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July 19, 2012

Mr. Randall Thompson
South Carolina Department of Health and Environmental Control
Industrial Wastewater Permitting Section
2600 Bull Street
Columbia, South Carolina 29201

Subject: William States Lee III Nuclear Station, Units 1 and 2
NPDES Permit Application
Permit Number SC0049140
Cherokee County, South Carolina

Dear Mr. Thompson:

Enclosed for your consideration is additional information on previous correspondence and an update to the subject NPDES application.

Please contact me at 704 382-4669 if you have questions or need additional information.

Sincerely,

Robert Wylie
Environmental Project Manager

Enclosures:

- 1) Additional Information for Draft NPDES Permit SC0049140
- 2) NPDES Permit Application Revisions (3 sets)
 - a. Part I – Figure 1
 - b. Part IV – Figure 1
 - c. Appendix A - Figure A-16 – Broad River Intake Structure
 - d. Appendix A - Figure A-18 - Pond A Intake Structure
 - e. Appendix C - Replacement of RWS Traveling Screen Velocity Calculation Report

Duke Energy Carolinas, LLC
Additional Information for Draft NPDES Permit SC0049140
William States Lee III Nuclear Station
July 19, 2012

Item 1: 316 (b) Monitoring Requirements

Section E. 11. c. (1) requires biological monitoring for the cooling water intake structures. The primary Broad River intake and Pond A intake will continuously operate during normal conditions. The refill river intake, Ponds B and C intakes will not be in continuous operation.

- Currently paragraph E.11.c.(1) (a) states "The permittee shall collect samples to monitor impingement rates (simple enumeration) for each species over a 24-hour period and no less than once per month when the cooling water intake structure is in operation."
- Currently paragraph E.11.c.(1) (b) states "During the months of February through September, the permittee shall collect samples to monitor entrainment rates (simple enumeration) for each species over a 24 hour period and no less than twice per calendar month with sampling events performed at least seven days apart. Samples shall be collected only when the cooling water intake structure is in operation."

Duke Energy interprets that E.11.c. (1) (a) and (b) are only applicable when an intake is in operation continuously for a 24-hour period. Thus, in months that the refill river intake, Ponds B and C intakes do not operate continuously for at least 24 hours, impingement and entrainment samples are not required. Please confirm this interpretation and provide clarifying language indicating same.

Item 2: Velocity Monitoring Requirements

Section E. 11. c. (2) requires velocity monitoring for the cooling water intake structures. Specifically, the current draft NPDES permit states:

- The permittee shall monitor head loss across the screens and correlate the measured value with the design intake velocity. The head loss across the intake screens must be measured at the minimum ambient source water surface elevations (best professional judgment based on available hydrological data). The maximum head loss across the screen for each cooling water intake structure must be used to determine compliance with the 0.5 fps performance requirement. Monitoring shall be conducted daily at startup of the facility for the first two weeks, and at least once per month thereafter.

It is requested that the following statement be inserted in E.11.c. (2), prior to the last sentence in the paragraph:

When ambient conditions impact the ability of the equipment to measure head loss and the practical quantification limit of the head loss measurement exceeds the corresponding 0.5 fps performance requirement, measurements below the quantification limits shall be deemed to be in compliance.

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This mesh screen size will be used on the dual flow traveling screens for the Broad River Intake (Figure A-16 enclosed) for both the plant pumps and the refill pumps and also for the Make Up Pond A pumps.

Due to limited operating data for fine mesh traveling screens, it is requested that the current language Section E.11.b.(3) in the permit continue. This will allow for the permit to be modified if the permittee submits a written request to the Department that justifies the use of coarse mesh screens as superior to fine mesh screens and obtains approval from the Department prior to installing the coarse mesh screens.

Item 5: Part V Page 34 of 35 of Draft NPDES Permit

As noted in Duke Energy's May 31, 2012 letter under Section 11.f. (2) (b) and (c), the 23 cubic feet per second (cfs) value represents a projected long term average non-consumptive value. During different seasons and operational conditions the non-consumptive value varies slightly. This may range from 22 cfs to 26 cfs for 2 unit operation depending on the month of the year. Approximately 5 cfs of the non-consumptive water is screen wash water, which will be discharged at the intake structure. Thus the following revisions are requested:

(b) When the 24-hour average Broad River flow is less than or equal to 483 cubic feet per second (cfs) for a ~~particular~~ calendar day, the river intake shall not be used on that day other than ~~23-cfs~~ non-consumptive water may be withdrawn from the primary intake section for screen wash water and for the make-up of cooling tower blowdown amounts that will be returned as discharge to the Broad River.

(c) When the 24-hour average Broad River flow is greater than 483 cfs for a ~~particular~~ calendar day, the river intake may be used on that day to withdraw ~~23-cfs~~ non-consumptive water plus the amount by which the 24-hour average Broad River flow for that day exceeds 483 cfs.

The withdrawal value will be determined by measuring the Broad River intake flow that is pumped to Pond A. The water being returned to the Broad River (mostly cooling tower blowdown) will be measured at outfall 001. Thus for item b above the flow measured at outfall 001 which reflects non-consumptive water will be equal to or greater than the determined withdrawal over a calendar day.

