-EPM-2802-01, "Disconnecting and Reconnecting Electrical Equipment", Procedure, North Anna Power Station

6.16 NAS-3014, "Electrical Installation", Specification, North Anna Power Station

6.17 "Backup Plant Computer System", Bid Specification, North Anna Power Station, NAP-0085

6.18 "Plenum Cable Fire Protection Acceptability - North Anna Power Station", Engineering Transmittal CEE 95-032, Rev. 0, March 30, 1995

6.19 "Effect of DCP 96-005 Modifications on Heat Load to Main Control Room Envelope - North Anna Power Station", Engineering Transmittal CME 97-0013, Rev. 0, February 20, 1997

6.20 "Human Factors Engineering Review of Two Desk Top Computer Monitors Installed on the Shift Supervisors' Console", Engineering Transmittal CEP 97-0014, Rev. 0, May 27, 1997

6.21 "Evaluation of Data Collected Via Temporary Modification 97-1641 (P250/RTP Parallel Adapter Prototype Verification)", Technical Report EE-0111, Electrical Engineering - I&C/Computers, Virginia Power

6.22 "Seismic Qualification of Control Room Bench boards 1-EI-CB-0 1A and 2-EI-CB-01A Due to Addition of Personal Computers", Virginia Power Calculation CE-0775, North Anna Power Station

6.23 "125V Direct Current System Analysis", Virginia Power Calculation EE-0009, North Anna Power Station

6.24 "Electrical Loading-TSC UPS and UPS Panel Boards", Stone and Webster Calculation 14938.70-E-1, North Anna Power Station

6.25 "Seismic Qualification of Cabinet Doors for 1-EI-CB-18A,B,C & 2-EI-CB-18A,B,C, P-250 Computer Replacement Project", Calculation CE-1310, North Anna Power Station

6.26 Memorandum, M. G. Pinion to B. S. Dunlap, III, April 15, 1997, "Nuclear Engineering - Configuration Control, Human Factors, Review of 70% Draft Design Change"

6.27 STD-GN-0005, "Human Factors", General Nuclear Standard, Virginia Power Company

6.28 STD-GN-0021, "Appendix 'R' Design Guidelines", General Nuclear Standard, Virginia Power Company

6.29 STD-GN-0035, "NRC Regulatory Guide 1.97 Compliance Engineering Guidelines for Post-Accident Monitoring", General Nuclear Standard, Virginia Power Company

6.30 STD-GN-0036, "Equipment Labeling and Tagging", General Nuclear Standard, Virginia Power Company

6.31 STD-EEN-0026, "Guidelines for Electrical Systems Analysis", Electrical Engineering Nuclear Standard, Virginia Power Company

6.32 STD-EEN-0225, "I&C Standard for Instrumentation Grounding", Electrical Engineering Nuclear Standard, Virginia Power Company

6.33 NUREG 0700, "Guidelines for Control Room Design Reviews",U. S. Nuclear Regulatory Commission

6.34 Nuclear Control Room Operator Development Program, "Plant Process Computer", North Anna Power Station, NCRODP-73*

6.35 Drawing N-96005-3-1FE27NA, Equipment Location Plan Technical Support Center - Demolition

6.36 Drawing N-96005-3-1FE27NB, Equipment Location Plan Technical Support Center

6.37 Drawing N-96005-3-E-8900, Cabinet Layout Dwg (Front View) Unit 1 P-250 Computer Cabinet

6.38 Drawing N-96005-3-E-8901, Cabinet Layout Dwg (Back View) Unit 1 P-250 Computer Cabinet

6.39 Drawing N-96005-3-E-8902, Cabinet Layout Dwg (Front View) Unit 2 P-250 Computer Cabinet

6.40 Drawing N-96005-3-E-8903, Cabinet Layout Dwg (Back View) Unit 2 P-250 Computer Cabinet

6.41 Drawing 11715-DA-001, Unit 1 Reactor Containment Sump Pumps 1-DA-P-4A and B Level Control Indication and Alarm Vent and Drain System

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6.42 Drawing 12050-DA-001, Unit 2 TLD Aerated Drains System Reactor Containment Sump Pumps 2-DA-P-4A and B Level Control Indication and Alarm

6.43 Drawing 11715-SW-050, Unit1 TLD Service Water System Service Water Pumps Discharge Header Temperature

6.44 Drawing 11715-CN-071, Unit 1 Condensate System Missile Protected Condensate Storage Tank 1-CN-TK-1 LDW Level Indicators and Alarm*

6.45 Drawing 12050-CN-069, Unit 2 TLD Condensate System Missile Protected Condensate Storage Tank 2-CN-TK-1 Level Indicators and Alarm*

6.46 Drawing N-96005-3-1FE7BG, Unit 1 Wiring Diagram Computer I/O Cabinet 01 Zone 3 (SH 1 of 2)

6.47 Drawing N-96005-3-2FE7BG, Unit 2 Wiring Diagram Computer I/O Cabinet 01 Zone 3 (SH 1 of 2)

6.48 Drawing N-96005-3-1FE7BJ, Unit 1 Wiring Diagram Computer I/O Cabinet 01 Zone 4

6.49 Drawing N-96005-3-2FE7BJ, Unit 2 Wiring Diagram Computer I/O Cabinet 01 Zone 4

6.50 Drawing N-96005-3-V-110268 Sh 1, Plant Computer System Unit 1 System Block Diagram

6.51 Drawing N-96005-3-V-110268 Sh 2, Plant Computer System Unit 2 System Block Diagram,

6.52 Drawing N-96005-3-1LPTSC1, Lighting Panelboard Schedule Technical Support Center Panel 1TSC1

6.53 Drawing N-96005-3-1LP1C1, Lighting Panelboard Schedule

6.54 Drawing N-96005-3-2LP1C1, Lighting Panelboard Schedule

6.55 Drawing N-96005-3-S-001, Benchboard Modification Details Control Room Benchboard Modification

6.56 Drawing N-96005-3-S-003, Benchboard Modification Details Control Room Benchboard

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Modification

6.57 Drawing N-96005-3-S-004, Shift Supervisor's Console Computer Support (Control Room) & P-250 Computer Cabinet Door Frame Temp Modifications

6.58 Drawing N-96005-3-E-1406, Wiring Diagram for GETARS Temporary Location in Technical Support Center

6.59 DCP 95-264, "Install Fibre Optic Cable in CR to Enhance NAPS LAN", North Anna Power Station, Units 1 and 2

6.60 EWR 90-024, "Install Mount IBM PS/2 Model 70 PC", North Anna Power Station, Units 1 and 2

6.61 SAIC Database Development System User Guide, Science Applications International Corporation, Manual No. 550-5200000-01

6.62 Database Reference Manual, Science Applications International Corporation, Manual No. 550-5200000-02

6 63 Hardware Configuration Manual, Science Applications International Corporation, Manual No. 550-5200000-03

6.64 Factory Acceptance Test Procedures, Science Applications International Corporation, Manual No. 550-5200000-04

6.65 Factory Acceptance Test Report, Science Applications International Corporation, Manual No. 550-5200000-05

6.66 Site Acceptance Test Report, Science Applications International Corporation, Manual No. 550-5200000-06

6.67 Factory Acceptance Test Plan, Science Applications International Corporation, Manual No. 550-5200000-07

6.68 Site Acceptance Test Plan, Science Applications International Corporation, Manual No. 550-5200000-08

6.69 Site Acceptance Test Procedures. Science Applications International Corporation, Manual No. 550-5200000-09

6.70 Detail Design. Science Applications International Corporation, Manual No. 550-5200000-10

6.71 Detail Design Appendix A - SDS, Science Applications International Corporation. Manual No. 550-5200000-11

6.72 Satellite Display Station / Data Views Manual, Science Applications International Corporation, Manual No. 550-5200000-12

6.73 System Administrator Manual, Science Applications International Corporation. Manual No. 550-5200000-13

6.74 Hardware Maintenance Manual. Science Applications International Corporation, Manual No. 550-5200000-14

6.75 Software Configuration Management Manual. Science Applications International Corporation. Manual No. 550-5200000-15

6.76 Validyne Interface Assembly Manual. Science Applications International Corporation. Manual No. 550-5200000-16

* - Requires Update

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FUEL BUILDING TROLLEY ENCLOSURE – SUPERSTRUCTURE / NAPS / UNITS 1 & 2	99-002

1.0 STATEMENT OF THE PROBLEM

Virginia Electric and Power Company submitted an application for the review and approval of a site-specific license for an Independent Spent Fuel Storage Installation (ISFSI) at North Anna Power Station on May 9, 1995 (Serial No. 95-195). The NRC submitted a Request for Additional Information to Virginia Power on May 18, 1998. In the subsequent Response to Request for Additional Information (TAC No L22113), Virginia Power committed to constructing a crane enclosure (a.k.a. Fuel Building Trolley enclosure) no later than December 31, 1999 to prevent the weather-driven spread of contamination from use of the spent fuel cask lifting equipment outside the Decontamination Building. In support of this commitment date, Design Change Package No. 98-006 was issued, in advance of this Design Change Package (DCP), to construct the new concrete foundation for the enclosure. The purpose of this DCP is to provide the remaining details required for the superstructure of the Fuel Building Trolley enclosure.

The primary design function of the Fuel Building Trolley enclosure is to provide nominal weather protection for the trolley, during periods when the trolley will be outside of the Decontamination and Fuel Buildings The enclosure shall prevent wind and precipitation from becoming a factor in the spread of contamination. Health Physics procedures are ultimately responsible for controlling the weather-driven spread of contamination. From an electrical design standpoint, an electrical distribution system for the crane enclosure, including new Gai-tronics station, interior/security lighting and lightning protection, is required to properly equip the enclosure.

Upon completion of the Fuel Building Trolley enclosure, minor fluctuations in weather conditions will no longer become a contributing factor to the weather-driven spread of contamination from the trolley and cask lifting equipment. The enclosure will afford greater flexibility for trolley movement outside of the Decontamination Building, without increased risk of weather-related problems.

2.0 PROPOSED RESOLUTION

The Fuel Building Trolley enclosure will attach to and envelope the existing trolley rail runway support structure, from the south end of the Decontamination Building, at column row "T", and extend past the rail stops, located outside and above the cask loading slab, near column row "W". Trolley rails are supported by two individual runway support structures; one located inside the Fuel Building and the other located outside the Fuel Building Inside the Fuel Building, the runway support structure is classified Non-Safety-Related, Seismic (i.e. NSQ, Seismic). Outside the Fuel Building, the runway support structure is classified Non-Safety-Related, Non-Seismic (i.e. NS). Expansion joints in the structural steel connections, and between concrete foundations, at the Fuel Building/Decontamination Building interface, along column row "Q", prevent any adverse interactions under tornado and seismic load combinations. Since the proposed enclosure will only be attaching to the NS portion of the runway support structure, it too shall be classified NS, Non-Seismic.

Wind loading governs the design of this relatively tall and narrow existing runway support structure (reference SWEC Calculation Nos. 11715-BK-5S & 5T). Member stresses for the proposed enclosure were calculated from load combinations in accordance with ASCE 7-95, which meets or exceeds the applicable requirements of BOCA and the NAPS UFSAR. The addition of this three-sided, roofed enclosure will draw increased wind and snow loading. To resist these increased loads, the proposed enclosure adds an outside braced-bay system to the west side of the runway structure and a truss reinforcement to existing columns on the east side. Individual concrete footings, constructed under DCP No. 98-006, transfer the increased gravity and wind loads from this braced bay to the ground. Details of the structural design of the proposed enclosure are documented in Calculation Nos. CE-1448 and CE-1452.

