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March 27, 2014

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

10 CFR 52.79

Subject: Duke Energy Carolinas, LLC
William States Lee III Nuclear Station – Docket Nos. 52-018 and 52-019
AP1000 Combined License Application for the
William States Lee III Nuclear Station Units 1 and 2
Revised Supplemental Response to Request for Additional Information Letter 064, RAI 09.02.01-6
Ltr# WLG2014.03-01

References:

1. Letter from Tanya Simms (NRC) to Peter Hastings (Duke Energy), Request for Additional Information Letter No. 064 Related to SRP Section 09.02.01 for the William States Lee III Units 1 and 2 Combined License Application, dated January 28, 2009 (ML090280416)
2. Letter from Christopher M. Fallon (Duke Energy) to the Document Control Desk, Supplemental Response to Request for Additional Information Letter No. 64, RAI 09.02.01-6, Ltr # WLG2012.04-04, dated April 16, 2012 (ML12109A156).

This letter provides the Duke Energy revised response to the Nuclear Regulatory Commission's (NRC) requests for additional information (RAIs) included in Reference 2. Since that time, design enhancements have been incorporated at the plant outfall that revise the original Duke Energy response. Thus, Subsection 9.2.9.2.2, the *Plant Outfall* paragraph is revised to reflect the new outfall pipe length along the Ninety-Nine Islands Dam.

The revised response identifies associated changes that will be made in a future revision of the Final Safety Analysis Report (FSAR) for Lee Nuclear Station.

If you have any questions or need any additional information, please contact Robert H. Kitchen, Nuclear Development Licensing Director at (704) 382-4046.

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NRO

I declare under penalty of perjury that the forgoing is true and correct.

Executed March 27, 2014.

Sincerely,

Christopher M. Fallon

Christopher M. Fallon
Vice President
Nuclear Development

Enclosure:

1. Lee Nuclear Station Revised Response to Request for Additional Information (RAI) Letter No. 064, RAI 09.02.01-6

xc (w/ enclosures):

Frederick Brown, Deputy Regional Administrator, Region II
Brian Hughes, Senior Project Manager, DNRL

Enclosure 1 to WLG2014.03-01

Lee Nuclear Station Revised Response to Request for Additional Information (RAI) Letter No. 064, RAI 09.02.01-6

Lee Nuclear Station Supplemental Response to Request for Additional Information (RAI)

RAI Letter No. 064

NRC Technical Review Branch: Balance of Plant Branch 1 (SBPA)

NRC RAI Number: 09.02.01-006

NRC RAI:

The raw water system (RWS) is relied upon for achieving and maintaining cold shutdown conditions which is necessary for satisfying Technical Specification requirements. In accordance with NRC policy considerations for passive plant designs, non-safety related active systems that are relied upon for achieving and maintaining cold shutdown conditions (i.e., transitioning from Mode 4 to Mode 5) should be highly reliable and able to accommodate single active failures without a loss of the cooldown capability that is needed. The staff found that Section 9.2.11 of the Final Safety Analysis Report (FSAR) does not provide a clearly defined design basis with respect to the RWS cooldown function, and the reliability and capability of the RWS to perform this function for the most limiting situations were not adequately described and addressed. For example, the minimum RWS flow rate, water inventory, temperature limitations, and corresponding bases for providing SWS makeup for the two Lee units were not described. Also, the suitability of RWS materials for the plant-specific application and measures being implemented to resolve vulnerabilities and degradation mechanisms to assure RWS functionality over time were not addressed. Consequently, Section 9.2.11 of the FSAR needs to be revised to properly describe and address the RWS design bases in this regard and to include design specifications that are necessary to ensure the reliability and capability of the RWS to perform its cooldown function. The following guidance is generally applicable and should be considered as appropriate when revising the FSAR in response to this question:

a. The design bases should specifically recognize and describe cold shutdown functions that are credited, and applicable design considerations that pertain to these functions should be specified, such as reliability, redundancy, backup power, etc. Other parts of the DCD should not be referred to in lieu of providing a complete description of the design-bases in FSAR Section 9.2.11.
b. The system description should explain how the applicable design-bases considerations referred to in (a) are satisfied. For example:
    - The minimum required system functional capability and the bases for this determination should be described (note that a minimum of seven days worth of on-site water inventory should be available for reactor decay heat removal and spent fuel cooling);
    - The description should explain how design-bases considerations are satisfied;
    - The guidance in SRP Sections 9.2.1 and 9.2.5 that are relevant for ensuring the capability and reliability of the RWS to perform its design-bases functions should be considered and addressed as appropriate (materials considerations, net positive suction head, waterhammer, etc.);
    - Operating experience considerations that pertain to the capability and reliability of the system to perform its design-bases functions needs to be addressed (note that the relevance of operating experience is independent of safety classification considerations);
    - In order to demonstrate adequate reliability, the system design should include (among other things) the capability of all necessary components (pumps, valves, strainers,

instrumentation and controls, etc.) to function during a loss of off-site power and redundancy for single active failure vulnerabilities;

- Dual-unit considerations need to be addressed.

c. Major components and features that are important to ensure the capability and reliability of the system to perform its cooldown function should be described. Applicable industry codes and quality group designations that are commensurate with plant-specific RWS reliability considerations should be specified and reflected in Chapter 3, "Design of Structures, Components, Equipment, and Systems." Note that this may be different from what is specified for the standard plant design since it was based solely on regulatory treatment of non-safety systems considerations and did not include consideration of the cooldown function.

d. System design parameters that are important for performing the cold shutdown function should be specified, such as water inventory, flow rate, nominal pipe sizes, limiting flow velocities, and design temperatures and pressures.

e. The RWS operating modes for performing its cold shutdown function should be described, such as interlocks, protective features, and automatic actuation.

f. Limitations on the capability of the RWS to perform its cold shutdown function should be described, such as minimum required water inventory and temperature restrictions that apply.

g. Instrumentation (e.g., indication, controls, interlocks and alarms) that are relied upon by plant operators in the main control room and at the remote shutdown panels for performing cooldown functions should be described.

h. System diagrams should show division designations, flow paths, major components and features, nominal pipe sizes, and instrumentation that is relied upon to ensure proper operation of the system by operators in the main control room and at the remote shutdown panels.

i. The more important periodic inspections that will be completed and specified frequencies for ensuring the capability and reliability of the system should be described. For example, design provisions and actions that will be implemented to periodically assess the condition of buried or otherwise inaccessible piping and components should be described.

j. The more important periodic tests that will be completed and specified frequencies for ensuring the capability and reliability of the system should be described. For example, periodic testing of pumps, valves, self-cleaning strainers, and vacuum breakers should be described.

k. Based on the FSAR description, plant-specific ITAAC should be established that are appropriate and sufficient for verifying that the RWS is constructed as designed.

l. The initial test program should test all modes of RWS operation that are credited for performing its cooldown function and confirm acceptable performance for the most limiting assumptions. For example, confirmation that net positive suction head requirements are satisfied for minimum pump suction head and maximum water temperature conditions with all pumps running at full flow, and that waterhammer will not occur during situations when voiding is most likely to occur should be specified. It should be clear from the information provided in Section 9.2.11 of the FSAR what constitutes acceptable performance.

Duke Energy Revised Response:

This response and the associated FSAR text and figure markups revise the supplemental response provided to RAI 09.02.01-06 in Reference 1 and the supplemental response provided to RAI 09.02.01-06 in Reference 2.

FSAR revisions are necessary to incorporate design changes being made to the number of pumps in the Raw Water Supply Subsystem (Make-Up Pond A intake). The number of pumps is being changed from three pumps per unit (six total) to two pumps per unit (four total). This change to the conceptual design previously submitted is being made to more closely align the sizing of these pumps with the required make-up flow for the Circulating Water System (CWS) under anticipated normal operation at four cycles of concentration. These changes are reflected in Attachments 2 through 8 and will be incorporated in a future revision of the FSAR.