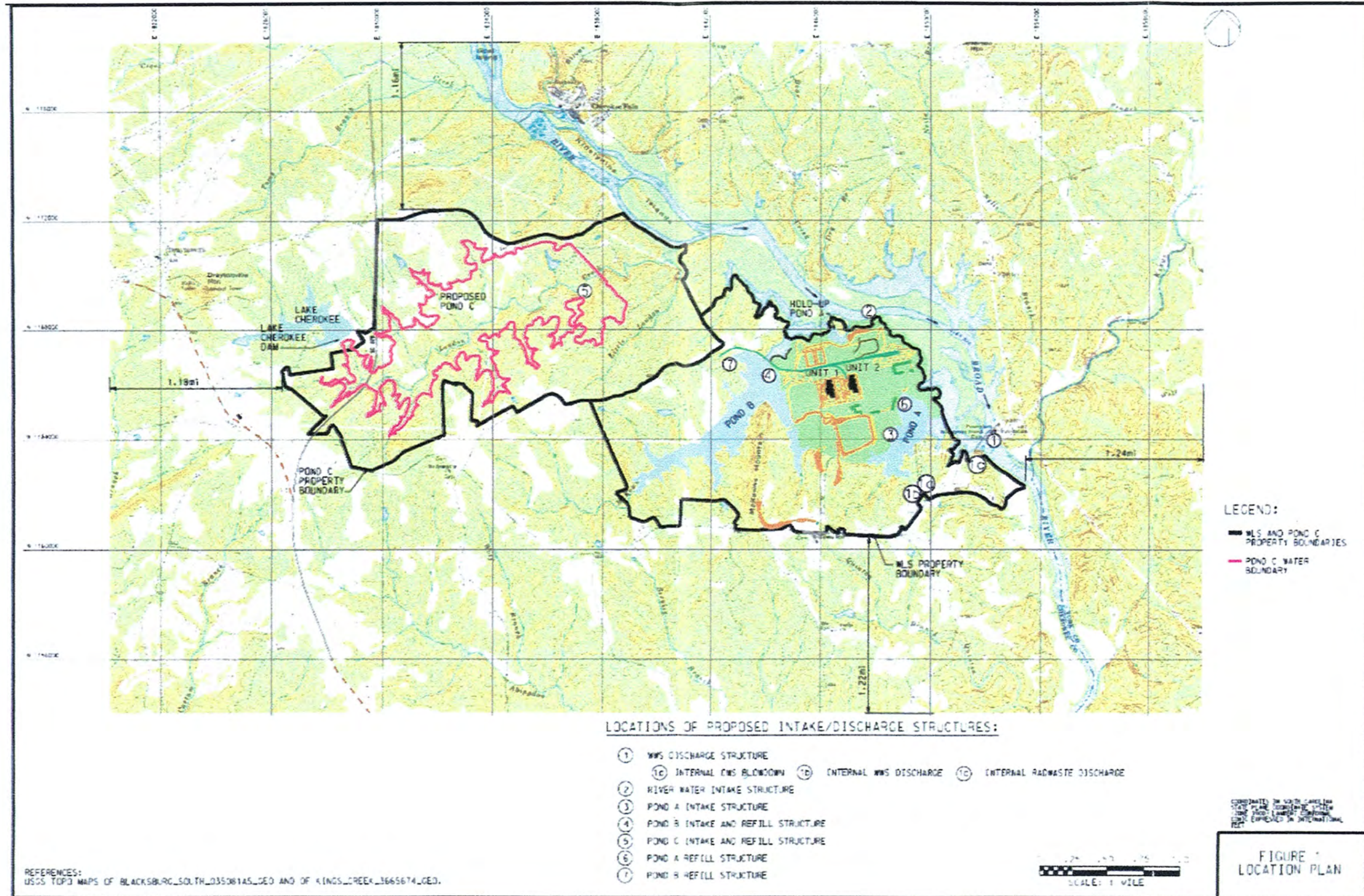
WILLIAM STATES LEE III NUCLEAR STATION
NPDES PERMIT APPLICATION REVISIONS
JULY 2012

- a. Part I – Figure 1
- b. Part IV- Figure 1
- c. Appendix A- Figure A-16 Broad River Intake Structure
- d. Appendix A – Figure A-18 Pond A Intake Structure
- e. Appendix C – Replacement of RWS Traveling Screen Velocity Calculation Report