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FUEL BUILDING TROLLEY ENCLOSURE – SUPERSTRUCTURE / NAPS / UNITS 1 & 2	99-002

The structural scope of work for the enclosure is described herein. Structural members, flashing and siding from the proposed enclosure will connect into the mating surfaces of the Decontamination Building. All tributary dead load and live loads, from the new enclosure, will be carried down to the concrete foundation, via the enclosure superstructure and the Non-Seismic portion of the runway support structure. No additional loads will be imposed upon the Fuel Building portion of the runway support structure as a result of the enclosure superstructure. Large roll-up doors, located opposite each other, on the east and west walls of the enclosure, permit drive-through access to the interior. Roll-up doors can be raised/lowered, as required, to protect against the weather-driven spread of contamination. The enclosure does not obstruct access to the interior space and does not affect operation of the Fuel Building Trolley.

The Fuel Building Trolley manufacturer has set a temperature range of –20 °F to +120 °F and a maximum wind speed limit of 35 mph for safe operation of the trolley (ref. Specification NAS-0051). Since the enclosure is not temperature controlled, and roll-up doors may be left open, outside weather conditions will significantly influence the interior enclosure environment. If existing or anticipated outside weather conditions will not meet the trolley manufacturer requirements, during the time that the trolley will be under the enclosure, then the trolley shall remain inside the Fuel Building, with the inner roll-up door closed. Additionally, to control the weather-driven spread of radiological contamination, while under the enclosure, the trolley cables and hook shall not be exposed to any wind-blown precipitation or moisture from a roof leak. Door openings shall be adjusted and/or the trolley shall be re-positioned to ensure that the trolley cables and hook remain dry while under the enclosure. If necessary, the trolley shall be moved back inside the Fuel Building until conditions become favorable. A precaution shall be posted in Operations Procedure No. 0-OP-4.3, and selected others, to restrict movement of the trolley when outside weather conditions do not meet the manufacturer's safe operation requirements or become unfavorable to control the weather-driven spread of contamination.

The existing Decontamination Building ventilation supply system draws 9,000-cfm of fresh air, via louvers, from the space which will be occupied by the Fuel Building Trolley enclosure, and discharges to the Auxiliary Building ventilation system (reference NAPS UFSAR, Sections 9.4.3 & 9.5.9). To accommodate the 9,000-cfm fresh air intake demand of the Decontamination Building, louvers have been provided in the exterior walls of the enclosure, in a passive airflow arrangement. An evaluation of this passive airflow arrangement has been performed to ensure that a proper supply of fresh air exists for delivery to the Decontamination Building ventilation supply system (reference ER&D, Section 3.16).

The proposed enclosure will cast shadows in the yard area, requiring additional security lighting to be installed. See DCP electrical drawings, as listed in the Drawing Revision Record, for details of this additional security lighting (reference ER&D, Sections 3.5 & 3.6).

The presence of the Fuel Building Trolley enclosure will create a change in the site description of structures associated with the Fuel Building Trolley, as described in the NAPS UFSAR, Figure 1.2-2 and Section 9.1.4.4.12, respectively. However, no other systems, structures or components, as described in the NAPS UFSAR, are affected by the presence of this enclosure (reference ER&D, Section 3.1).

The scope of the electrical design for the trolley enclosure provides for a new bucket and door to be installed in compartment A1 of the existing Motor Control Center 2B1-1B complete with two circuit breakers to replace the existing bucket, door and breaker. The new door shall be complete with hardware for the two breakers. One new breaker will replace the existing breaker serving the existing distribution panel 0-EP-DB-1 and the second breaker will serve the new feeder to the crane enclosure 480 volt Distribution Panel 0-EP-PNL-CE1.

From the 480 volt distribution panel 0-EP-PNL-CE1, circuits will be run to the roll-up doors, receptacles for welding/standby motor on loader's hydraulic pump and to the lighting transformer. From Lighting Panel 0-EP-PNL-CE2, 120 volt circuits will be run to the lighting fixtures and to the miscellaneous receptacles. Some existing outside lighting will be rearranged to coordinate with the new work and will be fed from the existing circuits. The outside lighting rework has been reviewed with Station Security personnel. Lightning protection will also be provided for the new crane enclosure.

3.0 PROGRAMS REVIEW

A Programs Review Checklist has been prepared for this DCP. As a result of the review, the following programs are affected by this design change:

3.1 Updated Final Safety Analysis Report (UFSAR)

NAPS UFSAR, Figure 1.2-2 needs to be revised to show the Fuel Building Trolley enclosure and a verbal description of the enclosure needs to be included in NAPS UFSAR Section 9.1.4.4.12. See Appendix 1-1 for the UFSAR Change Request.

3.3 Fire Protection/Appendix "R"

The addition of the Fuel Building Trolley enclosure superstructure has the potential to affect the Auxiliary Building fire area, as described in NAPS UFSAR, Section 9.5.1.3.1.8, in Appendix "R" drawings, 11715-FAR-200, 203-205, and in Tables 2-1 & 2-4 of the Appendix "R" Report. The enclosure is a steel building, containing approximately 58 cubic feet of wood nailer board, as a fixed combustible. The enclosure is open at its north end, and therefore shares the existing south wall of the Decontamination Building. The south wall of the Decontamination Building is the current southern boundary of Auxiliary Building fire area (i.e. Fire Area #11). Once completed, the enclosure may also house unidentified transient combustibles, which will be subject to the administrative control of VPAP-2401. The presence of the trolley enclosure will not invalidate the NAPS UFSAR description of Fire Area #11, however, a change is required to the Appendix "R" Report and certain FAR drawings to incorporate the Fuel Building Trolley enclosure as new Fire Zone, Z-54. A related change is also required to STD-GN-0021 to list the Fire Zone, Z-54, and the corresponding equivalent fire severity.

The Fuel Building Trolley enclosure does not result in or constitute a change to the Fire Protection Program that would affect the ability of the station to achieve and maintain safe shutdown in the event of a fire. This conclusion is based on the fact that no safe shutdown equipment exists within the trolley enclosure and adequate separation and protection exists to prevent a fire, within the enclosure, from exposing the safe shutdown equipment in adjacent Fire Area #11 (Reference Engineering Transmittal No. CEP-99-0035). See Appendix 1-7 for the associated Appendix "R" Report Change Notice.

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3.5 Station Security

The construction of the Fuel Building Trolley enclosure will cast shadows in areas not previously evaluated for security lighting. Security lighting changes are required to restore proper illumination to the areas in and around the enclosure. Additional security lighting has been included in the electrical scope of work to address any security issues. During construction activities, removal of siding and roof material from the Decontamination Building can create the need for a Security watch, if the inner roll-up door of the Fuel Building is raised. Appropriate compensatory measures to maintain security, during construction, are included in the SII

3.6 Electrical Systems Analysis

The lightning protection system consists of air terminals (a.k.a. lightning rods) on the roof cabled to the structural steel columns. The columns will serve as down conductors and will be connected to the ground grid. The changes in this DCP result in a change in load as indicated in the Electrical System Analysis Checklist (ESAC) and the Station Electrical Load List Change Notification (SELLCN) included in Appendix 1-2.

3.13 Flooding

Siding on the three exterior walls of the proposed enclosure, does not fit tightly to the ground. The siding stops short of the ground to permit rainwater runoff to convey underneath the enclosure. There is no new floor surface associated with the enclosure. The existing concrete cask loading slab, paved roadway surfaces and drainage ditch areas comprise the floor surface beneath the enclosure. Gutters and downspouts will direct rainwater runoff from the roof to the nearest drainage ditch location. A small gravel area, alongside the Decontamination Building driveway, approximately 600 square feet in area, will be paved over, maintaining existing grade and slope. This area currently drains into a nearby storm drain, therefore, no changes will result to the site drainage and flood protection plan due to the presence of the new Fuel Building Trolley enclosure.

3.16 Heating, Ventilation and Air Conditioning (HVAC)

The Decontamination Building ventilation system draws 9,000-cfm of fresh air from the interior of the proposed Fuel Building Trolley enclosure (reference NAPS UFSAR, Sections 9.4.3 & 9.5.9). An evaluation of the passive airflow arrangement between the Fuel Building Trolley enclosure and the Decontamination Building, has concluded that the louvers, provided in the exterior walls of the enclosure, will satisfy the intake supply demands of the Decontamination Building ventilation system (reference Engineering Transmittal No. CME-99-0038).

Additionally, ridge vents have been provided in the roof to help exhaust the upper regions of the enclosure during the heat of the day. NAPS Specification No. NAS-0051 prohibits operation of the trolley in temperatures below -20 °F and above +120 °F. Engineering Transmittal No. CME-99-0038 has also concluded that the exhaust ventilation and convective airflow, within the enclosure, will be sufficient to keep the upper regions of the enclosure from reaching temperatures in excess of +120 °F during the summer months

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Also, during construction, it will be necessary to temporarily remove sections of roof and siding from the Decontamination Building, which may reduce the efficiency of the Fuel Building ventilation system, particularly under a configuration "B" ventilation alignment. To prevent construction activities from adversely affecting any known ventilation lineups, the Operations Shift Supervisor and HVAC System Engineer shall be notified, before and after any roof or siding material is removed. See the SII section of this DCP for the specific administrative controls, relating to removal of roofing and siding material

3.22 Equipment Data System (EDS)

added per IPR 99-345
00000013433

Electronic EDSCR numbers 0000012565, 0000012741, 0000012259, 0000012274 and 0000012666 were initiated for the assignment of new mark numbers for equipment to be installed by this Design Change Package.

3.23 ALARA Analysis

Construction of the Fuel Building Trolley enclosure superstructure will require that siding and roof sections of the Decontamination Building be cut away to attach new structural steel members, siding and flashing The Decontamination Building is a radiological controlled area. Hence, the inside walls, and any material taken inside these walls, shall be considered potentially contaminated. As such a Radiation Work Permit will be required to control access of personnel and equipment in and out of these openings in the Decontamination Building. Contact Health Physics prior to entry and cutting of siding or roof sections

3.25 Recent NRC and Industry Concerns

The US NRC submitted a Request for Additional Information to Virginia Power on May 18, 1998. In the subsequent Response to Request for Additional Information (TAC No. L22113), Virginia Power committed to constructing a crane enclosure (a.k.a. Fuel Building Trolley enclosure) no later than December 31, 1999 to prevent the weather-driven spread of contamination from use of the spent fuel cask lifting equipment outside the Decontamination Building. See Appendix 1-4 for a copy of the Response to Request for Additional Information (TAC NO. L22113).

3.26 Impact of/on Other Design Changes

DCP No. 98-006, was issued, ahead of this DCP, to construct the concrete foundations for this enclosure. This DCP shall provide the rest of the details needed to complete construction of the enclosure. The foundation work must be complete prior to erecting structural steel. See SII for specific precautions and limitations.

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3.27 Summary of Equipment Added or Removed

The applicable component label specification sheets for the components, listed below, are provided in Appendix 2-1.

