PHILADELPHIA ELECTRIC COMPANY

NUCLEAR GROUP HEADQUARTERS

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Docket No. 50-352

License No. NPF-39

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

SUBJECT: Limerick Generating Station, Unit 1
Response to NRC Inspection Report 50-353/88-202,
"Inspection of Independent Construction Assessment,
Limerick Generating Station, Unit 2"

REFERENCE: Letter from J. S. Kemper to USNRC, dated March 29, 1989, "Limerick Generating Station, Unit 2 Independent Construction Assessment, Inspection Report No. 50-353/88-202."

Gentlemen:

NRC Inspection Report (IR) 50-353/88-202 dated January 23, 1989, requested that the applicability of the findings of the Independent Construction Assessment (ICA) for Limerick Generating Station (LGS), Unit 2, and the findings of the NRC Inspection Team not identified by the ICA, be evaluated for LGS Unit 1. This response provides our assessment of the applicability of these findings to Unit 1, as committed to in the referenced letter.

We have evaluated the findings identified for LGS Unit 2 by Stone and Webster Engineering Company (SWEC) during their performance of ICA, and by the NRC, for their applicability to LGS Unit 1. Our response addressing the applicability of the Unit 2 SWEC ICA findings to Unit 1 is provided in Attachment 1, and the applicability of the NRC Unit 2 ICA inspection findings to Unit 1 is provided in Attachment 2.

IE01
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Should you have any questions, or require additional information, please do no hesitate to contact us.

R M Bruch for

G. J. Beck
Manager-Licensing
Nuclear Engineering and Services

Attachments

cc: T. T. Martin, Administrator, Region I, USNRC
T. J. Kenny, USNRC Senior Resident Inspector, LGS

ATTACHMENT 1

Limerick Generating Station (LGS)

Independent Construction Assessment (ICA)

Applicability of Stone & Webster Engineering Corp.

Observations to Unit 1

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-001

Radiographs of Residual Heat Removal System Loop B, DLA-212-2, FW6 exhibit a crack-like indication that was not identified.

Supporting Information

ASME III, DIV. 1, subsection NB 5320, Radiographic Acceptance Standard, requires that welds that are shown by radiography to have any type of crack or zone of incomplete fusion are unacceptable.

Contrary to this acceptance criteria the radiographs of Residual Heat Removal System Loop B, DLA-212-2, FW6 exhibit a crack-like indication that was not identified. The defect is located at Station 20, views 10-20 and 20-30.

Response

This concern is not applicable to Unit 1.

This observation was determined to be a difference in radiographic interpretation between the Stone & Webster Engineering Corporation (SWEC) Radiographic interpreter and the Plant Architect/Engineer, Bechtel, Radiographic interpreter. The Bechtel interpretation was accepted by various Philadelphia Electric Company (PECo) and Bechtel personnel. This observation was not the result of any programmatic breakdown in radiographic interpretation.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-002

Documentation required on weld card (form WR-5) is missing or recorded incorrectly.

Supporting Information

Specification 8031-P-301-2, Paragraph 7.6 requires identification of welder (by welder symbol) to be marked on the pipe. Appendix 3 Paragraphs 6.3 and 7.4.3 require that the Lead Welding Quality Control Engineer (LWQCE) shall enter on the weld card name(s) and symbol(s) of welder(s) who actually performed root and fill, the welders shall be identified with the portion of the weld which they performed.

Welding filler material control procedure, WFMC-1 states in Paragraph 6.7 that a quantity of weld filler material sufficient for one shift of work shall be issued. Unused filler material shall be returned per requirements of Table 2 or after completion of assigned welds, whichever occurs first.

a. Contrary to the above, welder G. Laurin (symbol P2W) has identification stamped on the pipe adjacent to DLA-212-2, FW-3 and was issued filler metal for root pass and hot pass only but is not listed on the weld card as performing any welding.

b. Contrary to the above, welder D. Hedrick (Symbol P1V) was issued weld filler material on 4/30/86 and 5/1/86 for weld no. DLA-212-2, FW-1. The weld card record shows the aforementioned welder as completing the root pass. However, the weld was not released for welding until 5/13/86. As there was no weld filler material issued to Mr. D. Hedrick subsequent to 5/1/86, the time frame for welding and weld filler metal issuance should be investigated for field weld 1 on Dwg. DLA-212-2.

Response

This concern is not applicable to Unit 1.

Some weld card errors due to human error are expected and considered acceptable when considering the large population of weld cards which are manually filled out during the construction process. The Quality Assurance (QA) group conducted regularly scheduled annual audits and periodic surveillance of welding activities during the Construction phase of Unit 1 and Unit 2. During these surveillance activities there has been no unusual frequency of incorrect entries in Block 33 of the WR-5 reported. Therefore, this observation is not the result of a programmatic breakdown in the recording of weld records for Unit 1 or Unit 2.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-003

Performance of incorrect non-destructive examination (NDE).

Supporting Information

Nonconformance Report NCR 11780 was issued to magnetic particle/liquid penetrant (MT/PT) tacking block removal areas for Field Weld 3 on DLA-212-2. The area to be examined included 1" on each side of FW-3 taken from the toe of the weld. FW-3 is a transition weld from stainless to carbon steel. NCR 11780 (and USG-MT-9648) indicated that MT was performed on both the carbon and stainless steel sides of the weld.

The following additional factors should be addressed in your response:

- USG-MT-9648 itself indicated that the magnetic particle examination was performed on FW-3 with no additional information to show that the examination included 1" on each side of the toes of FW-3.

- The response to Construction Action Item, CAI-004 did not mention reexamining the areas where MT was incorrectly applied to stainless steel.

Response

This concern is not applicable to Unit 1.

The incorrect NDE method was chosen in this case as a result of personnel error. On August 19, 1988, a review of NCRs which were written against 14 dissimilar welds was done. There were a total of nine NCRs written, with seven of them dispositioned to perform PT, one not requiring NDE, and one (NCR-11780) was dispositioned to MT or PT the area adjacent to toes of the weld (MT was done). This is the NCR that generated this review. Therefore, this concern is viewed as an isolated occurrence, and is not indicative of any programmatic breakdown in non-destructive examination techniques used at Unit 1 or Unit 2.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-004

Installation of incorrect washer material.

Supporting Information

Shaft seal gland plates on Residential Heat Removal (RHR) pumps 2BP-202 and 2DP-202 each have one washer on hold down studs that is carbon steel. Manufacturers' instruction book (Bechtel document E11-C-002-K-2.1) requires the washers to be A240-304 stainless steel.

Response

This concern is not applicable to Unit 1.

The installation of the incorrect washers on Unit 2 equipment was the result of one step in the inspection/verification process of installing the mechanical seal being missed by Field Engineering and Quality Control personnel. An inspection of the four (4) Unit 2 Core Spray Pumps, whose seal gland installation is similar to the RHR pumps, was made and the installation was found to be in accordance with design documents. This observation is the result of an isolated case of human error and does not reflect any programmatic breakdown of the inspection/verification process which was performed on Unit 1.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-005

Radiographic location markers were vibro tooled on the RT film for the weld.

Supporting Information

General Electric (GE) NDE Procedure No. 18XA9602, Rev. 3, dated 07/11/80, titled "NDE Procedure Radiographic Examination of Welds," Para. 6.5, states that lead location markers shall be placed on the object being radiographed to provide evidence that the required coverage of the area has been obtained.

Contrary to this requirement the station markers were vibro tooled on the film for the weld:

Low Pressure Coolant Injection (LPCI) N17B-315 - Thermal Sleeve to Safe End - Index No. 29, Film No. N17B-315, View 5-0

ASME V, Article 2 requires that location markers appear as radiographic images on the film.

Response

This concern is not applicable to Unit 1.

This occurrence was shown to be an isolated case on Unit 2 following a review of all 24 radiographic exposures for the LPCI nozzles thermal sleeves where no other location markers were discovered to be vibro-tooled on the film. Additionally, this weld was not required to be radiographed by the ASME Code, which only requires surface examination. This observation was not the result of a common incorrect practice and is not indicative of a programmatic breakdown in the non-destructive examination techniques used at Unit 1 or Unit 2.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-006

Radiographs of welds have indications which have not been documented on the reader sheet as being evaluated.

Supporting Information

GE NDE Procedure No. 18XA9602, Rev. 3, dated 07/11/80, titled "NDE Procedure Radiographic Examination of Welds," states in part that a standard Radiographic Report Form shall be prepared and as a minimum contain film interpretation noting all significant indications, their location and acceptability.

Contrary to this requirement radiographs of the following welds have significant indications, which appear to be film artifacts that have not been documented as being evaluated.

LPCI-N17B-45	Thermal Sleeve to Safe End Index 20, Film No. N17B-45 Views 0-1 thru 5-0
LPCI-N17B-135	Thermal Sleeve to Safe End Index 22, Film No. N17B-135 Views 1-2, 2-3, 4-5 and 5-0
LPCI-N17B-225	Thermal Sleeve to Safe End Index 26, Film No. 17B-225 Views 3-4 & 4-5

All films reviewed of the Reactor Pressure Vessel (RPV) Modifications, Safe Ends to Nozzles and Thermal Sleeves to Safe Ends have clip holes from hand processing which scratch radiographic film during handling. This is detrimental for film archival when handling has already initiated scratch marks on the film.

Response

This concern is applicable to Unit 1.

Cause:

During and prior to 1981, common industry practice was to record only the data that was noteworthy to the film reviewer on the reader's sheets. No definition existed as to what constituted significant indication. The reader exercised his judgment based on his experience in complying with the specification.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Films of the RPV modifications, safe ends to nozzles and thermal sleeve to safe ends contain hand processing clip holes because they were not procedurally required to be removed with a corner clipper.

Extent of Condition:

During and prior to 1981, common industry practice was to record only that data that was noteworthy to the film reviewer on the reader's sheets. This condition is assumed to be prevalent to varying degrees depending on the reader of radiographs for Unit 1 through 1981.

Hand processing clip holes in the radiographic films for Unit 1 can be expected to exist except where "corner clipping" occurred.

Significance:

The omission of recording certain radiographic images on the reader's sheets does not indicate the films were not properly evaluated. Our opinion is that the specific examples cited by SWEC were easily recognized as film artifacts and would not typically be recorded. We believe that all significant indications were recorded and evaluated in the context existing at the time of evaluation. In addition, the specific examples are contractual items not required by the ASME Code.

The radiographic hand processing clip holes have no significance since they are outside the area of interest. Only mishandling of film with clip holes can cause problems.

Corrective Action:

Based on lack of significance as cited above, no corrective action is required.

Action to Prevent Recurrence:

Present industry practice is to more extensively record data and LGS radiographs after 1981 reflect this trend.

There are no ASME Code requirements regarding clip holes. Since the clip holes do not obstruct the area of interest, no action is planned.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-007

Radiographs of welds have indications that have not been documented as being evaluated.

Supporting Information

GE NDE Procedure No. 18XA9602, Rev. 3, dated 07/11/80, titled "NDE Procedure Radiographic Examination of Welds," Para. 7.0, states in part that a standard Radiographic Report Form shall be prepared and as a minimum contain film interpretation noting all significant indications, their location and acceptability.

Contrary to this requirement radiographs of the following welds have significant indications that have not been documented as being evaluated. Root condition found in radiograph of LPCI N17B-225, safe end to nozzle is considered rejectable.