PART I

FIGURE 1

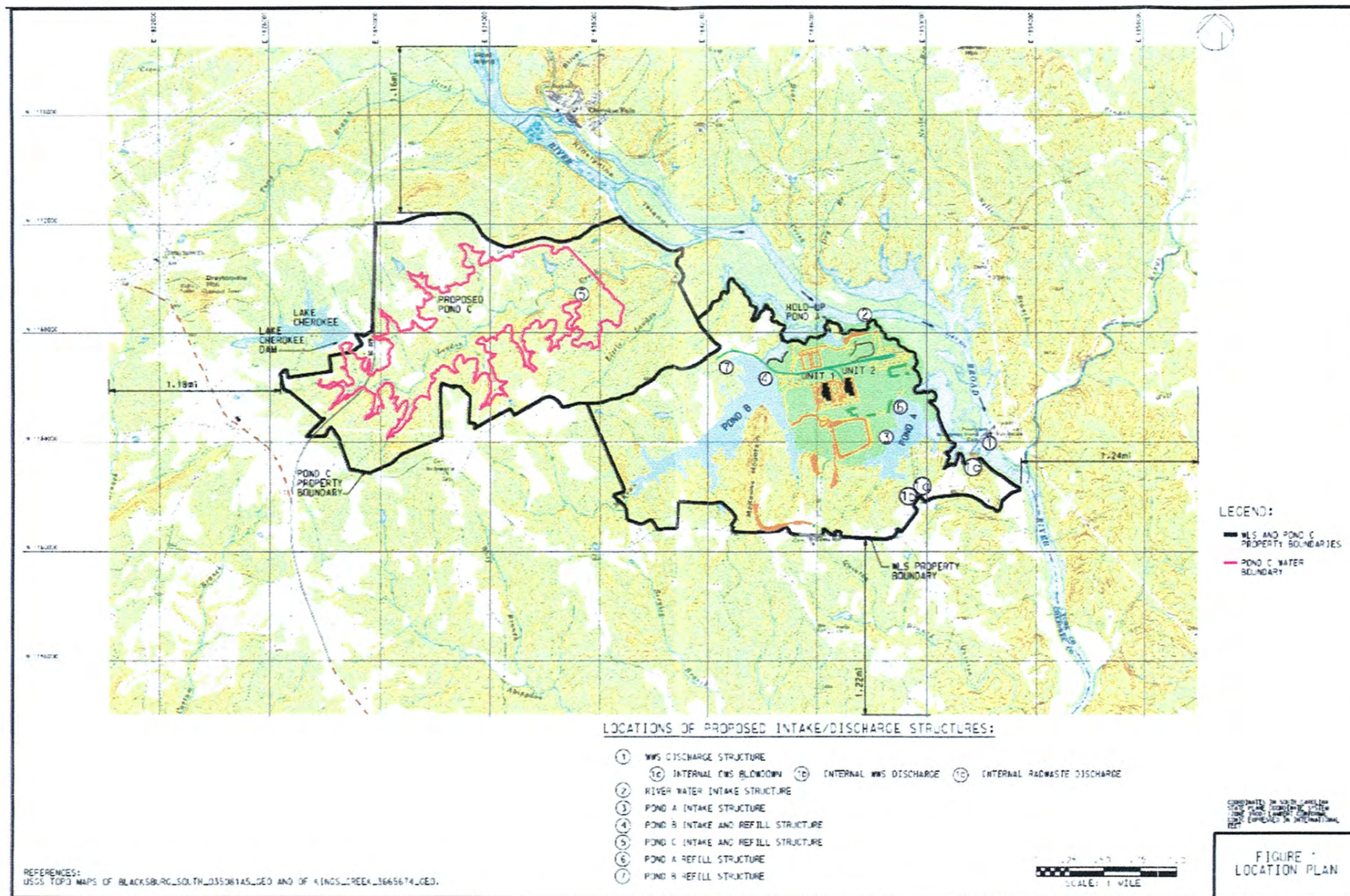
Figure 1: Location Map



PART IV

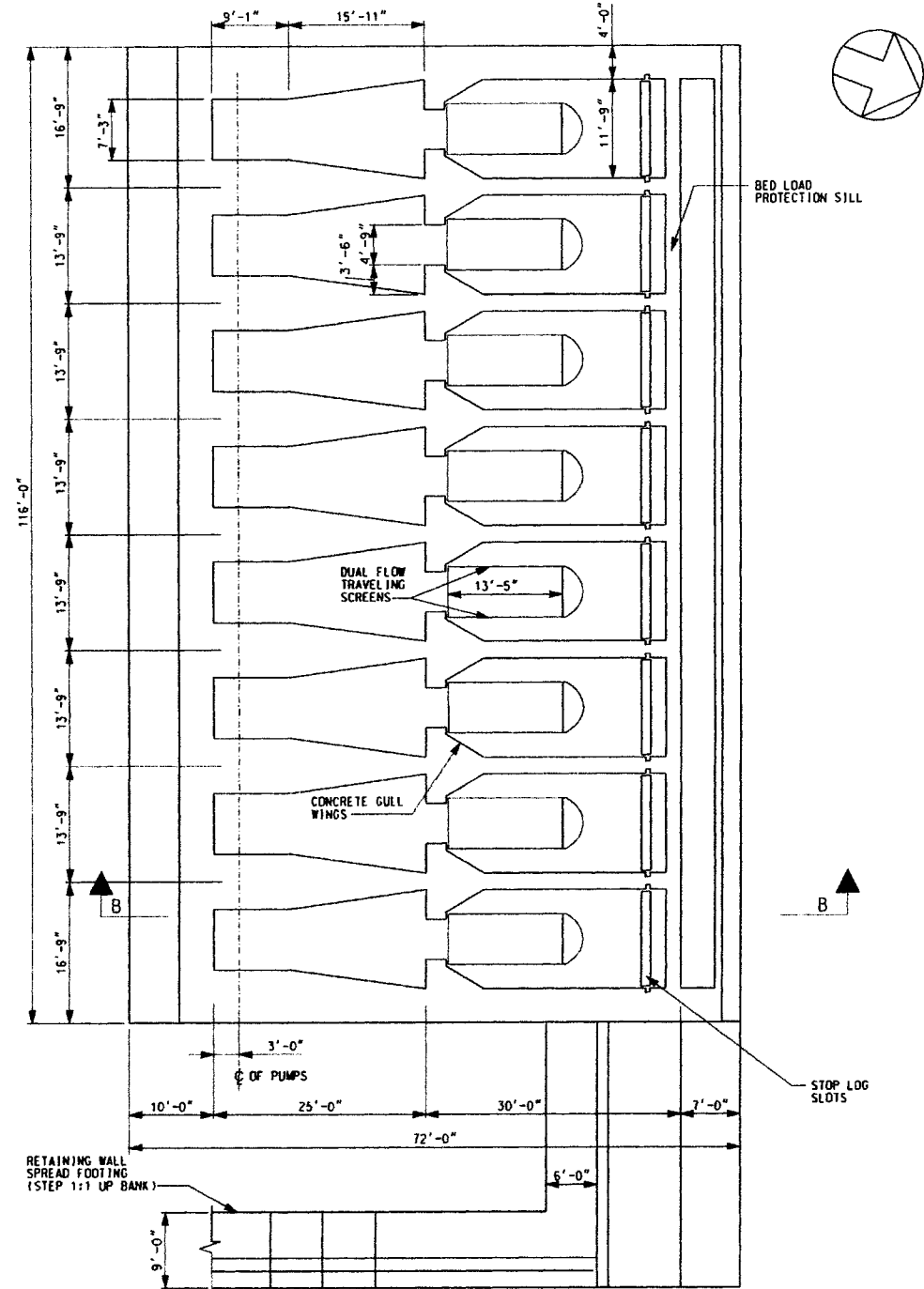
FIGURE 1

Figure 1: Location Map