Mark No.	Add/Remove	Function
59-01-BLD-BLD-FBTE-BLDG	Add	BUILDING
59-01-BLD-DR-FBTE-1-ACCESS	Add	ACCESS
59-01-BLD-DR-FBTE-2-ACCESS	Add	ACCESS
59-01-BLD-DR-FBTE-3-ACCESS	Add	ACCESS
59-01-BLD-DR-FBTE-4-ACCESS	Add	ACCESS
Changed per IPR 99-345 → 59-02-~~BLD~~-EP-BKR-2B1-1B-A1L	Remove	CIRCUIT BREAKER
59-02-~~BLD~~-EP-BKR-2B1-1B-A1L	Add	CIRCUIT BREAKER
59-02-~~BLD~~-EP-BKR-2B1-1B-A1R	Add	CIRCUIT BREAKER
59-00-EP-PNL-CE1-PANEL	Add	DISTRIBUTION PANEL
59-00-EP-PNL-CE2-PANEL	Add	LIGHTING PANEL
59-00-EP-TRAN-CE1-TRANSF	Add	LIGHTING TRANSFORMER
59-00-ELT-ELT-CE1-LIGHT-EGRESS	Add	EGRESS SIGN BATTERY BACKUP
59-00-ELT-ELT-CE2-LIGHT-EGRESS	Add	EGRESS SIGN BATTERY BACKUP
59-00-ELT-ELT-CE3-LIGHT-EXIT	Add	EXIT SIGN BATTERY BACKUP
59-00-ELT-ELT-CE4-LIGHT-EXIT	Add	EXIT SIGN BATTERY BACKUP
59-00-CO-GAI-OCE1-PHONE	Add	GAI-TRONICS
59-00-CO-SPK-OCE1-ANNUC	Add	GAI-TRONICS
59-00-EP-RCP-CE1-ELECON	Add	RECEPTACLE
59-00-EP-RCP-CE2-ELECON	Add	RECEPTACLE

3.31 Masonry Block Walls

The Fuel Building Trolley enclosure will require attachment of siding and flashing to the exterior masonry block walls on the Decontamination Building. These block walls are located above grade and are classified as Non-Safety-Related, Non-Seismic, Non-Class IE Bulletin 80-11 walls. Therefore, the construction of the trolley enclosure does not alter Virginia Power's response to IE Bulletin 80-11.

3.32 Nuclear Control Room Operator Development Program Training Modules

NCRODP-48-NA needs to be revised to include a verbal description of the Fuel Building Trolley enclosure. See Appendix 1-5 for the proposed change.

3.34 Labeling

See Appendix 2-1, Component Label Specifications, for a complete list of equipment requiring new component labels

3.42 Other Concerns

The Fuel Building Trolley enclosure will require attachment of structural steel members, siding and flashing to the side walls and roof of the Decontamination Building. Per DCP No. 93-145, the building materials in the original roof of the Decontamination Building may contain asbestos. Therefore, any connections that require cutting into the existing roof of the Decontamination Building shall be performed in accordance with VPAP-1901 and the Virginia Power Corporate Asbestos Compliance Manual. Similarly, existing paint may contain lead Hence, any removal of paint shall follow the applicable corporate and site procedures.

During construction, it will be necessary to temporarily disassemble existing structural steel connections on the existing crane runway support structure to tie in new framing members from the enclosure superstructure. To maintain structural integrity of the existing runway structure, only one existing connection, per structural bent, shall be disassembled at a time. All existing connections must be reassembled prior to the end of the work shift. The Fuel Building Trolley shall remain inside the inner roll-up door of the Fuel Building whenever a connection is disassembled. See SII for more specific administrative controls related to the safe construction of the enclosure superstructure.

During operation, it will be necessary to restrict the movement of the Fuel Building Trolley outside of the Fuel Building when operating conditions are not favorable. Favorable operating conditions are defined as wind speeds at or below 35 mph and temperatures within the range of -20 °F to +120 °F. While under the Fuel Building Trolley enclosure, trolley position and enclosure door openings shall be adjusted to prevent the weather-driven spread of radiological contamination. Specifically, the trolley cables and hook shall remain dry to prevent the potential spread of radiological contamination.

4.0 REFERENCES

4.1 DCP NO. 98-006
4.2 Virginia Power's Response to "Request for Additional Information (TAC No. L22113)
4.3 Virginia Power Calculation No. CE-1448
4.4 Virginia Power Calculation No. CE-1452
4.5 SWEC Calculation No. 11715-BK-5S & 5T
4.6 ASCE 7-95
4.7 DCP No. 93-145
4.8 Specification NAS-0051
4.9 Specification NAI-0027
4.10 VPAP-1901
4.11 VPAP-2401
4.12 Virginia Power Corporate Asbestos Compliance Manual
4.13 Calculation No. EE-0387, Rev. 0 – "Fault Currents for 4 AKV and 480V NSR Switchgears and MCC's Short Circuit"
4.14 Engineering Transmittal No. CEP-99-0035
4.15 Engineering Transmittal No. CME-99-0038

VIRGINIA POWER

Engineering Review and Design

STD-GN-0001

1 Design Change Title/Station/Unit	2. Design Change Number
Replacement of SW Lines to/from Charging Pumps and Instrument Air Compressors /NAPS/ Units 1 & 2	99-010

1.0 STATEMENT OF THE PROBLEM

The service water supply and return lines to/from charging pumps (CP) and instrument air compressors (IAC) were originally installed with carbon steel (CS) piping. The piping was degraded due to general and microbiologically influenced corrosion (MIC) over period of time and pipes below 4" dia were subsequently replaced with stainless steel (304) piping. Also two new 4" dia 316L SS headers were routed to supply IACs and CP lube oil coolers Over the past years minor leaks have been identified in the heat affected zones of welds at multiple locations on SS piping Four inch diameter CS headers are corroded, clogged and supplying only CP gear box coolers Investigation in the observed degradation showed that the flaws identified at the welds on the SS lines were typical of those produced by MIC. The results of the structural integrity evaluation of the flawed sections in the piping so far has shown that all sections with through wall flaws up to 15% of the circumference have shown that their structural integrity would be maintained when subjected to all specified loading conditions including seismic. The piping is visually inspected and nondestructively examined to determine the extent of degradation and to characterize the flaw, and consequently repaired in accordance with approved NRC Relief Request NDE 32. This relief request establishes a plan for continued operation with through-wall flaws in SS piping in the SW System based upon the guidance of GL 90-05 to the extent it is believed practical. The relief request is expiring in first quarter of 2000 NDE Requests No 15 and 16 have been submitted to the NRC to replace NDE 32.

Frequent through-wall leakages on the 4" SS headers and poor condition of 4" dia CS headers have prompted the replacement of the existing 4" dia headers (four supply and four return lines) to/from CPs and IACs with high corrosion resistance alloy AL-6XN (6% molybdenum SS).

2.0 PROPOSED RESOLUTION

Specification for Installation of Piping and Mechanical Equipment NAS-1009, Pipe Class 164, AL-6XN Alloy Piping for SW System was approved on March 12, 1998. This Pipe Class allows utilization of high corrosion resistance alloy AL-6XN (6% molybdenum stainless steel) for 10" diameter and smaller SW system pipes. Installation of this high corrosion resistance material will mitigate and possibly prevent deterioration of SW piping due to general and pitting corrosion. AL-6XN pipe has higher allowable stresses than carbon steel (CS) or stainless steel (SS) pipes, which have been utilized for the SW piping Also this pipe has approximately the same weight and temperature expansion qualities as the existing piping while having significantly higher corrosion resistance. Therefore, the replaced piping will maintain its integrity under the piping design conditions. **Utilization of AL-6XN piping for replacement of deteriorated 4" dia of SW lines to/from CPs and IACs will increase reliability of this piping and reduce future maintenance expenses.**

2.1 Current Design Configuration

There are four pair (supply and return) 4" SW headers that supply CPs and IACs from the main SW headers. Four 4" CS lines (4"-WS- C50,51,52,53-151-Q3) supply CP gear box coolers Four 4" SS lines (4"-WS-46,47,56,57-163-Q3) supply IACs and CP lube oil coolers

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SW is provided to the gear boxes and lube oil coolers of all six CPs (three per unit) as shown on drawing 11715-FM-078G, sh. 1 & 2. SW flow to each lube oil cooler supplied from both 3" dia SS subheaders which are continuation of the 4" SS lines to IACs. 2" SS pipes tap off from the 3" subheaders to supply the lube oil coolers. An additional backup 1" SS supply lines originated from 4" dia CS lines are normally isolated. Each additional backup line contains two isolation valves and a check valve. The 2" SS lines, which contain manual isolation valves and check valves, join together to form a common supply to each CP oil cooler. The single outlet line from each lube oil and gear cooler branches out into two 2" SS lines and connect to corresponding return header. There are three types of check valves installed for the coolers. The normal supply lines to the lube oil coolers contain 316L SS piston check valves whereas the normally isolated backup lines use 304 SS 1" dia swing check valves. The supply lines to the gear box coolers contain CS swing check valves.

Instrumentation is available to alert control room operators if insufficient cooling water is being supplied through the gear box coolers. A temperature control valve controls SW flow through the lube oil coolers. A lube oil high temperature alarm will alert operators if the temperature is high.

IACs are supplied from 4" SS headers (4"-WS-46,47,56,57-163-Q3). Two normally open 1" dia SS lines join together to form a common 2" supply to each IAC cooler. The single 2" dia SS outlet from each IAC cooler branches out into two 1" dia SS lines and connects to each of the 4" dia SS return headers. No check valves are installed on the lines to IACs but 4" dia SS swing check valves are installed on supply headers 4"-WS-46,47-163-Q3.

2.2 Proposed Design Configuration

Proposed design configuration is based on maximum simplification of the existing scheme with minimum new piping installation and, therefore, minimization of construction cost. The proposed replacement/modification shall satisfy all possible modes of station operation and SW failures during the final configuration and during the project implementation (intermediate configuration). Therefore intermediate and final configuration were checked for the worst case: LOCA with failure of one SW pump, i e two SW pumps operate on one SW header with the second SW header depressurized. Since check valves on the SW lines to the CPs were not adequately tested, the check valve failure was also assumed. SW flow was compared with CP specification requirements at SW design temperature of 99.8°F (calculation ME-062) For conservatism, flow rate requirements were taken from the specification sheets at 110°F.

Proposed design configuration (see final configuration below) will replace the existing four CS 4" dia headers for SW supply to the CPs and IACs with two new 4" dia SW headers. The reduction in lines will delete two of the four SW return header flow transmitters. The two flow transmitters to be deleted are 1-SW-FT-108A & B The flow will increase with combining of the lines, therefore, the existing flow transmitter loops (1-SW-109A & B) will be rescaled from 0-190 gpm to 0-300 gpm. The headers will be fabricated from high corrosion resistant alloy AL-6XN and routed in place of the existing 4"dia CS lines with new 4" extension for the IAC SW supply. New configuration will satisfy all the design requirements, simplify

operation and will be significantly less expensive than "one to one" replication of the present design configuration.