FSAR revisions are also necessary to incorporate design changes being made to the Waste Water System (WWS). The routing of the WWS piping from the Waste Water Retention Basins towards the WWS discharge diffuser on the upstream face of the Ninety-Nine Islands Dam, including the location of the blowdown sump, has changed. The elevation of the WWS discharge diffuser has been lowered several feet in the Ninety-Nine Islands Reservoir to further reduce the potential of floating debris in the Broad River impacting the WWS discharge diffuser. These changes are reflected in Attachment 1 and will be incorporated in a future revision of the FSAR.

References:

1) Letter from Bryan J. Dolan (Duke Energy) to NRC Document Control Desk, *Request for Additional Information (RAI Nos. 1922)*, Ltr# WLG2009.05-08, dated May 15, 2009 (ML091400207).
2) Letter from Bryan J. Dolan (Duke Energy) to NRC Document Control Desk, *Revised Response to Request for Additional Information*, Ltr# WLG2009.11-04, dated November 19, 2009 (ML093280308).
3) Letter from Bryan J. Dolan (Duke Energy to NRC Document Control Desk, *Supplemental Response to Request for Additional Information Letter No. 64, RAI 09.02.01-6*, Ltr# WLG2012.04-04, dated April 16, 2012 (ML12109A156).

Associated Revisions to the Lee Nuclear Station Final Safety Analysis Report:

FSAR Subsection 9.2.9.2.2

FSAR Subsection 9.2.11.2.3

FSAR Subsection 9.2.11.3.5

FSAR Subsection 9.2.11.4.3

FSAR Subsection 9.2.11.4.6

FSAR Figure 9.2-201

FSAR Figure 9.2-202

FSAR Figure 9.2-203

Attachments:

1) Revision to FSAR Subsection 9.2.9.2.2
2) Revision to FSAR Subsection 9.2.11.2.3
3) Revision to FSAR Subsection 9.2.11.3.5
4) Revision to FSAR Subsection 9.2.11.4.3
5) Revision to FSAR Subsection 9.2.11.4.6
6) Revision to FSAR Figure 9.2-201
7) Revision to FSAR Figure 9.2-202
8) Revision to FSAR Figure 9.2-203

Lee Nuclear Station Revised Response to Request for Additional Information (RAI)

Attachment 1 to RAI 09.02.01-006

Revision to FSAR Subsection 9.2.9.2.2

COLA Part 2, FSAR Chapter 9, Subsection 9.2.9.2.2, the *Basin Transfer Pumps* paragraph is revised as follows:

Basin Transfer Pumps

Two 750 gpm capacity transfer pumps send the waste water from the retention basin to the common blowdown sump. Operation of both pumps will transfer 75% of the basin's full level in one compartment (2,500,000 gallons) in 24 hours. Each basin has two compartments. In the event of oily waste leakage into the basin, the oil will be removed manually (as by skimming or vacuuming). Controls are provided for automatic or manual operation of the pumps based on the level in the retention basin.

COLA Part 2, FSAR Chapter 9, Subsection 9.2.9.2.2, the *Blowdown Sump* paragraph is revised as follows:

Blowdown Sump

A blowdown sump common to both Units 1 and 2 receives input from the wastewater retention basins and the circulating water system (CWS) cooling tower blowdown. The blowdown sump is located to the southeast of Units 1 and 2, outside of the protected area. A connection with the raw water supply subsystem of the raw water system provides an alternate dilution source to the blowdown sump. The blowdown sump outfall piping is sized to prevent sump overflow during maximum inlet flow to the sump.

COLA Part 2, FSAR Chapter 9, Subsection 9.2.9.2.2, as amended by Duke Letter WLG2012.04-04, dated April 16, 2012, the *Plant Outfall* paragraph is revised as follows:

Plant Outfall

The plant outfall is the final discharge point for Units 1 and 2. The single walled HDPE (High Density Polyethylene) outfall pipe is sized to drain, via gravity, the maximum expected flow from the blowdown sump. Dilution water for radioactive waste discharges may be supplied to the blowdown sump from the raw water system when cooling tower blowdown is not available. To prevent radioactive contamination of the blowdown sump, the location of the tie-in between the liquid radwaste system and the outfall pipe is downstream of and below the bottom elevation of the blowdown sump. Effluent from the blowdown sump mixes with the much smaller flow rate from the liquid radwaste system adjacent to the western bank of the Broad River and is discharged via the outfall pipe/diffuser to the Ninety-Nine Islands Reservoir. The outfall pipe is attached to the upstream face of the Ninety-Nine Islands Dam below the normal level of the impoundment, runs along the dam approximately ~~925~~ 750 ft. and ends with an approximately 88 ft. long multi-port diffuser located in the zone where the impoundment water flows to the intake of the Ninety-Nine Islands Hydroelectric station. The top of the multi-port diffuser is at elevation 501.1 ft., which is approximately 10 ft. below the full pond elevation of the Ninety-Nine Islands Reservoir. Liquid radioactive waste discharges are monitored for radiation and are addressed in detail in DCD Section 11.2; the applicable radiation monitor is addressed in detail in DCD Subsection 11.5.2.3.3.

Lee Nuclear Station Response to Request for Additional Information (RAI)

Attachment 2 to RAI 09.02.01-006

Revision to FSAR Subsection 9.2.11.2.3

COLA Part 2, FSAR Chapter 9, Subsection 9.2.11.2.3, first paragraph is revised as follows:

9.2.11.2.3 Subsystems Supplying Raw Water and Treated Raw Water

Raw Water Supply Subsystem

The raw water supply subsystem supports the SWS make-up function described in the power generation design basis. The raw water supply subsystem receives and stores water from the Broad River and/or Make-Up Pond B and supplies untreated water to plant systems. The subsystem consists of Make-Up Pond A, an intake, pumps, piping, valves and instrumentation. The intake contains four raw water pumps, two per unit.

Lee Nuclear Station Response to Request for Additional Information (RAI)

Attachment 3 to RAI 09.02.01-006

Revision to FSAR Subsection 9.2.11.3.5

COLA Part 2, FSAR Chapter 9, Subsection 9.2.11.3.5, first, third, fifth and sixth paragraphs are revised as follows:

9.2.11.3.5 Raw Water Supply Subsystem

Intake

The Make-Up Pond A intake supplies both units at the Lee Nuclear Station. The intake is separated into four forebays; two for each unit. Each forebay is equipped with a raw water pump and a separate traveling screen assembly. The separate forebays and traveling screens provide diversity to ensure the ability to supply raw water system flow.

The traveling screens are powered from the normal ac power system, and are not backed by the standby power supply for occurrences of loss of normal ac power. Raw water system make-up requirements following a loss of normal ac power condition are a small fraction of the normal flow. In this condition, the intake screens act as a passive screen. This is acceptable because the lower flow velocities and limited duration reduce the potential for entrainment and impingement.

Raw Water Supply Pumps

Four raw water supply pumps are located in the Make-Up Pond A pump structure. Each pump is sized to supply 100 percent of the design raw water demand for one unit, so one pump is typically in standby for each unit. If river water is transferred for storage in Make-Up Pond B with both units at full power, a standby pump(s) would be placed in service. The pumps are of vertical turbine, wet pit design. The length of each pump barrel is sized so that the minimum submergence and NPSH requirements for the pump are satisfied during the maximum operating drawdown condition for Make-Up Pond A.

The standby pumps are isolated from the discharge header by a motor-operated valve. Each pump is equipped with a pressure transmitter on the discharge piping that alarms in the control room on a low pressure condition. To start the standby pump, the operator manually opens the isolation valve and starts the pump either remotely or locally.

The pumps are powered from the normal ac power system in each unit. Each pump is supplied from a separate bus, and both of the raw water pumps in each unit are backed by the standby power supply for occurrences of loss of normal ac power. In the event of a loss of normal ac power, standby power is manually aligned to one or more raw water supply pumps. The pumps are started by operations, either locally or remotely as necessary.

