WOLF CREEK
NUCLEAR OPERATING CORPORATION

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JUL 7 2000

WO 00-0030

U. S. Nuclear Regulatory Commission
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Reference: Letter ET 00-0018, dated March 31, 2000, from R. A. Muench, WCNOC, to USNRC

Subject: Docket No. 50-482: Supplemental Information To Amendment Request To Technical Specification 3.7.9, Ultimate Heat Sink (UHS)

Gentlemen:

The Reference provided an application for amendment to Facility Operating License No. NPF-42 that proposed to revise Wolf Creek Generating Station (WCGS) Technical Specification 3.7.9, "Ultimate Heat Sink (UHS)," by adding a new ACTION (Condition A). The new ACTION proposed to allow WCGS to operate above the current plant inlet UHS water temperature limit of 90 °F provided certain Required Actions were taken. In discussions with the NRC staff on May 3, 2000, June 1, 2000, June 28, 2000, and July 7, 2000, additional information was requested to support the review of the application. That information is provided herein.

In addition to the information noted above, two changes to the specifications are also provided in this submittal. As discussed with the NRC staff, the proposed Required Action A.1 is revised to verify that the water level of the main cooling lake is greater than or equal to 1075 ft. mean sea level. The Completion Time for Required Action A.1 and A.2 is revised as discussed on June 28, 2000.

Attachment I provides additional information as requested by the NRC. Attachment II provides revised marked up changes to the Technical Specifications and includes all the pages that were previously provided in the Reference. Attachment III provides revised marked up changes to the Technical Specification Bases for information and includes all the pages that were previously provided in the Reference. The supplemental information provided herein does not impact the conclusions of the No Significant Hazards Consideration provided in the Reference.

As discussed with the NRC staff, in the No Significant Hazards Consideration Determination provided in the Reference, Standard III makes reference to 95 °F. The number under Standard III should be 94 °F.

A001

In accordance with 10 CFR 50.91, a copy of this application, with attachments, is being provided to the designated Kansas State Official. There are no commitments associated with this submittal. If you should have any questions regarding this submittal, please contact me at (316) 364-4112, or Mr. Tony Harris at (316) 364-4038.

Very truly yours,

Britt T. McKinney

BTM/rlr

Attachments: I - Supplemental Information
II - Revised Markups of Technical Specification Pages
III - Revised Markups of Technical Specification Bases Pages

cc: V. L. Cooper (KDHE), w/a
J. N. Donohew (NRC), w/a
W. D. Johnson (NRC), w/a
E. W. Merschoff (NRC), w/a
Senior Resident Inspector (NRC), w/a

STATE OF KANSAS)
) SS
COUNTY OF COFFEY)

Britt T. McKinney, of lawful age, being first duly sworn upon oath says that he is Vice President Plant Operations and Plant Manager of Wolf Creek Nuclear Operating Corporation; that he has read the foregoing document and knows the content thereof; that he has executed that same for and on behalf of said Corporation with full power and authority to do so; and that the facts therein stated are true and correct to the best of his knowledge, information and belief.

By Britt T. McKinney
Britt T. McKinney
Vice President Plant Operations and
Plant Manager

SUBSCRIBED and sworn to before me this 7 day of July, 2000.

RHONDA L. RODGERS
My Appt. Exp. 5-11-2002

Rhonda L. Rodgers
Notary Public

Expiration Date May 11, 2002

ATTACHMENT I

SUPPLEMENTAL INFORMATION

Supplemental Information

Question 1:

Confirm that the equipment required for safe shutdown will not exceed any design limits at the peak temperature of 97 °F. Identify any exceptions and provide justification, including vendor concurrence. Provide a complete listing of design-basis parameters that will be exceeded and justification for why it is acceptable to exceed these parameters.

Response:

Subsequent to the March 31, 2000 amendment request, additional analysis was completed and the below information supplements the information previously provided.

Shutdown after a LOCA and the main cooling lake dam intact

An evaluation has been performed with the LAKET computer program and ultimate heat sink (UHS) model using the worst case design basis weather conditions. The only changes to the evaluation are a starting lake temperature of 94 °F and increasing the lake volume to account for a higher water level of 1075 ft. mean sea level (MSL). The surface area of the additional water was conservatively kept the same as the UHS area while increasing the volume of water. The maximum temperature analysis, with the main cooling lake dam intact and design basis loss of coolant accident (LOCA) heat loads, resulted in a peak temperature of 94.4 °F. As such, the current licensing basis analysis for containment integrity would not be impacted because the maximum temperature of the cooling water supplied by the Essential Service Water (ESW) System for the containment fan cooler would remain within the temperature limit of 95 °F. This temperature limit was previously derived from the UHS analysis and reflected the highest credible temperature throughout the accident, based on an initial lake water temperature of 90 °F. Therefore, the design basis temperature limit of 95 °F for shutdown following a LOCA would not be exceeded with the main cooling lake dam intact.