Based on the above the following description will consist of two parts:
A. Intermediate (Temporary) Configuration
B. Final Configuration

2.3 Intermediate Configuration

The goal of the intermediate configuration is to make a smooth transition to the final configuration without creating any adverse effect on CPs and IACs operation, i.e. intermediate configuration shall satisfy all modes of station operation during its implementation. The intermediate configuration is shown on drawings N-99010-0-1FM078GA, sh.1 &2. During the intermediate mode of operation, all SW supply to CPs and IACs will take place from the existing SS SW headers 4"-WS-46,47,56,57-163-Q3 lines. To achieve this goal 2" crossconnects will be made between the gear box coolers and lube oil coolers. Location of these crossconnects is shown on drawing N-99010-0-1FP5J. The crossconects will be made within each pump cubicle in one cubicle at a time. Therefore only one CP will be inoperable during this implementation, two other pumps will remain operable. No TS AS is required. After all six CPs are transferred to the SS headers, lines 4"- WS - 50,51,52,53-151-Q3 will be disconnected from all SW consumers and ready for replacement. Note that the crossconnects are also part of the final configuration, therefore after installation of the crossconnects, no additional work inside the cubicles is planned

REPLACED

Calculation ME-0582 was performed to verify adequacy of flow to CPs and IACs during this mode of operation. The calculation shows that under all modes of SW operation the intermediate piping arrangement will satisfy required SW flow to CP coolers. However SW flow to the non-safety related IACs will be adequate but marginal. Therefore it is recommended to perform this modification during October-April when SW temperatures are below SW design temperature, which will compensate for slightly reduced SW flow rate to the IACs. Note also that 1" branches to IACs are the limited points in the IACs SW supply. These lines will be replaced with the 2" lines in the final configuration. Integrity of the modified piping was verified in calculation CE-1500, CE-1501 and CE-1509 for all design basis conditions.

Basic SWS functions and system configurations are not altered as a result of this intermediate configuration.

Applicable piping design and construction code B31.7 will be satisfied. This temporary configuration will not adversely affect the basic functions of the SW system and will not create an accident of a different type than was previously evaluated in the UFSAR. Piping supports were investigated for this evolution and found to be adequate (Calc.CE-1501).

2.4 Final Configuration

Existing SW lines 4"-WS-C50,51,52,53 will be demolished and replaced with the AL-6XN pipes For flow diagrams of final configuration see drawings N-99010-0-1FM078A, sh.4, N-99010-0-1FM078G, sh.1,2, N-

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99010-0-1FM078C, sh.2. Per DCP 91-012, the connection of these lines to the 24" SW headers was replaced with AL-6XN pipes up to isolation valves 1-SW-694, 681, 679, 678. These valves are CS gate valves type VGW-15A. The valves will be replaced with SS valves type VGW-15X. This replacement will require entering TS AS Section 3.7.4.1.d for each main SW header, i.e. one AS per each header. Note that all replaced lines will maintain their number with the exception of Pipe Class (for example line 4"-WS-C50-151-Q3 after replacement with AL-6XN material will have number 4"-WS-C50-164-Q3). These four inch lines will be extended to elevation 259'-6" to supply IACs with SW. SS gate valves will be installed on each line after the last CP (2-CH-P-1C) is connected. New supply header pressure and temperature indicators are to be added to both lines. SS check vales (type VCX-15X) will be installed on 2" dia branches to the CPs instead of the existing CS check valves. Flow orifices with local flow indicators will be installed on 2" dia return lines from each CP cubicle. The orifices and indicators (1-SW-FS-112A,B,C and 2-SW-FS-212A,B,C) will be located in the pipe chase tunnel close to the outside south wall of the cubicles. The indicators will be mounted on new support stands beside the existing flow indicators (1-SW-FS-102A,B,C & 2-SW-FS-202A,B,C respectively).

The IACs will be supplied from the continuation of AL-6XN lines to the CPs. These extension pipes will be routed from elevation 244'-6" up to elevation 259'-6". The existing supplies from 4"-316L headers will be disconnected and new 2" AL-6XN pipes will replace existing 1" supply and return lines. New 2" dia SS Gate valves and check valves will be installed on 2" supply lines to IACs as shown on drawings N-99010-0-1FM078C, sh.2, N-99010-0-1FP5K. Modification of SW to IACs will not require TS AS on SW lines since the modification will be done after new lines to charging pumps are installed and IACs may be supplied temporarily from one SW lines since they are not safety related

Basic SWS functions and system configurations are not altered as a result of this piping modification. Applicable piping design and construction code B31.7 will be satisfied. This modification will not adversely affect the basic functions of the SW system and will not create an accident of a different type than was previously evaluated in the UFSAR.

SW piping supports to/from CPs and IACs were investigated for all evolutions of this piping /modification. Appropriate measures will be implemented to maintain SW piping operable and adequately supported for the interim conditions Interim conditions were analyzed and are found to be adequate.

This DCP requires that four 4" diameter pipes be routed through the floor slab in the Auxiliary Building at elevation 259'-6", near Column lines J-10. This will require core drilling the concrete floor. The underside of the slab is congested with conduit and will greatly restrict the ability to alter the location of the holes to miss cutting reinforcing steel bars in the slab. The slab was evaluated in Calculation CE-0709, Rev. 0, Addendum A, and it is concluded that is acceptable to core drill the slab and reinforcing steel bars may be cut during the drilling of the holes

Safety related equipment is located in the areas in which piping replacement will occur and through which construction materials will pass. Implementation procedures will provide the proper precautions to prevent situations, which could adversely affect safety related equipment in the construction area.

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3.0 PROGRAM REVIEW

3.1 Updated Final Safety Analysis Report (UFSAR)

Section 9.2.1.2.1 of the UFSAR describes existing service water supply scheme for charging pumps lube oil and gearbox coolers. Per this scheme both coolers are supplied from a different pair of SW headers with check valves from each header, i.e., there are two independent circuits within each charging pump cubicle with four check valves and eight isolation valves to each charging pump outside the cubicle, within the pipe chase. Per the new scheme, the charging pump lube oil cooler and gear cooler will be supplied from one pair of SW headers (i.e. instead of four pairs of headers there will be two pairs, two supply and two return 4" diameter lines, with a corresponding reduction of the number of the valves installed). For the UFSAR Change Request see Appendix 1-1.

3.2 Technical Specifications

Replaced (1)

Project implementation will be organized in a way such that no TS Action Statement will be required for piping replacement and modification with the exception of replacement of the 4" diameter carbon steel valves 1-SW-678, 1-SW-679, 1-SW-681 and 1-SW-694 with stainless steel valves. To replace these valves a 168 hour TS AS 3 7.4.1.d on main SW headers will be entered. During this time the headers will be drained and new valves will be installed. These Action Statements will be scheduled in the end of the piping modifications, so that 4" dia SS lines to IACs will be cut from the headers simultaneously with the new valve installation. This will reduce number of TS AS on main SW headers. Note that modification of piping to each charging pump will be done on one pump at a time. No TS AS is required since two remaining pumps will be operable. Four inch gate valves will be installed on new SW headers downstream of charging pumps to supply SW to the IA compressors Therefore connections of IA compressors to new SW lines will not require TS AS since IA compressors are not safety related.

3.3 Fire Protection/Appendix "R"

This DCP involves modifications of the flow path of SW to the charging pumps and instrument air compressors with replacement of existing stainless steel and carbon steel four inch diameter headers with high corrosion resistant stainless steel (AL-6XN). Appendix "R" Design Summary Checklist has been reviewed. Drawing 11715-DAR-078A, sh.4 is affected and shall be revised per corresponding DCP drawings upon the DCP implementation (see CDS). Changes of flow path do not affect equipment performance, SW flow rates and equipment ability to perform safe shutdown functions in case of fire are not altered.

3.4 Environmental Qualification

This design change will replace and modify the SW supply and return lines to the charging pumps (gear box & lube oil coolers) and the instrument air compressors. The number of SW supply and return lines are decreased from four lines each to two lines each, thereby, reducing the flow instrumentation. The existing

flow transmitters 1-SW-FT-109A & B will remain with re-scaling to a new flow range. Flow transmitters 1-SW-FT-108A & B will be deleted since their flow line will be removed and their flow path will be combined with 1-SW-FT-109A & B. With the deletion of flow transmitters 1-SW-FT-108A & B, the Equipment Qualification Master List (EQML) will need to be revised. This change is documented on the EQ Master List Change (EQMLC) form in accordance with STD-GN-0025 and included in Section 1 Appendix 1-2.

3.7 Inservice Inspection

Carbon steel piping to charging pump cubicles will be replaced with AL-6XN piping and all carbon steel valves will be replaced with stainless steel valves. Also existing stainless steel lines to IA compressors and CPs will be replaced with AL-6XN piping. All new piping from the isolation valve from the main 24" SW headers up to individual valves or flanges to CH pumps and IACs will be initially hydrostatically tested at 1.5 times of 150 psig piping design pressure, i e. 225 psig. Piping within the cubicles and to each IAC up to the boundary described above may be leak tested in accordance with ASME Code Case N-416-1 or per IWD-5223 of ASME Section XI, i.e. 1.1 times of 150 psig of SW piping design pressure (165 psig), see details below. All pipe cuts/rewelds of "Q" lines or integral attachments to such lines shall be reviewed by Station Testing and Inspection to determine the appropriate Repair and Replacement requirements per VPAP-0307.

The SW piping is subject to the examination per ASME Section XI, Division I, Subsection IWD. Weld inspection will be performed in accordance with ANSI B31.7-1969 including 1970 Addendum.
The piping is subject to visual examination VT-2 of IWA-2212 in conjunction with the system pressure test of IWD-5000. Hydrostatic test for modified piping shall be 1.1 times the system design pressure of 150 psig, i e 165 psig (Article IWD-5223) and 225psig for the new piping (see above). Test condition holding time should be per Article IWA-5213. Where practical, hydrostatic test for the existing modified piping (piping within the CP cubicles) may be substituted by testing in accordance with Code Case N-416-1 and NRC approval contained in NRC letter Serial No. 95-041 dated January 18, 1995. Note that use of this code case requires additional NDE of Class 3 welds and documentation on NIS-2 form.

ISI system pressure test program and IWV program are affected since piping configuration has been changed. Requirements of VPAP-0307 are applied. Check valves in the cross-tie piping to CPs and IACs should be included in the IST program

3.8 Seismic

The Service Water System is a Safety Related Seismic Class 1 System and is designed in accordance with ANSI B31.7 code of 1969 with addendum through 1970, Class 3.

New SW pipes and pipes modified or replaced under this DCP including temporary installed piping are qualified to loading conditions which include Operational Basis Earthquakes (OBE) and Design Basis Earthquakes (DBE) in addition to normal operating conditions. During implementation of this DCP several interim configurations will be required. The piping and pipe supports were analyzed for all conditions to

ensure the piping structural integrity under normal operational and accident conditions (Calculations CE-1500, CE-1501 and CE-1509).

3.12 Emergency Response Facility System

This design change will replace and modify the SW supply and return lines to the charging pumps (gear box & lube oil coolers) and the instrument air compressors. The number of SW supply and return lines are decreased from four lines each to two lines each, thereby, reducing the flow instrumentation. The existing flow transmitters 1-SW-FT-109A & B will remain with re-scaling to a new flow range. Flow transmitters 1-SW-FT-108A & B will be deleted since their flow line will be removed and their flow path will be combined with 1-SW-FT-109A & B. With the deletion of flow transmitters 1-SW-FT-108A & B, the Validyne (Mux) inputs will be deleted. The ERF Design Checklist is completed and included in Section 1 Appendix 1- 4.