If the raw water supply subsystem alignment to support SWS cooling tower make-up is required, and both raw water supply pumps are shut down, the manual isolation valves between the pump discharge and the clarified water supply header are opened. The selected pump is aligned to the discharge header by opening the motor operated discharge valve and minimum flow path valve. These valves can be operated from the control room or a local handswitch. The valve operators are also equipped with handwheels to allow the valves to be opened manually during a loss of normal ac power condition. The pump is started to refill the SWS cooling tower basin and secured when the desired level is attained. Once the discharge and minimum flow recirculation flowpaths have been aligned, the pump can be restarted from the control room to maintain the desired basin level.

Lee Nuclear Station Response to Request for Additional Information (RAI)

Attachment 4 to RAI 09.02.01-006

Revision to FSAR Subsection 9.2.11.4.3

COLA Part 2, FSAR Chapter 9, Subsection 9.2.11.4.3, first paragraph is revised as follows:

9.2.11.4.3 Power Operation

During normal operation, one river water pump and one raw water supply pump per unit are normally in operation to supply untreated water to the circulating water system cooling towers and clarifier subsystem. If water storage in Make-Up Pond B is desired, a standby raw water supply pump in the Make-Up Pond A intake is placed in service. A standby river water pump is placed in service as necessary to maintain level in Make-Up Pond A.

Lee Nuclear Station Response to Request for Additional Information (RAI)

Attachment 5 to RAI 09.02.01-006

Revision to FSAR Subsection 9.2.11.4.6

COLA Part 2, FSAR Chapter 9, Subsection 9.2.11.4.6, third paragraph is revised as follows:

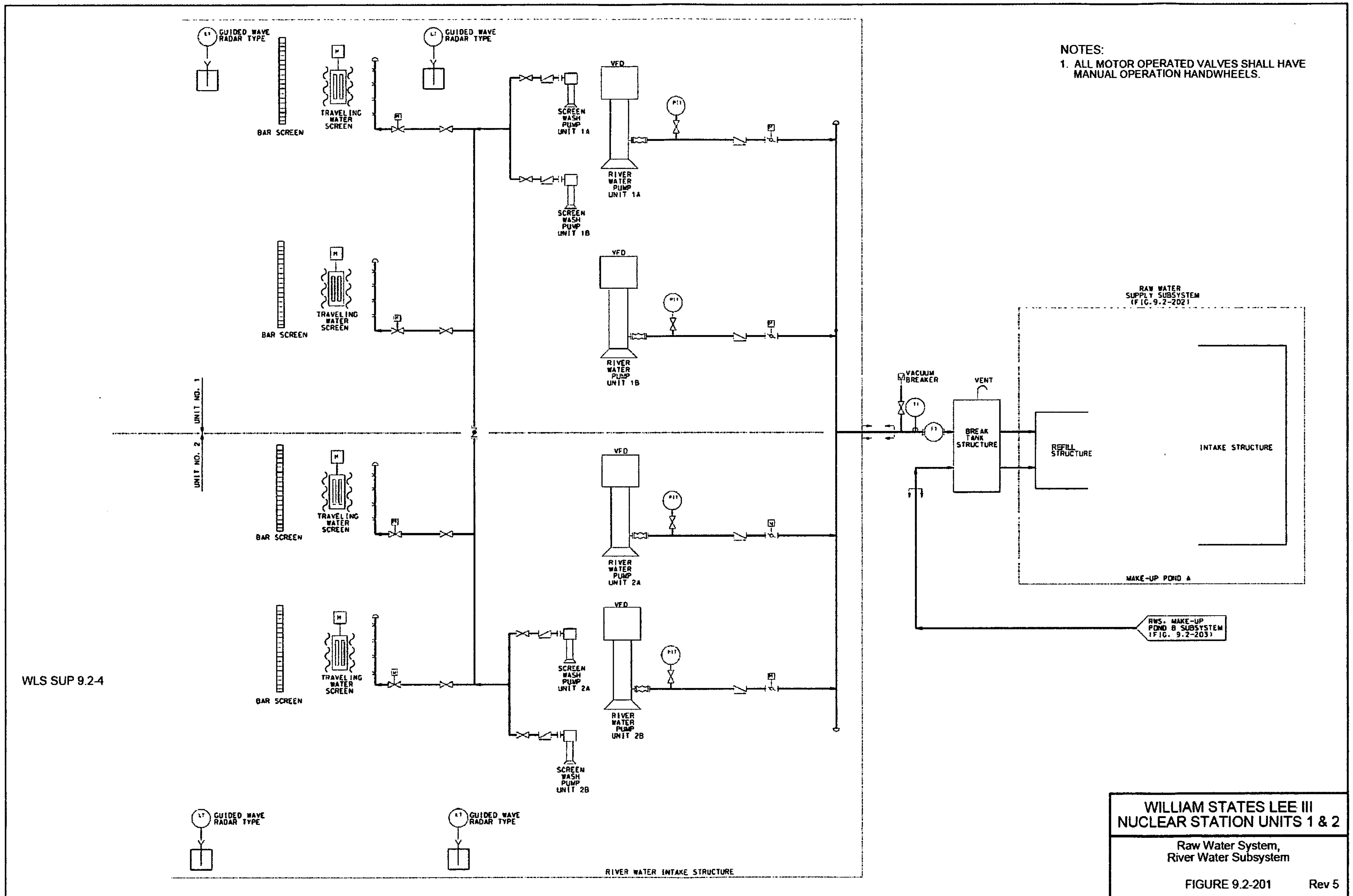
9.2.11.4.6 Loss of Normal AC Power Operation