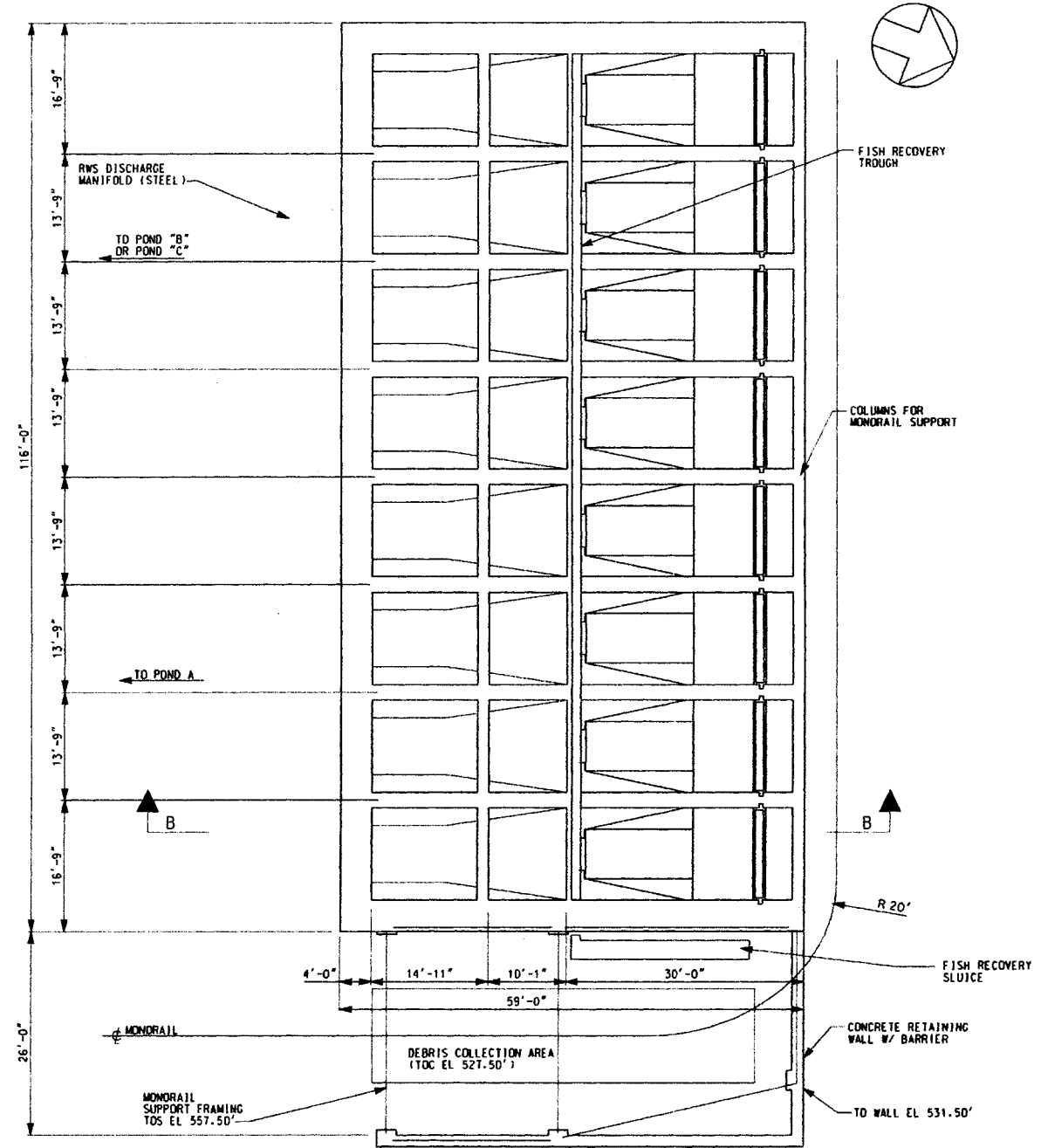


APPENDIX A

FIGURE A-16



PLAN @ EL 498.00'
PUMP AND PIPE OUTLINE NOT TO SCALE



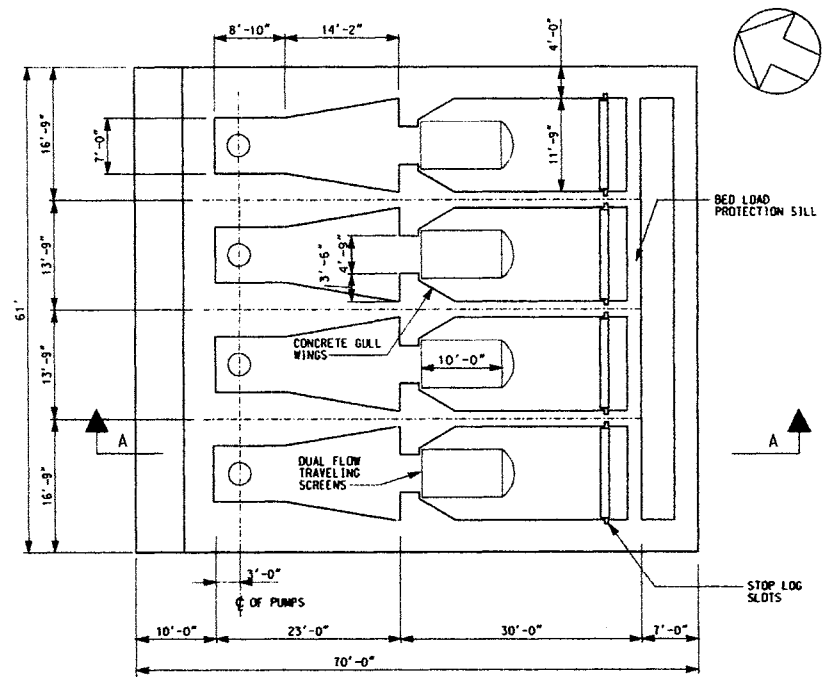
DECK PLAN
