Edwin I. Hatch Nuclear Plant
Unit 1 and Unit 2
Intake Structure Licensing Report

Demonstration of Compliance
With The Requirements Of 10 CFR 54,
the License Renewal Rule

Table of Contents

Tables

1.0 INTRODUCTION

The Edwin I. Hatch Nuclear Plant (Plant Hatch) intake structure houses, supports, or maintains the integrity of systems and equipment that operate to facilitate the intake of cooling water to Units 1 and 2. This document provides the NRC with an intake structure report that details the information required by §54.21(a) and (c) of the license renewal rule (Ref. 1), hereafter referred to as the "Rule." The Plant Hatch process document for implementing the requirements of the Rule was submitted to the NRC in April 1998 (Ref. 2). The Plant Hatch process is generally consistent with the generic guidance for implementing the Rule that is provided in NEI 95-10 (Ref. 3).

2.0 DESCRIPTION OF THE INTENDED FUNCTIONS SUPPORTED BY THE INTAKE STRUCTURE [54.4(a)]

The intake structure is a common structure that is shared by Units 1 and 2. The intake structure facilitates the intake of cooling water from the Altahama River to the residual heat removal service water (RHRSW) and plant service water (PSW) systems. It protects and supports safety and non-safety related equipment, including systems essential for safe plant shutdown. The intake structure is classified as a Class 1 structure. The structure has a mat foundation that bears on very firm and very dense clayey sands of the Duplin Formation. The service conditions include exposure to soil, water, weather, freezing, thawing, and flowing water.

The intake structure, constructed primarily of reinforced concrete, is separated into two general compartments or bays, each consisting of a screen well and a pump well. Pumps located in the pump wells include PSW pumps and RHRSW pumps. Most of the intake structure lies below the water table to facilitate pump suction from the cooling water source. A more detailed description of the intake structure is provided in the Edwin I. Hatch Nuclear Plant Unit 1 Final Safety Analysis Report (FSAR), subsection 12.2.7. An uncontrolled general arrangement drawing for the Intake Structure is provided for reference as Attachment A to this report.

American Concrete Institute (ACI) Standard 318-63 (Ref. 11) was used for the design of the intake structure. In addition, the guidance, and/or techniques in the following codes and standards were used:

- ACI 301-66 Specification for Structural Concrete Buildings (Ref. 12)
- ACI 613-54 Recommended Practice for Selecting Proportions for Concrete (Ref. 13)
- American Institute of Steel Construction (AISC) Manual of Steel Construction – Sixth Edition (Ref. 14)

Other codes, standards, and regulatory documents that have affected design, construction, and maintenance of the intake structure are cited, as appropriate, in section 3.0 and section 4.0 of this report, which describe the integrated plant assessment (IPA).

The Plant Hatch license renewal process methodology (Ref. 2) was used to identify the functions that are within the scope of the Rule. The scoping process determined that the following function is an intended function as defined by the Rule, and that the intake structure is required to accomplish that intended function:

- Protect and support equipment essential for plant shutdown from the influence of environmental conditions such as flooding, earthquake, and tornadoes.

To accomplish this intended function, the Plant Hatch intake structure is designed and constructed to resist the forces and environmental conditions resulting from normal operation, design basis accident conditions, and natural phenomena (as listed above).

3.0 INTAKE STRUCTURE COMPONENTS SUBJECT TO AGING MANAGEMENT REVIEW [54.21(a)(1)]

An integrated plant assessment process (IPA) was applied to the intake structure pursuant to §54.21(a) of the Rule. The IPA process, as described for Plant Hatch in Reference 2, requires an initial review of the intake structure to identify the components that require an aging management review. These components are typically grouped into commodities to facilitate the aging management review. The Plant Hatch process refers to this initial review as the "screening process." The application of the screening process to the intake structure is described in this section. The second part of the IPA is the aging management review of the identified components and is described in section 4.0 of this document.

3.1 Evaluation Boundaries

The evaluation boundary of the intake structure includes the foundation, the interior and exterior walls, the floor slabs, and the roof. This includes all concrete, grout, reinforcing steel, miscellaneous steel, structural steel, bolts, and anchors. The commodities described in section 3.3 are required for the intake structure to accomplish the intended function described in section 2.0, and therefore, are within the evaluation boundary.

The traveling water screens, the trash rake, stop logs, sluice gates, and the center screen between the stop logs are a separate system, therefore, are not within the evaluation boundary of the intended function described in section 2.0. The channel to the intake structure, sheet pile cells in the channel, and wall extension to the intake structure center wall between the inlet bays are considered separate structures, and are not in the scope of the Rule. Commodities at the intake structure such as pipe supports, cable trays, and electrical supports are not within the evaluation boundary of the intended function described in section 2.0. These commodities will be included in the evaluation boundaries of the intended functions that they support

3.2 Components Subject to Aging Management Review

Section 54.21(a)(1) of the Rule provides the requirements for identifying the intake structure components within the evaluation boundary that are subject to aging management review. To satisfy the requirements of §54.21(a)(1), the Plant Hatch process methodology document (Ref. 2) was used to identify the passive components and then to identify those that are long-lived. For the intake structure, the Plant Hatch process methodology determined that all of the components within the evaluation boundary of the intended function identified in section 2.0 are passive, long-lived, and subject to aging management review. The screening process produced the following commodity groupings for aging management review:

- Reinforced Concrete Commodities
- Steel Commodities

3.3 Commodity Descriptions

The commodity groupings subject to aging management review are further subdivided into commodity groups and described in the following paragraphs in terms of commonly recognized structural components (i.e., beams, columns, walls, floors, etc.). These commodity groups include all in-scope components within the intake structure boundary.