RPV Nozzle Modification

LPCI N17B-225 - Safe end to nozzle
Index No. 24, Film No. N17B-225R1
Views 2-3, 3-4, 4-5, and 5-0. Rejectable root condition with an abrupt density change at film location marker 5, Ref: ASME III, NB4424(e)

LPCI N17B-315 - Safe end to nozzle
Index No. 28, Film No. N17B-315
Views 2-3, 3-4, and 4-5. Root condition not documented as evaluated.

LPCI N17B-45 - Safe end to nozzle
Index 17, Film No. N17B-45
Views 1-2, 2-3, and 3-4. Root condition and linear indications not documented as evaluated.

*LPCI N17B-315 - Safe end repair (weld prep)
Index 30, Film No. IA 8
Views A-B - indication approx. 1" long, 3" from Station A not documented as evaluated.

* In addition, Film Report No. 8355 for this radiograph does not contain name of radiographic technician by Specification No. 18XA9602, Para. 7.1.1.

Response

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

This concern is applicable to Unit 1.

Cause:

During and prior to 1981, common industry practice was to record only the data that was noteworthy to the film reviewer on the reader's sheets. No definition existed as to what constituted a significant indication. The reader exercised his judgement based on his experience in complying with the specification.

Extent of Condition:

During and prior to 1981, common industry practice was to record only that data that were noteworthy to the film reviewer on the reader's sheets. This condition is assumed to be prevalent in varying degrees depending on the reader of radiographs for Unit 1 through 1981.

Significance:

The omission of recording certain radiographic images on the reader's sheets does not indicate the films were not properly evaluated. Our opinion is that the specific examples cited by SWEC were easily recognized as film artifacts and would not typically be recorded. We believe that all significant indications were recorded and evaluated in the context existing at the time of evaluation and the weld quality meets ASME Code requirements. The weld quality was found acceptable based on results of an additional visual boroscope exam plus an ultrasonic Pre-Service Inspection.

Corrective Action:

Based on lack of significance as cited in Significance above, no corrective action required.

Action to Prevent Recurrence:

Present industry practice is to more extensively record data, and LGS radiographs after 1981 reflect this trend.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-008

Radiographic film has chemical staining from residual thiosulfate.

Supporting Information

RHR system piping radiographs, DLA-212-2, FW2, GBB-201-2, FW7, and GBB-201-2, FW-9, show evidence of chemical staining from residual thiosulfate. This is indicative of film not being processed in accordance with Part II of Recommended Practice SE-94. BQAM-ASME III, Paragraph 7220 describes in part that final radiographs are permanent records for items classified as ASME Section III, Classes 1, 2, CS or MC. The subject radiographs in their existing condition cannot meet permanent record requirements.

Response

This concern is not applicable to Unit 1.

Investigation of this film with our vendor, U.S. Testing, reiterated that a problem was encountered with automatic film developing at the restart of construction of Unit 2. The problem existed from February 7, 1986 until June 1, 1986 when U.S. Testing installed a new film processor. This observation is therefore not applicable to Unit 1 as construction (and therefore radiography of welds) was completed in 198 .

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-009

Faulty installation of spring nuts.

Supporting Information

Spring nut on Unit 2 cable tray support 13/S7.2 has a cocked spring nut in bottom angle bracket for P-5001 to vertical strut.

Response

This concern may be applicable to Unit 1.

Although a specific inspection of spring nuts was not performed on Unit 1, a small number of cases of loose spring nuts could exist on Unit 1. The analysis performed for Unit 2 categorized 143 connections which were affected by incorrectly installed spring nuts into 12 types based on the number of spring nuts used and the configuration of the connections. An enveloping type structural analysis was performed and the results of the analysis indicate that all the computed loads in the bolts are less than the allowable loads. A minimum design safety factor of 2 is maintained for all of the inspected connections with improper installations.

Based on the analysis performed on the varied types of improper connections observed on Unit 2 we have concluded that this analysis would also demonstrate adequacy for similar deficient instaliations on Unit 1 should they exist.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-010

Motor Operated Valve Switch Compartment inadequately sealed.

Supporting Information

Valve HV51-2F0478 - In the side of the limit switch compartment body is a 2" plug (threaded). There is a section of electrical cable through the center of the plug. The cable is cut off flush at both sides of the plug. Plug is finger tight; environmental qualification (EQ) seal is inadequate.

Response

This concern is not applicable to Unit 1.

The 2" threaded plug with cut cable was an abandoned temporary power feed used on Unit 2 for periodic meggering by the Bechtel Long Term Maintenance (LTM) Group (Reference Construction Procedures CP-G-3/CP-E-7). Since the procedure neglected to require the reinstallation of the 2" plug once meggering or permanent power was complete, reinstallation was omitted.

A walkdown was performed of all Unit 2 Motor Operated Valves, 18 additional valves were found to have a temporary connector or no plug at this location. All unacceptable conditions found were located outside the primary containment. This condition was not a concern during the construction of Unit 1 because of the construction sequencing during that time frame. A walkdown of Unit 1 Motor Operated Valves that have been reworked under the Unit 2 program after Unit 1 initial operations were reviewed and found acceptable, confirming that the initial FM-4 Rework Program, without LTM interface, was acceptable.

Atiachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-011

Deficient instrumentation tubing installation and clearance.

Supporting Information

A. Ref. isometric drawing #FJ-51-04-16A. Tubing Hanger #H22 has a loose tube restraint connection (1/2" hex head bolt not tightened). This has been identified on Bechtel NCR #13838 and Start-Up NCR #5-89-J.

B. Conduit 2AI131 to TE-49-2N022A is in contact with tubing from connection A-3 of Rack 20-C021. This condition identified on Start-Up NCR #5-94-J.

C. Ref. ISO #FJ-42-07-35-C, Sht. 1 and Sht. 3. Tubing unions on adjacent lines are in contact. These unions are located between Hangers #H21 and H23. This condition has been identified on Bechtel NCR #13838 and Start-Up NCR #S-93-J.

Response

These concerns are not applicable to Unit 1.

Subsequent to final Unit 2 inspection, various construction activities occurred in the immediate area where the cited conditions exist and we consider these activities to be the causal factor.

Construction Engineering personnel performed a walkdown of 15 Unit 2 instrumentation installations consisting of 3400 feet of tubing. The results of the walkdown found that all of these installations were acceptable.

Based on walkdowns performed, we do not expect similar conditions to be prevelant elsewhere, and in consideration of the insignificance of the specific examples cited we do not consider that additional walkdowns are warranted. Therefore, these observations are viewed as isolated instances as a result of construction activities in the area and are not indicative of a programmatic breakdown in tubing installation for Units 1 or 2.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-012

Sieve Analysis Tests, ASTM C-117, were not performed on aggregates.

Supporting Information

LGS Final Safety Analysis Report (FSAR), Table 3.8-12, Page 1 of 2, states testing requirements as follows:

"Minimum Test Frequency for Concrete Materials;
Material finer than a 200 sieve, ASTM C-117;
once for each 5000 cubic yards of concrete production."

The tests were not performed on fine or coarse aggregates used in the Reactor Building Foundation Mat.

Response

This concern is applicable to Unit 1.

Cause:

Production Testing per ASTM-C117 was not required by PSAR.

Extent of Condition:

All concrete production placements performed prior to August 18, 1976 used California Sand Equivalent Test ASTM D-2419-69 versus ASTM C-117.

Significance:

Concrete mix design qualification tests were performed in accordance with ASTM C-117 as required by the FSAR and Specification C-61. The results of these qualification tests were reported on May 3, 1974 (Ref. BLP-5894). The results of these tests showed a small percentage of fines and demonstrated the excellent quality of the aggregate used for LGS.

As recommended by ACI 304-73, the California Sand Equivalent test (ASTM D-2419-69, Ref. ACI 304-73, Section 2.1.1) was used for production control of deleterious fine materials, as required by C-61 for every 5000 yards of concrete. Experience from the early pours indicated that the sand washing was so effective that too many fines were washed out, and therefore Bechtel Engineering recommended less extensive washing. To ensure that the percentage of fines remained within limits,

the C117 test requirement was invoked in Specification 8031-C-61 Revision 5 under paragraph 5 of Section 6.3.3 via Addendum 1 on August 18, 1976. During the period from August 26, 1976 to December 26, 1978, both ASTM D-2419-69 and ASTM C-117 tests were performed. Following the issuance of Addendum #10 to Specification 8031-C-61, Revision 7, no further test per ASTM D-2419-69 was performed after December 26, 1978, and since that time only ASTM C-117 tests have been performed for each 5000 cubic yards of concrete.

Corrective Action:

None required based on discussion under "Significance" above.

Action to Prevent Recurrence:

None required.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-013

Missing weld on pipe support.

Supporting Information

Flare bevel groove weld 11 1/2" long, near side and far side, shown on Hanger Drawing GBB-217-H13, Rev. 3, has not been made in the field. Total length of missing weld is approximately 23".

Rev. 2F1 of Drawing GBB-217-H13 was used for the final installation inspection. Weld documentation for GBB-217-H13 shows no Quality Control (QC) visual acceptance of the missing flare bevel weld. However, hanger was accepted by QC as complete on 10/28/87, ANII acceptance 11/24/87, PECo review 11/9/87.

Response

This concern is not applicable to Unit 1.

This concern related to the implementation/inspection of as-built hardware drawing revisions to previously as-built hanger design drawings. Quality Control personnel have re-reviewed all Unit 2 large bore as-built drawing revision that have been issued to date (FIR-P319-76-20) to determine if any other inspectable attributes have been overlooked (total reviewed was 1762).

No other instances were found that affected large bore hardware installations; however, 15 software items were identified. The 15 software items were physically reinspected and all items, with the exception of two, were found to be within the installation specification tolerances. The remaining two instances were determined to be drafting errors or extraneous information not required by design.

Based on the total re-review of Unit 2 large bore as-built drawing revisions by QC, this finding is not indicative of a programmatic breakdown in the construction or inspection of pipe supports installed at Unit 1 or Unit 2.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-014

Improper installation of gasket.

Supporting Information

Gasket in companion flanges between BPD-502-21A and duct work PC 49B, on Drawing M-1173-1 SSM, is missing on one corner of the flanges. This is a violation of M-68A-2.

Response

This concern is not applicable to Unit 1.

This Unit 2 deficiency was apparently caused by an unauthorized alteration after final installation and QC inspection. An additional 92 companion flanges were inspected on Unit 2 with no other damaged gaskets identified. Therefore, this concern is viewed as an isolated occurrence and not indicative of a programmatic breakdown of ductwork installation at Unit 1 or Unit 2.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-015

Incorrect drawing reference for instrument installation and foreign (oily) substance on flow transmitter.

Supporting Information

A. Isometric FJ-51-04-16A, Revision 1 referenced installation detail P034 instead of F034.

B. An oily substance was found on flow transmitter FT-51-2N052B and attached tubing and valves causing dirt and dust to stick.

Response

A. This concern is not applicable to Unit 1.

The reference to installation detail P034 was a drafting error on an isometric used for historical purposes only. The correct detail was used on all installation and inspection drawings. An additional 164 Unit 2 drawings were reviewed for errors of a similar nature. Three (3) additional drawings needed a correction to the installation detail. As discussed above, the correct installation detail was used in the work packages, therefore, this condition is not a concern for Unit 1 installed equipment.

