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SUBJECT: Forwards final response to Generic Ltr 89-13 re svc water sys problems,consisting of actions completed for program implementation since original response on 900125.

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Donald C. Cook Nuclear Plant Units 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
GENERIC LETTER (GL) 89-13; SERVICE WATER SYSTEM
PROBLEM RESPONSE

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Attn: A. B. Davis

January 30, 1991

Dear Mr. Davis:

The purpose of this letter is to complete our response to GL 89-13. In our first response (AEP:NRC:1104 dated January 25, 1990) we committed to specific actions which were to be completed during the 1990 refueling outages for both units. In the January 25, 1990 letter, we also committed to report on our actions once the outages were over. This letter is written to confirm that the committed actions are now complete.

The attachment to this letter describes (in larger print) our actions that were completed for program implementation since our original January 25, 1990 response. For the reviewer's convenience, Action Items I thru V, including the recommendations, from the GL 89-13 enclosures and our January 25, 1990 response are reiterated (in smaller print) in the attachment.

This letter is submitted pursuant to 10 CFR 50.54(f) and, as such, an oath is enclosed.

Sincerely,

M. P. Alexich
Vice President

ldp

Attachments

A065
'|1

bc: S. J. Brewer/K. J. Toth
T. O. Argenta/R. F. Kroeger
J. G. Feinstein - w/o
M. L. Horvath - Bridgman - w/o
J. F. Kurgan - w/o
J. J. Markowsky
J. B. Shinnock - w/o
B. Holian, NRC - Washington, D. C.
AEP:NRC:1104A
DC-N-6015.1

Initial responses submitted January 25, 1990, to Actions I through V of Generic Letter 89-13 and program implementation summary are as follows:

ACTION I

"For open-cycle service water systems, implement and maintain an ongoing program of surveillance and control techniques to significantly reduce the incidence of flow blockage problems as a result of biofouling. A program acceptable to the NRC is described in "Recommended Program to Resolve Generic Issue 51" (Enclosure 1). It should be noted that Enclosure 1 is provided as guidance for an acceptable program. An equally effective program to preclude biofouling would also be acceptable. Initial activities should be completed before plant startup following the first refueling outage beginning 9 months or more after the date of this letter. All activities should be documented and all relevant documentation should be retained in appropriate plant records."

RESPONSE I (1/25/90)

As a result of NRC IE Bulletin 81-03 entitled "Flow Blockage of Cooling Water to Safety System Components by Corbicula sp. (Asiatic clam) and Mytilus sp. (Mussel)" and INPO SOER 84-01 entitled "Cooling Water System Degradation Due to Aquatic Life," a program essentially in compliance with Enclosure 1 of Generic Letter 89-13 has already been established at Cook Nuclear Plant. With regard to the four specific recommendations of Enclosure 1, the following is a description of the program activities already in place and program enhancements that will be implemented prior to startup following the next refueling outage.

Recommendation A of Enclosure 1

The intake structure should be visually inspected, once per refueling cycle, for macroscopic biological fouling organisms (for example, blue mussels at marine plants, American oysters at estuarine plants, and Asiatic clams at freshwater plants), sediment, and corrosion. Inspections should be performed either by scuba divers or by dewatering the intake structure or by other comparable methods. Any fouling accumulations should be removed.

Response Recommendation A of Enclosure 1 (1/25/90)

Cook Nuclear Plant already complies with and will continue to comply with this recommendation. At least once per refueling cycle, the intake forebays are visually inspected for the presence of macroscopic biological fouling organisms, sediment, corrosion products, and miscellaneous debris. Inspections are performed by divers, with underwater cameras being used to document findings. Unusual sand accumulations and any debris that may have collected are removed at the time of the inspection. Evidence of macroscopic biological fouling has not been found.

Program Implementation Summary (1/91)

Inspections and sampling of the forebay as well as sampling of the intakes and discharge were performed during the 1990 refueling outage per procedure 12THP6020ENV.101 Rev. 4, "Mollusk Biofouler Sampling Analysis." This procedure was revised to include the requirements of GL 89-13 and established the methods for determining the presence of

Asiatic clams and zebra mussels. In our January 25, 1990, response, we indicated that evidence of macroscopic biological fouling had not been found. However, during inspections performed in July, 1990, zebra mussels were found in the plant vicinity and forebay.

Recommendation B of Enclosure 1

The service water system should be continuously (for example, during spawning) chlorinated (or equally effectively treated with another biocide) whenever the potential for a macroscopic biological fouling species exists (for example, blue mussels at marine plants, American oysters at estuarine plants, and Asiatic clams at freshwater plants). Chlorination or equally effective treatment is included for freshwater plants without clams because it can help prevent microbiologically influenced corrosion. However, the chlorination (or equally effective) treatment need not be as stringent for plants where the potential for macroscopic biological fouling species does not exist compared to those plants where it does. Precautions should be taken to obey Federal, State, and local environmental regulations regarding the use of biocides.

Response to Recommendation B of Enclosure 1 (1/25/90)

Temporary chlorination facilities can be connected to the open-cycle service water system at Cook Nuclear Plant. However, the water is presently not chlorinated because an actual macroscopic biological fouling problem has not been demonstrated to exist. Likewise, there has been no indication of microbiological growth during periods of high lake temperatures that would warrant chlorination of the service water system. However, since chlorination (liquid) of the circulating water has been necessary to prevent microbiological growth (slime buildup) in the tubes of the main and feedpump turbine condensers, a similar chlorination (liquid) program will be prepared on a contingency basis for the open-cycle service water system. Pending approval of the appropriate Federal, State, and local agencies, this program will consist of approximately 30 minutes per day chlorination from April through October. This program will comply with all environmental regulations regarding the use of biocides.

If necessary, fire protection water could be subjected to a chlorination program, because all normally used fire pumps take suction either directly or indirectly from the circulating water system. However, since macrobiological fouling is not a demonstrated concern at the plant and microbiological growth would not seriously impact flow capability, chlorination of the fire protection water is not considered necessary at this time.