3.3.1 Reinforced Concrete Commodities

The reinforced concrete commodities consist of exterior and interior walls, columns, beams, slabs, roof, floors, and equipment foundations. The concrete interior and exterior surfaces of the intake structure are not coated. The floor-supported equipment foundations generally use a steel support or a base plate bearing directly on a grout pad. The grout pad is placed on a reinforced concrete base that may or may not extend above the floor. Inside the intake structure physical separation of RHRSW pumps is maintained by barrier (or shield) walls. These walls separate the pumps by units and safety related divisions to protect against sprays from moderate energy line breaks. The shield walls are made up of concrete or steel columns and steel plates.

The reinforced concrete components, which make up the commodity groups listed above, are composed of concrete, reinforcing steel and grout. The concrete mix designs were based on the performance criteria in Reference (4). The performance criteria consisted of compressive strength and constituent requirements in conjunction with material and testing requirements. Type II Portland cement, which offers high resistance to sulfate attack, was used for the intake structure. The alkaline content of the cement was limited to 0.60 percent by weight. Air entrainment of 3 to 5% was specified for all of the concrete mixes (interior and exterior exposure). The aggregates were tested for abrasion and potential reactivity with the alkaline in the cement. The material and testing requirements provided high quality concrete, designed for long-term durability. The Class C concrete specified for the concrete components has a 4000-psi compressive strength at 28 days. Class C grout used in the intake structure has the same sand-cement and water-cement ratio as the concrete. The reinforcing steel used in the concrete components is intermediate grade deformed bars which conform to ASTM A 615 (60,000 psi minimum yield strength).

There are no compressible/expansion joints or masonry block units in the Plant Hatch intake structure evaluation boundary described in section 3.1.

3.3.2 Steel Commodities

The steel commodities consist of structural steel, miscellaneous steel, and bolts. Structural steel is used for structural beams and columns. Miscellaneous steel is used for door frames, shield barriers, stairs, ladders, handrails, wall plates, embed plates, cast-in-place bolts, equipment supports, grating, and grating supports. The structural and miscellaneous steel primarily consist of the following materials: ASTM A 6, A 36, A 108, A 242, A 440, A 441, and A 588. Bolts include high-strength bolts, and expansion anchors. High strength bolts, nuts, and hardened washers conform to ASTM A 325 or A 563. Expansion bolts are made of a variety of carbon steel, ferrous metals, or stainless steel.

Wall supports use structural steel framing which is anchored to the supporting wall by embed plates or steel plates and expansion or cinch anchors. High strength bolts were used for structural steel connections. Steel embedments include cast-in-place bolts, embed plates, ladder rungs and miscellaneous steel shapes. Exposed carbon steel, ferrous components are painted or galvanized.

3.4 Component Functions

Table 1.0 identifies component functions, subdivided by commodity group designation, that support the intended function described in section 2.0.

Table 1.0
Component Functions

Grouping	Commodity Group	Component Functions				
		Structural Support	Missile Barrier Protection	Shielding for Moderate Energy Line breaks	Flood Protection	Shelter
Reinforced Concrete	Walls	X	X	X	X	X
	Roof	X	X			X
	Floors	X			X	X
	Slabs	X			X	X
	Columns	X				
	Beams	X				
	Equipment Foundations	X				
Steel	Structural	X	X			
	Miscellaneous	X		X		
	Bolts & Anchors	X				

4.0 MANAGEMENT OF AGING EFFECTS FOR RENEWAL [54.21(a)(3)]

This section describes the integrated plant assessment (IPA) of the intake structure components that are subject to aging management review, as determined in section 3.0. Section 54.21(a)(3) of the Rule requires an aging management review to demonstrate that the aging effects will be adequately managed so that the intended functions will be maintained consistent with the current licensing basis (CLB) for the extended period of operation. The Plant Hatch process and guidance for performing the review is described in the Edwin I. Hatch Nuclear Plant License Renewal Process Methodology Document (Ref. 2).

4.1 Commodity Aging Effects

The plausible aging effects for each commodity group are identified and reviewed in sections 4.1.1 and 4.1.2. The Class 1 Structures License Renewal Industry Report (Ref. 9) was the primary source used to identify the plausible aging mechanisms for the intake structure components. Aging mechanisms are the causes of the aging effects. NUREG-1557 (Ref. 10) was used to establish the correlation between the Reference 9 aging mechanisms and associated aging effects. If the industry report concluded that an aging mechanism was significant, then the associated aging effect was considered plausible. Operating experience and recent NRC generic communications not evaluated by the industry report were also reviewed to determine if there were any additional, plausible aging effects. Plausible aging effects that are determined to be applicable for Plant Hatch are identified as detrimental aging effects requiring aging management. Table 2 presents the list of plausible and detrimental aging effects for the intake structure commodities that result from applying this process.

4.1.1 Reinforced Concrete Commodities

Plausible and detrimental aging effects for the concrete commodities are identified in Table 2. Cracking, spalling, scaling, expansion, shrinkage, distortion, increases in porosity and permeability; loss of strength, and loss of material resulting from one or more of the listed mechanisms are the plausible aging effects. The following paragraphs evaluate the aging effects and whether aging management is required during the extended operating period.

Cracking, scaling, and spalling due to freeze-thaw cycles are not concerns for concrete designed to ACI 318-63 (Ref. 11) with adequate air-entrainment and quality aggregates (Ref. 9). Plant Hatch is also in a geographic region subject to negligible weathering conditions, *i.e.*, a weathering index of less than 100 day-inches per year based on the number of freezing cycle days and average winter rain fall (Ref. 9). Therefore, cracking, scaling, and spalling due to freeze-thaw cycles are not considered detrimental aging effects for the intake structure and no aging management is required.