The clarifier subsystem is not powered from a diesel-backed bus. If a long-term loss of normal ac power condition depletes the clarified water storage tank, make-up flow to the service water system is aligned to the raw water supply subsystem as described in Subsection 9.2.11.3.5. Both raw water supply pumps in each unit are on buses that can be manually aligned to receive power from associated standby diesels. The raw water supply pumps can be started locally, or from the Control Room. The motor-operated valves in the raw water supply subsystem are designed to fail as-is during a loss of normal ac power, but can be operated locally by manual handwheels.

Lee Nuclear Station Response to Request for Additional Information (RAI)

Attachment 6 to RAI 09.02.01-006

Revision to FSAR Figure 9.2-201



WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2

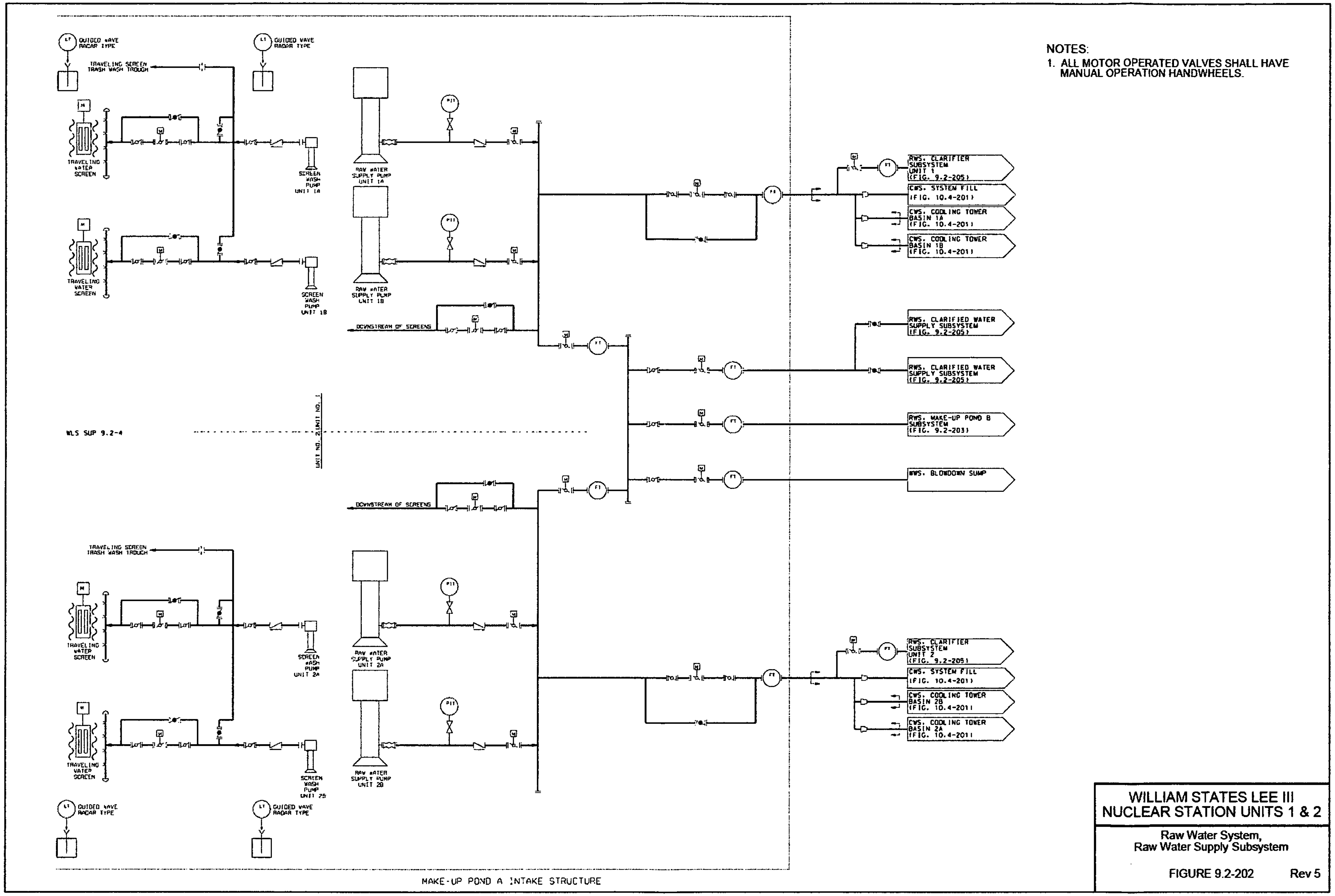
Raw Water System,
River Water Subsystem

FIGURE 9.2-201 Rev 5

Lee Nuclear Station Response to Request for Additional Information (RAI)