PUMP AND PIPE OUTLINE NOT TO SCALE

WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 AND 2

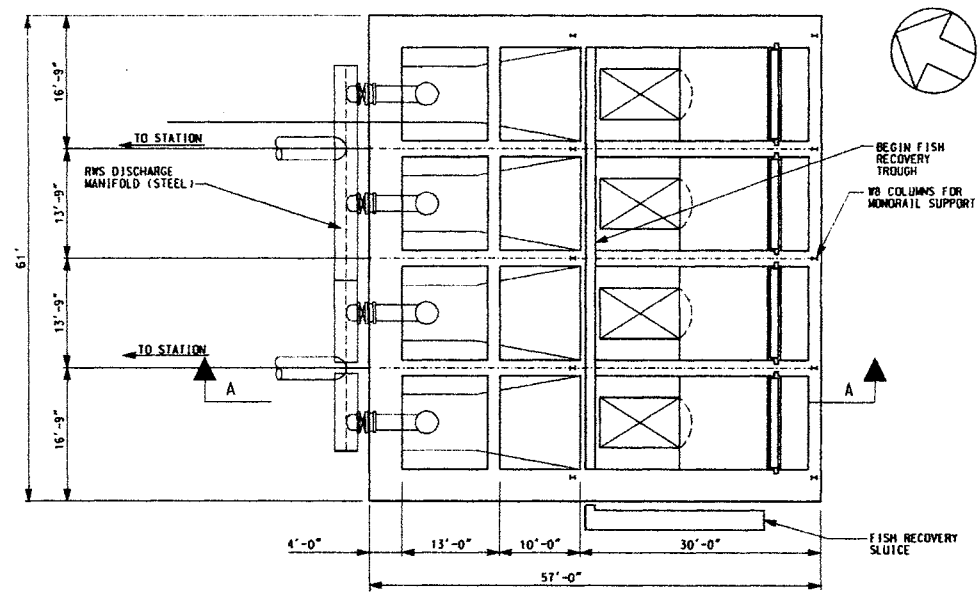
River Intake Structure
Sheet 3 of 3
Figure A-16