Program Implementation Summary (1/91)

In our January 25, 1990, response, we indicated that a chlorination program would be prepared for chlorinating the service water system on a contingency basis. The chlorination program has been defined and implemented through procedure 1&2THP6020LAB.200, Rev. 1, "Circulating Water and Essential Service Water Chlorination."

During the July, 1990, forebay inspection, a small population of zebra mussels was found and an investigation

was started to determine the extent of colonization. As a result of this investigation, a molluscicide application was performed in October, 1990, on the circulating water, essential service water, non-essential service water, and the fire protection systems.

We have since revised our program as a result of finding juvenile zebra mussels when the Unit 1 west component cooling water heat exchanger was inspected in December, 1990. The zebra mussels were found in the heat exchanger's channel head low flow velocity areas and have been removed.

The program was revised from a detection-based program to an eradication/control program. In order to eradicate the existing population, we intend to treat the service water system with a molluscicide followed by oxidizing biocide applications as required.

Concurrently or shortly after the treatment of the ESW system, the fire protection system will be treated with a similar molluscicide and the system will be flushed per the requirements of procedures 12OHP4030STP.120SF, Rev. 1, "Fire Protection Unobstructed Flow Test and Sprinkling Alarm Test" and 12OHP4030STP.124, Rev. 0, "Fire Protection System Flush and Loop Flow Test." During the warm summer months, the circulating water system will be treated with a similar molluscicide in conjunction with the circulating water chlorination program. The effectiveness of our program will be monitored through the use of biological monitors placed in various plant locations.

Recommendation C of Enclosure 1

Redundant and infrequently used cooling loops should be flushed and flow tested periodically at the maximum design flow to ensure that they are not fouled or clogged. Other components in the service water system should be tested on a regular schedule to ensure that they are not fouled or clogged. Service water cooling loops should be filled with chlorinated or equivalently treated water before layup. Systems that use raw service water as a source, such as some fire protection systems, should also be chlorinated or equally effectively treated before layup to help prevent microbiologically influenced corrosion. Precautions should be taken to obey Federal, State, and local environmental regulations regarding the use of biocides.

Response Recommendation C of Enclosure 1 (1/25/90)

Practices already in-place at Cook Nuclear Plant will be augmented and formalized to provide compliance with this recommendation.

A discussion of those portions of the open-cycle service water system which could be considered as "redundant and infrequently used cooling loops" is as follows:

o Containment spray (CTS) heat exchangers and associated ESW piping - During normal operation, the ESW discharge valves on the CTS heat exchangers are closed. This results in the shell side of the

CTS heat exchangers and the ESW supply piping from the main ESW headers being filled with ESW.

During an ESW flow test in 1986, it was discovered that the CTS heat exchanger shell side pressure drop, at the design flow, had increased from the original pressure drop recorded during the system preoperational test. The shell sides of the CTS heat exchangers were inspected and chemically cleaned; subsequent testing showed that the pressure drops were reduced to near the preoperational test values. Sediment and corrosion were determined to be the cause of the increased pressure drop. Biological fouling was not a factor.

Presently, the shell side of the CTS heat exchangers and the associated piping are flushed during the ESW flow balance procedure performed at each refueling outage. The ESW flow balance procedure will be augmented to record and trend the CTS heat exchanger pressure drops.

- <u>Piping from each standby ESW pump discharge to the common ESW headers</u> - The ESW system is typically operated with a particular pump in service on each train. Running of the standby pump is limited to monthly (Unit 1) and quarterly (Unit 2) surveillance testing, which results in the discharge piping associated with each train's standby pump remaining stagnant most of the time. However, the surveillance test, which requires the standby pump to run at about 7,000 gpm, is considered sufficient to meet the requirements for periodic flushing.

- <u>ESW piping to the control room air handler unit cooling coils</u> - During normal operation, a non-safety related closed-cycle chiller package provides cooling for the control room HVAC system. The safety-related backup to this arrangement is a connection to the ESW system which allows lake water to flow through the cooling coils of the air handling units.

  The ESW supply lines to the cooling coils are short vertical lines that occasionally accumulate sand. Since sand accumulation could interfere with flow through the coils in the event ESW was needed to provide control room cooling, a program has already been established to periodically open, inspect, and clean the supply lines. Originally, the inspection interval was set at 6 months, but has since been changed to 12 months due to the very minor accumulations of sand that have actually been found. Biological fouling of any type has not been noted.

  Direct flushing of the supply lines is not practical since discharge of ESW to the closed-cycle chiller package under normal circumstances is undesirable. Installation of backflushing connections is being considered, but will only be implemented if considered cost effective in comparison to the current inspection program.

- <u>ESW supply piping to the auxiliary feedwater (AFW) system alternate suction sources</u> - Although not a "cooling loop" in the same sense as the other areas discussed above, the ESW supply to the AFW pumps as a backup to the condensate storage tank would provide an important cooling function if needed.

  A partial flushing of these lines was performed in 1989 as part of an investigation related to an incident at Byron Nuclear Plant where sediment was found in their ESW-to-AFW supply lines. Little or no sediment and no evidence of biological fouling was found in

the lines at Cook Nuclear Plant. Surveillance procedures related to AFW system operability will be augmented to verify, once per cold shutdown but not more frequently than every 92 days, that the flow path from ESW to the AFW alternate suction source is open.

The actions discussed above will ensure that redundant and infrequently used cooling loops in the open-cycle service water system at Cook Nuclear Plant will not be fouled or clogged if called on to function.

The testing and/or inspections of other components as described in our response to Action II of Generic Letter 89-13 will ensure that those components are not fouled or clogged.

The open-cycle service water system is rarely, if ever, placed in layup. This system is always in operation to provide the required cooling during all phases of unit operation or shutdown. If maintenance is required on a train or train component, the involved portion is isolated and drained for the repair.

