NEK

TECHNICAL SPECIFICATION

Feasibility Study for Cooling Towers System Upgrade

KRŠKO NUCLEAR POWER PLANT

Specification Number: SP-ES1483
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Non Nuclear Safety Related

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ABBREVIATIONS

CT	Cooling Tower System
CW	Circulating Water System
ΔT	Daily average of water river temperature rise
NEK	Nuklearna elektrarna Krško (Krško Nuclear Power Plant)
NSSS	Nuclear Steam Supply System
QA	Quality Assurance
USAR	Updated Safety Analysis Report

1. BACKGROUND AND DESCRIPTION OF THE PROBLEM

Nuklearna elektrarna Krško (Nuclear Power Plant Krško), hereafter referred to as "NEK", is a Westinghouse designed two loop pressurized water reactor plant with 2000 MW NSSS thermal output and a gross power of around 736 MW. NEK was built in 1970's and is in commercial operation since 1983. Starting in 2024, NEK began long-term operation from 40 to 60 years.

The Circulating Water System (CW) provides cooling water from the Sava River for the main condenser and the turbine building closed cycle cooling water heat exchangers. Cooling towers are used to supplement the river during periods of low river flow or on high river flow periods when the water is too dirty and causes travelling screens section and taprogge debris filters clogging. Originally, two induced draft double-flow crossflow cooling towers were installed, each containing six cells. In response to a power upgrade and the increasingly noticeable effects of climate change in 2007, a third cooling tower was added. Additionally, modifications were made to the existing cooling towers to enhance their thermal performance. The third cooling tower is a induced-draft counter-flow concrete structure with four cells.

Generally, the Sava River has a flow rate of more than 100 m^3/s and a temperature below 20°C, which is sufficient for NEK to operate at 100 % without additional cooling capacity and without violating environmental restrictions. A review of past measurements and studies on climate change—particularly rising temperatures and extreme weather events—highlights potential challenges for future NEK operation. These include difficulties in meeting thermal emission limits for the Sava River.

Climate change is expected to reduce the efficiency of the Cooling Tower System (CT), which can only reduce cooling water temperatures to just above the current wet bulb temperature. As ambient temperatures continue to rise, this limitation becomes more significant. Historical cooling tower data aligns with earlier studies, confirming that climate change will lead to more frequent cooling tower usage to meet environmental requirements.

From a hydrological perspective, two distinct low-water periods stand out: winter (January - February) and summer (June - August). In winter, low river flow is the primary concern, while in summer, it is combined with high water temperatures. For example, in July 2022, the hourly average temperature at the NEK inlet reached 27°C or higher in the late afternoon, further emphasizing the growing impact of climate change on plant operations.

Since the 1960s, the average temperature in Krško and the surrounding area has increased by 1.8°C, while precipitation has decreased by 10% [11]. By 2050, projections indicate a further 1.7°C rise, more days exceeding 30°C, and longer, more frequent heat waves.

Various studies on the topic of climate change (ref. [7] - [10]) roughly distinguish three main types of impacts/risks of climate change, namely:

- Higher average ambient temperature.
- Higher average river water temperature.
- Higher frequency of extreme weather events (storms, downpours, drought, etc.).

These factors will impact NEK operations and compliance with water use and heat emission regulations.

This specification provides an overview of the existing Circulating Water System and Cooling Tower System and defines the scope of the feasibility study for its upgrade. The primary objectives of the upgrade include improving efficiency of existing Cooling Towers, reducing river water consumption, and ensuring regulatory compliance. The Contractor shall develop a comprehensive feasibility study, using their expertise and industry best practices, to support NEK in selecting the most suitable upgrade solution. This specification outlines the key requirements that the feasibility study must address. Relevant experience in similar projects is expected.

2. SCOPE OF WORK

The Contractor shall prepare a Feasibility Study for upgrading NEK Circulating Water System (CW) and Cooling Tower System (CT) with the aim of improving efficiency of the existing system and reducing water consumption. The upgrade should ensure compliance with environmental restrictions (ref. [4] and [6]) and enable uninterrupted operation of the power plant at full capacity, despite the challenges posed by climate change.

The most likely future operational impacts on NEK due to climate change-related trends are expected to affect thermal efficiency and power output, primarily due to:

- Rising ambient air and cooling (river) water temperatures
- Reduced water availability due to more frequent periods of low river flow
- Operational constraints related to thermal discharge limits.

