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July 24, 1992

Dr. Thomas E. Murley, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attn: Document Control Desk

Subject: Dresden Nuclear Power Station Units 2 and 3
Quad Cities Nuclear Power Station Units 1 and 2
RWCU Outboard Piping for Generic Letter 88-01
NRC Docket Nos: 50-237/249 and 50-254/265

- References:
- (a) B. Siegel (NRC) letter to T. Kovach (CECo), "Review of Response to Generic Letter 88-01 for Dresden Station Units 2 and 3," dated August 23, 1990.
 - (b) L. Olshan (NRC) letter to T. Kovach (CECo), "Review of Response to Generic Letter 88-01 for Quad Cities Station Units 1 and 2," dated August 21, 1990.
 - (c) M. Richter (CECo) letter to T. Murley (NRC), "Response to Safety Evaluation Report for Generic Letter 88-01 for Dresden Units 2 and 3," dated April 29, 1991.
 - (d) M. Richter (CECo) letter to T. Murley (NRC), "Response to Safety Evaluation Report for Generic Letter 88-01 for Quad Cities Units 1 and 2," dated April 29, 1991.
 - (e) J. Partlow (NRC) letter to all BWR licensees, "Generic Letter 88-01, Supplement 1," dated February 4, 1992.
 - (f) Meeting between CECo/NRR/Region III on May 12, 1992; "RWCU Outboard Piping Program for Dresden and Quad Cities Stations."

Dear Dr. Murley:

References (a) and (b) presented the NRC safety evaluations to Generic Letter 88-01, "NRC Position on Intergranular Stress Corrosion Cracking (IGSCC) in BWR Austenitic Stainless Steel Piping", for Dresden and Quad Cities Stations. In those safety evaluations, Commonwealth Edison Company (CECo) was notified to modify its IGSCC inspection program at each station to include those welds on the susceptible RWCU piping outboard of the isolation valves (inspection of 10% of those welds each outage). Following an evaluation which considered various mitigation alternatives/options for the susceptible outboard piping, CECo committed to replace that piping on a planned schedule in lieu of inspections (References (c) and (d)). This decision was based upon a cost/benefit analysis which did not credit isolation capability of the RWCU System and utilized conservative sample expansion estimates for weld inspections.

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Subsequent to the pipe replacement commitment (and Staff approval of that commitment), Supplement 1 to Generic Letter 88-01 (Reference (e)) was issued. The Supplement indicated that IGSCC piping inspections on the susceptible RWCU outboard piping would be required until actions associated with Generic Letter 89-10 (for the RWCU isolation valves) are completed. As a result of this information, CECO has reevaluated the pipe replacement commitment as discussed with the Staff in the Reference (f) meeting. During that meeting, CECO requested to rescind the current pipe replacement commitment based upon an alternate approach which involves the implementation of upgrades/enhancements for the RWCU isolation valves in response to Generic Letter 89-10 Supplement 3, coupled with the establishment of an "RWCU Outboard Piping Program." The upgrades/enhancements to the isolation valves will provide assurance of isolation capability; thereby eliminating the safety concerns associated with the susceptible outboard piping and the inspection requirements for Generic Letter 88-01. With isolation capability assured, CECO believes the appropriate actions for the susceptible piping can be implemented in a time-frame commensurate with the operational impact and the economic needs of the Company. To address this aspect, the "RWCU Outboard Piping Program" provides the framework for the determination of a prudent, cost-effective course of action for the susceptible piping.

The Attachment to this letter presents the basis for the request to rescind the RWCU pipe replacement commitment for Dresden and Quad Cities Stations. As indicated in the Reference (f) meeting, CECO has suspended engineering and procurement activities for the pipe replacement project. This action by CECO precludes expenditure of company resources on parallel efforts until the alternate approach presented by this letter can be reviewed by the Staff. CECO respectfully requests a decision on the acceptability of the proposed approach by September 1, 1992. A response by this date will preclude major changes to the pipe replacement schedule in the event that option must be continued. To facilitate the review of this submittal, CECO would be pleased to meet with the Staff in August 1992.

If there are any questions or comments, please contact John L. Schrage at 708-515-7283.