The fire protection system components are inspected or tested as scheduled on a 12- or 18-month cycle. The yard piping portion of the system is flushed every six months and the pressure is monitored at the hydrants to ensure an unrestricted flow path. Additionally, applicable portions of the system are flow tested on a three-year cycle in accordance with Chapter 5, Section 11 of the Fire Protection Handbook, 14th Ed., published by the National Fire Protection Association.

<u>Program Implementation Summary</u> (1/91)

Flow testing and flushing of the service water system is performed per procedures 1OHP4030STP.022E (W) Rev. 2 and 2OHP4030STP.022 E Rev. 3 and W Rev. 2 "Essential Service Water System Test." These procedures surveillance test the ESW pumps at 7000 gpm and are performed monthly. As stated in our initial response, this flow is considered sufficient to meet the requirements for periodic flushing.

The ESW flow balance procedures 1THP4030STP.241, Rev. 2 and 2THP4030STP.241, Rev. 1 were revised to require recording of the CTS heat exchanger pressure drop and were performed during each unit's 1990 outage.

Flushing of the ESW piping to the control room air handler unit cooling coils was performed in 1990 per PM Task 72 of procedure MHI5030 Rev. 12 "Preventive Maintenance and Environmental Qualification Program."

Flushing of the ESW piping to the auxiliary feedwater system alternate suction source was performed in 1990 per procedure 1&2OHP4030STP.022CS Rev. 1 "Essential Service Water Cold Shutdown Test."

Flushing of portions of the fire protection system was performed in 1990 per procedure 12OHP4030STP.120SF, Rev. 1, "Fire Protection Unobstructed Flow Test and Sprinkling Alarm Test." This procedure, in conjunction with 12OHP4030STP.124, Rev. 0, "Fire Protection System Flush and

Loop Flow Test," provide flushing of the system and also perform the required flow test in accordance with the Fire Protection Handbook. Procedure 12OHP4030STP.124 was not performed in 1990, in order to minimize propagation of zebra mussels. The deferral of this testing is in keeping with Technical Specification requirements (4.7.9.1.1f), and was deemed acceptable by the plant Fire Protection Coordinator. Procedure 12OHP4030STP.124 will be performed in 1991 following implementation of the zebra mussel control program. It is currently scheduled for August, 1991.

In our January 25, 1990, response to Recommendation C of Enclosure 1, we stated that the yard piping portion of the fire protection system is flushed every six months and the system is flow tested on a three-year cycle in accordance with the Fire Protection Handbook. However, due to Technical Specification changes (Amendments 130/115), the individual sprinkler valve supply lines and fire hydrants will be flushed every six months in accordance with T/S 4.7.9.1.1c. The fire protection system's main header segments will be flow tested at least once per three years in accordance with T/S 4.7.9.1.1f. It is our intent to perform this latter test annually to comply with the Fire Protection Handbook recommendations.

Recommendation D of Enclosure 1

Samples of water and substrate should be collected annually to determine if Asiatic clams have populated the water source. Water and substrate sampling is only necessary at freshwater plants that have not previously detected the presence of Asiatic clams in their source water bodies. If Asiatic clams are detected, utilities may discontinue this sampling activity if desired, and the chlorination (or equally effective) treatment program should be modified to be in agreement with paragraph B, above.

Response to Recommendation D of Enclosure 1 (1/25/90)

Cook Nuclear Plant already complies with and will continue to comply with this recommendation. Divers collect sediment samples from the forebay and from the substrate located near the intake structure, and water samples are taken from the plant discharge flow during the spawning season. The substrate and water samples are analyzed by biologists for the presence of Asiatic clam adults and larvae, respectively. In the future, samples will also be examined for the presence of zebra mussels.

In addition to the annual sampling program, Cook Nuclear Plant has implemented a beach walk program, in which trained biologists routinely inspect the beaches in the vicinity of the plant to look for shells or other evidence of Asiatic clam colonization in the lake. Future beach walks will also consider potential colonization by zebra mussels.

Program Implementation Summary (1/91)

In our January 25, 1990, response, we indicated that in the future, samples and beach walks would also be examined for

the presence of zebra mussels. Procedure 12THP6020ENV.101, Rev. 4, "Mollusk Biofouler Sampling Analysis" was revised to include the requirements of GL 89-13. This procedure now requires that samples and beach walks include exams for zebra mussels. As previously stated during inspections performed in July, 1990, zebra mussels were found in the plant forebay and vicinity.

ACTION II

"Conduct a test program to verify the heat transfer capability of all safety-related heat exchangers cooled by service water. The total test program should consist of an initial test program and a periodic retest program."

RESPONSE II (1/25/90)

A formal program will be defined and implemented at Cook Nuclear Plant to monitor all safety-related heat exchangers served by the open-cycle service water system. The affected components are:

- CCW heat exchangers (two per unit; four total)
- CTS heat exchangers (two per unit; four total)
- Emergency diesel generator (EDG) jacket water coolers (one per diesel; four total)
- EDG lube oil coolers (one per diesel; four total)
- EDG air after coolers (two per diesel; eight total)
- Control room air handler units (two per units; four total)
- Diesel driven fire pump lube oil coolers (one per diesel; two total)

With regard to the four specific recommendations of Enclosure 2, program activities already in place or which will be implemented prior to startup following the next refueling outage on each unit are as follows:

<u>Recommendation 1 of Enclosure 2</u>

For all heat exchangers:

Monitor and record cooling water flow and inlet and outlet temperatures for all affected heat exchangers during the modes of operation in which cooling water is flowing through the heat exchanger. For each measurement, verify that the cooling water temperatures and flows are within design limits for the conditions of the measurement. The test results from periodic testing should be trended to ensure that flow blockage or excessive fouling accumulation does not exist.

<u>Response to Recommendation 1 of Enclosure 2</u> (1/25/90)

The Cook Nuclear Plant's heat exchanger program will periodically monitor and record the cooling water flow, inlet and outlet temperatures, and pressures for the safety-related heat exchanges. This information will be verified to be within design limits and will be used to evaluate and trend component performance. The control room air handler units will be exempted from this program since they are not

normally supplied by the service water system. During normal operation, these components are cooled by a closed-cycle chiller package and are therefore not subject to biofouling or corrosion. Heat transfer degradation of this equipment, although very unlikely to occur, would be observable during seasonal operation of the system.