APPENDIX A

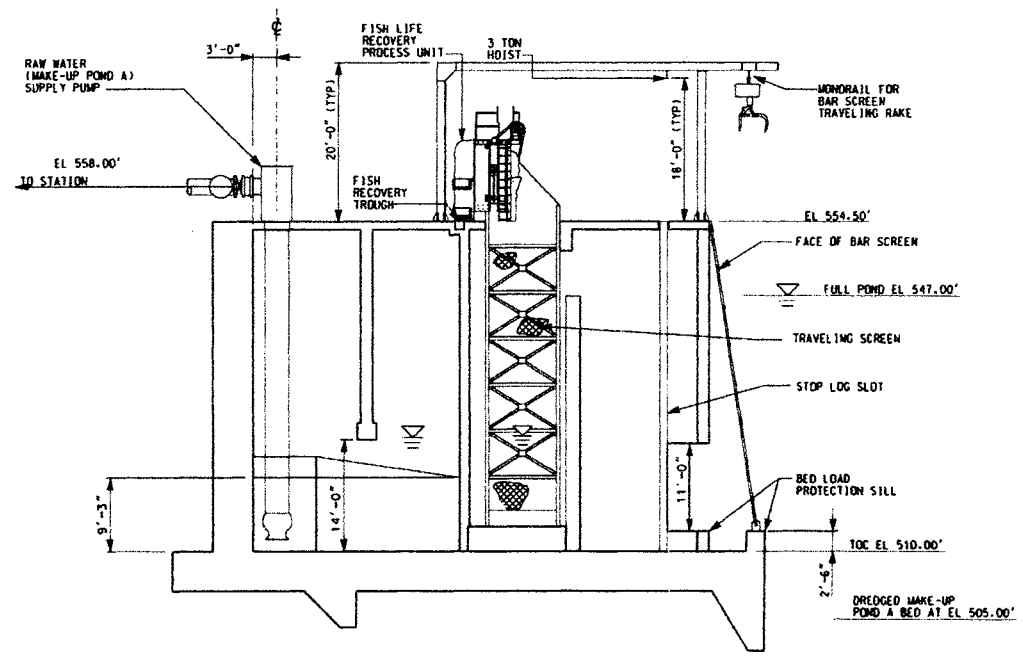
FIGURE A-18



PLAN @ EL 511.00'
PUMP AND PIPE OUTLINE ARE NOT TO SCALE



DECK PLAN
PUMP AND PIPE OUTLINE ARE NOT TO SCALE



SECTION A-A
PUMP AND PIPE OUTLINE ARE NOT TO SCALE

A-93

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NUCLEAR STATION UNITS 1 AND 2



Pond A Intake Structure
Sheet 2 of 2

Figure A-18

APPENDIX C
RWS TRAVELING SCREEN
VELOCITY CALCULATION REPORT



CALCULATION

CLIENT: Duke Energy Carolinas, LLC			PAGE 1 OF 21 TOTAL PAGES: 21 (Including attachments)	
PROJECT: Lee Nuclear Station Units 1 and 2				
CALCULATION TITLE: RWS Traveling Screen Calculation			QA CATEGORY <input type="checkbox"/> - I Nuclear Safety Related <input type="checkbox"/> - II <input checked="" type="checkbox"/> - III	
CALCULATION IDENTIFICATION NUMBER				
J.O. or W.O. NO.	DISCIPLINE CODE	CALCULATION NUMBER	REVISION NUMBER	Safety Class - E
124029	M	WLG-RWS-M3C-800005	3	Seismic Category - NS
REVIEW AND APPROVAL		SUPERSEDES CALC. NO.: WLG-RWS-M3C-012		CONFIRMATION REQUIRED YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
FUNCTION:	PRINT/SIGN	DATE	FOR PAGES:	
Preparer(s)	Michael Austin / <i>Michael Austin</i>	7/19/12	All	
	N/A	N/A	N/A	
Reviewer(s)	A. Senk / <i>Adam Senk</i>	07/19/12	All	
	N/A	N/A	N/A	
	N/A	N/A	N/A	
	N/A	N/A	N/A	
	N/A	N/A	N/A	
Design Verification Method: <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Independent Review <input type="checkbox"/> Alternate Calculation <input type="checkbox"/> Qualification Testing				
Design Verifier	N/A	N/A	N/A	
 				
Approver:	A. Senk / <i>Adam Senk</i>	Date:	07/19/12	

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124029

DISCIPLINE CODE
M

CALCULATION NUMBER
WLG-RWS-M3C-800005

REVISION NUMBER
3

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Record of Revisions

Rev. No.	Description of Changes/ Reason for Change	Pages Revised	Pages Added	Pages Replaced
0	Issue for permit. Updated design flows to incorporate screen wash flows, updated fine mesh to 2.38 mm size, supersedes WLG-RWS-M3C-012 Rev. 3, and replaced cover page.	N/A	N/A	Cover Page
1	Incorporated client comments	Cover page, 5, and 7		
2	Changed screen mesh open size to 2.45 mm from 2.38 mm in text to reflect actual mesh opening size rather than particle size filtered. Updated reference calculation numbers.	Cover page, 6, 8, 14, 15, 16, 21		
3	Incorporated client comments.	Cover page, 4, 7, 8, 14, 15, and 16		

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J.O. OR W.O NUMBER 124029	DISCIPLINE CODE M	CALCULATION NUMBER WLG-RWS-M3C-800005	REVISION NUMBER 3	Page 3 of 21

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1.0 Introduction

1.1 Background

The Raw Water System (RWS) River Water Intake consists of two subsystems, the Refill subsystem and the River Water subsystem.