B. This concern is not applicable to Unit 1.

Surface cleanliness was inspected on 333 locally mounted Unit 2 instruments. In areas where construction was complete and the equipment turned over to PECo, all instruments were found to be acceptable. Therefore, this concern is determined to be a result of construction activities on Unit 2 only.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-016

Improper bolting torque

Supporting Information

Manufacturer's Manual for RHR pumps require discharge head flange to shell flange capscrews to be torqued to 450-475 ft. lbs.

During torque verification of RHR pump 2CP202, the capscrews turned when a torque of 100-250 ft. lbs. was applied. This does not meet the Manufacturer's Manual requirements.

Response

This concern may be applicable to Unit 1.

LGS has implemented a Torque and Vibration Monitoring Program for Unit 1 and Unit 2 RHR pumps to detect and correct any torqueing problems which may develop. A recent check on the torque of the RHR pump capscrews did not reveal any problems.

Attachment 1

Applicabi , of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-017

Battery cleanliness

Supporting Information

Our understanding is that you are using Surveillance Test, ST-6-096-902-2 and ST-6-095-912-2 as guidelines for maintenance up until the time of fuel load.

Paragraph 4.3 in the aforementioned procedures require electrolyte spills to be immediately cleaned. C&D batteries Vendor Manual No. 8031-E13-28 in Section 6.10 requires the covers and containers to be clean and dry at all times.

Three (3) battery cells had water droplets around the fill hole area and forty-three (43) battery cells had a white acid residue around the fill holes, on the cap, along the line between the clear container and the cap and on the side rail plastic covers.

Response

This concern is applicable to Unit 1.

Personnel performing hydrometer Surveillance Tests were re-instructed regarding compliance with procedure cleaning requirements. In addition, Routine Test RT-6-095-930-0, "Verification of Battery Cleanliness," was written to resolve this concern and requires inspection/cleaning of batteries and battery rooms monthly.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-018

Fire dampers improperly identified on drawing.

Supporting Information

Bechtel Drawing M-1175 SH. 1 of 2, Rev. 25 shows fire damper, FPD-502-31 installed at the 283' elevation and at the 253' elevation. The valve at the 283' elevation should be FPD-501-32.

Response

This concern is not applicable to Unit 1.

The cause of this Unit 2 observation was a human error in drafting. We have reviewed 46 other section views for all 119 FPD's in the Unit 2 Reactor Building and found this condition does not exist on any other drawings. This substantiates our conclusion that this finding is not indicative of a programmatic breakdown in the quality of drafting for Unit 1 drawings.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-019

Incorrect material size

Supporting Information

Reference Hanger #66 on Schneider Drawing M-1169-2 SSM.

Bechtel Drawing M-1169, Rev. 27 requires the referenced hanger to be per requirements of Drawing C-1397-2 detail 5. This detail shows the lower gusset plate to be 3/4" thick. The installed plate is 1/2" thick.

Response

This concern is not applicable to Unit 1.

The installed 1/2" plate reflects the original design drawing requirements. The actual problem was an individual mistakenly believed the as-built drawing should reflect a 3/4" plate. Therefore he changed the as-built drawing via an FCR to correct the apparent descrepancy, which was then reflected in detail 5 of drawing C-1397-2.

A review of 6 similar hanger installations and 15 associated FCR's which were written by the individual that originated FCR C-11860F, revealed no other material size discrepancies. Therefore, the observed condition is concluded not to be indicative of a programmatic breakdown.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-020

Faulty installation of conduit.

Supporting Information

Item 1A. Conduit 2BD104 has a two-hole strap at C1-1159. There is a shim positioned between top of conduit and strap. This is not shown on any detail available.

Item 1B. JB-HD78-091B has a section of flexible metal conduit approx. two feet long attached only at junction box end. Other end is left hanging in the air.

Response

Item 1A. This concern is not applicable to Unit 1.

Construction Engineering personnel performed a walkdown of Unit 1 and Unit 2 at conduit bend locations where this condition could exist. This support configuration was seldom utilized. It was used when no other alternatives existed except to support the conduit at a bend. Six (6) additional supports were identified as being of similar configuration. Only one of these supports exhibited a shim, which was previously identified on NCR #5078.

Item 1B. This concern is not applicable to Unit 1.

This Unit 2 concern is due to construction activities in progress. Since the issuance of CAI-061 Revision 0, the abandoned flexible conduit in question has been removed. The resulting hole in junction box #JB-HD78-091B was plugged. This was not a nonconforming condition, and would have been evaluated by Construction Engineering during the facility walkdown.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-021

Loose cable tray attachment hardware.

Supporting Information

Cable tray 2BCVC03 located approx. 4' west of "30.5" line is attached to the "D" line wall by means of bolt/spring nuts to embedded strut. The attachment at Elev. 222' (east side) has two 1/4" thick square washers between strut and siderails to act as a shim; the washers are free to rotate about the axis of the bolt.

Response

This concern is not applicable to Unit 1.

The Unit 2 bolt in question was torqued to 50 ft./lbs. during installation as referenced by QCIR E1261-30-4. There is no record that any rework was performed on this bolt. The bolt on the west side of the support was checked and found fully torqued. The condition appears to be an unauthorized bolt torque adjustment by an unknown individual.

Construction QC personnel performed a random walkdown of sixteen supports in the Unit 2 Reactor Building. A total of fifty-four bolts were verified for torque. No additional torque deficiencies were identified. Based on this walkdown we do not expect similar examples to be prevalent elsewhere, and do not view this concern as a programmatic breakdown in bolt torqueing during support installation for Unit 1 or Unit 2.

Attachment 1

Applicability o. Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-022

Deficiencies in the Long Term Maintenance Program of permanent equipment have resulted in a lack of maintenance on equipment for approximately five years (1975 to 1981) and equipment not being placed in the Maintenance Program.

Supporting Information

Bechtel Construction Procedure CP-G-3, "Procedure for Long Term Storage/Maintenance/Lubrication of Permanent Plant Equipment and Materials Prior to Turnover," requires that long-term maintenance be performed on permanent plant equipment from the time it is released for storage or installation until turnover to the Client.

Contrary to these requirements, there are no maintenance records available for the following permanent plant equipment:

Component	Time Period
RHR Heat Exchangers 2AE205 and 2BE205	12/72 to 12/73 and 6/76 to 1/81
RHR Pump Shell 2BP202	7/75 to 2/81
RHR Pump Shell 2DP202	2/76 to 2/81
RHR Pump Discharge Head 2DP202	8/75 to 7/77; 10/78 was the last PM Check
Motor Control Center 20B212 (D224-R-G)	4/78 to 4/81
Battery Chargers 2B1D103 and 2B2D103	2/84 to 5/86
20" Valve GBC-GB-MO-51 2F068A & B	9/75 to 10/81
RHR Suppression Pool Suction Strainers 2A1F211, 2B1F211, 2C1F211 2D1F211, 2A2F211, 2B2F211, 2C2F211 and 2D2F211	5/83 to 9/88

In addition, the Suppression Pool Strainers for the High Pressure Coolant Injection (HPCI), Reactor Core Isolation Cooling (RCIC), and Core Spray Systems were not placed in the Maintenance Program when received in May 1983.

Response

This concern is not applicable to Unit 1.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Unit 1 equipment was inspected when turned over to PECo and has been maintained in accordance with the Unit 1 Maintenance program. Therefore, we have no reason to suspect any degradation of Unit 1 components due to improper long term maintenance.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-023

Incomplete construction action on electrical junction boxes.

Supporting Information

Two junction boxes having 4.16 kv circuits are not closed.

2JB013 located under the ceiling and above the 4.16 kv switchgear 20A116 needs a cover.

2JB880 in the emergency diesel generator room (cell B) needs to be enlarged and permanently enclosed.

Response

These concerns are not applicable to Unit 1.

The two observed incompleted construction items on Unit 2 were determined to be "under construction" and therefore are not indicative of any programmatic breakdown on Unit 1 electrical equipment installations.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-024

Deficient/damaged condition of electrical equipment.

Supporting Information

RHR Motor "B"

Electrical Box 2BTB-BP-202 is mounted to motor by means of a 1 1/4" nipple and hub through back of box to motor. Also there are two bolts through back of box that act as spacers to motor surface, one is slightly bent. Box is free to rotate on axis of nipple. Is this mounting adequate under seismic conditions?

Response

This concern is not applicable to Unit 1.

A subsequent inspection of all (4) four of the Unit 2 RHR pump motors was performed with all similar installations found secure, therefore, this concern has been determined to be an isolated case of an inadequately tightened spacer bolt on Unit 2 equipment. The junction box is supported adequately with or without the spacer bolts. Pictoral evidence (Wyle Test Report No. 58032, July 14, 1976, GE VPF #3929-27-1, Photograph 1, Page 17, available for SWEC review at G.E. offices in San Jose) shows that the motor assembly was seismically tested with the junction box attached only by the nipple and hub; the spacer bolts were not installed.

This concern is not indicative of a programmatic breakdown in the installation methods of electrical equipment for Unit 1 or Unit 2.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-025

Discrepant information on vendor drawing to the as-built condition.

Supporting Information

Vendor Dwg. 8031-M1-H23-P021 E-002.2 (GE rack wiring diagram) did not agree with as-built condition.

Terminal Block CC Points 4 and 5
Found Cable 22IO02A instead of 22IC002A

Terminal Block BB Points 1 and 2
Found Cable 22IC006C (corrected from original Action Item)
instead of 2B1F061A

Response

This concern is not applicable to Unit 1.

Six (6) additional GE instrument racks were selected at random to see if similar discrepancies existed. None were found. Therefore, this concern is viewed as an isolated occurrence on Unit 2 and is not indicative of a programmatic breakdown in GE as-built drawing continuity for Unit 1 or Unit 2.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-026

Discrepant conditions in a Motor Operated Valve (MOV).

Supporting Information

MOV-HV51-2F004B

Item 1 (CAI Item B) There is a loose nut/lug on terminal 10 on Fingerbase.

Item 2 (CAI Item C) Limit switch compartment cover gasket is split in half at upper right corner.

Response

Item 1 This concern is not applicable to Unit 1.

Sixteen (16) additional limit switch compartments in Unit 2 (approximately 10%) were inspected by Construction Engineering and QC personnel for similar conditions and no discrepancies were found. Therefore, this concern is viewed as an isolated instance and is not indicative of a programmatic breakdown in MOV installations on Unit 1 or Unit 2.

Item 2 This concern is not applicable to Unit 1.

A review of Quality Control Inspection Record (QCIR) M51-7P-HV-2F004B-61-1 indicates the Unit 2 gasket was inspected and accepted with no flaws and installed in the valve limit switch cover. Prerequisite testing was performed in accordance with Inspection and Test Procedure EE11.10 which required inspection of the limit switch compartment for good workmanship (including checking the gasket) prior to reinstallation of the cover. The gasket is only .0312" thick and easily damaged during cover removal. The damage found most probably occurred as a result of the ICA inspection. Site procedures currently address gasket inspection/replacement each time a limit switch cover is removed. (Reference Drawing 8031-FM-4, Inspection and Test Procedure EE11.10 and Preventative Maintenance Procedure PMQ-500-98).