Increases in porosity and permeability due to the leaching of calcium hydroxide is not a concern for concrete components designed and constructed in accordance with the ACI standards (Ref. 9). Satisfying these requirements results in well-cured, dense concrete with low permeability. The concrete used at the intake structure was constructed in accordance with the guidance provided in ACI 318-63 (Ref.11) and plant construction specifications (Ref. 4). Water, either from rain or melting snow, that contains small amounts of calcium ions can readily leach lime from concrete. The water's aggressiveness or ability to leach calcium hydroxide depends on its dissolved salt content and its temperature. This leaching action of the water can only occur if the water passes through the concrete. Water that merely passes over the surface will not cause significant leaching (Ref. 9). Minor indication of surface leaching of calcium hydroxide was noted during the periodic inspections of the intake structure. This leaching is limited to a localized surface area on an exterior wall. The area was dry with no indication of flowing water. The leaching was noted as minor with no structural impact and no corrective action required. Therefore, increases in porosity and permeability due to the leaching of calcium hydroxide are not considered detrimental aging effects for the intake structure and no aging management is required.

Increased porosity, cracking, spalling, and loss of strength due to aggressive chemical attack are concerns for concrete components exposed to groundwater or river water (Ref. 9). The following components are below grade: exterior walls, the basemats, and the bay walls of the intake structure. Per Reference 9, an aggressive chemical attack is not a concern for the concrete components that are exposed to concentrations of chlorides that are less than 500 PPM, for concentrations of sulfates that are less than 1500 PPM, and for a pH of 5.5 or greater. At Plant Hatch, the ground water and river water chemistry were reviewed and are well within these limits. Review of the operating experience identified one case of an excavation exposing below grade exterior walls. The inspection records of the excavation did not note any cracking, spalling, or increases of porosity on the below grade exterior wall. Therefore, increased porosity, cracking, spalling, and loss of strength due to aggressive chemical attack from groundwater or river water are not considered detrimental aging effects for the intake structure and no aging management is required.

Expansion, shrinkage, and cracking due to chemical reactions between certain aggregates and alkalis are not concerns for concrete components where non-reactive aggregates are used (Ref. 9). At Plant Hatch, ASTM C-289 testing of the aggregate was used during construction to minimize the potential use of reactive aggregates. As a precaution, low alkali, high sulfate resistant cement (Type II Portland) was used to further minimize any manifestation of aggregate reactions. Inspections of the intake structure have not identified any concrete degradation symptomatic of reactive aggregate. Therefore, expansion, shrinkage, and cracking due to aggregate reactions are not considered detrimental aging effects for the intake structure and no aging management is required.

Loss of material, loss of bond, and cracking due to corrosion of the reinforcing steel are not concerns if the reinforced concrete is not exposed to significant concentrations of aggressive ions (Ref. 9). At Plant Hatch, the concrete components are exposed to chloride concentrations less than 500 PPM, sulfate concentrations less than 1500 PPM, and a pH of 5.5 or greater. In addition, the concrete structures are designed and constructed in accordance with ACI-318-63 (Ref. 11), which contains provisions for the minimum concrete coverage of reinforcement. Inspections of the intake structure have not detected evidence of rust staining, rebar exposure, or signs of corrosion. Therefore, loss of material, loss of bond, and cracking due to corrosion of the reinforcing steel are not considered detrimental aging effects for the intake structure and no aging management is required.

Loss of material, cracking, and spalling due to corrosion of embedded steel are concerns for concrete components continuously exposed to aggressive ions (Ref. 9). The intake structure is not continuously exposed to an aggressive ion environment; however, it is exposed to water and high humidity for extended periods. The operating experience review determined that corrosion had been identified and repaired at the intake structure. Therefore, cracking, spalling and loss of material due to corrosion of embedded steel are identified as detrimental aging effects for the intake structure. Periodic inspections, as described in section 4.2.1, will be continued during the extended operating period as an aging management program to monitor the intake structure for cracking, spalling, and loss of material due to corrosion of embedded steel.

Loss of material due to erosion, abrasion or cavitation is not a concern for structures that are continuously exposed to flowing water with velocities less that 40 fps or less than 25 fps in closed conduits with abrupt bends (Ref. 9). The intake structure bays are exposed to flowing water with a maximum velocity of 5.5 fps. Inspections of the intake structure have not identified any concrete degradation symptomatic of erosion, abrasion, or cavitation. Therefore, loss of material due to erosion, abrasion, or cavitation due to continuously flowing water is not considered detrimental aging effect for the intake structure and no aging management is required.

Cracking and loss of strength due to low cycle and high cycle fatigue were considered in the original design of the intake structure. Low cycle fatigue is less than 100 cycles of high level load due to extreme design basis events. The intake structure has not experienced low cycle fatigue. If an extreme design basis event is experienced, low cycle fatigue of the structure will be evaluated. Low cycle fatigue is not an age-related mechanism, therefore, cracking and loss of strength are not considered detrimental aging effects for Plant Hatch, and no aging management is required. High cycle fatigue is more than 100 cycles of low level repeated load, such as equipment vibration load experienced during normal operation. The intake structure is a Class 1 seismic structure designed in accordance with ACI 318-63 (Ref. 11). ACI 318-63 limits the member stresses to less than 55% of the static strength. The stresses induced by high cycle loading are a small portion of the combined stresses resulting from static and dynamic loads. This means the stress range is within the limit that yields an extremely long fatigue life of greater than

10^7 cycles. This is in effect an almost infinite life for concrete (Ref. 9). Therefore, cracking and loss of strength due to high cycle fatigue are not considered detrimental aging effects for the intake structure and no aging management is required.