- The Refill subsystem consists of four pumps separated in four pump bays. Each pump has a maximum capacity of 22,500 gpm (REF 3.1.5). These pumps are connected to a common header and will be used to transfer water from the Broad River to either Pond B or Pond C.
- The River Water subsystem consists of four pumps separated in four pump bays. Each pump has a maximum capacity of 20,980 gpm (REF 3.1.1). Two of these pumps are considered in standby. These pumps are connected to a common header and will be used to transfer water from the Broad River to Pond A.

The RWS Raw Water Supply (Pond A) Intake consists of the Raw Water Supply subsystem.

- The Raw Water Supply subsystem consists of four pumps separated in four pump bays. Each pump has a maximum capacity of 17,000 gpm (REF 3.1.6). Two of these pumps are considered in standby. These pumps are connected to a common header and will be used to transfer water from Pond A to meet the nuclear station's water demands. The flow rate for the Raw Water Supply subsystem is currently being reviewed to change the flow rate from 17,000 gpm to 22,000 gpm. To be conservative, 22,000 gpm will be used in calculating the screen size for the Make-up Pond A intake structure.

1.2 Purpose

This calculation will determine the minimum dimensional requirements for traveling screens in both the river water and raw water supply intake structures which will meet the maximum 0.5 feet/second through-screen velocity requirement:

- Minimum screen width
- Minimum wetted screen height

This calculation will determine the above dimensions for both a coarse mesh size and fine mesh size (coarse mesh was defined as 5.1 mm and fine mesh was defined as 2.45 mm for this calculation in Section 4.1.5). This information is required as input to the design, specifically the traveling screen region, of the river water and the raw water supply intake structures in support of both Units 1 and 2.

1.3 Limits of Applicability

This calculation is only applicable to the William State Lee III Nuclear Station Units 1 and 2 river water and raw water supply intake structures, in all modes of operation.

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2.0 Summary of Results and Conclusions

2.1 Results

The minimum traveling screen dimension results are given in **Table 2-1**.

Dimension	At Primary Side "River Portion" of River Intake Structure	At Secondary Side "Refill Portion" of River Intake Structure	At Make-up Pond A Intake Structure
Minimum Traveling Screen Width (W) with Fine Mesh, ft	13.40	11.29	10.0
Minimum Wetted Screen Height (Y) with fine mesh, ft	8.1	10.1	10.9
Minimum Traveling Screen Width (W) with Coarse Mesh, ft	12.24	10.32	10.0
Minimum Wetted Screen Height (Y) with coarse mesh, ft	8.1	10.1	9.92

2.2 Conclusions / Recommendations

- The results listed in the previous section are based on the best available information. Although there will be changes to the Raw Water System (RWS) as the design progresses, the sizing of the traveling screens must maintain compliance with the acceptance criteria in Section 5.2.1. The traveling screens shall be re-sized if required during the design process to maintain thru-screen velocity less than 0.5 ft/s per Ref. 3.2.3.
- This calculation should be used as input to the design of both the river water and raw water supply intake structures. All minimum dimensions, developed from this calculation, shall be no less than the corresponding value, from Table 2-1, for example the width of the traveling screen (W) should be no less than 13.40 ft for a fine mesh screen at the river intake structure.
- The intake screen procurement specification shall include the scope of calculating actual head loss by supplier.
- An enveloping traveling screen width of 13.40 feet could be used for both the "River Portion" and the "Refill Portion" of the river intake structure if desired.

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3.0 References

3.1 AP1000 Documents

- 3.1.1 WLG-RWS-M3C-800004, "RWS, River Water Subsystem Hydraulic Analysis", Revision A
- 3.1.2 WLG-7500-CCH-002, "Lee Nuclear Station Units 1& 2 River Water and Refill Intake Structure Plans and Section" Revision D
- 3.1.3 WLG-RWS-MY18-001, "Intake Screen Selection for the Raw Water System," Revision A
- 3.1.4 WLG-RWS-M3C-800009, "Raw Water (Make-up Pond A) Intake Hydraulic Calculation," Revision A
- 3.1.5 WLG-RWS-M3C-800007, "RWS, Refill Subsystem Hydraulic Analysis" Revision A
- 3.1.6 WLG-RWS-M3C-008, "RWS, Raw Water Subsystem Hydraulic Analysis" Revision C
- 3.1.7 WLG-7510-CCH-003, "Lee Nuclear Station Units 1& 2 Make-up Pond A Intake Structure Plans and Section" Revision C