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-027

Pipe support not constructed in accordance with drawing.

Supporting Information

Bill of materials requires (4) 5 1/2 x 2 7/8 x 3/8" stiffener plates. Visual inspection shows eight plates are installed.

Response

This concern is not applicable to Unit 1.

The Bill of Material quantity for Item 5 was specified as (4) on Revision 2 of the Design Drawing. The stiffener plate detail (Typ. 4 places) on Sheet 2 of 2 specified 2 stiffener plates per location (total 8 required). The incorrect quantity specified in the Bill of Material was a drafting error. The support detail was specific as to the design intent and subsequently obvious to the installer.

Construction Engineering generated Field Change Request (FCR) 17781F during physical construction of the support in order to obtain Project Engineering concurrence that eight plates were required per the stiffener plate detail. The FCR was approved by Project Engineering on 2/4/84.

During the subsequent incorporation of the FCR into Revision 3 of the design drawing, a second drafting error was made in that the correction did not occur. The correction to the Bill of Material was not made.

The incorrect quantity in the Bill of Material was a drafting error and is unique to GBB-204-H4 as this was not a standard detail. Construction Engineering and QC personnel have reviewed all Unit 2 large pipe hanger (total of 1454) PE-ABR Drawing Revisions on FIR P-319-76-20 to identify any additional drafting errors; four (4) additional software errors were identified (less than 1%).

This condition, therefore, is not indicative of a programmatic breakdown in pipe support installation for Unit 1.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-028

Deficiency raceway hardware installation.

Supporting Information

There is a cocked spring nut at support CI-1346 for strap on conduit 2DL011.

Response

This concern may be applicable to Unit 1.

Although a specific inspection of spring nuts was not performed on Unit 1, a small number of cases of loose spring nuts could exist on Unit 1. The analysis performed for Unit 2 categorized 143 connections which were affected by incorrectly installed spring nuts into 12 types based on the number of spring nuts used and the configuration of the connections. An enveloping type structural analysis was performed and the results of the analysis indicate that all the computed loads in the bolts are less than the allowable loads. A minimum design safety factor of two (2) is maintained for all of the inspected connections with improper installations.

Based on the analysis performed on the varied types of improper connections observed on Unit 2 it has been concluded that this analysis would also demonstrate adequacy for similar deficient installations on Unit 1, should they exist.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-029

Incomplete structural connections.

Supporting Information

Two (2) joints on the platform for cooler 2AV-212 are currently connected using two bolts. The original requirement was to make the connection with four (4) bolts. Due to a misfabrication, a Design Change Notice (DCN) was issued to allow welding of the joint. The welding was not accomplished. The platform has been final accepted and the two (2) joints are neither welded nor connected using four (4) bolts.

Response

This concern is not applicable to Unit 1.

A sample of thirty-seven (37) Unit 2 QCIRs have been reviewed for completeness of scoping and inspection for field welding activities (Reference FIR #C-63-22-56). The work scope on these QCIRs includes various kinds of steel construction involving field welding. No discrepancies were found in the sample of thirty-seven (37) QCIRs. Therefore, this finding is limited to this particular unit cooler and is not indicative of a programmatic breakdown in the structural support fabrication practices employed on Unit 1 or Unit 2.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-030

Use of uncontrolled/uncalibrated measuring and test equipment.

Supporting Information

10CFR50, Appendix B, Criterion 12, identifies that "measures shall be established to assure that...measuring and test devices used in activities affecting quality are properly controlled, calibrated and adjusted at specified periods to maintain accuracy within acceptable limits".

Review of 61 WR5 reports for underground RHR Service Water piping (HBC-507 and HBC-509) on Drawings C1072, C1074, C1076 and C1077, shows NDE reports that identify temperature of weld surfaces being examined, but no identification of method of determining temperature, instrument used or calibration date, is shown. An example is offered on NDE Report for weld HBC-509-C1074, FW59 that records a $42^{o}F$ surface temperature. The NDE procedure, IPPT 340-3902, Rev. A, Amendments 1 and 2, is qualified between $40^{o}F$ and $120^{o}F$. In this instance, an uncalibrated temperature measuring instrument may not have the accuracy to allow use of the NDE procedure.

Response

This concern may be applicable to Unit 1.

The NDE subcontractor also did not maintain the type of thermometer required to check temperatures for PT exams under their calibration procedure for measuring and test equipment during Unit 1 construction.

An in-depth review of the possibility that PT exams performed on Unit 2 were inadequate was conducted. The results of this review were to use the welds as-is. There is no evidence that any questionable liquid penetrant examinations exist on Unit 1, however, based on the review performed on Unit 2 the expected disposition for similar Unit 1 deficiencies would be "use-as-is".

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-031

Minor hardware deficiencies in a D.C. distribution panel.

Supporting Information

Minor deficiencies listed below were found in 2PPB1 (2BD102):

Wire to a receptacle on the left wall was pulled out of receptacle. Two receptacles on the right wall have either a set screw loose or missing. Set screws hold the receptacles to the housing.

Response

This concern is not applicable to Unit 1.

The minor Unit 2 deficiencies identified are the apparent result of unauthorized rework in Unit 2 D.C. distribution panel 2BD102.

The remaining Unit 2 D.C. distribution panels (2AD102, 2CD102 and 2DD102) were inspected by Construction Engineering for similar conditions and no deficiencies were noted.

Therefore, deficiency is not indicative of a programmatic breakdown in the installation of electrical equipment in Unit 1 or Unit 2.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-032

The compressive strength test reports do not contain all the required data.

Supporting Information

LGS FSAR, Para. 3.8.6.1.2.1, requires that concrete properties will be verified by testing. Compressive strength shall be tested in accordance with ASTM C-39.

Specification 8011-C-61, Paragraph 6.3.9, states, in part, "Compressive strength samples shall be tested in accordance with ASTM C-39."

ASTM C-39, Section 6 states, in part, "The report shall include"

- o diameter of cylinder, in inches
- o cross-sectional areas, in square inches
- o maximum load, in pounds.

Contrary to these statements the test reports for the Reactor Building Foundation Mat lack this data.

Response

This concern is applicable to Unit 1.

Cause:

The contributing cause for the omission of subject data from test reports was that the governing Field Inspection Manual contained a mandatory report form which did not specify inclusion of the subject data.

Extent of Condition:

Test reports prior to June, 1975 were prepared with old forms and do not include all the ASTM required entries.

Significance:

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Test reports contain the calculated compressive strength derived from the measured test load and calculated cylinder area. Although test reports during the period from late 1973 to June, 1975 do not show test cylinder diameter, area, and maximum test load, these parameters were measured and recorded separately in order to calculate the cylinder compressive strength. Note that compressive strength of the concrete is the primary design concern. Omission of the above stated three items on the test reports has no impact on the compressive strength, it only prevents checking for any mathematical error in calculation of compressive strength. Compressive strengths are adequate and there is no safety implication.

Corrective Action:

NCR #13811 was generated and has been dispositioned by Project Engineering to "Use As Is" since the compressive strength of the concrete is the primary design criteria. All supplementary records showing diameter, area of cylinder and maximum load have been reviewed and attached to corresponding QCIRs. Fifty (50) of these supplementary records were randomly selected and checked for correctness of the recorded compressive strength on the old form. No error was found on those fifty (50) records.

Action to Prevent Recurrence:

Since all QCIRs prior to June, 1975 include the identified information on supplementary records and the strength requirements of the concrete were correctly determined even though all related variables were not initially recorded on the form no further action is required.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-033

PGCC panel wiring & sealing deficiencies.

Supporting Information

PGCC Panel 20C618

Item 1 Cable 1801/E11A-006 at AAA6 does not have cable sheath inside clamp of plug at J-106.

Item 2 Vendor leads lifted at Points 18 and 19 at (AAA4) Section "B"; they have no tags indicating what or why lifted. Leads are insulated at ends.

Response

This concern is not applicable to Unit 1.

Inattentiveness to detail caused cable 1801/E11A-006 at AAA6 to be improperly secured into the plug connector at the time the cable connector was assembled.

Items 1 & 2: 100% of the cables in eleven (11) Unit 2 panels (20C648, 20C647, 20C626, 20C610, 20C669, 20C644, 20C646, 20C619, 20C605, and 20C604) were inspected by Construction Engineering Personnel for similar conditions, no deficiencies were noted. Therefore, Item 1 is viewed as an isolated case of inattention to detail at the time of assembly and is not indicative of a programmatic breakdown in the installation of cable connectors on Unit 1 or Unit 2.

Item 2 was caused by wire/cable terminations which were lifted during preoperational testing on Unit 2 which were not replaced due to lack of proper tagging. This condition would have been detected during the system checkout portion of the testing program. LGS Administrative procedure A-42, "Procedure for Control of Temporary Circuit Alterations (TCA)," ensures that the lifting of leads is properly controlled at LGS Unit 1.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-034

Grouted-in rods have not attained minimum embediment length requirements.

Supporting Information

Four grouted-in rods on baseplate for GBC-204-H4 have embediment lengths of 6 3/4", 6 3/4", 6 7/8", and 6 7/8", as determined by ultrasonic testing method. This is contrary to the requirements of drawing C615, Sheet 2, which shows a minimum embedment length of 7".

Response

This concern may be applicable to Unit 1.

We are not aware of any specific cases of grouted-in rods not having attained their minimum embedment depth on Unit 1. A sample of 15% (136) of Unit 2 grouted-in rods were examined for compliance with the minimum specifications for embedment as shown in installation drawings. Thirty-one of these rods do not meet their specification. An engineering evaluation of these cases found each to be acceptable "as-is." These results suggest that other grouted-in rod installations will demonstrate the same factors of safety and satisfy the design requirements of the calculations of record.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-035

Code Violations on RHR Heat Exchanger Radiographs

Supporting Information

ASME VIII, Division 1, 1968 Edition (as referenced by ASME III Subsection C), Paragraph UW-51 contains the following requirements:

1. UW-51(c)(3): "If the film density through the weld varies more than minus 15 or plus 30 percent from the density through the penetrameter, then an additional penatrameter will be required for the exceptional area or areas."

2. UW-51(c)(3): "The H. & D. density through acceptable weld metal shall be 1.3 minimum for single film viewing, and 1.8 minimum for composite viewing of double film exposures."

3. UW-51(c)(5): "The penetrameter shall be placed adjacent to the weld seam except as provided for in Paragraph (4)."

The radiographs of the below listed RHR Heat Exchanger welds Violate the Code for one or more of the following reasons: (a) Density deviation exceeds (minimum 15%) or (plus 30%); (b) Penetrameter/shim in area of interest; and (c) Density below 1.3.

(1) 35002T2N1-1 AD914 (a)(b)(c)
(2) 35002T2N2-1 AD914 (a)
(3) 35002T2SG4 AD914 (b)
(4) 35002T2SG2 AD914 (b)

In addition, the following unsatisfactory practices were observed:

(1) Repair radiographs are always stapled together with originals; (2) Developing clip marks are on film; (3) No date included on film ID (required by procedure).

Although it may not violate the Code per se, the fact that sharp objects (staples, clip marks on film) exist is likely to degrade film quality.

The extent of these conditions is not known, as there were only 5 welds reviewed.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Response

This concern may be applicable for Unit 1.