Sincerely,


John L. Schrage
Nuclear Licensing Administrator

Attachment: Basis for Withdrawal of Commitment to Replace RWCU Outboard Piping for Dresden and Quad Cities Stations

Enclosures: Figure 1 RWCU System-Dresden Station
Figure 2 RWCU System-Quad Cities Station

cc: A. Bert Davis, Regional Administrator - III
L.N. Olshan, Project Manager - NRR
B.L. Siegel, Project Manager - NRR
T.E. Taylor, Senior Resident Inspector - Quad Cities
W.G. Rogers, Senior Resident Inspector - Dresden
R. Hermann, NRR Technical Staff
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ATTACHMENT

BASIS FOR WITHDRAWAL OF COMMITMENT TO REPLACE RWCU OUTBOARD PIPING FOR DRESDEN AND QUAD CITIES STATIONS

BACKGROUND

In response to Generic Letter 88-01, "NRC Position on Intergranular Stress Corrosion Cracking (IGSCC) in BWR Austenitic Stainless Steel Piping," CECo issued a plan to the Staff to address the IGSCC concerns. For Dresden and Quad Cities Stations, this plan only addressed the ASME classed portions of the piping systems susceptible to IGSCC. The subsequent NRC Safety Evaluation for each station (References 1 and 2) required CECo to modify its IGSCC inspection program to include the welds on the non-class portions of the RWCU piping, outboard of the isolation valves. Specifically, the safety evaluations required inspection of 10% of the welds each outage. If cracks were found during the inspections, sample expansion and mitigation methods were to be discussed with the Staff.

CECo's responses to the NRC Safety Evaluations (References 3 and 4) stated that the company would evaluate the impact of incorporating the susceptible portion of the RWCU outboard piping into the inspection program. The evaluation included a cost/benefit analysis which considered various mitigation alternatives/options for the susceptible piping. The cost/benefit analysis did not credit isolation capability of the RWCU system, and utilized previous IGSCC inspection results coupled with conservative sample expansion estimates. The results of the analysis indicated that planned pipe replacement without interim inspection was the most cost-effective option.

In References 5 and 6, CECo committed to replace the IGSCC susceptible outboard piping for Dresden and Quad Cities Stations on a planned schedule, rather than perform piping inspections. The replacement was scheduled over a two refueling outage period for each unit, and was contingent upon no IGSCC inspections prior to replacement. The original replacement schedule is presented below:

Dresden Unit 2 RWCU pipe replacement

D2R14 (fall 1994) and D2R15 (spring 1996) refuel outages

Dresden Unit 3 RWCU pipe replacement

D3R13 (fall 1993) and D3R14 (spring 1995) refuel outages.

Quad Cities Unit 1 RWCU pipe replacement

Q1R13 (spring 1994) and Q1R14 (fall 1995) refuel outages.

Quad Cities Unit 2 RWCU pipe replacement

Q2R12 (spring 1993) and Q2R13 (fall 1994) refuel outages.

CURRENT SITUATION

In February 1992, the NRC issued Supplement 1 to Generic Letter 88-01 (Reference 7). This supplement to the Generic Letter indicated that IGSCC piping inspections on the RWCU outboard piping would be required until the actions associated with Generic Letter 89-10 (for the RWCU isolation valves) are completed. As a result of this information, CECO has reevaluated the pipe replacement commitment.

In response to Generic Letter 89-10 Supplement 3, the RWCU isolation valves at Dresden and Quad Cities Stations are receiving upgrades/enhancements which will assure isolation capability prior to the completion of the next refueling outage for each unit (which is prior to the completion of the scheduled pipe replacement for each unit). This schedule was found acceptable for each station by the Staff in Reference 8. With isolation capability assured, the safety concerns associated with the susceptible RWCU outboard piping are eliminated. There still exists, however, a potential operational (and economic) impact associated with the piping. To address this aspect, CECO has developed a "RWCU Outboard Piping Program" for Dresden and Quad Cities Stations. The objective of the program is to provide the framework to determine a prudent, cost-effective course of action for the susceptible outboard piping. The program was discussed with the Staff in a May 12, 1992 meeting (Reference 9). The isolation valve enhancements, coupled with the outboard piping program, provide the basis for CECO's request to rescind the RWCU pipe replacement commitment for Dresden and Quad Cities Stations.

RWCU SYSTEM ISOLATION CAPABILITY

RWCU System isolation capability is a prerequisite to CECO's "RWCU Outboard Piping Program". With isolation capability, the safety concerns associated with the susceptible outboard piping are eliminated, allowing for implementation of appropriate actions in a time-frame commensurate with the operational impact and the economic needs of the company.