The study shall analyse the existing CW and CT systems, to assess available upgrade technologies. It shall provide recommendations considering:

- Compatibility with existing infrastructure
- Cost-benefit analysis
- Operational lifespan until 2043, with potential license renewal until 2063 (80 years of operation).

The Feasibility Study shall cover, but not be limited to, the following key aspects:

- Technical feasibility of potential CW and CT Systems upgrade solutions
- Economic and financial analysis of implementation costs and long-term savings
- Implementation strategy to minimize plant downtime
- Conclusions and recommendations for optimal system upgrades.

2.1. Technical Feasibility

Based on available data, climate change is projected to worsen low river flow and increase cooling water temperatures by up to 20%. To improve resilience, sustain production efficiency, and ensure compliance with environmental regulations, the study should evaluate the current CW and CT systems and propose the most viable and cost-effective upgrades.

The feasibility study shall evaluate available technical solutions, including but not limited to:

a. Assessing the maximum achievable increase in NEK Cooling Towers System performance while maintaining the existing arrangement (2 pumps and 3 Cooling Towers with 16 cells) by upgrading or replacing necessary CW and/or CT Systems equipment (including pumps and cell components).

b. Investigating the feasibility of installing additional cells to existing three Cooling Towers, with various options considered (e.g., two, three, or more new cells).

Investigation should evaluate the impact of installing new cells, either with additional CT pumps or in combination with more efficient components and other necessary infrastructure upgrades (e.g. more powerful fans, improved drift eliminators and louvers, cooling tower basin modifications).

c. Investigating the feasibility of installing additional Cooling Tower to existing NEK CW and CT Systems. Investigation should evaluate the impact of installing new Cooling Tower, either with additional CT pumps or in combination with more efficient CW/CT components and other necessary infrastructure upgrades.

d. Reviewing any other potential process optimizations and automation enhancements to improve overall CT system efficiency and reliability.

For each of these potential upgrades, the feasibility study must analyse Steam Supply System thermal efficiency impacts, evaluate operational reliability, and present pros and cons of each upgrade. The proposed solutions must ensure NEK's continuous operation at full capacity under climate conditions deteriorating by 20%.

2.2. Economic and Financial analysis

This section of the Feasibility Study shall assess the financial viability of upgrading the CW and CT systems, including estimates for capital investment and operating costs. A cost-benefit analysis will compare different upgrade options, considering initial investment versus long-term savings from improved efficiency and reduced water consumption. The assessment should be prepared for NEK's operation until 2043 and for operation until 2063.

2.3. Implementation Plan

The approximative implementation plan should outline a timeframe for the proposed technical solutions, assessing the need for a phased implementation approach to minimize plant downtime, ensuring continuous operation during the upgrade.

2.4. Conclusion and Recommendations

The final section shall define the preferred upgrade option, providing a clear justification for its selection. It will outline an implementation roadmap and summarize the associated benefits, costs, and risks.

3. SAFETY CLASSIFICATION OF WORK

This work is classified as NON-NUCLEAR SAFETY.

4. INPUT DATA

Before the start of the work, the Contractor shall define the list of all necessary inputs needed for performing the described scope of work. NEK will inform potential Contractor on availability of information sources and which of the stated sources can be delivered to Contractor and under which terms. NEK may decide that to some of the sources a Contractor will have access only at NEK site.

4.1. Environmental Conditions

The following environmental limiting conditions for operations are derived from the water and environmental protection permit and the related decisions (ref. [1] - [6]):

1. Maximum measured water daily average temperature in the river total mixing point must not exceed 28° C.
2. Maximum calculated river temperature increase at the total mixing point of Sava River should not exceed daily average of water river temperature rise (ΔT) of more than 3.0°C.
3. Circulating Water discharge temperature is limited to a value of 43°C on a daily average, at measuring point.
4. Cooling tower discharge temperature to Sava River is limited to a daily average of 43°C May to September and 30°C October to April measuring point.
5. Not more than 27,4 m^3/s of the Sava water flow may be used for cooling purposes.