Recommendation 2 of Enclosure 2

In addition to the considerations for all heat exchangers in Item I, for water-to-water heat exchangers:

A. Perform functional testing with the heat exchanger operating, if practical, at its design heat removal rate to verify its capabilities. Temperature and flow compensation should be made in the calculations to adjust the results to the design conditions. Trend the results, as explained above, to monitor degradation. An example of this type of heat exchanger would be that used to cool a diesel generator. Engine jacket water flow and temperature and service water flow and temperature could be monitored and trended during the diesel generator surveillance testing.

B. If it is not practical to test the heat exchanger at the design heat removal rate, then trend test results for the heat exchanger efficiency or the overall heat transfer coefficient. Verify that the heat removal would be adequate for the system operating with the most limiting condition of flow and temperature.

Response to Recommendation 2 of Enclosure 2 (1/25/90)

Functional testing of safety-related water-to-water and water-to-oil heat exchangers will be performed as illustrated in Figures 1 through 4.

Recommendation 3 of Enclosure 2

In addition to the considerations for all heat exchangers in Item I, for air-to-water heat exchangers

A. Perform efficiency testing (for example, in conjunction with surveillance testing) with the heat exchanger operating under the maximum heat load that can be obtained practically. Test results should be corrected for the off-design conditions. Design heat removal capacity should be verified. Results should be trended, as explained above, to identify any degraded equipment.

B. If it is not possible to test the heat exchanger to provide statistically significant results (for example, if error in the measurement exceeds the value of the parameter being measured), then

   1. Trend test results for both the air and water flow rates in the heat exchanger.

   2. Perform visual inspections, where possible, of both the air and water sides of the heat exchanger to ensure cleanliness of the heat exchanger.

Response to Recommendation 3 of Enclosure 2 (1/25/90)

Functional testing of safety-related air-to-water heat exchangers will be performed as illustrated in Figure 5.

Recommendation 4 of Enclosure 2

In addition to the considerations for all heat exchangers in Item I, for types of heat exchangers other than water-to-water or air-to-water heat exchangers (for example, penetration coolers, oil coolers, and motor coolers)

A. If plant conditions allow testing at design heat removal conditions, verify that the heat exchanger performs its intended functions. Trend the test results, as explained above, to monitor degradation.

B. If testing at design conditions is not possible, then provide for extrapolation of test data to design conditions. The heat exchanger efficiency or the overall heat transfer coefficient of the heat exchanger should be determined whenever possible. Where possible, provide for periodic visual inspection of the heat exchanger. Visual inspection of a heat exchanger that is an integral part of a larger component can be performed during the regularly scheduled disassembly of the larger component. For example, a motor cooler can be visually inspected when the motor disassembly and inspection are scheduled.

Response to Recommendation 4 of Enclosure 2 (1/25/90)

In general, this recommendation is not applicable to the small heat exchangers (penetration coolers, oil coolers, and motor coolers) used at Cook Nuclear Plant since these items are served by the CCW system, not the open-cycle service water system.

The only exceptions are the diesel driven fire pump lube oil coolers. Every 18 months, these coolers are inspected and the sacrificial anodes provided for corrosion protection are replaced. These components, which are cooled by the pump's discharge water (service water), are tested during the diesel driven fire pump's monthly surveillance test. Heat transfer degradation of this equipment would be indicated during the surveillance test by an abnormally low cooling water temperature rise across the cooler. Future surveillance tests will monitor and trend the temperature rise. This information, coupled with the 18-month inspection results, will ensure that a fouling condition does not go undetected.

Program Implementation Summary (1/91)

The heat exchanger monitoring program has been defined and implemented through the following procedures:

12THP6040PER.002 Rev. 4 "Service Water Systems Heat Exchanger Monitoring"

12THP6040PER.002.CCW Rev 0 "Component Cooling Water Heat Exchanger Functional Heat Transfer Test"

12THP6040PER.002.EDG Rev, 1 "Emergency Diesel Generator Coolers Performance Test"

This series of procedures assures that the Cook Nuclear Plant's heat exchanger program will periodically monitor and record the cooling water flow, inlet and outlet

temperatures, and pressures for the safety-related heat exchangers.

The results of the heat exchanger program, performed during each unit's 1990 refueling outage, are as follows:

Component Cooling Water (CCW) Heat Exchanger

A performance test of the CCW heat exchangers was performed and the test data was evaluated. The evaluation indicates that an approximate 8 percent (Unit 1) and 7 percent (Unit 2) degradation has occurred to the CCW heat exchanger's heat transfer capability. However, the effect of the heat transfer degradation has been evaluated on the CCW heat exchanger's design capabilities. That is, at the design conditions, both units' CCW outlet temperatures increase from 95°F to 96°F. This slight increase in temperature will not affect other equipment cooled by the CCW system.

The service water (tube) side of the four CCW heat exchangers was inspected and the tubesheets were found to be fairly clean with some sand accumulation noted on the discharge side. Minor signs of biofouling (algae), corrosion, erosion, or wear were noted. However, the Unit 1 west CCW heat exchanger was found to have a small population of juvenile zebra mussels in the channel head low flow velocity areas. This finding has resulted in a revision to the service water chlorination program (see Program Implementation Summary on page 2).

Emergency Diesel Generators

During each diesel's 24-hour test, which requires full load operation of the diesels, temperature data was recorded for the air after coolers, the lube oil and jacket water coolers. An evaluation of this data indicates that the heat duty for both units' EDGs is 65 to 70 percent of that projected by the manufacturer for full load operation.

Inspections of the service water side of the EDG coolers was performed. No signs of biofouling, erosion, or silting were found in the diesel lube oil and jacket water coolers. However, inspections of the diesel air after coolers found a sludge buildup which has been analyzed and indicates the presence of iron oxidizing bacteria of the type which are responsible for microbiologically-induced corrosion. It is our intent to monitor this condition through bacterial lab analysis and inspections of the air after coolers.