CECO has implemented upgrades/enhancements to the RWCU isolation valves at each station during recent outages (refueling and forced). These upgrades/enhancements primarily included the adjustment of torque switch settings and the bypassing of close torque switches (to 95% of valve travel). The upgrades/enhancements were implemented to ensure that the valves would produce sufficient thrust to perform their design basis function, which is the isolation of containment in the event of a pipe break downstream of the valves. At this time, CECO has determined that only one isolation valve at each station is considered 'deficient' with respect to Generic Letter 89-10 Supplement 3 (Quad Cities Unit 1 outboard isolation valve, Dresden Unit 2 inboard isolation valve). Further enhancements to these valves during the upcoming refueling outages (Q1R12-September 1992, D2R13-January 1993) will ensure isolation capability. Additionally, CECO plans to implement long-term upgrades/enhancements on the isolation valves during the upcoming refueling outage for each unit (see following schedule). These upgrades/enhancements, which primarily involve hardware modifications (e.g., valve replacements, installation of larger valve actuators, gear replacements in existing valve actuators, installation of larger power cables), will increase design margins.

Dresden Unit 2: D2R13 refuel outage (starting January 1993)

Dresden Unit 3: D3R13 refuel outage (starting September 1993)

Quad Cities Unit 1: Q1R12 refuel outage (starting September 1992)

Quad Cities Unit 2: Q2R12 refuel outage (starting March 1993)

This isolation valve enhancement schedule will be completed prior to the scheduled completion of the pipe replacement commitment (References 5 and 6).

RWCU OUTBOARD PIPING PROGRAM

The RWCU Outboard Piping Program, which provides the framework for the determination of a prudent, cost-effective course of action for the susceptible outboard piping, contains three major elements:

- Element 1.** Ensure adequate leak detection capability.
- Element 2.** Perform limited/targeted weld inspections to determine existing conditions, and the necessity and schedule for potential future actions.
- Element 3.** Perform a cost/benefit analysis to determine a prudent, cost-effective approach to address the susceptible piping.

The first element of the program is a sensitivity evaluation of the area leak detection (temperature monitoring) in the vicinity of the susceptible RWCU piping. This evaluation was completed in July 1992. The evaluation ensures that the temperature sensors will detect a leak prior to the crack reaching a critical crack size. It should also be noted that the evaluation concentrated on the detection capability in the vicinity of the RWCU supply piping, since leakage from the supply piping could lead to design basis differential pressure conditions for the isolation valves (differential pressure conditions resulting from return pipe leakage would be reduced by resistance created by the system components). A Leak-Before-Break (LBB) analysis was performed, on a weld specific basis, to support the sensitivity evaluation. The analysis confirmed that LBB is applicable for the outboard piping; and determined the applicable leak rate for various crack sizes (which are less than the critical crack size). For Dresden Station, results from recently completed temperature rise calculations indicate that the area temperature sensors in the vicinity of the outboard piping will detect leakage in sufficient time to allow for system isolation prior to the point of reaching critical crack size. Therefore, enhancements to the area leak detection at Dresden Station are not planned at this time. For Quad Cities Station, the results indicate that it would be prudent to augment the area leak detection for the outboard supply line. Therefore, CECO will begin monitoring the temperature of the RWCU heat exchanger room for each Quad Cities unit on a daily basis.

The second element of the program is the performance of a limited number of weld inspections based upon susceptibility to IGSCC. These inspections (ultrasonic examinations) will be conducted on a one-time basis for a single unit at each station, and will be used to estimate the condition of the outboard piping. CECO will also use the results of the inspections as input to the cost/benefit analysis (Element 3 of the program).

The inspections will be performed using EPRI qualified personnel and CECO approved methods. CECO will limit the inspections to detection of circumferential cracks, since axial cracks in the vicinity of a pipe weld typically do not affect the structural integrity of the piping. This approach will reduce the radiation exposure by minimizing the amount of weld preparation and inspection time for each weld. Sample expansion will not be performed if IGSCC indications are detected, based upon the assurance of isolation capability and adequate area leak detection.

As indicated previously, the weld inspections will be conducted on those sections of outboard piping which are most susceptible to IGSCC. The susceptibility of the various sections of outboard piping have been qualitatively reviewed taking into account operating temperature and conductivity considerations. Since industry data/information indicates that welds are more susceptible to IGSCC at temperatures greater than 300°F, it was determined that welds from the supply piping (between the outboard isolation valves and regenerative heat exchangers) and return piping (from the regenerative heat exchangers to the feedwater system) will be selected for inspection. The majority of those inspection welds will be selected from the supply line, since that line is exposed to the highest operating temperature (in excess of 500°F) and contains water with the highest conductivity. Additionally, leakage from the supply piping could lead to design basis differential pressure conditions for the isolation valves. Details on the supply and return piping sections (i.e., pipe length, total welds, operating temperature) for Dresden and Quad Cities Stations are presented in Figures 1 and 2, respectively.