3.2 Other

- 3.2.1 "Cameron Hydraulic Data," C.C. Heald, 19th Edition, 2002
- 3.2.2 "Particle Size/ Screen Mesh Comparison Table," Screen Technology Group, Inc, February 08 2009 (<http://wovenwire.com/reference/particle-size>)
- 3.2.3 40 CFR Part 125: National Pollutant Discharge Elimination System—Amendment of Final Regulations Addressing Cooling Water Intake Structures for New Facilities (Implements Requirements of Section 316B of the Clean Water Act).
- 3.2.4 "William S. Lee III Nuclear Station Clean Water Act 316(b) Compliance Demonstration", Part VII of the NPDES Permit Application, August 2011

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4.0 Calculation Inputs

4.1 Inputs

4.1.1 Maximum Flow Rate

Each river water pump has a maximum capacity of 20,980 gpm (REF 3.1.1), each refill pump has maximum capacity of 22,500 gpm (REF 3.1.5), and each raw water supply pump has maximum capacity of 17,000 gpm (REF 3.1.6 and REF 3.1.4). The river water pump flow will be used as the design input for determining the traveling screen size on the "River portion" of the river intake structure. The refill pump flow will be used as the design input for determining the traveling screen size on the "Refill portion" of the river intake structure. The flow of the raw water supply will be used as the design input for determining the traveling screen size on the Make-up Pond A intake structure. The flow rate for the Raw Water Supply subsystem is currently being reviewed to change the flow rate from 17,000 gpm to 22,000 gpm. To be conservative, 22,000 gpm will be used in calculating the screen size for the Make-up Pond A intake structure.

Based on data from screen vendors, the screen wash pump flow will be continuous to ensure there is adequate water within the fish return troughs; therefore, the screen wash flow will be included in the traveling screen design flow rates. The traveling screen design flow rate for the "River portion" of the river intake is limited to 49 cfs (approximately 22,000 gpm). This value is based on a maximum allowable river water withdrawal of 98 cfs (Ref. 3.2.4) and considering two pumps normally operating. The traveling screen design flow rate for the "Refill portion" of the river intake is limited to 51.5 cfs (approximately 23,115 gpm). This value is based a maximum allowable withdrawal of 206 cfs (Ref. 3.2.4) with four (4) pumps operating during the refill of drought-contingency ponds. The traveling screen design flow rate for the Make-up Pond A intake will be the same as the "River portion" of the river intake, 49 cfs (approximately 22,000 gpm). This will allow the outgoing flow from Make-up Pond A to match that of the incoming flow from the "River portion" of the river intake that supplies makeup water to Make-up Pond A.

4.1.2 Intake Structure Floor Top of Concrete (TOC)

Broad River intake structure floor TOC is El 497' (REF. 3.1.2)

Make-up Pond A intake structure floor TOC is El 510' (REF. 3.1.7)

4.1.3 Low Water Elevation

The Broad River low water El is 509.1' (REF. 3.1.2). This elevation was used in determining the traveling screen width for the River Water Subsystem pumps.

However, the Refill Subsystem pumps will use the Broad River normal water El 511.1' (REF.3.1.2). The normal water elevation is appropriate since this subsystem is not used during low flow conditions (low water level). The Refill Subsystem is utilized to refill the drought contingency Ponds B and C which occur during high flow river conditions following a drought.

The Make-up Pond A low water elevation will not vary significantly from the full pond elevation of 547' (REF. 3.1.7) during plant operation. In addition, the traveling screen is submerged well

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below the expected low water elevation. Therefore, the Make-up Pond A traveling screen width is not dependent on the water depth. Since a maximum standard screen width is 10 feet based on discussions with vendors, a minimum wetted screen height and associated minimum water elevation were determined such that a 0.5 ft/s through-screen velocity is maintained given a screen width of 10 feet.

4.1.4 Standoff Height of Screen

Based on discussions with vendors, typical height the traveling screen stands off the intake structure floor is approximately 4 feet (Open Item 4).

4.1.5 Percentage of Open Area

4.1.5.1 Fine Mesh

Preliminary screen sizes considered 2mm (Ref. 3.1.3); however, a slightly larger fine mesh size of 2.45 mm (next step in size) will be utilized given the limited river water depth and the industry's fabrication capabilities for screen widths. The 2.45 mm screen size will still provide fine mesh filtering. The traveling screen shall filter debris and aquatic life 2.45 mm in size and larger. Based on an approximate 2.45 mm mesh size, the equivalent percent open area can be determined. The value used is 60.2% referenced from Appendix B (Opening = 0.0964 inches).

4.1.5.2 Coarse Mesh

Typically a coarse mesh is greater than or equal to 9.5 mm (3/8 in) in size. For this calculation, a smaller mesh size of 5.1 mm was used to calculate the intake dimensions to meet the 0.5 ft/s through screen velocity standard. The traveling screen shall filter debris and aquatic life 5.1 mm in size and larger (REF 3.1.3). Based on a 5.1mm mesh size, the equivalent percent open area can be determined. The value used is 65.9% referenced from Appendix B (Opening = 0.2023 inches).