3.15 Post - Accident Monitoring (RG 1.97)

This design change will replace and modify the number of SW supply and return lines to the charging pumps (gear box & lube oil coolers) and the instrument air compressors The number of SW supply and return lines are decreased from four lines each to two lines each, thereby, reducing the flow instrumentation. This design change will replace and modify the SW supply header and return header lines for the charging pumps (gear box & lube oil coolers) and the instrument air compressors The SW return header lines are decreased from four lines to two lines; thereby, reducing the flow instrumentation. The existing flow transmitters 1-SW-FT-109A & B will remain with re-scaling to a new flow range. Flow transmitters 1-SW-FT-108A & B will be deleted since their flow line will be removed and their flow path will be combined with 1-SW-FT-109A & B. With the deletion of flow transmitters 1-SW-FT-108A & B, this will change the RG 1.97, D-31 variable.

Flow transmitters 1-SW-FT-108A & B and 1-SW-FT-109A & B are used as RG1.97, D31 variable, to measure service water from the Engineered Safety Features (ESF) components. The SW Flow Transmitters are required to meet the RG 1.97 requirements for a Cat.2 variable per Attachment 6 of STD-GN-0035. This change eliminates two flow paths by combining the flow and will be monitored by 1-SW-FT-109A & B. The RG 1.97 requirement is to have flow indication of 0-110% flow for this variable. The new normal design flow is 200 gpm and the new indicated range will be 0-300 gpm. Therefore, the requirements for RG 1.97, D-31 variable, has been met. An ECR has been prepared and included in Appendix 1-5. For ERF Design Checklist see App.1-4.

3.19 Setpoints, Station Curves, Instrument Scaling and Instrument Uncertainty

This design change will replace and modify the SW supply and return lines to the charging pumps (gear box & lube oil coolers) and the instrument air compressors. The SW supply and return lines are decreased from four lines each to two lines each, thereby, reducing the flow instrumentation. Since the SW return header lines are decreased from four lines to two lines, the individual charging pump cubicle flow has changed. This increase in charging pump cubicle flow is also the result of changing the SW flow path to include the

Lube Oil Cooler with the Gear Box Cooler. Therefore, the Charging Pump Gear Box Cooler's low flow setpoints will have to be increased from 3.5 PSID to 4.3 PSID. Setpoint Data Sheets have been prepared and include in Appendix 2-2.

3.22 Equipment Data System

The scope of this DCP includes replacement of existing 4" dia carbon steel (CS) headers with high corrosion resistance material (AL6XN), replacement of CS valves with stainless steel valves, modification of the existing supply and return lines to CP cubicles and IA compressors. Existing 4" dia stainless steel headers to IA compressors will be demolished, and IA compressors will be supplied with SW from new AL-6XN piping New flow indicators will be installed on SW return lines from each CP. This extended modification involves significant changes in the EDS system. Note that the replaced lines were assigned the same number. For example, if the existing line number is 4"-WS-52-151-Q3, replacement line number is 4"-WS-52-164-Q3. The Equipment Data System (EDS) is also revised to delete 1-SW-FT-108A & B and add new flow switches (1-SW-FS-112A, B, C & 1-SW-FS-212A, B, C) from each of the charging pump cubicles Also, the EDS is updated to reflect the new pressure (1-SW-PI-137A & B) and temperature (1-SW-TI-121A & B) indicators that are added to SW supply headers.

EDS card numbers 14772, 14790, 14797, 14803, 15358 were prepared to reflect the above changes.

Note: Card 15358 is issued for new mark numbers for the first phase of work (transfer CPs on the existing SS headers). This phase will take approximately six weeks. The rest of the cards will be issued prior to completion of the phase one.

3.23 ALARA

Service Water piping replacement work under this DCP will require work in the Auxiliary Building basement (elevation 244'-6") in the area of CCHXs, charging pump cubicles and charging pump pipe chase. Also work will be performed on elevation 259'-6" in the area of the CCHX and IA compressors. All these areas are radiological control areas (RCA). In order to minimize exposure to workers, the following ALARA considerations will be incorporated into this DCP.

1. Prefabrication of piping, use of mock-up and preparation for the repair work in a non-radiation area.

2. Where possible, work for cutting and welding pipe and preparation for the repair work has been selected in areas where radiation levels are relatively low.

3. Health Physics (HP) review of the work area and issuance of an RWP.

4 Briefing of personnel on the radiological condition of the work areas will be conducted prior to the performance of any work.

5, Work in the charging pump cubicles will be performed on SW lines, close to south wall of the cubicle During this time the corresponding charging pump is inoperable. Shielding will be used to reduce radiation dose to workers during SW piping modification.

Radiation surveys of the intended work areas will be reviewed prior to and during implementation of this DCP and appropriate precautions taken. All hot spots are to be identified by HP prior to performing work. The total anticipated exposure is calculated as shown below:

Phase No.1 Install 2" Crossconnect within Charging Pump cubicles 6449 mhr x .33 x 2=4256 mrem=**4.256 rem**
Where: 6449 mhr - overall manhours estimate, 0.33 - manhours within cubicles (Sect.5.4.4 of STD-GN-0020). 2 mrem/hr - radiation dose survey data for work area.
Phase No. 2 Install new valves 1-SW-694, 681, 679, 678. 1524 x .33 x .05 = 25 mrem = **0.025 rem**
Phase No 3 Remove Lines 4" -WS-C50, C51, C52, C53-151-Q3. 1222 x .1 = 122 mrem = **0.122 rem.**
Phase No 4 Install new lines 4"-WS-C50, C51, C52, C53-164-Q3. 23727 x 0.33 x .1 = 783 mrem = **0.783 rem**
Phase No. 5 Tie-ins to Charging Pumps. 15204 x 0.33 x .5 = 2509 mrem = **2.509 rem**
Phase No. 6 Cap 4" Lines at IA Compressors. 352 x 0.33 x .1 = 11.6 mrem = **0.011rem**
Phase No 7 Install new lines to IA Compressors. 10462 x 0.33 x .3 = 1036 mrem = **1.036 rem**
Phase No. 8 Tie-ins to IA compressors. 6496 x 0.33 x .1 = 214 mrem = **0.214 rem**
Phase No. 9 Demolish SS piping and supports. 3430 x 1 x .1 = 343 mrem = **0.343 rem.**

Overall estimated exposure: 4.256 + 0.025 + 0.122 + 0.783 + 2.509 + 0.011 + 1.036 + 0.214 + 0.343 = 9.3 rem

This calculation has been prepared in accordance with STD-GN-0020, "Design Change ALARA Dose Estimates". Manhours estimate is based on Nuclear Engineering Services Estimate Transmittal, IR 4168, Replacement of SW Lines, to/from Charging Pumps and IA Compressors dated March 22, 2000 (NAPS Estimating File Estimate No C4168R0)

All piping replacement will be performed on the Service Water System. SW neither contains radioactive fluid nor does it pass through a neutron field capable forming activated corrosion products. Therefore, this design change does not adversely impact the radiological status of the surrounding areas

3.25 Recent NRC Concerns

Integrity of SW system is topic of permanent attention of NRC and Nuclear Industry since SW piping corrosion is a common problem for all power plants and problems with essential SW system may affect the

safe operation of Nuclear power plants. Numerous NRC Generic Letters (89-13, 90-05, 91-18, etc) addressed SW piping and equipment repairs and testing. Current leakages in SW SS piping to CP and IA compressors were addressed by Engineering in Virginia Power ASME Section XI Relief Request NDE-32, Rev.2, MIC Monitoring Program. NDE Requests No.9 and 15 have been submitted to the NRC to replace NDE 32. The goal of this DCP is to prepare technical documentation for implementation of replacement of leaking 316L SS piping and deteriorated CS piping to CP and IA compressors with high corrosion resistant alloy AL-6XN, which will eliminate existing leakages, increase reliability of this piping and cut future maintenance expenses.

3.26 Impact of/on Other Design Changes

Implementation of this DCP will require significant involvement of construction manpower and financial resources. Due to urgency of this work, design and implementation of 36" diameter SW header inspection and recoating including DCP 92-008, Addition of Manholes on 36" SW Headers (phase II of SW Restoration Project) have been postponed.

3.27 Summary of Equipment Added or Removed

This design change will replace and modify the SW supply and return lines to the charging pumps (gear box & lube oil coolers) and the instrument air compressors. The SW supply and return lines are decreased from four lines each to two lines each, thereby, reducing the flow instrumentation The existing flow transmitters 1-SW-FT-109A & B will remain with re-scaling to a new flow range. Flow Transmitters 1-SW-FT-108A & B will be deleted since their flow line will be removed and their flow path will be combined with 1-SW-FT-109A & B.

Individual Flow Switches will be added to each of the charging pump cubicles Service Water return lines. This change is per the System Engineering request to assist in performing the station PT. Also, new Pressure and Temperature Indicators are added to the SW Supply Headers for indication prior to entry to the charging pump cubicles, which supply SW to the Lube Oil Coolers and the Gear Box Coolers.

See Appendix 1-7 for the Table of Equipment added/removed as a result of this piping replacement/modification.

3.28 System and Plant Design Basis Documents

This DCP replaces deteriorated SW piping with high corrosion resistant piping. Simultaneously with replacement, the DCP modifies and simplifies the existing piping configuration maintaining all necessary design requirements and SW design flow rates to the CPs and IACs. Calculations ME-0582 and ME-0586 verify adequacy of the piping modifications for all modes of operation. Calculations CE-1500, 1501 and 1509 verify adequacy of the piping stresses and supports for the design conditions. Therefore DBD figures reflecting flow path to CPs and IACs shall be revised per the DCP drawings (Figures 3.3-1A, 3.3-1B, 3.3-2A,

3.3-2B, 3.3-3A, 3.3-3B, 3.3-4A, 3.3-4B, 3.3-4C, 3 3-4D, 3.3-5A, 3.3-5B, 3.3-5C, 3.3-5D, 4.2-1A, 4.2-1B). The above calculations will be included in Chapter 25 of SBD-NAPS-SW and DCP description will be added to Table 20.1-1 of the DBD. Individual Flow Switches will be added to each of the charging pump cubicles Service Water return lines. Service Water supply header lines, prior to the charging pump cubicles, will be modified to add both temperature and pressure indicators This addition of Flow Switches and supply header indicators are not identified in the SW SDBD and will be added to Chapter 14, Section 14.1.20. See Appendix 1-6 for the DBD Change Request.

3.29 Removable Blocks and Other Barriers

Design Change 99-010 requires that four, 4-inch diameter pipes be routed through the floor slab in the Auxiliary Building at elevation 259'-6", near Column lines J-10. This will require core drilling the concrete floor. The underside of the slab is congested with conduit and will greatly restrict the ability to alter the location of the holes to miss cutting reinforcing steel bars in the slab. The slab was evaluated in Calculation CE-0709, Rev. 0, Addendum A, and it is concluded that is acceptable to core drill the slab and reinforcing steel bars may be cut during the drilling of the holes.

3.32 Nuclear Control Room Operator Development Program Training Modules

SW modification per this DCP requires change in the NCRODP-13. Figures 13.3 sh.3 and 13.3-NA sh.2 shall be changed per DCP drawings. SW supply Charging Pumps and Instrument Air Compressors description (p.p. 20-22) will be changed and Sections Corrosion Problems and Corrective Actions (p.p 68 and 71 of NCRODP-13) will be updated (Appendix 1-3 to the DCP).