During the upcoming Dresden Unit 2 refueling outage (D2R13, January 1993), seven (7) welds will be ultrasonically examined. Five (5) of the welds will be selected from the outboard supply piping which is exposed to temperatures in excess of 500°F (see Note '1' on Figure 1), resulting in an inspection sample size of approximately 13% of the welds in that section of outboard piping. The remaining two (2) welds will be selected from the outboard return piping.

For Quad Cities Station, eight (8) welds will be ultrasonically examined. These examinations will occur no later than the next Unit 2 refueling outage (Q2R12, March 1993). Six (6) of the welds will be selected from the outboard supply piping, resulting in an inspection sample size of approximately 13% of the welds in that section of outboard piping. The remaining two (2) welds will be selected from the outboard return piping.

The third element of the program is a cost/benefit analysis to determine a prudent, cost-effective approach to address the susceptible piping, given the results of the limited inspections. The current scope of the pipe replacement (which involves a single train design) will be compared to other options, which include but are not limited to the following:

Deferral of the current pipe replacement work/scope to a later point in time;

Implementation of the current pipe replacement work/scope over an extended period of time;

Implementation of a "like-for-like" pipe replacement scope over an extended period of time;

Planned repair/replacement of those sections of piping which are exposed to temperatures above 300 °F; and

Repair/Replacement as required (on an "as-needed" basis).

As part of the cost/benefit analysis, CECO will develop a predictive model utilizing the inspection results, and industry crack growth data. This model will be used to predict the likelihood of leakage over time. CECO will utilize this information to determine the appropriate option and implementation schedule. For example, if the inspection results indicate that no immediate or near-term repair/replacement actions are necessary, the model will be used to predict when such actions will have to be considered. Conversely, if the inspection results indicate that immediate or near-term actions are warranted, a cost-effective pipe replacement and/or repair option will be implemented, consistent with potential operational impacts and schedules for engineering and procurement.

STATUS OF PIPE REPLACEMENT PROJECT

As discussed in the Reference 9 meeting, initial pipe replacement work cannot begin at Quad Cities Unit 2 during the previously scheduled refueling outage (Q2R12, spring 1993). This delay has primarily been caused by an increased 'lead time' for the procurement of IGSCC resistant pipe. Although initiation of the pipe replacement work has been delayed, CECO has been pursuing actions necessary to complete the pipe replacement work by the conclusion of the second scheduled refuel outage (Q2R13, Fall 1994).

Additionally, as discussed in the Reference 9 meeting, CECO has suspended engineering and procurement activities for the pipe replacement project. This action precludes expenditure of company resources on parallel efforts until the approach presented in this Attachment can be reviewed by the Staff. A Staff decision on the proposed approach by September 1, 1992 will preclude major changes to the pipe replacement schedule in the event this option must be continued.

REFERENCES

- 1) B. Siegel (NRC) letter to T. Kovach (CECo), "Review of Response to Generic Letter 88-01 for Dresden Station Units 2 and 3," dated August 23, 1990.
- 2) L. Olshan (NRC) letter to T. Kovach (CECo), "Review of Response to Generic Letter 88-01 for Quad Cities Station Units 1 and 2," dated August 21, 1990.
- 3) M. Richter (CECo) letter to T. Murley (NRC), "IGSCC Inspection Plan for the Fall 1990 Refueling Outage for Dresden Unit 2," dated September 17, 1990.
- 4) M. Richter (CECo) letter to T. Murley (NRC), "Response to Safety Evaluation Report for Generic Letter 88-01 for Quad Cities Units 1 and 2," dated October 19, 1990.
- 5) M. Richter (CECo) letter to T. Murley (NRC), "Response to Safety Evaluation Report for Generic Letter 88-01 for Dresden Units 2 and 3," dated April 29, 1991.
- 6) M. Richter (CECo) letter to T. Murley (NRC), "Response to Safety Evaluation Report for Generic Letter 88-01 for Quad Cities Units 1 and 2," dated April 29, 1991.
- 7) J. Partlow (NRC) letter to all BWR licensees, "Generic Letter 88-01, Supplement 1," dated February 4, 1992.
- 8) R. Barrett (NRC) letter to T. Kovach (CECo), "Response to Generic Letter 89-10 Supplement 3: Consideration of the Results of NRC-Sponsored Tests of Motor-Operated Valves," dated April 16, 1992.
- 9) Meeting between CECo/NRR/Region III on May 12, 1992, "RWCU Outboard Piping Program for Dresden and Quad Cities Stations."