Cracking and distortion due to settlement of the structures can be classified in two categories (Ref. 9). Immediate settlement refers to the elastic deformation that occurs shortly (within a few days) after the soil is loaded. Immediate settlement is not an age-related degradation mechanism. Consolidation settlement refers to the time dependent settlement of the cohesive soils. Total and differential settlement of the intake structure is monitored at Plant Hatch. The settlement curves (Hatch Unit 2 FSAR –Figure 2A-17, sheet 7) flattened out in 1978 and have remained flat, indicating that no subsequent measurable settlement has occurred. Therefore, cracking and distortion due to settlement are not considered detrimental aging effects for the intake structure and no aging management is required.

Loss of strength due to elevated temperature is a concern for concrete commodities that experience temperatures in excess of 150° F (Ref. 9). This is not a concern for the intake structure because temperatures above 150° F are not experienced due to the ventilation system and the proximity to the river acting as a heat sink. Therefore loss of strength due to elevated temperature is not considered a detrimental aging effect for the intake structure and no aging management is required.

4.1.2 Steel Commodities

The plausible and detrimental aging effects for the steel commodities are identified in Table 2. Expansion, deformation, distortion, stress relaxation of bolts, and loss of material resulting from one or more of the listed mechanisms are the plausible aging effects. These aging effects, and the associated mechanism(s), are reviewed in the following paragraphs to determine if aging management is required during the extended operating period.

Loss of material due to corrosion of the steel commodities in the intake structure is inhibited by protective coatings, galvanizing, or by embedding the steel commodity in concrete. The intake structure is exposed to water and high humidity for extended periods. The operating experience review determined that corrosion had been identified and repaired at the intake structure. Therefore, loss of material due to corrosion is considered a detrimental aging effect for the steel commodities in the intake structure. An aging management program, as described in section 4.2.1, will continue during the extended operating period to visually inspect the steel commodities for loss of material due to corrosion.

Cracking and loss of strength due to low-cycle and high-cycle fatigue were considered in the original design of the structural steel. Low cycle fatigue is less than 100 cycles of high level load due to extreme design basis events. The intake structure has not experienced low cycle fatigue. If an extreme design basis event is experienced, low cycle fatigue of the structure will be evaluated. Low cycle fatigue is not an age-related mechanism. High cycle fatigue for steel is greater than 10^5 loading cycles. Steel designed to the AISC code

(Ref. 14) is designed to limit stress ranges such that fatigue degradation will not affect the structural function of the steel (Ref. 9). Therefore, cracking and loss of strength due to low-cycle and high-cycle fatigue are not considered detrimental aging effects for the intake structure and no aging management is required.

Cracking and distortion of the structural steel components could result from settlement of the intake structure. Cracking and distortion due to settlement of the structures can be classified in two categories (Ref. 9). Immediate settlement refers to the elastic deformation that occurs shortly (within a few days) after the soil is loaded. Immediate settlement is not an age-related degradation mechanism. Consolidation settlement refers to the time dependent settlement of the cohesive soils. Total and differential settlement of the intake structure is monitored at Plant Hatch. The settlement curves (Hatch Unit 2 FSAR – Figure 2A-17, sheet 7) flattened out in 1978 and have remained flat, indicating that no subsequent measurable settlement has occurred. Therefore, cracking and distortion due to settlement are not considered detrimental aging effects for the intake structure and no aging management is required

Loss of strength due to stress relaxation of bolts could result from a number of causes including: low initial preload, settlement of contact surfaces, large cyclic load (near yield strength), gasket compression, high thermal temperatures, self loosening and elastic interaction. The causes of stress relaxation or loss of preload occur within a short time period following initial bolt tightening, except for cyclic loading, thermal effects and self loosening, which occur over an extended period and are highly dependent on the magnitude of temperatures, stress level proximity to yield stresses, and number of cycles (Ref. 18). For structural joints installed with proper torque the initial loss of preload is limited and sufficient preload remains to ensure its integrity. The intake structure bolts were installed and inspected per plant procedures in accordance with AISC (Ref. 14) requirements. Components at the intake structure are not subject to high temperatures. No gaskets are used on structural connections. The bolted components at the intake structure are not subject to high displacement or high stress vibration loading. Inspections at the intake structure have not noted any case of loss of preload in bolted structural joints. Loss of preload in structural joints has not been an industry problem and there is no current requirement to periodically retighten or check bolt tightness in structural joints. Therefore, loss of strength due to stress relaxation of bolts is not considered a detrimental aging effect for the intake structure and no aging management is required

Loss of strength due to elevated temperature is not a concern for steel commodities that experience temperatures less than 700° F (Ref. 9). This is not a concern for the intake structure because elevated temperatures are not experienced due to the ventilation system and the proximity to the river acting as a heat sink. Therefore, loss of strength due to elevated temperature is not considered a detrimental aging effect for the intake structure and no aging management is required.