Containment Spray (CTS) Heat Exchanger

During each unit's ESW flow balance test, the CTS heat exchanger's pressure drops were recorded to be at or near the pressure drops recorded during initial operation of the ESW system. Based on no change in the CTS pressure drops, it appears that no degradation has occurred to the CTS heat exchanger's heat transfer capability.

The service water (shell) side of the CTS heat exchangers was inspected. The internals accessible through the inspection ports showed no signs of erosion, silting, corrosion, biofouling, or wear.

Diesel Driven Fire Pump Lube Oil Coolers

In our January 25, 1990, response, we indicated that future surveillance tests on the diesel driven fire pump would monitor and trend the lube oil cooler's temperature rise. Procedure 12THP6010PER.002, Rev. 2, "Service Water Systems Heat Exchanger Monitoring System" includes trending of this component's temperature rise.

ACTION III

"Ensure by establishing a routine inspection and maintenance program for open-cycle service water system piping and components that corrosion, erosion, protective coating failure, silting, and biofouling cannot degrade the performance of the safety-related systems supplied by service water. The maintenance program should have at least the following purposes:

- o To remove excessive accumulations of biofouling agents, corrosion products, and silt;
- o To repair defective protective coatings and corroded service water system piping and components that could adversely affect performance of their intended safety functions."

Response III (1/25/90)

At present, the Cook Nuclear Plant inspection and maintenance program for open-cycle service water system piping and components is performed on a post-maintenance basis. However, some particular components, such as the EDG jacket water coolers, are opened, inspected, and cleaned on a scheduled basis. Certain portions of the piping, as noted previously in our response to Action I, are also routinely opened, inspected, and cleaned. The remainder of the service water system components are checked for biofouling, silting, and corrosion product buildup whenever they are opened for required maintenance. If any foreign material is found, appropriate personnel are notified and the material is removed.

Based on a review of maintenance records for the past two years, it appears that the existing practices have been effective in preventing the sort of major common-mode failure of safety-related service water systems addressed by Generic Letter 89-13. However, results of the testing and trending program established in response to Action II will

be reviewed to determine if development of a more comprehensive inspection and maintenance program is warranted.

Additionally, an erosion monitoring program consisting of cycle-to-cycle UT wall thickness measurement of selected service water system piping elbows will be implemented. Selection of locations to monitor will be based on a design review to determine the most likely spots for erosion to occur. Revision or expansion of the program will depend on evaluation and trending of the accumulated data.

Program Implementation Summary (1/91)

Routine inspection, flushing, and maintenance requirements for service water system components have been proceduralized as necessary to form an ongoing program. Examples include forebay inspection (12THP6020ENV.101), system flushing (OHP4030STP.022 series), control room air handling unit line inspection (MHI56030, PM Task 72), fire system inspection and flushing (12OHP4030STP.120SF, 12OHP4030STP.124 and 12THP4030STP.021), diesel driven fire pump lube oil cooler inspection and anode replacement (12MHP4030STP.021), and EDG jacket water cooler inspection (MHI5030, PM Task 10).

Erosion/corrosion monitoring of the service water system has been incorporated into the plant's erosion/corrosion program. Nondestructive examinations for the erosion/corrosion program are performed per procedures 12SHP5050NDE.008, Rev. 0 "Ultrasonic Inspection for Thickness Measurements" and 12SHP5050NDE.014, Rev. 1 "Grid Layout for Erosion/Corrosion Examinations."

Inspections of the service water system, performed during each unit's refueling outage, indicated no change from the previous exams performed in 1985-86 in response to IE Bulletin 87-01, "Thinning of Pipe Walls in Nuclear Power Plants." Even though the scope of the inspections was not identical, it was concluded that service water system erosion degradation had not occurred.

As the current programs are effective, expanded maintenance inspection programs are not necessary and will not be established.

ACTION IV

"Confirm that the service water system will perform its intended function in accordance with the licensing basis for the plant. Reconstitution of the design basis of the system is not intended. This confirmation should include a review of the ability to perform required safety functions in the event of failure of a single active component. To ensure that the as-built system is in accordance with the appropriate licensing basis documentation, this confirmation should include recent (within the past two years) system walkdown inspections. This confirmation should be completed before a plant startup following the first refueling outage beginning nine months or more after the date of

this letter. Results should be documented and retained in appropriate plant records."

RESPONSE IV (1/25/90)

A review of Cook Nuclear Plant's service water system has confirmed that the system is capable of performing its required safety function in the event of failure of a single active component. The service water system is designed to prevent any failure, active or passive, from limiting its ability for long term heat removal.

A complete system walkdown was performed in 1984 by operations and engineering personnel. This walkdown compared the as-built system with the operational flow diagram. All discrepancies were noted and corrected on the flow diagrams at that time. The discrepancies found were all minor in nature and did not impact the ability of the service water system to perform its intended functions. Even though the complete walkdown did not occur during the last two years as recommended, we believe it meets the intent and the requirements of the generic letter. The Cook Nuclear Plant design change procedures ensure that any modifications to the system since the 1984 walkdown would have been subject to walkdowns of the affected portion of the system pre- and post-change, and would ensure that the design function of the system was not adversely impacted by the change.

Program Implementation Summary (1/91)

A complete system walkdown was performed for the 1990 ESW SSFI by Operations and Engineering personnel. During the walkdown, minor discrepancies were found which did not impact the ability of the ESW system to perform its intended function.

ACTION V

"Confirm that maintenance practices, operating and emergency procedures, and training that involves the service water system are adequate to ensure that safety-related equipment cooled by the service water system will function as intended and that operators of this equipment will perform effectively. This confirmation should include recent (within the past two years) reviews of practices, procedures, and training modules. The intent of this action is to reduce human errors in the operation, repair, and maintenance of the service water system. This confirmation should be completed before plant startup following the first refueling outage beginning nine months or more after the date of this letter. Results should be documented and retained in appropriate plant records."