FIGURE 1

RWCU SYSTEM - DUAL TRAIN - DRESDEN UNIT 2 & 3

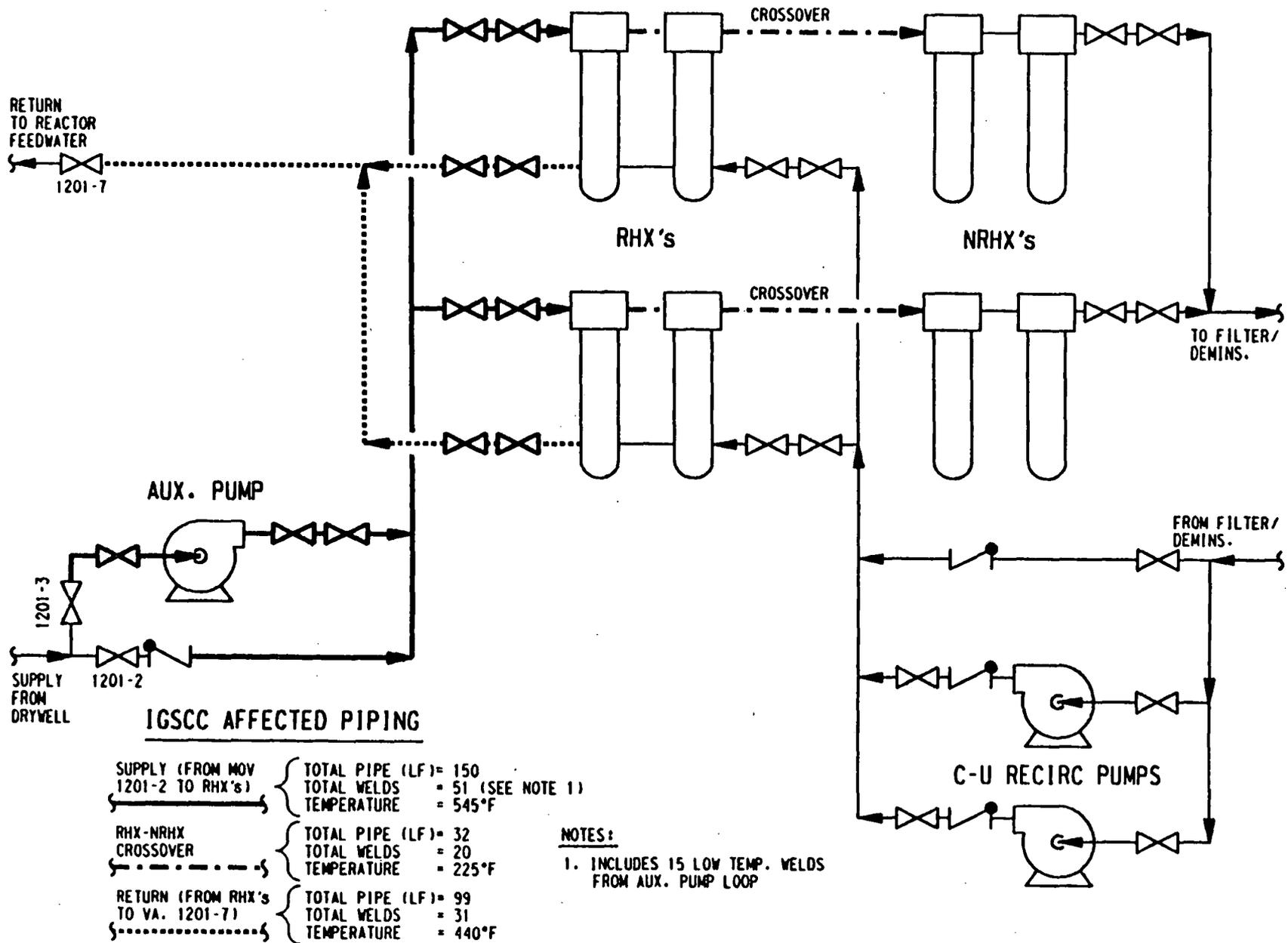


FIGURE 2

RWCU SYSTEM - DUAL TRAIN - QUAD CITIES UNIT 1 & 2