Table 2
Intake Structure Plausible and Detrimental Aging Effects (Sheet 1 of 2)

Intake Structure Commodities	*Plausible Aging Mechanisms*	*Plausible Aging Effects*	*Detrimental Effect/Mech. For Hatch?*	*Remarks*
Reinforced Concrete (4.1.1)	Freeze-Thaw	Cracking, scaling and spalling	No	Hatch Plant located in "negligible" freeze-thaw region (Ref. 9)
	Leaching of Calcium Hydroxide	Increase in porosity and permeability	No	Meets ACI 318-63 design for dense well-cured concrete.
	Aggressive Chemicals	Increased porosity, cracking, spalling, and loss of strength	No	Chlorides < 500ppm Sulfates < 1500 PPM pH >5.5
	Reaction with Aggregates	Expansion, shrinkage and cracking	No	Aggregates tested to ASTM C-289
	Corrosion of Reinforcing Steel	Loss of material, loss of bond and cracking	No	Meets ACI 318-63 design for min. concrete coverage
	Corrosion of Embedded Steel	Loss of material, cracking and spalling	Yes	Visual Inspections by Structural Monitoring Program (SMP)
	Erosion, Abrasion, Cavitation	Loss of material	No	Flow velocity is <5.5fps
	Fatigue	Cracking and loss of strength	No	Low cycle < 100 cycles Design per ACI Code
	Settlement	Cracking and distortion	No	Settlement Monitoring Curves Flat
	Elevated Temperature	Loss of strength	No	Temperature ranges are less than 150°F

Table 2 (Sheet 2 of 2)

Intake Structure Commodities	*Plausible Aging Mechanisms*	*Plausible Aging Effects*	*Detrimental Effect/Mech. For Hatch?*	*Remarks*
Steel (section 4.1.2)	Corrosion	Loss of material	Yes	Visual Inspections by SMP
	Fatigue	Cracking and loss of strength	No	Low cycle < 100 cycles Design per AISC Code
	Settlement	Cracking and distortion	No	Settlement Monitoring curves flat
	Stress Relaxation of Bolts	Loss of Strength	No	Meet AISC installation and inspection requirements. EPRI Bolting Manual (Ref. 18)
	Elevated Temperature	Loss of strength	No	Temperature ranges are less than 700°F

4.2 Management of Detrimental Aging Effects

Section 4.1 identified the detrimental aging effects that require aging management. Aging management programs that manage the following aging effects for concrete and steel commodities are evaluated in this section.

Reinforced Concrete detrimental aging effect:

- Loss of material, cracking and spalling due to corrosion of embedded steel

Steel detrimental aging effect:

- Loss of material due to corrosion

4.2.1 Aging Management Program Review

The Plant Hatch intake structure is within the scope of 10CFR50.65, the "Maintenance Rule," (Ref. 5). As such, the structure is included in the scope of the Plant Hatch Structural Monitoring Program (Ref. 6) for the Maintenance Rule, which assures continued functionality of the intake structure. This program was developed using the guidance provided in NEI 96-03 guidelines (Ref. 7) and the NRC's comments provided (Ref. 8) during their review and acceptance of NEI 96-03. The program was formalized as a corporate document and implemented in 1996. The Structural Monitoring Program (SMP) manages the aging effects listed in section 4.2. Key features of the SMP are described below.

The SMP inspection process assesses the ongoing, overall conditions of the intake structure, and identifies any ongoing degradation. The SMP inspects the steel commodities for loss of material due to corrosion and the concrete commodities for loss of material, cracking and spalling due to corrosion of embedded steel. Normal inspection frequency for plant structures is 5 years, unless otherwise required by the site conditions. At this time, Plant Hatch has elected to inspect the intake structure annually due to humid environmental conditions. However, based on the results of intake structure inspections, in the future, the plant may elect to go back to the 5-year frequency. For areas of the intake structure that are permanently inaccessible due to physical obstruction and below grade, embedded or buried components, inspections are performed whenever these areas are excavated, exposed or modified.

The inspections are performed by knowledgeable and experienced civil engineers, using detailed checklists, inspection tools, and preparations. Some of the inspections are performed by divers to assess the areas of the intake structure that are normally submerged, including the external surfaces of the intake and the pump pit surfaces below the water line. The results of inspections performed by divers are evaluated by engineers. Inspection results are documented in checklists and noted degradations are documented with photography. Detailed records are kept of suspect areas to assure re-inspection, performance of repairs and maintenance actions. As required by the Maintenance Rule (Ref. 5), areas which show degradation sufficient to impair the component functions or which are predicted to impair the intake structure intended functions prior to the next inspection interval, assuming the degradation continues unmitigated, will be evaluated for possible disposition to 50.65 (a) (1) (goal setting and monitoring). A cause evaluation may be performed and/or corrective action implemented.

Acceptance criteria for the inspection and criteria for categorizing the overall structure and component conditions (i.e., acceptable, acceptable with deficiency, or unacceptable) are provided in the SMP. The inspection acceptance criteria is consistent with the recommended criteria in ACI-349.3R-1994 (Ref. 15), but includes criteria are consistent with the recommended criteria in ACI-349.3R-1994 (Ref. 15), but include additional criteria for roof ponding, water leakage, coatings, penetration seals, etc. The results of the inspections are evaluated in accordance with NEI-96-03 guidelines (Ref. 7) and NRC Regulatory Guide 1.160 Rev. 2 (Ref. 16).

Needed actions identified by the SMP are supported or implemented by other procedures. This collection of procedures includes plant administrative control procedures, plant corrective action procedures, and maintenance procedures. The plant administrative control procedures provide the necessary controls for review and approval of procedures and records associated with the SMP. The plant corrective action procedures provide for corrective action, verification of corrective actions, root cause determination, formal review and approval process, and trending. The maintenance procedures, including those that implement the Maintenance Rule requirements, provide a means for repairing deficiencies, performing preventive actions, and trending and evaluation of the aging management.