4.2. Circulating Water System and Cooling Tower System Configuration

The Circulating Water System provides cooling water from the Sava River for the main condenser and the turbine building closed cycle cooling water heat exchangers. Cooling towers are used to supplement the river during periods of low flow in the river, or on high river flow periods when the water is too dirty and causes travelling screens section and taprogge debris filters clogging. The Circulating Water intake structure also provides a source of river water for the screen wash system. Main Circulating Water pump's bearings are supplied with water via two lubricating water pumps, which take suction from lubricating water tank.

The Circulating Water System provides cooling water for the main condenser and turbine building auxiliary coolers, 25 m^3/s (883 ft^3/s) of river water is used to remove waste heat from the energy cycle, which is adequate to satisfy system requirements for all normal and abnormal conditions including turbine trip from full load. The heated circulating water can be discharged to the river or partially recycled through cooling towers. The portion of heated water not recycled is discharged to the river. The Cooling Towers System is not required to function under plant emergency or cold shutdown conditions.

Design parameters used for the Circulating Water System are as follows:

a. Flow - 25 m^3/s (883 ft^3/s).
b. Normal temperature rise - 12.4°C (22.3°F).

The cooling tower design parameters are as follows:

a. Flow - 15 m^3/s (530 ft^3/s).
b. A 7.8°C (14°F) approach to a 23.3°C (74°F) wet bulb temperature.

The circulating water intake structure is located upstream of the low head dam, which maintains a minimum level of 150.00 m a.s.l. at the intake. Trash racks and travelling water screens are installed to remove trash and debris before the circulating water enters the pump chamber. Taprogge debris filters are installed upstream of each section of the condenser, to prevent debris blockage of condenser tubes. The system water requirements are supplied by three 33 % capacity vertical wet pit pumps which discharge into a concrete pressure tunnel leading to the turbine building with condenser.

The main condenser is a single pass, twin shell and divided water box type. It is divided into four sections. Each section is separately connected to the intake and discharge tunnels and can be isolated. The condenser is equipped with a Taprogge tube cleaning system. The turbine building closed cycle cooling water heat exchangers are connected to the tunnels in parallel with the main condenser. A concrete pressure tunnel returns the water to the discharge structure located downstream of the river dam. The discharge structure contains the seal pit and the pump chamber for two Cooling Tower pumps.

During periods of low river flow or when river is too dirty, the cooling towers are used to reduce heat input to the river or reduce river water intake. The two 50 % capacity Cooling Tower pumps divert up to 15 m^3/s of the circulating water to the cooling towers in a concrete pressure tunnel. From the cooling tower cold water basins, the water flows by gravity in an open flume back to the Circulating Water pumps intake. A diversion flume with recirculation gates is provided to permit a discharge of 5 m^3/sec of the diverted circulating water to Sava River and return of 10 m^3/sec to the Circulating Water intake structure.

The cooling towers 1 and 2 are a induced draft double-flow crossflow type with six cells per each of them and provide additional cooling of the main condenser discharge water when the river temperature rise (ΔT) exceeds 3.0°C or when river flow due to rainfall exceeds 700 m^3/s and becomes too dirty and causes travelling screens section and taprogge debris filters clogging. The third cooling tower is a induced-draft counter-flow concrete structure with four cells, equipped with the two speed fan motors.

When daily average temperature rise (ΔT) is less than 3.0°C (Sava River flow is approx. 90 m^3/s or higher) main turbine condenser can be cooled by the river water (once-through cooling) and Cooling Tower System out of service. On the other hand, when daily average temperature rise (ΔT) reaches 3.0°C limit, Cooling Tower System is placed into operation. Number of CT pumps and towers in operation depends on Sava River flow (i.e. current ΔT). As much as possible, cooling tower water is discharged into the river as colder river water is preferred. The maximum discharge channel capacity depends on the highest allowed water level and the height of the recirculation gates (at water level about 2.0 m in the discharge channel about 6 m^3/s can be discharged to the river). The rest of tower cooling water is diverted back to the CW intake structure. Cooling Tower System operation strategy is determined according to the plant procedure in order not to exceed ΔT limit of 3.0°C. This may involve starting the second cooling tower pump, tower cells and fans as needed.