The subject Unit 2 welds were determined to be acceptable. Independent review of the radiographs in question has confirmed that the radiographs are readable and the welds are acceptable, as confirmed by ultrasonic reexamination of the suspect welds. While current, more precise radiograph examination techniques might today raise questions on the literal Code compliance of these radiographs, the then duly licensed Section III vessel Manufacturer and Authorized Inspector interpreted these radiographs as acceptable to certify Code compliance for these vessels. Therefore, the identified questions on weld radiograph quality are considered insignificant, and although no Unit 1 radiographs have been identified as deficient, we consider that should they exhibit the same type of deficiency an ultrasonic test (UT) of the corresponding welds would yield similarly acceptable results.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-036

A structural column anchor bolt has a loose nut.

Supporting Information

A platform column located near pipe support HBB-218-H37 has a loose nut. Bechtel has identified this column as "column for platform No. 27, located 10'-3/8" east of 27.5 and 2'-0" south of E at EL 177'-0".

The baseplate is anchored to the foundation slab with four (4) bolts. Three (3) of these bolts are acceptable, with nuts tight and washers installed. One (1) of the bolts has a loose nut. The nut is 1/2" clear of the baseplate.

Response

This concern is not applicable to Unit 1.

All platform column base plates with anchor bolts requiring snug tight condition in the Unit 2 Reactor and Unit 2 Diesel Generator Buildings were inspected and no loose nuts were found on any additional column base plates. Therefore, this single instance of a loose nut is viewed as an isolated event and not indicative of a programmatic breakdown in pipe support installation for Unit 1 or Unit 2.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-037

Incorrect nameplate

Supporting Information

Instrument Rack 20C021 (G.E. No. H23-P021) contains safety-related instrument 2FT-007B (G.E. No. E11-N007B) RHR Service Water flow which is safety-related yet the nameplate is white lamicoid engraved as follows:

RHR System B
H23 P021
Non Safeguard

The flow transmitter is safety-related (E11-N007B) so the following must addressed:

Change nameplate to yellow lamicoid for safety-related identification and change engraving from non-safeguard.

Response

This concern is not applicable to Unit 1.

Instrument rack 20C021 was upgraded as a result of the issuance of FDDR-HH1-3479 in September of 1985. The nameplate which was affixed to the rack was intentionally left "As-Is" pending implementation of the component labeling program. This is viewed as an isolated occurrence and is not indicative of a programmatic breakdown in the labeling for Unit 2 or Unit 1.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-038

Miscellaneous House Keeping Items

Supporting Information

Miscellaneous items on safeguard 4KV switchgear D22 Bus 11600 (20A116)

1. Considerable dirt and chunks of sealing material are scattered on top of the switchgear. A breaker hand crank and a small metal panel (internal protection panel) are also on the top of the switchgear.

2. Two (2) bolts in bottom cover plate of non-segregated busduct located over cubicle 11609 are loose.

3. Removable section of the differential CT test switch is missing from front of cubicle 11607 and resulting exposed fingers are dusty.

Response

1. This concern is not applicable to Unit 1.

   This concern was a result of Unit 2 construction activity in the area and is not indicative of condition present in Unit 1 areas.

2. This concern is not applicable to Unit 1.

   All remaining Unit 2 non-segregated busduct was inspected with no additional discrepancies, noted. This deficiency is not indicative of a programmatic breakdown in busduct installation on Unit 1 or Unit 2.

3. This concern is not applicable to Unit 1.

   This cover was removed for Unit 2 testing purposes only. Unit 1 Administrative procedure A4?.1 "Troubleshooting Safety Related/Tech. Spec. Equipment"which includes an Independent Verification of Restoration (IVOR) assures proper restoration of equipment to their pre-work condition and would preclude the cover of this cubicle being left unattached on Unit 1.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-039

Potential interference between spring can and structural beam was not evaluated.

Supporting Information

GBB-218 H26 spring can is 1/4" from structural beam. Subsequent evaluation has indicated that this clearance is acceptable.

Response

This concern is not applicable to Unit 1.

This potential interference on Unit 2 was discovered prior to the final pipe stress walkdown being performed on the system. Had this concern existed on Unit 1 during the construction phase it would have been detected by the Potential Interference (PI) program and evaluated/corrected prior to turnover to PECo.

Construction Procedure CP-G-7, paragraph 5.3.1.1.e(4), states that potential interferences which are obviously acceptable based on an evaluation by the Construction Engineer do not require documentation under the Potential Interference Notification (P.I.N.) Program.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-040

Incorrect fillet weld acceptance criteria.

Supporting Information

a. When welded connections are substituted for bolted connections, the QC Inspectors are required to compute the weld sizes to develop the acceptance criteria. A review of the calculation per AISC Manual, indicates that the fillet weld size should be 3/8" for welds 1A-5A on platform No. 49A and welds 14-18 on platform No. 57 (Ref. dwg. C-1172).

QCIRs indicate an acceptance criteria for weld size of only 5/16" for platform No. 49A and 1/4" for platform No. 57.

b. Clip to embed connection located 1'-6" south of "H" line is not identified on QCIR weld map for platform No. 57.

Response

a. This concern is not applicable to Unit 1.

Acceptance of weld sizes which are less than required by AISC when changing from bolted to welded connections was caused by the use of a conversion table in a Unit 2 procedure which was provided as Exhibit 5 in Construction Procedure CP-C-9 and a miscalculation by Construction Engineering and QC personnel. The conversion table was utilized by Construction Engineering and QC personnel to determine the appropriate size of welds to be applied as a substitute for bolted type connections. This conversion table was not utilized on Unit 1 during construction.

b. This concern is not applicable to Unit 1.

This was an isolated case of a missed QC inspection on a Unit 2 weld and is not indicative of a programmatic breakdown in structural installation at Unit 1 or Unit 2.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-041

Incomplete hardware installation

Supporting Information

Cable 2BB21232C in Panel OBC667 is not adequately secured in the area where it terminates to terminal block DD.

Response

This concern is not applicable to Unit 1.

The unsecured cable was the result of the failure of Unit 2 testing personnel to replace ty-wrap removed during Unit 2 preoperational testing. Unit 1 requires that any configuration changes be performed in accordance with procedure A-41.1, "Troubleshooting Safety Related/Tech Spec Equipment." This procedure includes a IVOR which assures proper restoration of equipment to their pre-work condition.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-042

An incorrect drawing reference

Supporting Information

Drawing No. C-1136 references various drawings for cross-sectional views of slabs and walls. One cross-section makes reference to a detail as being "Section A/Drawing C-1130 similar" Drawing C-1130 does not exist.

Response

This concern is not applicable to Unit 1.

An inspection of 200 other Unit 2 drawing revisions revealed no other errors. This error and other drafting errors like it are not viewed as indicative of any programmatic breakdown in the quality of drawings on Unit 1 or Unit 2. In addition, the impact of such errors is insignificant and thus does not warrant a program of drawing review.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-043

Erroneous nameplate data

Supporting Information

MOV HV51-2F014B motor nameplate indicates the motor insulation as "(Radiation Ins. "R")" while the Valve Data Sheet (Attachment 1 to Design Specification P102, Sheet 20) indicates it to be Class H.

Response

This concern is not applicable to Unit 1.

This concern was deemed not valid for Unit 2 therefore it was not inspected for Unit 1.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-044

Unauthorized cable tray attachments

Supporting Information

In tray 2BCUA25 at EL. 242' there is a cable tray roller attached to the side rail near the point where the tray turns from the vertical to the horizontal.

Response

This concern is not applicable to Unit 1.

The cable tray "roller/clamp" was left in place by Construction Cable Pulling Crews. This type of device is utilized to facilitate bulk cable pulling efforts throughout the plant during construction. The facility walkdown which would have identified this particular item for removal had not yet been performed at the time of its identification.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-045

Hardware and housekeeping deficiencies in electrical panels.

Supporting Information

CAI Item 1 The unistrut required to brace the 4.16 KV field cables have not been installed in 2BG-502 as shown on Drawing 8031-M-71-249(2). These cables are currently not braced.

CAI Item 3 Dust is starting to accumulate in the bottom of the back of each section of panel 2BC-514. Also electrical cable measuring tape requires dressing. These panels need cleaning.

Response

CAI Item 1 This concern is not applicable to Unit 1.

An FCR was generated on 2/15/83 to install the unistrut cross member in Unit 1 cabinet 1BG-502 only, to address a unique installation difficulty. This FCR was then incorrectly incorporated into the reference drawing and shows these supports required for both Unit 1 and Unit 2 equipment, 1BG-502 and 2BG-502, respectively.

Additional unistrut bracing is not required for the support of the rigid #750 MCM cables which terminate inside the reactor cubicles. The cables enter through floor penetrations and are supported, as required, to side wall unistrut supports provided within the panel. The cables are formed to the exact position at their termination points to assure that no weight will be realized there. This was not the case with panel 1BG-502 which necessitated the addition of cross member supports.

CAI Item 3 This concern is not applicable to Unit 1.

This condition is a result of ongoing construction activities on Unit 2 and is not indicative of the cleanliness of Unit 1 equipment.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-046

Hardware and cable deficiencies in electrical panel

Supporting Information

CAI Item 2-Cable 22KGA1Q was wrapped to another cable for support where it exits the bottom of the panel, not to the panel itself. (Bay 6)

CAI Item 3-There is a loose cable support bar resting against the left wall positioned diagonal to the floor (Bay 6)

CAI Item 4-Cable 2BSP0007A with a plug connector is coiled and hung near the top of the panel. This cable is believed to be spare. Leaving this cable in this configuration permits it to swing into other panel equipment during a seismic disturbance. (Bay 6)

CAI Item 5-In Bays 1 through 5 several device enclosure back covers have been removed and left lying at the bottom of the under panel trough.

Response

CAI Item 2-This concern is not applicable to Unit 1.

CAI Item 3-This concern is not applicable to Unit 1.

CAI Item 4-This concern is not applicable to Unit 1.

Any work such as that identified in CAI Items 1, 2 and 3 performed on Unit 1 will be controlled by procedure A41.1, "Troubleshooting Safety Related/Tech. Spec. Equipment" which includes an IVOR to assure proper restoration of equipment to their pre-work condition.

CAI Item 5-This concern is not applicable to Unit 1.

The back covers to these devices were removed as a part of the Unit 2 preoperational testing program.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-047

Missing nameplate

Supporting Information

Transformer 20X107 does not have a yellow lamicoid nameplate to signify its safety-related status.

Response

This concern is not applicable to Unit 1.

The Unit 1 equivalent transformers were inspected and found to be properly labeled.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-048

Obstruction within 2T + 2 distance of PSI/ISI weld.

Supporting Information

Specification 8031-P-319-2 requires that there be no obstructions for a distance of 2T + 2 inches from Preservice Inspection/Inservice Inspection (PSI/ISI) weld.

Contrary to the above, double U-bolt pipe clamp for snubber DCA-418-H3 is resting partially on FW7 (DLA-212-02).

Response

This concern is applicable to Unit 1.

The specification addresses clearance requirements and documentation of pipe support obstructions in relation to PSI/ISI welds. The intent of the specification is to establish a method of compiling access information for the owner for performing inservice inspection. The information is used in determining which welds will be examined (in systems where only a percentage of the total population requires examination), or in the case where 100% examination is required, what the scope of work is to remove obstructions. There is no code violation when a part of a pipe support has been installed adjacent to or on top of a PSI/ISI weld after the PSI for that weld has been satisfactorily completed.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-049

Potential thermal interferences between snubber and various commodities were not evaluated.