In 1996 an initial evaluation was performed, as part of the SMP, to establish a "base-line" condition of the intake structure (Ref. 17). Areas within the scope of the Maintenance Rule were visually inspected and photographs were made to document notable degrees of degradation. Specific items and areas included in the intake structure inspection were the roof, settlement around the building, outer concrete walls, interior concrete columns, beams, floors, walls, interior steel columns and beams, foundations, anchor bolts, and equipment slabs. All inspected areas were found "Acceptable- no further evaluation required." A second condition survey was conducted in April 1997, as part of the 1997 outage. In addition to the intake structure items inspected in 1996, the catwalks were also included in this inspection. The inspection report concluded the same findings as the previous report. The "Report on Settlement of Plant Structures" was also reviewed and settlement of all structures was found to be within acceptable range.

A review of operating history for the Intake Structure was performed to confirm the effectiveness of the aging management for the intake structure. Selected samples of maintenance work orders were reviewed. It was determined that needed repairs have been identified and corrected. In addition, an exterior wall of the intake structure below grade was uncovered during excavation for past maintenance activities and no aging degradation was identified. The results of the operating history review demonstrate that aging management for the intake structure is being implemented effectively.

Table 3 provides an evaluation summary of the SMP and procedures listed above to 11 program attributes to manage the commodity aging effects identified in section 4.2. This summary more fully describes the credited aging management programs and procedures discussed above in terms of the composite program attributes. The SMP and procedures manage the aging effects assuring that all component/commodity functions are maintained such that there is no loss of intended function for the intake structure.

Table 3
Aging Management Program Attribute Evaluation

Attributes	*Aging Management Program/Procedure*
1. Scope of the program includes the specific Structure, component or commodity (SCC) for the identified aging effect.	The Structural Monitoring Program (SMP), under the Maintenance Rule, includes the intake structure.
2. Preventive actions to mitigate or prevent aging degradation.	The SMP and Maintenance Procedures accomplish timely monitoring and goal setting for degradation.
3. Parameters monitored or inspected are linked to the degradation of the particular SCC function.	The aging effects requiring management for the commodities identified in section 3.2 are readily detectable by visual inspection. The SMP performs visual inspections, which are evaluated to judge the structural impact of any degradation noted.
4. The method of detection of the aging effects is described and performed in a timely manner.	The SMP evaluates the intake structure on an annual basis.
5. Monitoring and trending is included for timely corrective actions.	The SMP provides for monitoring and trending to assure timely corrective or mitigative actions. The SMP evaluates the intake structure on an annual basis.
6. Acceptance criteria are included	The SMP includes acceptance criteria against which corrective action will be evaluated.
7. Corrective actions, including root cause determination and prevention of recurrence are included.	Degradation identified by the SMP is timely. Corrective action will be accomplished using the Plant Corrective Action Procedures (CAPs). The CAPs include root cause determination and actions to prevent recurrence.
8. Confirmation process is included.	The CAP assures that corrective and preventive actions are accomplished and adequate.
9. Administrative controls are present for the program, procedures, and records.	The Plant Administrative Control Procedures provide for the control of plant procedures and records associated with SMP inspections. The SMP is controlled by the Design Engineering Administrative Control Procedures. These procedures provide a formal review and approval process for the SMP and supporting procedures.
10. Operating experience of the aging management program, including past corrective actions resulting in program enhancements or additional programs, are considered.	Operating experience is reviewed as part of the SMP and Maintenance Procedures.
11. Aging management programs and/or procedures are established by regulation and are subject to regulatory oversight.	The SMP is established by 10 CFR 50.65 Maintenance Rule and has been evaluated by the NRC and site organizations.

4.2.2 Demonstration That Aging Effects Are Adequately Managed

The review of Structural Monitoring Program and supporting procedures, inspections, and plant operating history in section 4.2.1 was performed to demonstrate that the aging management for the intake structure is adequate so that the intended functions will be maintained consistent with the CLB for the period of extended operation.

The NRC has reviewed the Plant Hatch SMP during its baseline inspection (Ref. 8) of the plant's implementation of the Maintenance Rule requirements. The NRC's inspection team concluded that the plant personnel performing the inspections are knowledgeable and experienced civil engineers. The inspection team selected a plant building within the scope of the SMP for visual inspection. The team concluded that the building appeared structurally sound, with no unacceptable conditions.

At the time of the NRC's baseline inspection, industry guidance had not been established for developing performance criteria that could be used to determine structural components that are not capable of performing their functions. This issue was identified in Reference 8 as an inspector follow-up item. The Plant Hatch SMP was subsequently revised to incorporate the industry performance criteria guidance.

The intake structure is in good condition and is performing its intended function. Section 4.2.1 links the SMP, as augmented by plant administrative control procedures, corrective action procedures, and maintenance procedures, to the detrimental aging effects requiring aging management listed in section 4.2. A review of plant operating history, and inspections of the intake structure, demonstrate that the aging management activities credited have been and will continue to be effective to manage the detrimental aging effects. Aging effects have been monitored, identified, and corrected when required. Therefore, there is reasonable assurance that detrimental aging effects will be adequately managed and the intended functions of the intake structure will be maintained consistent with the CLB in the extended operating period.

5.0 EVALUATION OF TIME LIMITED AGING ANALYSES [54.21(c)]

The Plant Hatch license renewal process methodology document (Ref. 2) was used to identify plant time-limited aging analysis (TLAA) issues for the intake structure. The intake structure design calculations and evaluations were reviewed to identify potential issues. The six criteria delineated in §54.3 of the Rule (Ref. 1) were used to determine that TLAA issues for the Plant Hatch intake structure do not exist. A review of the relevant licensing correspondence also revealed that there are no exemptions granted under 10 CFR 50.12 that are in effect and based on TLAA issues.