In case of ice formation in CW intake structure (screens and pumps), a de-icing system has to be used. In that case a portion of CW outlet water has to be directed into CW de-icing system and discharged through nozzles in front of CW intake structure trash racks in order to prevent the formation of frazil ice. De-icing system is composed of de-icing pump and de-icing bypass pipeline with three valves, providing option of gravity or forced deicing flow. CW de-icing system can be used as direct recirculation with up to 4 m^3/s of CW water without cooling, which increases the recirculation capacity and reduces the consumption from the Sava River. The study should also evaluate this system for extreme conditions, such as low flow scenarios.

The Circulating Water System piping and valves are designed in accordance with applicable industry codes and standards. Condensers are designed in accordance with Heat Exchange Institute Standards. The turbine building closed cycle cooling heat exchangers are designed in accordance with ASME Code, Section VIII, Division 1, and Standards of Tubular Exchanger

Manufacturers Association Class C. Pumps are designed in accordance with Hydraulic Institute Standards.

5. APPLICABLE WORK CONTROL PROGRAM

Each document and product shall be verified by the Contractor in accordance with Contractor's QA Program, which complies with ISO 9001 or a comparable standard.

6. APPLICABLE CODES, STANDARDS AND REFERENCES FOR THE WORK

The following documents shall be taken into account:

[1] USAR rev. 31

[2] DCM-SD-041, Circulating Water System, Final System Design Description, Rev. 4, 2024

[3] NEK-ESD-TR-19/01 Cooling tower strategy in winter (Strategija hladilnih stolpov pozimi), 2003.

[4] Environmental permit for emissions into water (Environmental Agency of the Republic of Slovenia, No. 35441-103/2006-24 of 30. 6. 2010, which was amended (amended points 1.1, 1.4 and 1.8) and re-decided by decision No. 35441-103/2006-33 of 4. 6. 2012 and amended (amended point 1.5, Table 3) by decision No. 35444-11/2013-3 of 10. 10. 2013 (Okoljevarstveno dovoljenje glede emisij v vode (Agencija RS za okolje, št. 35441-103/2006-24 z dne 30. 6. 2010, ki je bilo spremenjeno in v treh točkah izreka (spremenjene točke 1.1, 1.4 in 1.8 OVD) in ponovno odločeno z odločbo št. 35441-103/2006 -33 z dne 4. 6. 2012 ter spremenjeno (spremenjena točka 1.5, Tabela 3) z odločbo št. 35444-11/2013-3 z dne 10. 10.2013).

[5] Environmental Agency of the Republic of Slovenia water permit: partial water permit No. 35536-31/2006-16 of 15. 10. 2009 and decision on amendment of water permit No. 35536-54/2011-4 of 8. 11. 2011, decision No. 35536-26/2011-9 of 23. 5. 2013, decision No. 35530-7/2018-2 of 22. 6. 2018 (Vodno dovoljenje ARSO: delno vodno dovoljenje št. 35536-31/2006-16 z dne 15. 10. 2009 in odločba o spremembi vodnega dovoljenja št 35536-54/2011-4 z dne 8. 11. 2011, odločba št. 35536-26/2011-9 z dne 23. 5. 2013, odločba št. 35530-7/2018-2 z dne 22. 6. 2018).

[6] Environmental consent for the lifetime extension of NEK from 40 to 60 years, No. 35428-4/2021-2550-96, dated 13 January 2023, final on 21 February 2023 (Okoljevarstveno soglasje za poseg: podaljšanje obratovalne dobe NEK s 40 na 60 let, št. 35428-4/2021-2550-96, z dne 13. 1. 2023, pravnomočno dne 21. 2. 2023).

[7] Climate Change: Assessment of the Vulnerability of Nuclear Power Plants and Approaches for their Adaptation (Nuclear Energy Agency – NEA, 2021)

[8] Nuclear Plant Resilience in the Face of Climate Change (EPRI, October 2021).

[9] Anticipating Climate Impacts to Nuclear Power Plants (EPRI, November 2023).

[10] INPO 24-002 Climate Vulnerability Assessment (INPO, March 2024).

[11] Climate variability in Slovenia in the period 1961-2011 (Podnebna spremenljivost Slovenije v obdobju 1961-2011) (ARSO, May 2018).

[12] Environmental Impact Assessment Report "Extension of Krško NPP's Operational Lifetime from 40 to 60 Years – Nuklearna Elektrarna Krško D.O.O." No.: 100820-dn, Ljubljana, October 2021, amended 8 November 2021, 10 January 2022, 5 May 2022.