Attachment 7 to RAI 09.02.01-006

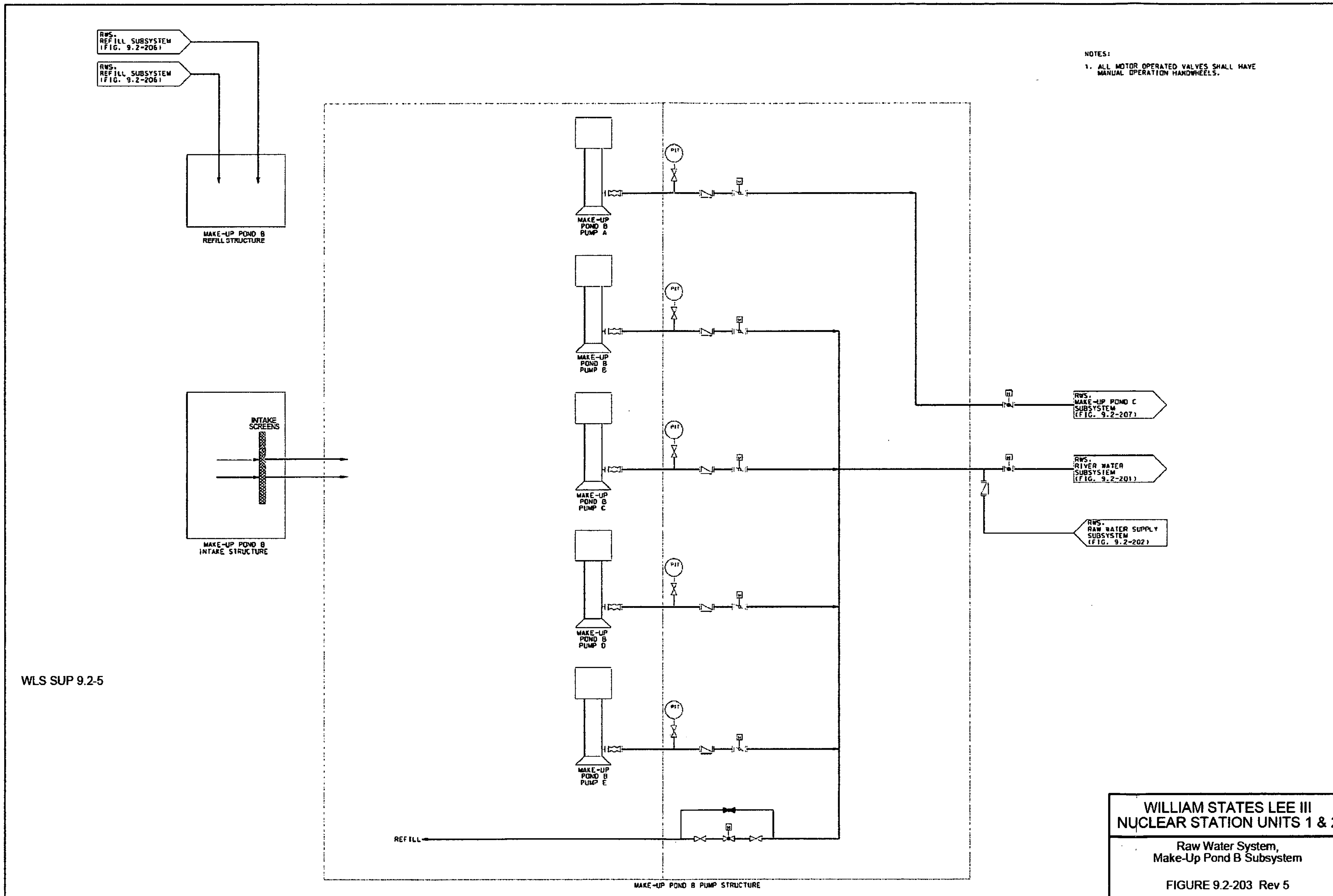
Revision to FSAR Figure 9.2-202


NOTES:
1. ALL MOTOR OPERATED VALVES SHALL HAVE MANUAL OPERATION HANDWHEELS.
GUIDED WAVE RADAR TYPE
TRAVELING SCREEN TRASH WASH TROUGH
TRAVELING WATER SCREEN
SCREEN WASH PUMP UNIT 1A
SCREEN WASH PUMP UNIT 1B
SCREEN WASH PUMP UNIT 2A
SCREEN WASH PUMP UNIT 2B
RAW WATER SUPPLY PUMP UNIT 1A
RAW WATER SUPPLY PUMP UNIT 1B
RAW WATER SUPPLY PUMP UNIT 2A
RAW WATER SUPPLY PUMP UNIT 2B
DOWNSTREAM OF SCREENS
UNIT NO. 1
UNIT NO. 2
RWS, CLARIFIER SUBSYSTEM UNIT 1 (FIG. 9.2-205)
CWS, SYSTEM FILL (FIG. 10.4-201)
CWS, COOLING TOWER BASIN 1A (FIG. 10.4-201)
CWS, COOLING TOWER BASIN 1B (FIG. 10.4-201)
RWS, CLARIFIED WATER SUPPLY SUBSYSTEM (FIG. 9.2-205)
RWS, CLARIFIED WATER SUPPLY SUBSYSTEM (FIG. 9.2-205)
RWS, MAKE-UP POND B SUBSYSTEM (FIG. 9.2-203)
WWS, BLOWDOWN SUMP
RWS, CLARIFIER SUBSYSTEM UNIT 2 (FIG. 9.2-205)
CWS, SYSTEM FILL (FIG. 10.4-201)
CWS, COOLING TOWER BASIN 2B (FIG. 10.4-201)
CWS, COOLING TOWER BASIN 2A (FIG. 10.4-201)
MAKE-UP POND A INTAKE STRUCTURE
WILLIAM STATES LEE III NUCLEAR STATION UNITS 1 & 2
Raw Water System, Raw Water Supply Subsystem
FIGURE 9.2-202
Rev 5

Lee Nuclear Station Response to Request for Additional Information (RAI)

Attachment 8 to RAI 09.02.01-006

Revision to FSAR Figure 9.2-203



WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2

Raw Water System,
Make-Up Pond B Subsystem

FIGURE 9.2-203 Rev 5