RESPONSE V (1/25/90)

Review of practices, procedures, and training involving the service water system which are currently in place in the operations, maintenance and construction areas at Cook Nuclear Plant indicates compliance with this recommendation. Some specifics identified in the review include:

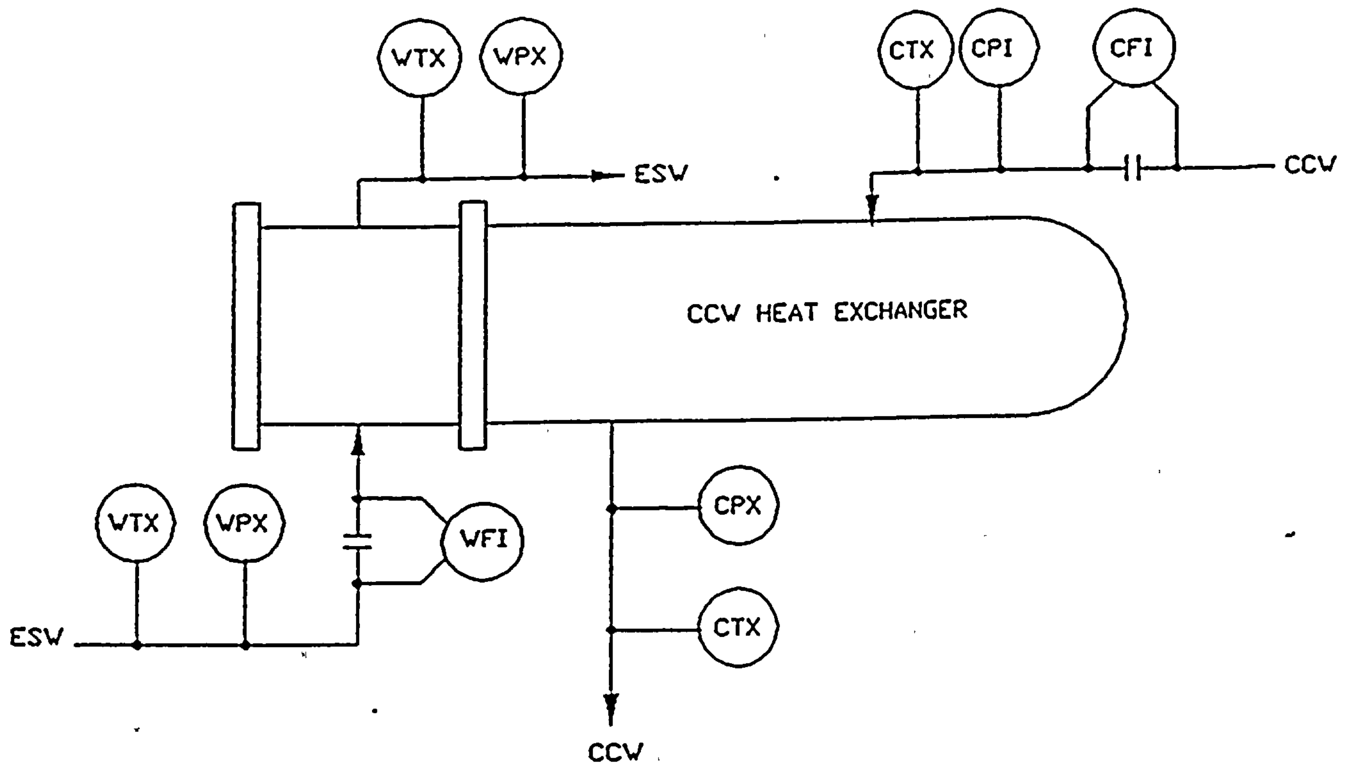
- Operations - The normal, abnormal, and emergency operating procedures associated with the open-cycle service water system have been reviewed within the past 18 months, and have been determined to ensure that the system functions as intended.

Lesson plans were reviewed in the areas of requalification training, replacement training, and non-licensed operator training. They were determined to provide adequate background to allow personnel to perform competently with regard to operating the service water system and promptly identifying problems that may arise.

- Maintenance - A specific lesson plan emphasizing the function and importance of the ESW system has been part of the maintenance training program since 1986.
- Construction - Construction personnel follow approved plant procedures and receive appropriate training for the work they are performing. Review of work orders and QA audit/surveillances associated with construction work activities on the service water system indicates that procedural guidance and training have been adequate to ensure the integrity of the completed work.

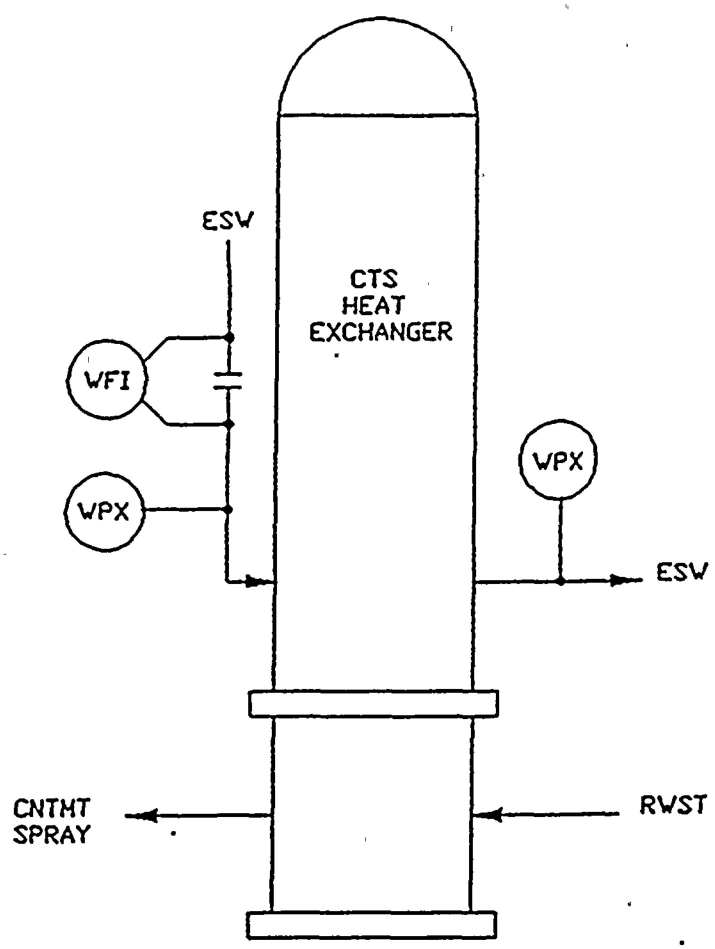
Program Implementation Summary (1/91)

Maintenance practices for the service water system have been included in lesson plan EM-C-F228. This lesson plan was revised to include information and concerns addressed in GL 89-13.