3.34 Labeling

New isolation valves and check valves will be added during this piping replacement/modification. Individual Flow Switches will be added to each of the charging pump cubicles Service Water return lines. Service Water supply header lines, prior to the charging pump cubicles, will be modified to add both temperature and pressure indicators This addition of Flow Switches and supply header indicators are new mark numbers, which Component Label Specifications (CLSs) have been prepared and are included in Section 2 Appendix 2-1.

3.40 Maintenance Rule

Equipment availability is managed in accordance with the maintenance rule (VPAP-2001). Configurations involving SW header, charging pump and IA compressor outages are analyzed based on cooperation between the station planning and NA&F departments to ensure acceptability of the corresponding equipment and piping outage time.

1. Design Change Title/Station/Unit Replacement of SW Lines to/from Charging Pumps and Instrument Air Compressors /NAPS/ Units 1 & 2	2. Design Change Number 99-010

4.0 REFERENCES

* indicates revision is required

4.1 Calculations

1. ME-0582, Rev 0 Charging Pump Lube Oil, Gear Box, and Instrument Air Cooler Hydraulic Flow Model for Original and Intermediate Configurations.
2. ME-0586, Rev.0 Charging Pump Lube Oil, Gear Box, and Instrument Air Cooler Hydraulic Flow Model for Final Piping Configuration.
3. CE-0709, Rev.0 Evaluate Auxiliary Building Floor Slab near Col. Line J-10.
4. CE-1500 , Rev.0 Pipe Stress Calculation for Replacement of SW Lines to/from Charging Pumps and IA Compressors (IR-9552A).
5 CE-1501, Rev.0 Pipe Support Design and Evaluation for Replacement of SW Lines to/from Charging Pumps and IA Compressors (IR-9552A).
6 CE-1509, Rev.0 Pipe Stress Analysis for 2" SW Line for DCP 99-010 for Intermediate Condition.

4.2 Specifications

1. NAP-0017, Rev.1, Add.10 Specification for Manually Operated Carbon Steel and Stainless Steel Gate, Globe and Check Valves 2 1/2" and Larger. NAPS, Unit 1 & 2.
2 NAP-0097, Rev.0 Specification for Flow Orifice Plates, NAPS, Units 1 & 2.

Note that all other references are identified in the corresponding sections of the DCP.

1. Design Change Title/Station/Unit	2. DCP No.
Replacement of SW Lines to/from Charging Pumps and Instrument Air Compressors/NAPS/Units 1 & 2	99-010, FC#1

42. Field Change (Continued)

corresponding drawings/DRR will be revised to incorporate the above change. Also, some minor inconsistencies (symbols and pipe class boundary will be incorporated on the DCP drawings which are not affected by the IPR 00-175.

3.0 ACTUAL CHANGE TO DCP

3.1 In the ER&D, Section 2.3, in the first paragraph, prior the sentence " Note, that the crossconnects .." add the following:

Valves 1-SW-1211, 1-SW-1212, 1-SW-1213 and 1-SW-1214 will be cut from the carbon steel piping and installed on the stainless steel piping to the charging pumps in accordance with drawings N-99010-0-1FM078GA, sh.1, Rev.1 and N-99010-0-1FP5J, sh1, Rev.1. This will retain capability of FP or PG water to backup two charging pumps in case of loss of SW while operating charging pumps in the intermediate configuration Two 72 hour TS AS 3.7.4.1.c, one on headers 4"-WS-46-163-Q3 and 4"-WS-57-163-Q3 and one on headers 4"-WS-47-163-Q3 and 4"-WS-56-163-Q3, are required to install the backup connections

3.2 In the ER&D, on page 5, replace Section 3 2 with the following·

3.2 Technical Specifications

Two 72 hour TS AS 3.7.4.1.c, one on headers 4"-WS-46-163-Q3 and 4"-WS-57-163-Q3 and one on headers 4"-WS-47-163-Q3 and 4"-WS-56-163-Q3, are required to install backup connections for the intermediate configuration. FP or PG water may be utilized as a backup water

To replace 4" diameter carbon steel valves 1-SW-678, 1-SW-679, 1-SW-681 and 1-SW-694 with stainless steel valves a 168 hour TS AS 3.7.4.1.d on main SW headers will be entered During this time the headers will be drained and new valves will be installed. These Action Statements will be scheduled in the end of the piping modifications, so that 4" dia SS lines to IACs will be cut from the headers simultaneously with the new valve installation This will reduce number of TS AS on main SW headers Note that modification of piping to each charging pump will be done on one pump at a time. No TS AS on charging pumps is required since two remaining pumps will be operable Four inch gate valves will be installed on new SW headers downstream of charging pumps to supply SW to the IA compressors. Therefore connections of IA compressors to new SW lines will not require TS AS since IA compressors are not safety related

3.3 In the beginning of Section 1.2 of the SII add the following paragraph:

After all charging pumps are transferred on the existing SS headers, and carbon steel lines are ready for demolition, valves 1-SW-1211, 1-SW-1212, 1-SW-1213 and 1-SW-1214 will be cut from the carbon steel piping and installed on the stainless steel piping to the charging pumps in accordance with drawings N-99010-0-1FM078GA, sh.1, Rev.1 and N-99010-0-1FP5J, sh1, Rev.1 for intermediate configuration. This will retain capability of the existing FP or PG water to backup two charging pumps in case of loss of SW while operating charging pumps in the intermediate configuration Two 72 hour TS AS 3.7.4.1.c, one on headers 4"-WS-46-163-Q3 and 4"-WS-57-163-Q3 and one on headers 4"-WS-47-163-Q3 and 4"-WS-56-163-Q3, are required to install the backup connections.

3.4 Add items 54-59 on Materials List in accordance with the attached page

3.5 Revise drawing Revision Record to show new revision of the following drawings.

N-99010-0-1FM078GA, sh 1, Rev.1
N-99010-0-1FP5J, sh 1, Rev.1
N-99010-0-1FM078G, sh 1, Rev.1
N-99010-0-M400, sh 1, Rev.1
N-99010-0-M801, sh 1, Rev 1

VIRGINIA POWER

Field Change (Supplement)

STD-GN-0001

1. Design Change Title/Station/Unit	2. DCP No.
Replacement of SW Lines to/from Charging Pumps and Instrument Air Compressors/NAPS/Units 1 & 2	99-010, FC#2

42. Field Change (Continued)

intermediate configuration from the end of April to May 10 Safety Evaluation, ER&D and SII will be revised to incorporate the above change.

3.0 ACTUAL CHANGE TO DCP

3.1 In Section 2.3 Intermediate Configuration, on page 3 of ER&D, replace sentence:

> Therefore it is recommended to perform this modification during October-April when SW temperatures are below SW design temperature, which will compensate for slightly reduced SW flow rate to the IACs

with the following:

> Therefore it is recommended to maintain CPs on intermediate configuration only during October-May 10 when SW temperatures are below 85EF, which will compensate for slightly reduced SW flow rate to the IACs.

3 2 In Section 1.1, on page 1of the SII replace word "April" with words "May 10" in the following sentence:

> To increase the margin, transfer of the charging pumps to the new AL-6XN headers will be planned during a time period between October and Apnl when expected temperature in the SW reservoir will be below 85EF.

3.3 Delete Safety Evaluation 00-SE-MOD-12, Rev.1 with the attached Rev.2.

3 4 Annotations reflecting this FC have been made in the controlled copy of the DCP.

Teresa Sims 4/10/01

Signature / Date

4.0 SECURITY REVIEW

Security is not affected by this FC.

5.0 TESTING

Test Plan is not affected by this FC.

1 Design Change Title/Station/Unit	2 Design Change Number
Relocate RS Pump Temporary Test Dike Panel Storage for Installation of Reactor Head Stand Water Shields / North Anna / Unit 1	**99-124**

1.0 STATEMENT OF PROBLEM

Each refueling outage, 21 fiberglass water shield barrels are placed inside the reactor head stand to reduce personnel exposure for inspection, removal and replacement of the reactor head O-ring seals. Installation of the water shields is performed under the Temporary Shielding Program per VPAP-2105. This is a time consuming process at the beginning of each outage since the water shields are individually carried down to the basement using the elevator and placed inside the reactor head stand. Once placed inside the reactor head stand, the barrels are filled with water to provide radiation shielding. Transport, installation and filling the water shield barrels normally takes two individuals at least two shifts to complete. When the fiberglass water shield barrels are damaged during storage, personnel handling or transport, the fiberglass has to be repaired so that the barrel remains leaktight. At the end of the outage, the water shield barrels are drained and then individually carried back to the equipment hatch, using the elevator, where they are placed in large boxes for storage in Warehouse 9 between outages.

In Unit 1 containment, the reactor head stand structure has been used during normal operation to provide seismically restrained storage for the Recirculation Spray (RS) pump temporary test dike panels per NSS Work Procedure GMP-C-106. Therefore, the dike panels will require approved storage in a different location to allow permanent installation of the water shield tanks inside the reactor head stand.

Installation of permanent water shields inside the reactor head stand was requested by ALARA per REA 96-494. This modification will be implemented in Unit 2 per DCP 99-125.

2.0 PROPOSED RESOLUTION

New water shield tanks (12) will be purchased by ALARA/Radiation Protection to meet their radiation shielding requirements and the physical geometry of the reactor head storage stand as shown on drawings 11715-FV-71A and 11715-FV-71B. The tanks will remain in place within the reactor head stand to minimize the time spent each outage preparing the reactor head stand radiation shielding. This will also eliminate the potential for damage caused by handling required for installation and removal of the tanks each outage. The tanks will be an interlocking design as shown in Appendix 1.1. The shield tanks shall be constructed using stainless steel material to provide corrosion resistance. The tanks shall have an open fill and vent hole in the top of the tank that will allow pressure equalization during normal and emergency plant operation. Also, the

tanks shall have a local drain plug near the bottom for water removal at the end of the outage. This is required to prevent potential dilution of RS sump boron concentration if the shield tanks were to leak after a LOCA. The two shield tanks that will be located near the access doors on the reactor head stand will also have a local drain valve. This will permit draining the tank(s) so that they can be moved (pushed in) for access under the reactor head, if required. The small handhole inspection ports in the reactor head stand will be blocked by the shield tanks. This is not a concern since the handhole inspection ports are not normally used. The fiberglass shield tanks currently used also block these inspection openings. The drain plugs/valves shall be left open during plant operation so that the tanks do not hold up water required for containment recirculation after a LOCA. Due to the open drain and vent connections, the shield tanks will fill up with water during a LOCA and will not float out of the head stand. The tanks are effectively restrained by the rugged reactor head stand structure during a seismic event. No interaction with Safety Related components is possible.

The RS Pump temporary test dike panels and steel brace members shall be stored in a designated area on containment basement floor elevation 216'-11" as shown on drawings N-99124-1-1FM1D and N-99124-1-S-001. The panels will be laid flat on the floor and stacked one on top of another. The dike panels will be laterally restrained during storage by four new tube steel post structures as shown on drawing N-99124-1-S-001. The designated storage location is isolated from Safety Related components, therefore, seismic interaction between dike panels and Safety Related components is not possible.

3.0 PROGRAMS REVIEW

3.8 Seismic

The drained stainless steel shield tanks will be effectively restrained during a seismic event by being enclosed within the reactor head stand structure. No interaction with Safety Related components is possible.