The following supplements the text under the paragraph entitled "Safe shutdown or post-accident capability without the main cooling lake dam" in Attachment I to the March 31, 2000 amendment request (letter ET 00-0018), page 7 of 10:

Safe shutdown capability without the main cooling lake dam

Safe shutdown capability is ensured without the main cooling lake dam intact and lake water temperature less than or equal to 94 °F. Analysis completed since the March 31, 2000 amendment request with an initial lake water temperature of 94 °F results in a maximum short time peak temperature of 96 °F rather than the 97 °F stated in the March 31, 2000 amendment request. The time duration where the analysis predicted the lake water temperature to increase above 95 °F is only a few hours with the first occurrence being at the beginning of the third day after shutdown when the plant would be in cold shutdown. In fact, for the first 48 hours, the average lake water temperature would be about 91.5 °F.

The plant inlet water temperature typically varies 4 or 5 °F from the daytime peak to the overnight minimum. This diurnal variation reflects heat gained by the lake during the daytime

hours and net heat loss from the lake during nighttime hours. Throughout the entire analysis period, the lake water temperature would exceed the design basis temperature of 95 °F by a maximum of 1 °F for only a few hours on three occasions and 95% of this time the water temperature returning to the plant would be less than 94°F. Given the conservatism in the LAKET computer program, the ESW System inlet water temperature is expected to remain below the 95 °F design basis limit.

Safe shutdown equipment utilizing Component Cooling Water (CCW) would not be affected since the Residual Heat Removal (RHR) System flow is throttled during the initial RHR cooldown period to maintain the CCW heat exchanger outlet water temperature below 120 °F. This limitation is imposed by cooling water temperature requirements of the reactor coolant pumps plus a suitable margin deemed necessary to provide adequate protection of these pumps. Only the cooldown time could potentially be lengthened as discussed in the response to Question 2 below.

The plant room coolers, heat exchangers, and air conditioning units which are supplied cooling water by the ESW System were specified during the original plant design to have an operating capability that is well in excess of the calculated heat removal capacity based on a constant water temperature of 95 °F. Manufacturers typically then designed and constructed these components with a capability in excess of the specified value. This has resulted in a"design margin" existing between actual heat loading and unit capability. This margin has been available for off-setting other variable conditions expected to occur in the design and operation of the equipment. Some of the variable conditions to be off-set would be the plugging of leaking heat exchanger tubes, changes to the cooling water flow rates or other changes to hydraulic conditions, and other minor excursions in the cooling water temperature. Although design margins for some of the equipment have been reduced during the operating life of the plant, significant margins remain for most components.

For the scenario of shutdown with the UHS only, the resulting potential increase in peak ESW System water temperature to 96 °F is considered a small increase. More importantly, the time duration where the analysis predicted the water temperature to increase above 95 °F is only a few hours with the first occurrence being at the beginning of the third day after shutdown when the plant would be in cold shutdown. Given the potential small increase in ESW System water temperature above 95 °F and the short cyclical duration of the increase, it is not expected that there would be any significant increase in room temperatures or any equipment operation abnormalities resulting from a slight room temperature excursion if it were to occur.

The room coolers and air conditioning units which are impacted by an increased cooling water temperature are all considered support equipment. This equipment does not perform a direct active function in the safe shutdown of the plant. This equipment supports other equipment required for safe shutdown. For those rooms where equipment required for safe shutdown is located and where no margin is assumed to be available in the room coolers, the 1 °F ESW System water temperature increase could translate into a small increase in room temperatures. Any increase in these room temperatures would be only marginal, of a transient nature, and insignificant.