Supporting Information

GBB-201-H32 snubber is located 3/4" from an instrumentation flex hose.

Instrument tubing is located 3/8" from structural portion of snubber GBB-201-H32.

Instrument tubing support is located 5/8" from structural portion of snubber GBB-201-H32.

Subsequent evaluation has indicated that these interferences are acceptable.

Response

This concern is not applicable to Unit 1.

This potential interference on Unit 2 was discovered prior to the final pipe stress walkdown being performed on the system. Had this concern existed on Unit 1 during the construction phase it would have been detected by the Potential Interference (PI) program and evaluated/corrected prior to turnover to PECo.

Construction Procedure CP-G-7, paragraph 5.3.1.1.e(4), states that potential interferences which are obviously acceptable based on an evaluation by the Construction Engineer do not require documentation under the Potential Interference Notification (P.I.N.) Program. This judgement is confirmed by Project Engineering during the P403 Section 10 seismic walkdown.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-050

Inspection records incomplete.

Supporting Information

Inspection records for pipe spools HBC-509-C1074-1 thru 4 have no calibration due date listed for the P-201 "holiday" tester used. These completed records have been reviewed and accepted by QC.

Response

This concern is not applicable to Unit 1.

The omission of the calibration expiration date is viewed as an administrative error in completion of a Unit 2 form for the following reasons.

1. The calibration due dates of measuring and test equipment are retrievable from permanent quality control records.

2. These records also include measuring and test equipment numbers, and date of use

3. Permanent QA records provided the missing information for the referenced spools

4. QC personnel are trained to verify that measuring and test equipment used for acceptance have an active calibration sticker prior to use.

5. Measuring and test equipment are recalled for recalibration prior to their expiration date as detailed in QC guidance.

Therefore, this finding is not indicative of a programmatic breakdown in pipe spool testing on Unit 1 or Unit 2.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-051

Deficiencies with the battery racks installation for batteries 2B1D101 & 2B2D101.

Supporting Information

Item 1A. Para. 3.2.3, Line 10 of Manufacturer's Installation Book for Batteries states, in part, "should only be tightened enough to ensure that they will not work loose - approx. 10-15 ft./lbs. torque." Nut was found loose on the rod at Cell 40-41 (2B1D101).

Item 4. Drawings 8031-E-13-17-4 & E-13-18-4 denote dimensions for overhang of bottom rails @ 6.00" and 7.50" respectively. Actual overhang on both battery racks at this end varies between 7.50" and 9.00". Consequently, the other end overhangs approx. 4.50." This is addressed on NCR S-73-E.

Response

This concern is not applicable to Unit 1.

Item 1A and 4: All Unit 1 and Unit 2 battery racks have been inspected by Construction Engineering personnel for similar conditions; no deficiencies were noted.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-052

Inspection records incomplete

Supporting Information

NDE report for HBC-509-C1076-FW1 has no batch number recorded for the developer used.

Response

This concern is applicable to Unit 1.

QC performed a random sample review of 200 similar reports for proper documentation of the batch number. Only one additional report was found to not have the batch number recorded. The isolated omission of batch numbers does not affect the quality of either the weld or associated NDE, and is not viewed as a programmatic breakdown in the performance of NDE reports for Unit 1 or Unit 2.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-053

Missing component identification

Supporting Information

In MCC 2OB218 cubicle 19 for MOV 2FO68B, terminals 1, 2 and 3 have no identification as required by Bechtel drawing 8031-E-1412, Sheet 1.4.2, Paragraph 1.21.

Response

This concern is applicable to Unit 1.

The Unit 1 component labeling program is replacing labeling methods which are easily susceptible to damage with more durable equipment identification methods.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-054

Incorrect hardware installed

Supporting Information

Shunt Trip Device
Motor Control Center 20B224

The Shunt Trip Device in Cubicle 7A was mounted on the right pole of the circuit breaker contrary to the information on drawing E-68, Sheet 2, Rev. 12. Cubicles 7A and 7B should be identical per the drawing but they are not. Also note the following:

The adhesive sticker attached to the breaker in cubicle 7A contains the following information:

Attachment RH
Shunt Trip
Style 2609D4264
Voltage 125v dc
Current .975 amps

The adhesive sticker attached to the breaker in cubicle 7B contains the following information:

Attachment LH
Shunt Trip
Style 2609D42G10
Voltage 125v dc

Response

This concern is not applicable to Unit 1.

This condition occurred as a result of an isolated case of repurchasing Shunt Trip devices incorrectly for Unit 2. No Shunt Trip devices have been repurchased for Unit 1.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern COR-055

Insufficient equipment protection.

Supporting Information

Some form of protection (grating suggested) should be put over the duplex strainer and instrument tubing located in pit in front of terminal box 2ATB-BG501. The strainer and tubing are subjected to persons stepping on them every time entrance is made to terminal box 2ATB-BG501.

Response

This concern is not applicable to Unit 1.

The duplex stainer and instrument pit in question is covered by a permanent grating for Unit 1 and Unit 2 during normal operation. This concern is of a construction nature only.

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Concern 56

Equipment is not adequately controlled after QC acceptance to protect it from construction damage and to restore and maintain it in the design condition after post acceptance testing.

Supporting Information

The information contained in this observation report is indicative of a potential trend that has been evaluated through a review of the ICA observation reports issued to date.

During our review of the observation reports, the ICA Trending Group has determined that the following OR's represent a concern that care and control of equipment after QC acceptance may not be adequate.

The following items identified on CORs were accepted by QC and subsequently found deficient. It appears that these would have remained undetected or would not have been routinely corrected.

COR-09	Cocked spring nut on tray support
COR-10	Improper conduit plug in MOV
COR-21	Loose shims cable tray support
COR-24	RHR pump motor Jb, bent stand off bolt, box free to rotate
COR-26	MOV loose wire lug, damaged gasket
COR-28	Cocked spring nut conduit support
COR-31	Pulled out wire and missing mounting set screws DC Panel 2BD102
COR-33	Cable not secured in cable clamp
COR-51	Loose nut on tie rod on battery rack
COR-54	Incorrect shunt trip device in motor control center

The following items were accepted by QC and subsequently found deficient. The response to the ORs indicates that they would have been routinely corrected by an existing program.

COR-17	Battery cell cleanliness
COR-33	Conductors lifted and spared
COR-38	Dirt/dust/debris on 4 Kv switchgear, missing bolts, missing CT test switch cover
COR-45	Dirt/dust in Panel 2BG-502/2BC-514
COR-46	Loose cable support bar, instrument covers removed, spare cable coiled and hung from panel, one cable tywrapped to another rather than to the panel
COR-47	Transformer yellow nameplate fell off
COR-53	Terminal marking strip torn off

Attachment 1

Applicability of Unit 2 Independent
Construction Assessment (ICA) Findings to Unit 1

Response

This concern is not applicable to Unit 1.

The Unit 2 COR response is applicable to this item.

Equipment controls after QC acceptance are detailed in the Unit 2 response to COR 056. The disposition of the cited items and their significance is also provided in that response. The response provides the following conclusion: "...we conclude that two relatively minor, unrelated concerns cannot be considered a trend..." Based on our analysis of the results of your review, the system is working. The system used on Unit 2 is patterned after the Unit 1 program. Unit 1 has been successfully preoperational, startup, surveillance tested and has operated successfully for several years and demonstrated that the developed programs are adequate.

ATTACHMENT 2

Limerick Generating Station

Applicability of Unit 2 Independent Construction Assessment (ICA)

NRC Inspection Findings to Unit 1

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.2.2.2

Concern

The NRC team reviewed the radiographs for Low Pressure Coolant Injection (LPCI) N17B-225 and LPCI N17B-315, nozzle-to-safe-end welds. The team verified root concavity indications on these radiographs that Stone & Webster Engineering Corporation (SWEC) identified during their Construction Assessment. SWEC documented their findings in CAI-022. General Electric (GE) responded that the root concavity was found acceptable after a boroscope inspection. However, ASME Code Section III, NB-4000, required that root concavity be evaluated by film density comparison with the base material. G.E. should review the subject radiographs and evaluate the root concavity in accordance with the ASME Section III requirements.

Response

This concern is applicable to Unit 1.

Cause:

During and prior to 1981, common industry practice was to record only that data that were noteworthy to the film reviewer on the reader's sheets. No definition existed as to what constituted a significant indication. The reader exercised his judgement based on his experience in complying with the specification.

Extent of Condition:

As a result of this common industry practice, this condition is assumed to be prevalent in varying degrees depending on the reader of radiographs for Unit 2 thru 1981.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

Significance:

The omission of recording certain radiographic images on the reader's sheets does not indicate the films were not properly evaluated. As stated previously, the root condition of LPC N17B-225 was determined acceptable based on a boroscopic examination. In addition, a preservice UT examination was conducted on the weld and revealed no flaws. Finally, although radiography of the thermal sleeve to safe end welds were required by contract, we do not consider that they are required by the ASME code.

In the time frame of 1981, our opinion is that the specific examples cited by SWEC were easily recognized as film artifacts and would not typically be recorded. We believe all significant indications were recorded and evaluated in the context existing at the time of evaluation and the weld quality meets code requirements.

Corrective Action:

Based on lack of significance as cited above, no corrective action required.

Action to Prevent Recurrence:

Present industry practice is to more extensively record data, and LGS radiographs after 1981 reflect this trend.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.2.2.3

Concern

SWEC assessed the radiographs of the nozzle-to-shell welds for the "B" loop Residual Heat Removal (RHR) heat exchanger. They identified film densities that did not comply with the density requirements set forth in ASME Section VIII, UW-51. The density requirements stated in part that the density in the area of interest (i.e., the weld) shall be within -15 percent to +30 percent of the density through the penetrameter. The NRC team reviewed the radiographs of the nozzle-to-shell welds for both RHR heat exchangers, welds 35002T1N1 and N2, and 35002T2N1 and N2. The team verified SWEC's finding and identified the same condition with the "A" RHR heat exchanger radiographs.

Failure to use adequate shim thickness under the pentrameter or to use more than one shimmed penetrameter was the root cause of the problem. A secondary contributing factor was the low density in the weld area caused by the weld reinforcement. Because of the large variation in density between the welds and the penetrameter, it was impossible to assess the quality of the welds.

Response

This concern may be applicable for Unit 1.

The subject Unit 2 welds were determined to be acceptable by re-evaluation of the radiographs and a follow-up UT inspection. Although no Unit 1 radiographs have been identified as deficient, we consider that if a similar deficiency exists, a UT would verify the welds as acceptable.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.3.2.1

Concern (1)

Three of four anchor bolts for the lower support columns on RHR heat exchanger 2A did not have washers as shown on anchor bolt Drawing C-615.

Response

This concern is not applicable to Unit 1.