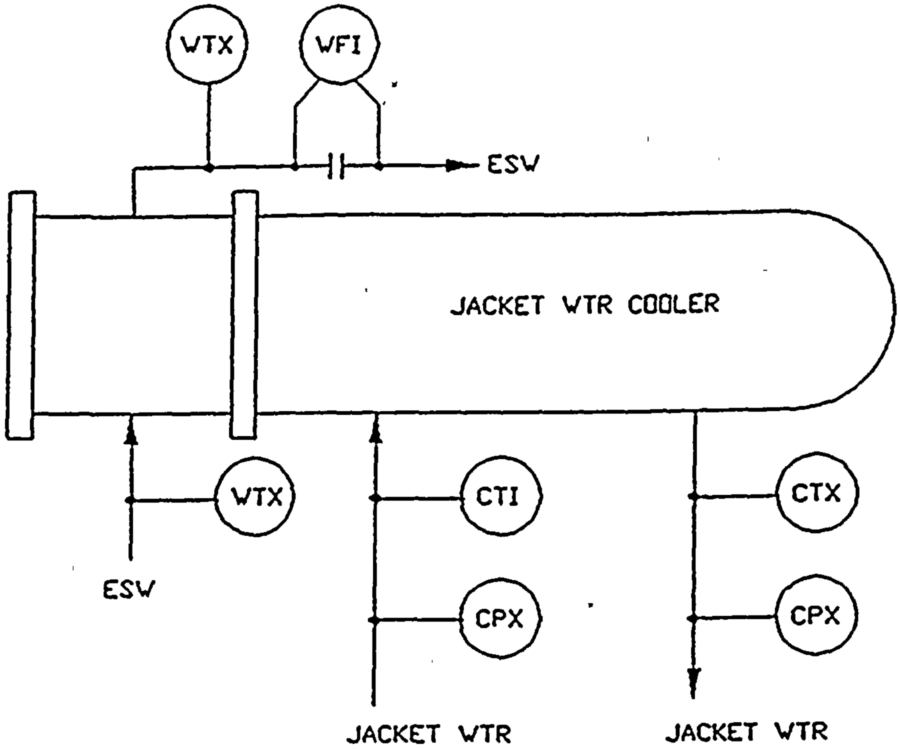
COOK NUCLEAR PLANT UNITS 1 & 2
COMPONENT COOLING WATER HEAT EXCHANGERS
FIGURE 1

An initial full functional heat transfer test will be performed on the CCW heat exchangers during shutdown for each unit's next refueling outage (Unit 2 - June 25, 1990, Unit 1 - October 25, 1990). The heat transfer test will consist of measuring the shell and tube side flows (CFI, WFI), temperatures (CTX, WTX), and pressures (CPI, CPX, WPX). This data will be used to compare actual heat exchanger performance to design conditions. Periodic testing will be conducted in a similar manner during the next three scheduled refueling outages on each unit.



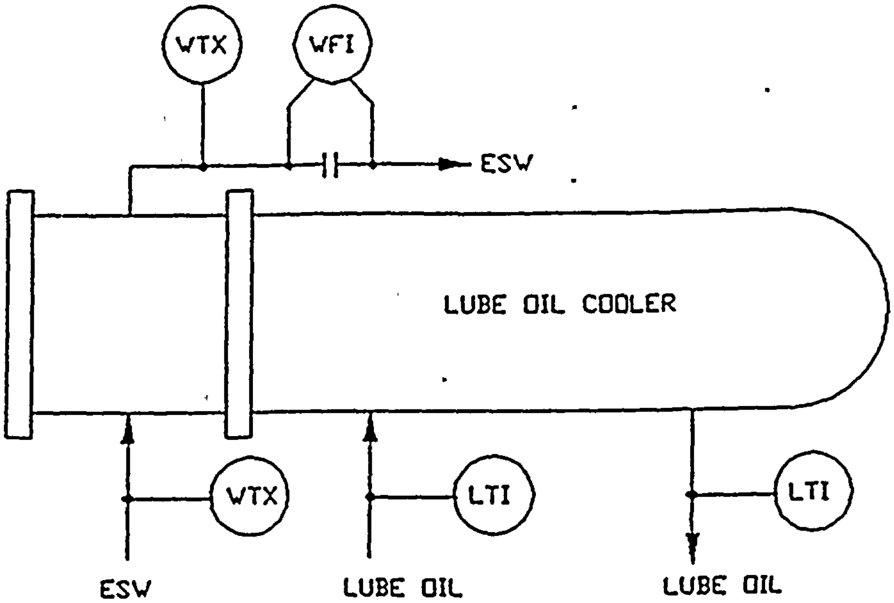
COOK NUCLEAR PLANT UNITS 1 & 2
CONTAINMENT SPRAY HEAT EXCHANGERS
FIGURE 2

A functional heat transfer test cannot be performed on this component since a heat source is not available during normal or shutdown operations. The monitoring program on this component, instead, will be based on trending the delta P across the heat exchangers (WPX) at a given flow (WFI). (See page 2 under Recommendation C of Enclosure 1.) Periodic testing will be conducted in a similar manner during the next three scheduled refueling outages on each unit.