[13] Energy facilities along and on the Sava River - Thermal analysis of the Sava River in August 2012 (Energetski objekti ob in na reki Savi - Analiza termike Save v avgustu 2012) (IBE, 2012).

[14] Energy facilities along and on the Sava River - Analysis of river temperatures on the lower Sava in July and August 2019 and verification of previous studies - revision A (Energetski objekti ob in na reki Savi - Analiza rečnih temperatur na spodnji Savi v juliju in avgustu 2019 ter verifikacija dosedanjih študij - revizija A) (IBE, April 2020).

[15] Mutual impacts of energy facilities along and on the Sava River from the perspective of the thermal load on the Sava - revision A, (Medsebojni vplivi energetskih objektov ob in na reki Savi z vidika toplotne obremenitve Save -revizija A) (IBE, 2012).

[16] Assessment of the impacts of the construction of the Suhadol, Trbovlje and Renke HPPs on the temperature of the Sava River, (Ocena vplivov izgradnje HE Suhadol, HE Trbovlje in HE Renke na temperaturo reke Save), (IBE, 2023).

Other as applicable as per Contractor findings.

7. AFFECTED SYSTEMS

No plant systems are directly affected with the Feasibility Study.

8. IDENTIFICATION OF AFFECTED EQUIPMENT

No equipment is directly affected with the Feasibility Study.

9. REVIEW AND/OR VERIFICATION OF WORK

The Contractor is required to conduct an independent review of the work performed within their organization, in accordance with their own Quality Assurance Program.

10. SCHEDULE REQUIREMENTS

Below schedule requirements apply, if it is not otherwise appointed in Request for Quotation (RFQ).

Overall Schedule Requirements for Project Deliverables (milestone dates) are following:

Description	***Milestone***
Date of contract approval	T0
Preliminary Feasibility Study	T0 + 5 months
NEK's review and comments on Preliminary Feasibility Study	T0 + 6 months
Final Feasibility Study	T0 + 7 months

The Contractor is responsible for completing the required tasks on time.

NEK will provide feedback on the preliminary Feasibility Study, and it should be noted that the review process may require several iterations before it is finalized.

The Contractor must address all NEK comments and submit the Final Feasibility Study.

The Feasibility Study will be reviewed and approved by NEK.

11. STATUS REPORTING REQUIREMENTS

There are no special status reporting requirements.

12. WORK TO BE PERFORMED OR INFORMATION TO BE PROVIDED BY NEK

NEK will supply the Contractor with the inputs that the Contractor will require for the Scope of Work. Note that some of the documents may only be available at the NEK site due to proprietary requirements.

NEK will assist the Contractor with technical experts where support or clarification of open technical issues is required.

NEK will perform review of the Feasibility Study (preliminary and final).

13. CHANGES OF WORK SCOPE

The Contractor shall identify any scope changes that could cause an impact the Contractor's cost or schedule of the project by the issuance of a Contractor Change of Work Scope Request. The Contractor shall not proceed with a change in the scope of the Work until written approval has been authorized by NEK. It is the Contractor's obligation to notify the NEK Responsible Person in writing of the noted scope change and it is the responsibility of the NEK Responsible Commercial Person to attempt to respond within 15 working days of the acceptability of the Contractors scope change request. Unauthorized Work will not be reimbursed by NEK.

14. DELIVERABLES

The Contractor will be required to provide following deliverables according to the schedule outlined in Section 10:

- Preliminary Feasibility Study
- Final Feasibility Study.

14.1. Bid Proposal Deliverables

The bid shall contain Contractor's Technical Approach Plan. For details see Section 17.

The Contractor's and Subcontractor's relevant references in the field of upgrading NPP cooling systems with the aim of improving efficiency and reducing water consumption to adapt to the effects of climate change shall be submitted to NEK.

14.2. Project Deliverables

The Contractor shall provide the Feasibility Study timely with the Schedule Requirements (see Section 10).

Deliverable Item	Number of Copies
Preliminary Feasibility Study	1 Adobe pdf 1 Word docx
Final Report (final documentation)	1 hard copy 1 Adobe pdf 1 Word docx

All documentation shall be written in English language.