Clarification of this issue has been provided through the issuance of Field Change Request (FCR) CC-1561-A which makes the use of washers for anchor bolts AB-93C1 optional.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.3.2.1

Concern (2)

Paragraph 4.4.7.1.1 of GE Design Specification 21A9227AT for the RHR heat exchanger stated that installation requirements shall include the following requirements for bolts: "Clearance... to allow for radial thermal expansion of the heat exchanger". Note (1) of Figure 1 in the vendor (Delta Southern Company) technical manual indicated that the difference between support and mating structure bolt circles was to allow clearance for thermal expansion. However, GE and Bechtel design drawings for the lower support and Bechtel installation work plans did not specify any required clearance. Consequently, the existence or amount of any clearance in the installed position was unknown. Zero clearance could result in overstress or failure of support structure components during heatup. This concern must also be addressed for Unit 1 installations.

Response

This concern is not applicable to Unit 1.

An analysis of the as-built gaps of the Unit 1 RHR Heat Exchange Supports has been completed and no shims are required on the support bumpers.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.3.2.1

Concern (3)

Additional loads from attached pipe supports and electrical equipment were not reflected on the design drawings for the lower support structure for either RHR heat exchanger. The NRC inspection team inquired about the existence of an alternate method for assuring that designers would be aware of all loading on these structures for future calculations. The licensee indicated that no such methods were in use.

Response

This concern is not applicable to Unit 1.

Generally, in the early stages of the structural design of power plants, principal loads for major equipment and structures are reasonably well defined. Other loads, such as pipe supports, are not known with any degree of accuracy. Therefore, the design process generally allows for these loads either by conservatively estimating for various additional loads or by selecting members sized slightly larger than that required for the known loads. This approach is necessary since final locations and exact design loads are unknown for the pipe support loads until their detailed analyses are performed in later stages of design. Sheets 16 and 38 of Calculation 101.73, Revision 1, show that significantly larger steel sections were used to allow a margin for additional pipe supports and other loads.

Limerick Project Specification 8031-P-401, "Design Criteria for Design and Documentation of Pipe Supports and Restraints for Pipe 2-1/2 inches and Larger"

and 8031-P-366-2, "Specification for As-Built Reconciliation," address the coordination of pipe support loads with the civil engineering discipline. Specification P-410, Section 4.2.4.2, states that all large pipe hangers shall be coordinated with the civil group via a coordination print. Specification P-366 addresses the procedure for coordination of small pipe hangers with the civil group. Section 5.4 of Specification P-366-2 states that small pipe supports need to be coordinated only when the attachments are to the structural members W10 or smaller, including channel sections. However, it further states that the pipe support group shall exercise good engineering judgement to coordinate other attachments when it appears that there may be some impact to the civil structure. Methods do exist for the coordination of multiple commodity supports as discussed in Project Specifications 8031-G-21 and 8031-G-28. In addition, a comparison of heat exchanger reactions and existing pipe attachment loads clearly indicate that the design engineers exercised sound engineering judgement because the incremental load in terms of percentage of the original load is about 1%. We note that in cases of significant pipe support loads, civil calculations were made to investigate their effects on the structure. Another key consideration is to view the impact of small pipe support or conduit support reactions in their true relative importance. The RHR heat exchanger supports are not specifically shown to be designed for these small attachment loads, but the calculations do not ignore them; they are implicitly considered in the design process.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.3.2.1

Concern (4)

Piping and arrangement design drawings for the RHR pump shaft seal assemblies indicated that the drain port was to be plugged with a steel plug. However, the NRC inspection team found that plastic shipping plugs were actually installed in pumps 2A, 2B, 2C, and 2D. Subsequent discussions between Bechtel Engineering and GE indicated that in addition to removing the shipping plugs, drain lines should have been piped to radwaste drains. A Field Deviation Disposition Request (FDDR) was generated to request design details for this piping and for approval to continue startup testing with the present drain port configuration. This concern must be addressed for Unit 1 installations also. The licensee initiated NCR 13878 and FDDR M1102 in response to the teams finding.

Response

This concern is not applicable to Unit 1.

The condition is limited to the four (4) Unit 2 RHR pumps. The Unit 1 RHR pump shaft seal assembly drain ports contain steel plugs per current design requirements. The Core Spray (CS) pump's seal is similar in design to the RHR pump and both were manufactured by Ingersoll Rand and supplied by General Electric. The Unit 1 and Unit 2 CS pump seal drain connections are piped to a floor drain in accordance with Bechtel design documents.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.3.2.1

Concern (5)

Bechtel Design Drawing C-631, "Equipment Foundations," specifies the use of jam nuts or staked threads on the foundation bolts for the standby liquid control (SLC) pumps. Jam nuts were not installed, nor were threads staked on any of the foundation bolts on SLC pumps 2A, 2B, and 2C. The licensee initiated NCR-13877 based on this NRC finding.

Response

This concern is applicable to Unit 1.

A Unit 1 walkdown was performed to verify design basis specifications for anchor bolts on various Reactor and Diesel Building equipment. The following generic disposition was developed for discrepancies found with foundation bolts.

Maintenance to "Rework" all items, including those identified as "to be determined" in attachment 2 of Unit 2 Nonconformance Report (NCR) 13877, as follows.

1) Add washers whenever hole size is 1/16" greater than bolt size. Whenever washers cannot be added, such as when washer affects thread engagement, resubmit for case-by-case review.

2) Add additional jam nut or second standard nut for all vibrating equipment and the sliding end of heat exchangers. Whenever nuts cannot be added due to inadequate thread engagement, threads may be staked in accordance with

Spec 8031-p-401. Jam nuts need not be added for tanks or other non-vibrating equipment.

3) The as-built condition after 'rework' shall be provided to Nuclear Engineering for incorporation into Design Drawings. These details should be provided at one time after maintenance personnel have signed Section 5 of NCR 13877.

4) NCR L89112-312 (Unit 1) identifies discrepancies in the installation of equipment anchor bolts, wherein washers and/or jam nuts have been provided as required by the design drawings. Related discrepancies in the installation of Unit 2 equipment have been identified in PECo audit finding 2N-638.

The significance of the discrepancies identified in NCR 13877 is summarized as follows.

A) Washers play only a minor role in distributing the pressure due to bolt tension, except where oversized or short-slotted holes are used. However, since we have metal-to-metal contact between the foundation nuts and the associated equipment, there is no concern about equipment operability.

B) Jam nuts are used to ensure that standard nuts do not become loose during constant and prolonged vibration.

i) The lack of jam nuts on heat exchanger is not considered significant since the anchor bolts are not subject to vibration. Jam nuts are provided on the sliding end to maintain a relatively-fixed clearance. Although failure to

provide jam nuts could lead to contact, the friction from such contact would be negligible and would not affect the function of the sliding end.

ii) The lack of jam nuts on unit coolers is not considered significant since the equipment has vibration isolators. The vibration at the anchor bolts is therefore negligible.

iii) The lack of jam nuts on pumps was determined to be not significant for the following reasons.

a) In general, pumps need to operate for only short periods of time in comparison to the plant life.

b) Vibration of pumps are of relatively small amplitude. Bolt pretension caused by the snug-tightness is considered to exceed the bolt loads due to vibrations, which precludes the loosening of the standard nut.

iv) The lack of jam nuts on equipment not addressed above is acceptable either in comparison to the above equipment, e.g., turbines, recombiner, etc.), or because the equipment is not subject to vibration, (e.g., tanks).

Based on the above rationale, we have concluded that the failure to provide jam nuts for the Unit 1 equipment installations identified in NCR13877 would not affect equipment operability. This is particularly true due to the fact that there is metal-to-metal contact between the foundation nuts and the associated equipment as identified in NCR 13877. Nevertheless, the original design required a locking mechanism for the subject nuts, so for

enhancement purposes the NCR shall be dispositioned to "rework" the installati[illegible].

This disposition is consistent with the disposition for the Unit 2 equipment. Since the affected existing installations have already been reviewed for both Units 1 and 2, this concern is satisfied for Unit 1.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.3.2.1

Concern

Washers were not installed on any of the eight attachment bolts for unit cooler 2FV211 as shown on the American Air Filter Final Assembly Design Drawing 107D-153890-G. In addition, two of the angle clips through which these bolts were mounted had been enlarged, as authorized by a FCR. Standard structural practice as detailed in the American Institute of Steel Construction (AISC) Manual dictated that washers be used under nuts wherever holes are exposed. Also, one of the vibration absorber pad mounting bolts for the fan unit was not fully engaged. NCR 13906 was initiated by the licensee to document and resolve this discrepancy.

Response

This concern is applicable to Unit 1.

The disposition for the previous finding (5th concern in 4.3.2.1) also applies to this item.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.3.2.1

Concern

Three (3) of four (4) bolts attaching the horizontal brace between the fan suction bell and unit cooler 2FV210 were loose. This unit cooler was part of the SWEC ICA sample.

Response

This concern is not applicable to Limerick Unit 1.

A visual inspection was performed on nine (9) Unit 1 unit cooler horizontal braces. All braces inspected appeared tightly bolted and the original paint was undisturbed.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.3.2.1

Concern

Washers shown on the foundation anchor bolt design drawing were not installed on the fixed end of fuel pool cooling water heat exchanger 2A and on the sliding ends of fuel pool cooling water heat exchangers 2A, 2B, and 2C. In another example, heat exchanger 2C bolt holes had been significantly enlarged and were visible around the perimeter of the nut. Jam nuts shown on Bechtel Equipment Foundation Design Drawing C-631 were not installed on the fixed ends of any of these heat exchangers. Balance of Plant Condition Report M3144 was written by the licensee to document this NRC finding.

Response

This concern is applicable to Unit 1.

The disposition for the 5th concern in section 4.3.2.1 also applies to this item.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.3.2.1

Concern

Jem nuts on Bechtel Foundation Design Drawing C-631 were not installed on any of the anchor bolts for the fuel pool service water booster pumps. This condition was also recorded by the licensee on Balance of Plant Condition Report M3144.

Response

This concern is applicable to Unit 1.

The dispostion for the 5th concern in section 4.3.2.1 also applies to this item.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.3.2.1

Concern

Various pumps and unit coolers did not have jam nuts installed on the foundation bolts. General Note 5 on Bechtel Design Drawing C-626, "Reactor Building Equipment Foundations," specified that two nuts were required for anchor bolts securing vibrating equipment.

Response

This concern is applicable to Unit 1.

The disposition for the 5th concern in section 4.3.2.1 also applies to this finding.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.3.2.1

Concern

The NRC inspection team reviewed Work Packages (WPs) for the Unit 2 RHR pumps and heat exchangers. During this limited review, the team identified several discrepancies in the documentation and some apparent weaknesses in the control and execution of WPs. These observations may point out contributory causes of the hardware discrepancies previously detailed.

This inspection primarily focused on the hardware installation. However, the NRC inspection team was concerned about the condition of mechanical equipment WPs and the separate and confusing QC inspection documents. The licensee should review the existing documentation to assure that all aspects of installation and modification of mechanical equipment at Limerick have been completed and that the required documentation exists.

The NRC team also concluded that the policy of considering the WPs as nonpermanent QA records creates a potential information gap in the machinery history of the plant's mechanical equipment. The lack of a clear and detailed machinery history could hamper long term corrective efforts and does not provide an auditable record.

Response

This concern is not applicable to Unit 1.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

The WP program was not used during construction of Unit 1. The WP program was instituted in early 1986 about the time of Unit 2 construction was resumed. All Unit 1 equipment was installed prior to that time.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.3.2.2

Concern

Two (2) bolts joining the companion angles of duct segments 73A and 80 were loose.

Response

This concern is not applicable to Unit 1.