For equipment which is qualified to operate in a harsh environment under IEEE-323, "Institute of Electrical and Electronics Engineers, Standard for Qualifying Class IE Equipment for Nuclear Power Generating Stations - 1974" requirements, a higher continuous operating room

temperature would have the possibility of impacting the environmental qualification (EQ) qualified life of the equipment. However, the EQ equipment is typically qualified with a large margin between the maximum expected room temperatures that are used in the qualified life calculation and the temperatures which have actually existed in the room. In the case of the shutdown after the loss of the main cooling lake dam, the short duration of the potential room temperature transient, the small increase in the temperature as well as the calculation margin again assures that there will be no impact on the qualified life of any EQ equipment.

Although the equipment is qualified for an environment expected after a design basis accident, the components are only subjected to normal operating conditions for most of the design life. Therefore, the thermal aging due to normal operating conditions is of major importance and is the parameter controlled by Technical Requirement (TR) 3.7.22, "Area Temperature Monitoring." This TR establishes temperature limits during normal operation for specific locations in various buildings, excluding containment. If the established temperature limits are exceeded, actions are taken to either restore temperature to within limits or determine OPERABILITY of the affected equipment. As such, the appropriate actions are taken to ensure equipment remains functional or equipment OPERABILITY determined.

The Emergency Diesel Generator (EDG) heat exchangers would not be impacted by the small increase in ESW System water temperature to 96 °F because the tube plugging limit for these exchangers has been administratively established. These administrative limits are based on a constant ESW System water temperature of 96 °F. The EDG vendor has supplied de-rate factors for the diesel engine for various inter cooler water temperatures. The EDG will be able to meet the design bases requirements stated in the Updated Safety Analysis Report (USAR) Section 8.3.1.1.3 considering the slight increase in ESW System water temperature.

Question 2:

In order to satisfy the TS requirements and be able to achieve cold shutdown within 36 hours, the average temperature of the Lake cannot exceed 91.6 °F. Modify the proposed TS Action Requirement to include provisions to assure that this condition will be satisfied.

Response:

With plant inlet water temperature of the UHS at 94°F and two RHR trains operating, cool down of the plant to cold shutdown can be completed in about 8 hours after shutdown. With plant inlet water temperature of the UHS at 94 °F and one RHR train operating, cool down of the plant to cold shutdown can be completed in about 46 hours after shutdown. However, if a plant shutdown and subsequent cooldown were required with only one RHR train available, plant procedures allow the cool down of the plant using other means such as the Auxiliary Feedwater System in conjunction with steam generators and their associated atmospheric relief valves or minimizing pump heat by securing the operating reactor coolant pump(s). It is expected, based on engineering judgment, that a plant cooldown to cold shutdown conditions using only one RHR

train along with the other available means mentioned above can be accomplished within 36 hours after shutdown. As discussed in the TS Bases 3.7.5, "Auxiliary Feedwater (AFW) System," in MODE 4 the AFW System may be used for heat removal via the steam generators but is not required since the RHR System is available and required to be OPERABLE in this MODE.

The TS Bases for TS 3.7.9, "Ultimate Heat Sink (UHS)," indicate that the requirement to place the plant in cold shutdown within 36 hours is based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems. Utilization of available plant equipment will result in the ability to achieve cold shutdown in an orderly manner within the 36 hours specified in the Technical Specifications. As discussed in USAR Section 5.4A.3, the safe shutdown design basis is hot standby (MODE 3), which can be achieved within 6 hours. As such, there is no safety significance with not achieving cold shutdown within 36 hours. Should MODE 5 not be achieved within the 36 hours specified in Required Action A.2 (proposed B.2), entry into LCO 3.0.3 would be required since the associated ACTIONS were not met. Entry into LCO 3.0.3 would require the plant to continue to cooldown and place the plant in MODE 5.

Based on the above, WCNOC does not believe that additional changes to the TS on the ability to achieve cold shutdown are required. However, the TS 3.7.9 Bases are revised to include information concerning calculated cooldown times for a single RHR train with an elevated plant inlet water temperature.

Question 3:

Research and establish a minimum quantity of water that is needed in the finger area of the lake (as compared to the quantity of water that is contained in the UHS, such as 2X, 3X, 4X) to assure that the intake cooling water temperature will not exceed 95 °F during the design-basis LOCA. Include provisions in the TS Action Requirement to assure that this condition will be satisfied.