6.0 TECHNICAL SPECIFICATION CHANGES OR ADDITIONS [54.22]

The Plant Hatch technical specifications were reviewed to determine if they are affected by the results of the aging management review in section 4.0. The review determined that the technical specifications would not need to be changed.

7.0 REFERENCES

1. 10 CFR 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," 60 FR 22491, May 8, 1995.

2. "Edwin I. Hatch Nuclear Plant License Renewal Process Methodology Document," April 13, 1998.

3. NEI 95-10, "Revision 0, Industry Guideline on Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule," March 1996.

4. Plant Hatch Concrete Mix Design: GA-3041 "Excavation, Concrete and Piling Work for Edwin I. Hatch Nuclear Plant", Section 300, General Concrete Specification. Section 300, mix design per ACI 613-54, "Recommended Practice for Selecting Proportions for Concrete."

5. 10 CFR 50.65, "Requirements For Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," 56 FR 31324, July 10, 1991.

6. A-44985, Rev. 4, "Structural Monitoring Program for the Maintenance Rule."

7. NEI 96-03, "Guidelines for Monitoring the Condition of Structures at Nuclear Power Plants."

8. "NRC Inspection Report 50-321, 50-336/96-12 Notice of Violation," Document No. EA 96-452, November 22, 1996.

9. EPRI TR-103842, Revision 1, July 1994, "Class 1 Structures License Renewal Industry Report".

10. NUREG – 1557, " Summary of Technical Information and agreements from NUMARC Industry Reports Addressing License Renewal," October 1996.

11. ACI 318-63, "Building Code Requirements for Structural Concrete and Commentary", American Concrete Institute.

12. ACI 301-66, "Specifications for Structural Concrete for Buildings."

13. ACI 613-54, "Concrete Mix Design."

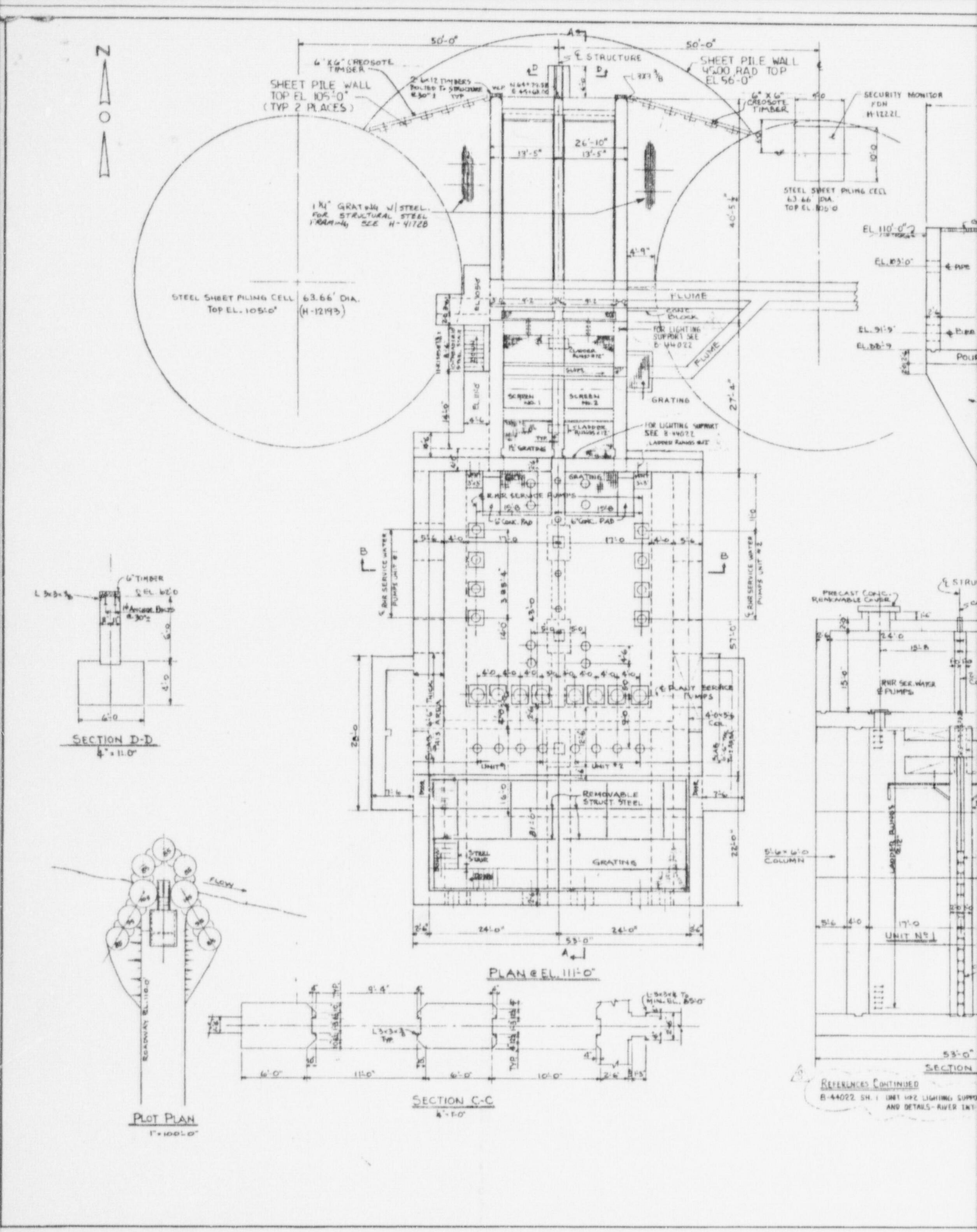
14. AISC Manual of Steel Construction, 6th Edition.