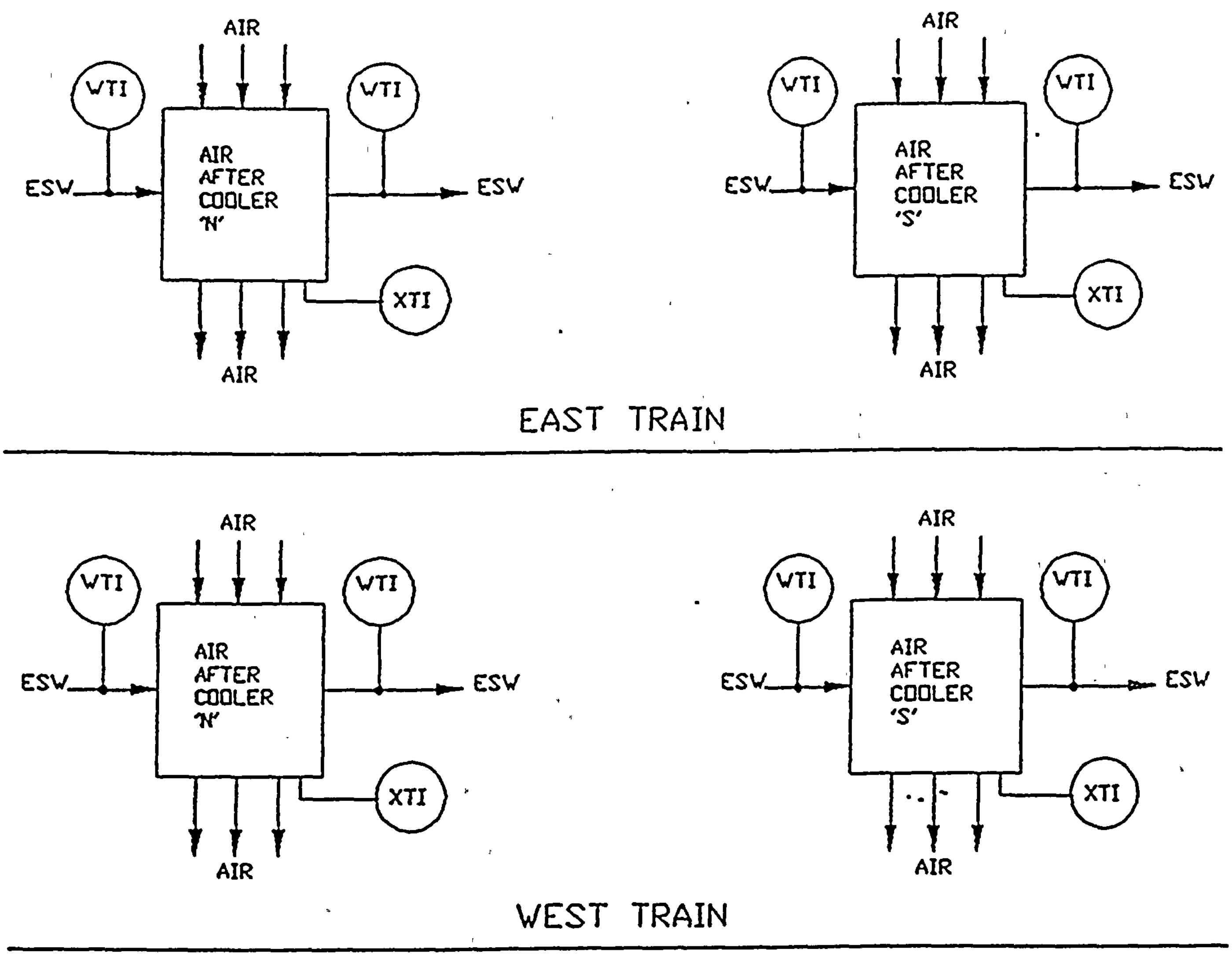
COOK NUCLEAR PLANT UNITS 1 & 2
EMERGENCY DIESEL JACKET WATER COOLERS
FIGURE 3

A functional heat transfer test cannot be performed on this component since the shell side flow cannot be measured. The monitoring program on this component will be based on a temperature trending program at a given test flow (WFI). Both shell and tube side temperatures (CTI, CTX, WTX) can be measured during the emergency diesel 18-month surveillance test. The temperatures obtained during this test can be compared to the design temperatures and performance trended. Periodic testing will be conducted in a similar manner during the next three scheduled refueling outages on each unit.



COOK NUCLEAR PLANT UNITS 1 & 2
EMERGENCY DIESEL LUBE OIL COOLERS
FIGURE 4

A functional heat transfer test cannot be performed on this component since the shell side flow cannot be measured. The monitoring program on this component will be based on a temperature trending program at a given test flow (WFI). Both shell and tube side temperatures (LTI, WTX) can be measured during the emergency diesel 18-month surveillance test. The temperatures obtained during this test can be compared to the design temperatures and performance trended. Periodic testing will be conducted in a similar manner during the next three scheduled refueling outages on each unit.



COOK NUCLEAR PLANT UNITS 1 & 2
EMERGENCY DIESEL AIR AFTER COOLERS
FIGURE 5

A functional heat transfer test cannot be performed on this component since the shell and tube side flows cannot be measured. The monitoring program on these components will be based on a temperature trending program. Both shell and tube side temperatures (XTI, WTI) can be measured during the emergency diesel 18-month surveillance test. The temperatures obtained during this test can be compared to the design temperatures and performance trended. Periodic testing will be conducted in a similar manner during the next three scheduled refueling outages on each unit.

STATE OF OHIO)
COUNTY OF FRANKLIN)

Milton P. Alexich, being duly sworn, deposes and says that he is the Vice President of licensee Indiana Michigan Power Company, that he has read the forgoing Response to Generic Letter 89-13: Service Water System Problem Response and knows the contents thereof; and that said contents are true to the best of his knowledge and belief.

Subscribed and sworn to before me this 30th

day of January, 1991.

)NOTARY PUBLIC

RITA D. HILL
NOTARY PUBLIC, STATE OF OHIO
MY COMMISSION EXPIRES 6-28-94