Response:

The following supplements the text under the paragraph entitled "LOCA with the main cooling lake dam intact" in Attachment I to the March 31, 2000 amendment request , page 7 of 10:

Additional evaluations were performed subsequent to the March 31, 2000 amendment request with the LAKET computer program and UHS model using the worst case design basis weather conditions. The only changes to the evaluation are a starting lake temperature of 94 °F and increasing the lake volume to account for a higher water level of 1075 ft. MSL. The surface area of the additional water was conservatively kept the same as the UHS area while increasing the volume of water. The maximum temperature analysis, with the main cooling lake dam intact and the design basis LOCA heat loads, resulted in a peak temperature of 94.4 °F. Therefore, the design basis temperature limit of 95 °F for shutdown following a LOCA would not be exceeded with the main cooling lake dam intact.

To assure that the above condition will be satisfied, Required Action A.1 has been modified to verify water level of main cooling lake greater than or equal to 1075 ft. MSL.

During the telecon on June 28, 2000, the NRC indicated that the Completion Times for the proposed new Condition should be modified to require the verification of main cooling lake level and plant inlet water temperature at an increased frequency. Specifically, the Completion Time for Required Action A.1 is revised to "1 hour AND Once per 12 hours thereafter" and Required Action A.2 is revised to "Once per hour." The lake level and plant inlet water temperature readings are readily available from the plant computer. Therefore, since entry into Condition A is expected to be infrequent, the increased frequency of the Completion Times is acceptable. Additionally, as discussed on July 7, 2000, the TS Bases are revised to indicate that a main cooling lake dam monitoring program, consistent with the recommendations of Regulatory Guide 1.127, Revision 1, ensures that a sudden catastrophic failure of the main cooling lake dam is highly unlikely.

ATTACHMENT II

REVISED MARKUPs OF TECHNICAL SPECIFICATION PAGES

3.7 PLANT SYSTEMS

3.7.9 Ultimate Heat Sink (UHS)

LCO 3.7.9 The UHS shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
INSERT 3.7-20 ~~A. UHS inoperable.~~	~~A~~.1 Be in MODE 3.	6 hours
B	AND	
	~~A~~.2 Be in MODE 5.	36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.9.1	Verify water level of UHS is ≥ 1070 ft mean sea level.	24 hours
SR 3.7.9.2	Verify plant inlet water temperature of UHS is ≤ 90°F.	24 hours

B. Required Action and associated Completion Time not met.

OR

UHS inoperable for reasons other than Condition A.

INSERT 3.7-20

A. Plant inlet water temperature of UHS not within limit.	A.1	Verify ~~required cooling capacity maintained.~~ **water level of main cooling lake ≥ 1075 ft. mean sea level.**	~~4 hours~~ **1hour** AND Once per 12 hours thereafter
	AND		
	A.2	Verify plant inlet water temperature of UHS is ≤ 94 °F.	Once per ~~12 hours~~ **hour**

ATTACHMENT III

REVISED MARKUPs OF TECHNICAL SPECIFICATION BASES PAGES

FOR INFORMATION ONLY

B 3.7 PLANT SYSTEMS

B 3.7.9 Ultimate Heat Sink (UHS)

BASES

BACKGROUND

The UHS provides a heat sink for processing and operating heat from safety related components during and following a transient or accident or a plant cooldown using only safety grade equipment. This is done by utilizing the Essential Service Water (ESW) System and the Component Cooling Water (CCW) System.

The design temperature of water supplied to the plant is assumed to be 95°F.

The UHS is the normally submerged seismic Category I cooling pond. The UHS is formed by providing a volume of cooling water behind a Seismic Category I dam built in one finger of the main cooling lake. The two principal functions of the UHS are the dissipation of residual heat after reactor shutdown, and dissipation of residual heat after an accident.

The basic performance requirements are that a 30 day supply of water be available, and that the design basis temperatures of safety related equipment not be exceeded.

Additional information on the design and operation of the system, along with a list of components served, can be found in Reference 1.

APPLICABLE SAFETY ANALYSES

The UHS is the sink for heat removed from the reactor core following all accidents and anticipated operational occurrences in which the unit is cooled down and placed on residual heat removal (RHR) operation. Its maximum post accident heat load occurs after a design basis loss of coolant accident (LOCA) when the unit switches from injection to recirculation and the containment cooling systems and RHR are required to remove the core decay heat.

The operating limits are based on conservative heat transfer analyses for the worst case LOCA. Reference 1 provides the details of the assumptions used in the analysis, which include worst expected meteorological conditions, conservative uncertainties when calculating decay heat, and worst case single active failure (e.g., single failure of a manmade structure). The UHS is designed in accordance with Regulatory Guide 1.27 (Ref. 2), which requires a 30 day supply of cooling water in the UHS.