The RS Pump temporary test dike panels and steel brace members shall be stored in a designated area on containment basement floor elevation 216'-11" as shown on drawings N-99124-1-1FM1D and N-99124-1-S-001. The panels will be laid flat on the floor and stacked one on top of another. The dike panels will be laterally restrained during storage by new tube steel post structures on four sides as shown on drawing N-99124-1-S-001. The designated storage location is isolated from Safety Related components, therefore, seismic interaction between dike panels and Safety Related components is not possible.

1. Design Change Title/Station/Unit	2 Design Change Number
Relocate RS Pump Temporary Test Dike Panel Storage for Installation of Reactor Head Stand Water Shields / North Anna / Unit 1	**99-124**

3.10 In Containment Coatings & Banned / Restricted Materials

Carbon steel materials used in fabrication of the tube steel restraint structures for dike panel storage shall be coated in accordance with Specification NAS-3000 (Inside Containment) for corrosion protection. No banned or restricted materials are required for implementation of this DCP.

3.13 Plant Flooding

The interlocking stainless steel shield tanks in the reactor head stand will be filled with water during the refueling outage to provide radiation shielding for personnel inspecting, removing or replacing reactor head O-ring seals. In the unlikely event that one or more of the tanks develop a leak, water will drain harmlessly to the containment sump area. The amount of water contained in each tank is approximately 200 gallons (or less for the smaller tanks). This relatively small amount of water will not create any concern with flooding in the containment basement during refueling outage operations.

The tanks shall be drained before returning the plant to normal operation. The tank local drain plugs/valves will be maintained open. This will allow the tanks to fill with water to prevent floating when the containment basement is flooded during a LOCA.

3.22 Equipment Data System (EDS)

Mark numbers for the Reactor Head Stand Water Shield tanks and drain valves will added to the EDS database by EDSCR #12634.

3.23 ALARA

Installation of the reactor head water shield tanks will be performed prior to placement of the reactor head on the storage stand. The water shield will minimize radiation dose for workers required to inspect, remove and replace the reactor head O-ring seals. Adequacy of the radiation shielding provided by 24" nominal thickness of water was determined by the ALARA staff.

Installation of the dike panel storage restraint posts will require drilling into the concrete basement floor of containment for installation of Hilti-Kwik II anchor bolts. The DCP implementing work in containment will be adequately controlled by a

RWP. Based on the installation areas, these activities are not expected to require significant expenditure of personnel radiation dose to implement.

3.27 Summary of Equipment Added or Removed

The following mark numbers will be added by this DCP:

Mark Number	Add/Rem	Function
1-BLD-SHWA-RC01A	Add	Radiation Barrier/Shield
1-BLD-SHWA-RC01B	Add	Radiation Barrier/Shield
1-BLD-SHWA-RC01C	Add	Radiation Barrier/Shield
1-BLD-SHWA-RC01D	Add	Radiation Barrier/Shield
1-BLD-SHWA-RC01E	Add	Radiation Barrier/Shield
1-BLD-SHWA-RC01F	Add	Radiation Barrier/Shield
1-BLD-SHWA-RC01G	Add	Radiation Barrier/Shield
1-BLD-SHWA-RC01H	Add	Radiation Barrier/Shield
1-BLD-SHWA-RC01J	Add	Radiation Barrier/Shield
1-BLD-SHWA-RC01K	Add	Radiation Barrier/Shield
1-BLD-SHWA-RC01L	Add	Radiation Barrier/Shield
1-BLD-SHWA-RC01M	Add	Radiation Barrier/Shield
1-BLD-100	Add	"A" Shield Tank Drain Valve
1-BLD-101	Add	"B" Shield Tank Drain Valve

3.29 Removable Blocks and Other Barriers

The Reactor Head Stand Water Shield consists of 12 interlocking stainless steel tanks that will be permanently located inside the Reactor Head Stand. The shield tanks will be filled with water to provide radiation shielding for plant personnel performing inspection, removal and replacement of the Reactor Head O-rings during refueling outages. The tanks will be drained at outage completion.

The RS pump temporary test dike consists of reinforced metal panels that are installed to allow the RS sump area to be flooded to allow flow testing the Inside RS pumps per 1-PT-64.8. The dike panels are required to be removed and stored away from the RS sump area during normal plant operation. The dike panels will be stored and restrained on the containment basement floor, elevation 216'-11".

1. Design Change Title/Station/Unit	2 Design Change Number
Relocate RS Pump Temporary Test Dike Panel Storage for Installation of Reactor Head Stand Water Shields / North Anna / Unit 1	**99-124**

3.34 Labeling

The Reactor Head Stand Shield Tanks and local drain valve on two of the tanks shall be labeled to identify the mark number. Component Label Specifications are included in DCP Appendix 2 1.

3.37 Reactivity Management

The reactor head stand water shield tanks will hold a total of approximately 2,000 gallons of unborated water when filled. Therefore, the tanks shall be drained prior to unit start-up to avoid a possible concern with water leakage from the shield tanks diluting RS sump boron concentration after a LOCA. Maintaining sump boron concentration, without dilution, is important to assure that the reactor core remains subcritical following a LOCA. The design of the tanks will have open vent and drain connections to provide containment pressure equalization and prevent water hold up in the tanks. The open vent and drain connections will allow the shield tanks to fill up with water during a LOCA so that they will not float. Recirculation flow paths to the RS sump during design basis accident conditions will not be affected.

During shutdown operations, when the shield tanks are filled with water, significant damage to the tanks resulting in gross leakage is not considered credible in the event that the RS sump is required to maintain alternate core cooling using Forced Feed and Spill in accordance with 0-GOP-13.0.

1 Design Change Title/Station/Unit	2. Design Change Number
Relocate RS Pump Temporary Test Dike Panel Storage for Installation of Reactor Head Stand Water Shields / North Anna / Unit 1	**99-124**

4.0 REFERENCES

4.1 GMP-C-106, NSS Work Procedure for Recirc. Spray Pump Dike

4.2 Drawing 11715-FM-1D, Machine Location, Containment Elevation 216'-11"

4.3 Drawing 11715-FV-71A, Reactor Head Storage Assembly and Details

4.4 Drawing 11715-FV-71B, Reactor Head Storage Assembly and Details

4.5 Drawing 11715-FC-16A, Plan & Details Elevation 216'-11", Interior Concrete Reactor Containment

4.6 EWR 89-284, Design and Installation of Unit 1 Dike

4.7 Engineering Transmittal CE 97-044, Storage of RS Pump Dike Inside Reactor Head Stand

4.8 1-PT-64.8, Flow Test of the Inside Recirculation Spray Pumps

1. Design Change Title/Station/Unit	2 Design Change Number
SERVICE WATER CHEMICAL ADDITION PIPING & VALVE UPGRADE / NAPS / UNITS 1 & 2	99-172

1.0 STATEMENT OF THE PROBLEM

The existing Service Water chemical addition return lines that tap into the 36" SW supply lines located inside the expansion joint enclosure are constructed of 1" carbon steel piping. The associated isolation valves and check valves are also constructed of carbon steel. The use of carbon steel components in the concentrated chemical environment has resulted in fouling, corrosion, and reduced flow concerns. Actual pipe blockage and valve failures that have occurred over the years have jeopardized the reliability and operability of the SW system and SW chemical addition subsystem. It has been requested that the SW chemical addition piping be upgraded to preclude the problems that currently plague the system (REA 97-255).

2.0 PROPOSED RESOLUTION

The SW chemical addition subsystem was installed under the controls of DCP 85-048 to provide chemistry control of the SW system in order to minimize corrosion of the SW system piping and spray array support system. The existing SW chemical addition piping consists of a 1 ½" carbon steel supply line (1 ½"-WS-F22-151-Q3) which taps into the 36", SW "A" supply header (36"-WS-1-151-Q3). This safety related, seismically supported line runs from the SW expansion joint enclosure, underground to the SW chemical addition building. The non-safety related piping inside the chemical addition building is constructed with either PVC or stainless steel. The return piping from the chemical addition building consists of a single, 1 ½", PVC line (1 ½"-WS-E98-155), which returns underground to the SW expansion joint enclosure. Upon entering the expansion joint enclosure, the return line immediately reduces down to a 1" PVC line (1"-WS-E99-155). This line then transitions to a 1" carbon steel line, which then splits into two, safety related, seismically supported lines which eventually tie into each 36" SW supply lines (36"-WS-1-151-Q3 & 36"-WS-2-151-Q3). Each 1" return line (1"-WS-F02-151-Q3 & 1"-WS-F04-151-Q3) has an isolation gate valve and two swing check valves prior to entering the associated 36" SW header. The purpose of the double check valve arrangement was to prevent back flow from the SW supply headers into the dilution water return lines and prevent draining of the SW headers due to failure in the chemical addition piping. Two check valves were installed for redundancy in the event that one valve failed.

Upgrade of the SW chemical addition piping will be twofold. In order to improve system flow rate, the 1" dilution water return lines will be replaced with 1 ½" diameter piping inside the SW expansion joint enclosure. Secondly, the existing carbon steel return piping will be replaced with a material that can withstand the corrosive nature of the SW chemicals. Research into selecting the appropriate material for this service was undertaken with the assistance of the SW RCE Task Team, Materials Engineering, and Calgon. Possible candidates included coated carbon steel (not feasible or practical in small diameter), AL6XN (valves not available), 316L SS (susceptible to MIC), carbon steel with non-metal lining (not feasible for safety-related pressure boundary application) and Hastelloy (Calgon recommendation). The ultimate

recommendation is Hastelloy C-276, a low carbon, high nickel, steel alloy intended for highly corrosive chemical service. Hastelloy C-276 is a versatile, corrosion resistant alloy that has very good resistance to oxidizing corrosives. The material has excellent stress corrosion cracking resistance with very good resistance to localized attack. The mechanical properties associated with Hastelloy C276 include a tensile strength of 100,000 psi and a yield strength of 41,000 psi. Carbon steel A-106, Grade B material has a tensile strength of 60,000 psi and a yield strength of 35,000 psi. The original Q3 carbon steel pipe was installed in accordance with the requirements of the Code for Nuclear Power Piping, ANSI B31.7-1969. Hastelloy C276 material is not covered under ANSI B31.7, but it does conform to the requirements of ASME Boiler & Pressure Vessel Code, Section III Class 3 components. Therefore, it is acceptable to use Hastelloy C276 material for replacement of the applicable, safety related, Q3 SW piping.

The service water chemical addition system was installed under DCP 85-048. Manual isolation valves (1-SW-1067 & 1070) and check valves (1-SW-1068, 1069, 1071, & 1072) were installed to provide the required boundary between the safety related SW system and the non-safety related chemical addition system. The two-check valve arrangement was installed under the premise to meet single failure criteria. In actuality, only one check valve would have been required for these Q3, safety related lines. This is supported by Technical Report No. ME-0026, "Service Water Single Failure Review", which states that the North Anna service water system is not vulnerable to a single failure of any active component that would render the system unable to perform its intended design function. Since two check valves are not required for each chemical addition return lines, check valves 1-SW-1069 & 1072 will be permanently removed from the system. A single check valve arrangement will continue to prevent back-flow of service water into the chemical addition subsystem. Check valves 1-SW-1068 & 1071 will continue to provide the safety to non-safety related boundary.