14.2.1. Table of contents

The Feasibility Study should include, but not be limited to, the following contents:

Executive Summary

- Purpose of the study
- Key findings and recommendations
- Cost-benefit analysis

Background and Objectives

- Overview of the existing CW and CT systems
- Identified climate change risks
- Goals of the upgrade

Technical Feasibility

- Assessment of available cooling technologies
- Compatibility with existing infrastructure
- Energy efficiency and operational reliability analysis

Economic and Financial Analysis

- Capital investment and operating cost estimates
- Cost-benefit comparison of different cooling system options

Implementation Plan

- Timeframe for the proposed technical solutions
- Implementation approach to minimize plant downtime

Conclusion and Recommendations

- Preferred upgrade option and justification
- Roadmap for implementation
- Summary of benefits, costs, and risks

14.2.2. Page Numbering

All subsequent pages including attachments shall be sequentially numbered starting with the Table of Contents as "Page 2 of XX". Page numbers should be placed on the bottom right corner of each page.

14.2.3. Text Processor and Document Layout

The Feasibility Study shall respect the following requirements:

Word Processor:	Microsoft Word, Excel (for figures and tabulated data)
Paper:	A4
Margins:	Top, Bottom, Left, Right – 2.54 cm (1 inch)
Font:	Verdana 10 pt (text)
	Verdana 14 pt Bold (Chapter Title – i.e. Chapter 6.0, or Chapter 2.0)
	Verdana 12 pt Bold (Subchapter Title – i.e. Subchapter 4.1, or Subchapter 5.2)
Pictures:	All the pictures must be delivered electronically in appropriate, clearly readable resolution and file format.

15. DOCUMENTS AND RECORDS

All the final and interim documents in connection with the work implementation shall be delivered to NEK in the prescribed format in time. They are property of NEK and can be modified depending on potential changes.

The Contractor shall provide NEK all original records generated during the project, and these shall become NEK property. These records could be independent reports, calculations, walk-down report etc.

16. ORGANIZATIONAL CONTACT

Contractor shall co-ordinate all technical and scheduling matters with the assigned NEK project manager and responsible engineers.

NEK project manager:

Blaž Likovič

Phone:+ 386 7 4802 646

E-mail: blaz.likovic@nek.si

NEK responsible engineer:

Sabina Pungerčar

Phone:+ 386 7 4802 166

E-mail: sabina.pungercar@nek.si

NEK responsible engineer:

Ilijana Iveković

Phone:+ 386 7 4802 519

E-mail: ilijana.ivekovic@guest.nek.si

Commercial items are to be addressed with the NEK Commercial Department representative. The representative will be defined during the bidding process.

17. CONTRACTOR TECHNICAL APPROACH TO THE WORK

The bid shall contain the Contractor's interpretation of the scope of work. The bid shall also contain references to similar work performed by the Contractor in the field of upgrading NPP cooling systems with the aim of improving efficiency and reducing water consumption to adapt to the effects of climate change in a cost-effective manner.

18. ACCESS TO CONTRACTOR FACILITY AND DOCUMENTS

For the purpose of the review of work quality and progress, the Contractor will grant NEK access to Contractor's or to its Authorized Sub-contractor's work process.

19. SUBCONTRACTED WORK

The Contractor can subcontract any portion of the work to qualified subcontractors. The work cannot be subcontracted without the written approval of the NEK. Subcontractors will be required to be technically qualified to the satisfaction of NEK criteria.

20. QUALITY ASSURANCE REQUIREMENTS

The work shall be performed in accordance with Contractor's QA Program, which complies with ISO 9001 or a comparable standard, and requirements of NEK QS 610, Rev.2, Generic Quality Assurance Program Requirements.

If the Contractor's QA Program Manual has not been previously accepted by NEK, it shall be submitted to NEK as part of Proposal.

21. NEK PROPRIETARY DATA

NEK has a proprietary interest in all the drawings, designs, specifications, documents, information, or know-how that may be furnished pursuant contract execution. Also, NEK has a proprietary interest in any know-how, improvement, discovery, or invention that may be made, developed, or conceived in the performance of the scope of work under this specification. All such information shall be considered proprietary to the NEK. The right to use all such Information shall be transmitted to the Contractor only for its personnel use and shall be entirely restricted to the performance of the Contract and subject to the confidentiality provision.

22. ATTACHMENTS

22.1. DCM-SD-041, Circulating Water System, Final System Design Description

22.2. NEK Process Information System values for key study parameters

(will be agreed within the scope of work)