The UHS satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

BASES

LCO

The UHS is required to be OPERABLE and is considered OPERABLE if it contains a sufficient volume of water at or below the maximum temperature that would allow the ESW System to operate for at least 30 days following the design basis LOCA without exceeding the maximum design temperature of the equipment served by the ESW System. To meet this condition, the UHS temperature should not exceed 90°F and the level should not fall below 1070 ft mean sea level during normal unit operation.

APPLICABILITY

In MODES 1, 2, 3, and 4, the UHS is required to support the OPERABILITY of the equipment serviced by the UHS and required to be OPERABLE in these MODES.

In MODE 5 or 6, the OPERABILITY requirements of the UHS are determined by the systems it supports.

ACTIONS

INSERT B 3.7.9-2

If the Required Actions are not completed within the associated Completion Time, or the UHS is inoperable for reasons other than Condition A,

B

~~A~~.1 and ~~A~~.2

~~If the UHS is inoperable, because either inlet water temperature > 90°F or water level is below 1070 ft MSL,~~ the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 6 hours and in MODE 5 within 36 hours.

The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.9.1

This SR verifies that adequate long term (30 day) cooling can be maintained. The 24 hour Frequency is based on operating experience related to trending of the parameter variations during the applicable MODES. This SR verifies that the UHS water level is ≥ 1070 ft mean sea level (USGS datum).

SR 3.7.9.2

This SR verifies that the ESW System is available to cool the CCW System to at least its maximum design temperature with the maximum accident or normal design heat loads for 30 days following a Design Basis Accident. The 24 hour Frequency is based on operating experience

INSERT B 3.7.9-2

A.1 and A.2

If the inlet water temperature of the UHS exceeds 90 °F, the unit cannot provide a 30 day supply of cooling water in the event of a worst case LOCA concurrent with the failure of the main cooling lake dam as specified by Regulatory Guide 1.27. As such, action is taken to verify that ~~the required cooling capacity is maintained. The required cooling capacity is maintained with~~ the main cooling lake dam is intact. Verification that the main cooling lake dam is intact is based on verification that the lake level is ~~>~~ ≥ **1075** ~~1085~~ ft mean sea level. With the main cooling lake dam intact, the volume of the lake is sufficient to ensure the design basis temperature of the safety related equipment is not exceeded **(Ref. 3). The main cooling lake dam monitoring program, which is consistent with the recommendations of Regulatory Guide 1.127, Revision 1, ensures that a sudden catastrophic failure of the dam is highly unlikely.** During the time period the inlet water temperature of the UHS is > 90 °F, temperature is verified to be ≤ 94 °F once per ~~12 hours~~ **hour**. This verification ensures the plant inlet temperature remains below the maximum water temperature allowed for the safety related components to perform their safety function.

When in this Condition, a heightened awareness of available plant equipment should be maintained. Additional measures (e.g., reduction in power level (Ref. 4) or securing of the operating reactor coolant pump(s) during a required plant cooldown) may be warranted with one RHR train inoperable for achieving MODE 5 within the specified Completion Time if a plant shutdown were required. Utilization of available plant equipment will result in the ability to achieve MODE 5 in an orderly manner within the specified Completion Time.

The Completion Time of Required Action A.1 is based on engineering judgment and the fact that degradation of the main cooling lake dam's structural, hydraulic, and foundation conditions is slow and significant degradation would be promptly detected and corrected prior to catastrophic failure of the main cooling lake dam.

~~The Completion Time of Required Action A.2 is based on engineering judgment and considered acceptable since temperature monitoring capability is available to the operators in the control room to quickly detect an increase in plant inlet water temperature~~. **The once per hour Completion Time of Required Action A.2 takes into consideration the increased monitoring frequency needed to ensure design basis assumptions are not exceeded in this condition.**

BASES

SURVEILLANCE REQUIREMENTS

SR 3.7.9.2 (continued)

related to trending of the parameter variations during the applicable MODES. This SR verifies that the average water temperature of the UHS is ≤ 90°F.

REFERENCES

1. USAR, Section 9.2.5.

2. Regulatory Guide 1.27, "Ultimate Heat Sink."

3. Amendment No. xxx, to Facility Operating License No. NPF-42, xxxx, xx, 2000.

4. Westinghouse letter SAP-9B-150 dated October 29, 1998.