A 1994 North Anna Service Water System Operational Performance Assessment (SWSOPA) identified the fact that the check valves that were intended to isolate the non-safety related lines, were not included in the surveillance test program. As part of the corrective action to this deviation (DR N-94-0985), the ISI group committed to include only the manual isolation valves (1-SW-1067 & 1070) in the IST program. As of present, the safety related check valves have never been included in any IST program. Therefore, eliminating of one of the safety related check valves from each chemical addition return line will not impact the IST program.

The existing 1" isolation valves (1-SW-1067 & 1-SW-1070) and 1" check valves (1-SW-1068, & 1071) will be replaced with 1½" Hastelloy valves. A comparison between the existing valves and replacements is shown below:

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SERVICE WATER CHEMICAL ADDITION PIPING & VALVE UPGRADE / NAPS / UNITS 1 & 2	99-172

PARAMETER	Existing Isolation Valve	Replacement Isolation Valve	Existing Check Valve	Replacement Check Valve
Manufacturer	Vogt	Noble	Vogt	Noble
Figure Number	SW13111	FF1S767676TT15	SW4835	SF1S76T15
Valve Type	Gate	Ball	Swing	Swing
Size	1"	1 ½"	1"	1 ½"
Port	Full	Full	Full	Full
ANSI Rating	800 LB.	150 LB.	800 LB.	150 LB.
Material	Carbon steel ASTM A-105	Hastelloy C276 ASTM B564	Carbon steel ASTM A-105	Hastelloy C276 ASTM B564
End Connections	SW	SW	SW	SW
Seats/Seals	Metal	TFE	Metal	TFE
Weight (lbs.)	12.1	21	22.1	14
C_V	46.5	309	17	76

North Anna's Piping Specification, NAS-1009, stipulates the use of 600 lb. gate, globe, or check valves for Class 151 piping, 2" and below. Utilizing 150 lb. ball valves and 150 lb. swing check valves in this application is acceptable because the pressure/temperature rating of the replacement valves exceed SW design pressure/temperature conditions. The normally open ball valve has better flow characteristics and shut-off capabilities than the existing gate isolation valves. System flowrate will be enhanced with an increase in pipe diameter from 1" to 1 ½" and by using valves whose flow coefficients (C_V) surpass those of these existing valves. TFE is compatible with the SW chemical addition subsystem.

The existing 1" carbon steel piping will be replaced with 1 ½", Hastelloy C276, ASME SB-622 seamless pipe. Hastelloy C276, ASME SB-564 forged fittings will be used to complete installation of the metal piping inside the SW expansion joint enclosure. Welding technique 4401 and 4402 currently exist for welding base metals Hastelloy C276 or C22 to themselves or carbon steel. This eliminates the need to develop new weld procedures in order to implement this design change.

1. Design Change Title/Station/Unit	2 Design Change Number
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System flow rate will also be enhanced by replacing the existing 1", Class 155 PVC return piping inside the SW expansion joint enclosure with 1½" PVC piping. This piping will be replaced one-for-one between the flanged connection where the existing 1½" PVC enters the enclosure and the flanged connection of the new Hastelloy pipe. Existing supports will be re-used for the new 1½" PVC piping

The modification's impact on the seismic integrity of the piping has been analyzed to ensure that the affected piping will maintain its structural integrity without additional pipe supports. Although the pipe diameter will increase, replacing the check valves with lighter weight components and eliminating two check valves will result in an overall weight decrease within the affected piping system. An existing support anchor (H-750) will be modified to account for the increase in pipe diameter only.

paragraphs added

3.0 PROGRAMS REVIEW

3.1 Updated Final Safety Analysis Report (UFSAR)

The UFSAR will be revised to include Hastelloy C276 material in the service water chemical addition piping description. Existing stainless steel piping inside the SW chemical addition building will also be added to the piping description. The safety related, seismic boundary class description for the dilution water return line will be enhanced by identifying the check valve as part of the two valve isolation arrangement from the SW headers. This will help to clarify that the manual isolation valve and the single check valve create this two-valve isolation. A UFSAR Change Request is included in Appendix 1-1.

3.2 Technical Specifications

Section 3/4.7.4 addresses the required availability of the service water system. Two service water loops (shared between units) shall be operable during Modes 1, 2, 3, or 4. Isolation of one service water loop for up to 168 hours is permitted only as part of service water system upgrades. If one loop becomes inoperable for a period greater than 168 hours, both Units 1 and 2 must begin to shut down.

This modification may be performed simultaneously with planned service water system upgrades that require the isolation of one header. Since the design change affects both service water supply headers, the modification must be implemented in two stages. The activity will not result in the violation of any LCOs and plant safety will not be compromised.

3.3 Fire Protection/Appendix "R"

The SW system is an Appendix "R" Safe Shutdown system. The DCP will replace the dilution water return piping inside the service water expansion joint enclosure. The modification does not affect the SW system's ability to perform its safe shutdown function. Modification does not affect any fire protection systems or equipment. Replacing the existing 1" PVC piping with 1½" PVC will add a minimal amount of combustibles to the existing total amount inside the enclosure. Combustible loading within the enclosure is not tracked within the Appendix R Report. Appendix "R" drawings affected by this activity will be revised accordingly. Modification does not adversely impact the Station's design basis for compliance with Appendix "R" to 10CFR50 or Appendix "R" shutdown procedures.

3.7 Inservice Inspection/Inservice Testing

The design change will replace manual isolation valves 1-SW-1067 and 1-SW-1070, which fall under the ASME Section XI ISI/IST program. The manual valves are relied upon to isolate the safety-related portion of the service water system in the event of a loss of the non-seismic SW chemical addition piping. Existing check valves, 1-SW-1068, 1069, 1071, 1072 are not included in the program. Eliminating one of the check valves (1-SW-1069 and 1-SW-1072) from each return line will therefore, not impact the IST program. ISI Classification Boundary drawings and System Pressure Testing drawings will be revised as a result of this modification.

3.8 Seismic

Replaced 1

The modification's impact on the seismic integrity of the piping has been reviewed to ensure that the affected piping will maintain its structural integrity. Isolation valves (1-SW-1067 and 1-SW-1070) will be replaced with a heavier valve and increasing the pipe diameter from 1" to 1½" will result in an initial weight increase within the seismic portion of the piping. However, elimination of one of the check valves from each return line will result in an overall weight decrease within the affected piping. A pipe support will be modified as required to account for the increased pipe size. Additional pipe supports will not be required. Engineering Mechanic's review per addendum to calculation 14938.20-NP(B)-001-XD is documented in Appendix 1-2.

3.18 EPIX

The new Hastelloy ball valves and swing check valves are provided by Noble Alloy Valve. An EPIX review did not reveal any performance or reliability concerns associated with these components.

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3.22 Equipment Data System (EDS)

Replacing the 1" carbon steel lines with 1½" Hastelloy piping and valves will require a revision to the EDS database. Eliminating check valves 1-SW-1069 and 1-SW-1072 will also be reflected as a result of this activity. Reference EDSCR # 0000014493.

3.26 Impact of/on Other Design Changes

Replaced 1

Implementation of this design change may be performed in conjunction with other service water system upgrade design changes that necessitate SW header outages. This work will be performed independently from the other design changes during the time period allotted for the applicable Action Statement.

3.27 Summary of Equipment Added or Removed

MARK #	ADD/REMOVE	FUNCTION
1-SW-1067	REM	Carbon steel isolation valve from 36"-WS-1-151-Q3
1-SW-1067	ADD	Hastelloy isolation valve from 36"-WS-1-151-Q3
1-SW-1068	REM	Carbon steel check valve isol. from 36"-WS-1-151-Q3
1-SW-1068	ADD	Hastelloy check valve isol. from 36"-WS-1-151-Q3
1-SW-1069	REM	Check valve isolation from 36"-WS-1-151-Q3
1-SW-1070	REM	Carbon steel isolation valve from 36"-WS-2-151-Q3
1-SW-1070	ADD	Hastelloy isolation valve from 36"-WS-2-151-Q3
1-SW-1071	REM	Carbon steel check valve isol. from 36"-WS-2-151-Q3
1-SW-1071	ADD	Hastelloy check valve isol. from 36"-WS-2-151-Q3
1-SW-1072	REM	Check valve isolation from 36"-WS-2-151-Q3
1"-WS-E99-155	REM	Chemical addition PVC return piping
1"-WS-F01-151	REM	Chemical addition carbon steel return piping
1"-WS-F02-151-Q3	REM	Chemical addition carbon steel return piping
1"-WS-F03-151	REM	Chemical addition carbon steel return piping
1"-WS-F04-151-Q3	REM	Chemical addition carbon steel return piping
1½"-WS-368-164X	ADD	Chemical addition Hastelloy return piping
1½"-WS-369-164X-Q3	ADD	Chemical addition Hastelloy return piping
1½"-WS-370-164X	ADD	Chemical addition Hastelloy return piping
1½"-WS-371-164X-Q3	ADD	Chemical addition Hastelloy return piping

Note: Class 164X – Hastelloy C276, ASME SB-622, UNS#10276, Schedule 80, 150 lb. Pipe class specific for this DCP only and will not be included in North Anna Piping Specification, NAS-1009.

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3.28 System and Plant Design Basis Documents

SDBD-NAPS-SW will be revised to reflect changes generated as a result of this modification A SDBD change request is included in Appendix 1-3.

3.29 Removable Blocks and Other Barriers

The modification will require removal of the manhole cover to the service water expansion joint enclosure in order to gain access to the SW headers. Compensatory measures for the removal and re-installation of a missile barrier will be controlled under station procedure 0-MCM-1304-01.

3.32 NCRODP

NCRODP-13-NA, Service Water System will require revision as a result of this modification. A change request is included in Appendix 1-4.

3.33 Recommended Spare Parts

Noble Alloy Valve has recommended that a seal kit consisting of packing, body seals, and TFE seats be stocked for the new isolation valves and a body seal be stocked for the new check valves. The spare parts have been identified on the Materials List to allow for new stocking requirements.

3.36 Vendor Technical Manuals (VTMs)

Installation of the new Noble Alloy isolation and check valves will require the development of a new VTM. A VTMCR is included in Appendix 1-5.

3.40 Maintenance Rule

Equipment availability is managed in accordance with the Maintenance Rule (VPAP-0815). SSC function SW002 is for the SW system to provide an emergency source of cooling water to the Recirculation Spray System. Implementation of this design change will require two Service Water header outages whose availability is tracked under the Maintenance Rule program. SSC function SW015 provides for the SW system to include the capability to add chemicals to minimize pipe degradation. The SW chemical addition subsystem will be out of service during implementation of this DCP. Pipe degradation will not be a concern during the short time period when chemical addition is unavailable.

1. Design Change Title/Station/Unit	2 Design Change Number
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4.0 REFERENCES

4.1 REA 1997-255

4.2 DCP 85-048-3, Service Water Chemical Addition System.

4.3 Calculation 14938.20-NP(B)-001-XD, Pipe Stress Analysis: Chemical Addition Line to SW - SW Pump House Pit.

4.4 Calculation 14938.20-M-3, Dilution Water Charging Pumps for the Service Water Chemical Addition System.

4.5 Technical Report No. ME-0026, Service Water Singe Failure Review, September 15,1995.

4.6 Service Water System Operational Performance Assessment, July 11 – July 29, 1994.

4.7 NCRODP-13-NA (Service Water System)

4.8 Calculation ME-062, Service Water Reservoir Thermal Performance Calculation.

4.9 added Δ1