15. ACI 349.3 R-1994, "Evaluation of Existing Nuclear Safety-Related Concrete Structures."

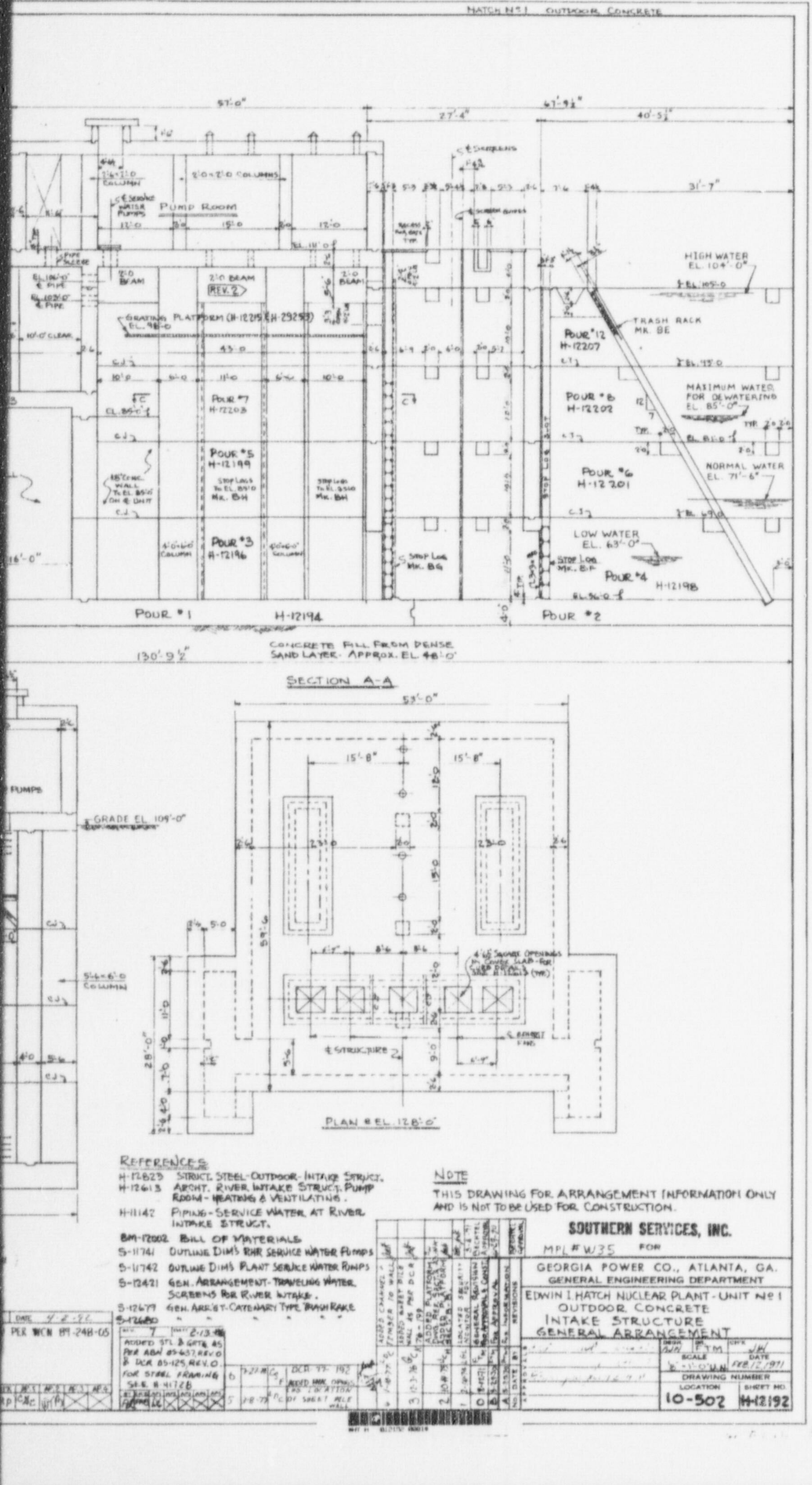
16. Regulatory Guide 1.160 Rev. 2, March 1997, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants."

17. 1996 Structural Monitoring Baseline Inspection Report for the Intake Structure.

18. EPRI Bolting Procedures Reference Manual, NP5067, Vol. 1, "A Reference Manual for Nuclear Power Plant Maintenance Personnel, Large Bolt Manual."


N
SHEET PILE WALL
TOP EL 105'-0"
(TYP 2 PLACES)
6"X6" CREOSOTE TIMBER
℄ STRUCTURE
SHEET PILE WALL
4500 RAD TOP
EL 56-0"
6" X 6" CREOSOTE TIMBER
SECURITY MONITOR
STEEL SHEET PILING CELL
63.66' DIA.
TOP EL 105'0
STEEL SHEET PILING CELL 63.66' DIA.
TOP EL. 105'-0" (H-12193)
FLUME
GRATING
SCREEN No. 1
SCREEN No. 2
℄ RHR SERVICE PUMPS
6" CONC. PAD
℄ PLANT SERVICE PUMPS
REMOVABLE STRUCT STEEL
STEEL STAIR
GRATING
PLAN @ EL. 111'-0"
SECTION D-D
SECTION C-C
PLOT PLAN
FLOW
PRECAST CONC. REMOVABLE COVER
RHR SER. WATER ℄ PUMPS
UNIT No 1
REFERENCES CONTINUED

Attachment A



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