An additional 92 companion flanges were inspected for loose bolts on Unit 2 and no discrepancies were found. Therefore, this finding is viewed as an isolated case and is not indicative of a programatic breakdown in the construction of ductwork on Unit 1 or 2.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.3.2.2

Concern

A splitter damper was installed at segment 73, but no damper was shown installed at that location on the Bechtel Design Drawing or the Schneider Construction Drawing.

Response

This concern is not applicable to Unit 1.

During the construction phase of Unit 1 various problems were identified with Schneider work practices. As a result of these problems, all HVAC work was stopped for a period of time in 1981. Corrective actions were instituted including an aggressive inspection program which was instituted for all completed HVAC work. This inspection program included a three part independent inspection by Schneider, Bechtel and PECo personnel. Therefore, we are confident that the above Unit 2 concern is an isolated occurrence and that the above described inspection program assures accuracy of the Heating, Ventilating and Air-Conditioning (HVAC) drawings for Unit 1 and Unit 2.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.3.2.2

Concern

Tapered washers were not installed between the fasteners and the channel iron frame of a splitter damper, segment 73, as specified in the AISC Manual of Steel Construction. Paragraph 3.2.1 of HVAC Specification 8031-M-68-2 stated that equipment and components shall conform to this standard.

Response

This concern is not applicable to Unit 1.

A review of the cited Unit 2 condition concludes that it conforms to Specification M-68A requirements. Per the AISC Manual of Steel Construction, 7th Edition, Page 5-196 requirement, the use of bevelled washers is to compensate for the lack of parallelism between mating surfaces. The subject bolt heads and nuts have been verified as achieving sufficient bearing of mating surfaces, therefore eliminating the need for washers.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.3.2.2

Concern

Three (3) tap holes used for checking pressures and flows during system balancing were not properly sealed after the balancing work. Plugs consisting of bolts with gasket washers were not fully engaged. This situation provided potential leakage paths and the possibility that the bolts could back out completely due to vibration during system operation.

Response

This concern is not applicable to Unit 1.

The cited condition is attributable to ongoing Unit 2 Construction Activities in that balancing of the subject system had not started at the time of this inspection. The inspector misunderstood the Start-up Engineer to say all testing had been completed. Startup Technical Test TT1.10, Appendix A, verifies by notation that the static and traverse bolts are wrench tight upon completion of final balancing.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.4.2.1

Concern

The NRC team had one concern relating to sister splices made for cadweld testing. Contrary to the requirements of Section 3.8.6.2.2.2 of the FSAR, sister splices were not tested prior to the start of production splices made by cadweld operator 93 for splice numbers 38271 and 41851. A similar concern was also raised by the SWEC reviewer for a different cadweld crew.

Response

This concern is not applicable to Unit 1.

Cause:

The cited Unit 2 condition is attributable to an oversight by Construction Engineering and Quality Control personnel to ensure that sister splices were made prior to production splices when the three (3) day limit was exceeded after the welder requalified.

Extent of Condition:

A review of 120 records was performed on Unit 2 to inspect for similar conditions; 10 additional discrepancies were noted. We consider that this ratio of error is representative of the entire records population.

Significance:

This issue has been evaluated and the conclusion is that it is not significant for the following reasons which are valid for Unit 1 and Unit 2.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

- All welders were prequalified and every 25th splice was pull-tested.
- All splices were visually examined.

Corrective Action:

The deficiencies were documented on Unit 2 NCR-14244 which has been dispositioned to "Use-As-Is". Therefore, this concern is not indicative of a programmatic breakdown in cadweld activities for Units 1 and 2. Accordingly, no further actions are needed for Unit 1.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.4.2.2

Concern

On platform 55, the NRC team noted that one bolt might not have enough projection to exclude the threads from the shear plane, as required by Bechtel Design Drawing C-1184 Revision 31. PECo should confirm whether this bolt meets the requirements of the above mentioned design drawing.

Response

This concern is not applicable to Unit 1.

An additional 2500 bolts on Unit 2 were inspected for similar conditions; 35 discrepancies were noted. This low percentage of discrepancies is not indicative of a programatic breakdown in structural connections on platforms at Unit 1 or 2. Additionally, these deficiencies identified for Unit 2 have been determined to be insignificant through engineering evaluation and have been dispositioned Use-As-Is.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.4.3

Concern

The NRC and SWEC reviews showed that the structural steel platform samples selected conformed to the design requirements shown on the appropriate drawings, except for the missing connection welds on platform 2AV-212. However, the NRC team believed that PECo should perform additional field inspections to determine whether a generic problem exists regarding missing connection welds on Limerick Unit 2 Structural Steel connections.

Response

This concern is not applicable to Unit 1.

A sample of thirty-seven (37) Quality Control Inspection Records (QCIRs) have been reviewed for completeness of scoping and inspection for field welding activities (Reference FIR #C-63-22-56). The work scope on these QCIRs includes various kinds of steel construction involving field welding. No discrepancies were found in the sample of thirty-seven QCIRs. Therefore, this finding is limited to this particular unit cooler and is not indicative of a programmatic breakdown in the structural support fabrication practices employed on Unit 2 or Unit 1.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.4.3

Concern

The SWEC ICA review for the block walls was comprehensive and adhered to their review plan LK-C-1903. The NRC team believed that from the independent review performed on block wall 104, construction was in accordance with the FSAR requirements and is consistent with SWEC findings. However, the concerns raised by SWEC regarding construction documentation should be resolved by PECo before a conclusion can be reached on the adequacy of all masonry construction at Unit 2.

Response

This concern is not applicable to Unit 1.

The cited Unit 2 condition regarding construction documentation has been resolved in accordance with Stone & Webster Construction Action Item CAI-82, which stated that all of the records for block wall 104 are in the QC vault and available for review.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.5.2.1

Concern

Vendor installed cabling in several Class 1E motor control centers exhibited deficiencies in the bend radius. The team's examination of motor control centers 2AC224 and 2BC224 (Control panels for the unit hydrogen recombiners) disclosed wiring between the heater breaker and the motor starter that exhibited significantly less radius than that required by industry and site standards. The wires in question were number 4 AWG (American Wire Gage) in size and were installed with a radius of approximately one (1) inch. The team also noted that the insulation of these wires had buckled and pulled away from the individual conductors because of their excessive bending. Similar deficiencies were observed in cubicle 08 of motor control center 20B212, in which vendor wiring was formed with a radius of approximately 1/2 inch.

In response to this observation, the licensee issued NCR 13910 to document and evaluate the impact of the deficiencies on component and system operation. However, based upon the frequency of this observation from a relatively small sample, it appeared that the licensee should consider conducting a review of vendor wiring in Class 1E motor control centers to determine the scope and significance of bend radius deficiencies.

Response

The concern identifies two (2) conditions that are unrelated and must be addressed individually. As a means of differentiation, they are referred to as concern #1 and concern #2.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

Response to Concern #1

This concern is not applicable to Unit 1.

All Unit 1 control panels provided by the vendor in question were examined. These panels were found to be free of this condition.

Response to Concern #2

This concern is not applicable to Unit 1.

The cited Unit 2 condition relative to the bend radius deficiency identified in motor control center 208212 is attributable to the as supplied condition of the vendor supplied equipment.

The wire in question was a #4 SIS wire with a bend radius of approximately 1/2 inch. The vendor (Cutler-Hammer) has advised us that their standard wire bending policy is that the inside bend radius is to be no smaller than the outside diameter of the cable being bent. The #4 SIS wire has an outside diameter of .360 inch and therefore, a .5 inch inside bend radius is acceptable.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.5.2.1

Concern

During the examination of motor control center (MCC) 20B217, the NRC inspector noted that cable 2CB21703A in cubicle 03 was improperly terminated. This three conductor cable was the power feed for the 2A reactor enclosure cooling water pump and was terminated by bolted connection to the breaker terminal bars. The inspector noted that the phase 'B' lug had been bent by construction activity resulting in a 1/2 to 3/4 inch gap between the lug and the terminal bar. Although circuit continuity had been maintained, this configuration resulted in a contact "hot spot" which may lead to operational problems. The licensee should have reterminated this cable replacing or repairing the lug in question.

Response

This concern is not applicable to Unit 1.

The cited Unit 2 condition has been evaluated as acceptable. With input from the Burndy Corporated, the manufacturer of the lug in question, Design Change Notice, DCN #70, to Drawing E-1412 has been issued to clarify the criteria for bending of lugs. It is permissible to bend the Burndy type YA lug up to 30^{o}, the lug in question was observed to be bent approximately 10^{o} and, therefore, is acceptable. Therefore, this concern is not indicative of any problems regarding Unit 1 electrical terminations.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.5.2.1

Concern

During the examination, the inspectors noted that several Class 1E penetrations contained circuits that ...ed both engineered safety features (ESF) and reactor protection system (RPS) functions. Additionally, the inspectors noted that several penetrations contained both Class 1E and Non Class 1E circuits.

The LGS Final Safety Analysis Report (FSAR) provided requirements for the physical independence of redundant sys... in Section 8.1.6.1.14. This section detailed specific physic... separation between ESF, RPS, and Non-Class 1E plant system circuits. These requirements reflected those specified in Regulatory Guide 1.75 and Institut... of Electrical and Electronics Engineers (IEEE) Standard 384-1947, with stated exceptions.

With regard to electrical penetrations, the FSAR made provision for the routing of Class 1E and Non-Class 1E circuits through a common penetration. However, no provision was made for the routing of ESF and RPS circuits or multiple division of RPS circuits through a common penetration. Consequently, the routing of both ESF and RPS circuits in this manner did not appear to meet the intent of the regulat... ...uide or the FSAR for the station.

Additionally, Section 5.5 of IEEE Standard 384, to which the station is committed, required that Non-Class 1E circuits routed in penetrations containing Class 1E circuits be treated as associated circuits in accordance with the requirements of Section 4.5. Section 4.5 stated that associated circuits shall comply with one of the following:

1. They shall be uniquely identified as such and shall remain with, or be separated the same as, those Class 1E circuits with which they are associated.

2. They shall be in accordance with (1) above from the Class 1E equipment to and including the isolation device. Beyond the isolation device, a circuit is not subject to the requirements of this document provided it does not again become associated with a Class 1E system.

3. They shall be analyzed or tested to demonstrate the Class 1E circuits are not degraded below an acceptable level.

The LGS FSAR stated that associated circuits were not uniquely identified as such and were treated and identified as Class 1E up to an isolation device. Contrary to these requirements, the Non-Class 1E circuits routed with Class 1E circuits through common penetrations have not been identified or routed as Class 1E once they exit the penetration.

In response to these concerns, Bechtel Project Engineering stated that the existing design conformed to the requirements of the FSAR for the station. The NRC inspectors believed that additional evaluation, clarification, or analysis would be required before this issue could be closed.

Response

This concern is not applicable to Unit 1.

We have analyzed the cited Unit 2 conditions and have concluded the following.

Penetration 20JX100D

This penetration contains RPS Channel 'Z' cables only, therefore, electrical separation is maintained by redundant RPS, Class 1E or Non-Class 1E cables routed through different penetration assemblies dispersed around the circumference of the containment.

Penetration 20JX103B

This penetration contains:

1. Class 1E Divisions B&D Instrumentation Cables, and

2. Non-Class 1E Instrumentation Cable

The following conditions apply:

a. Inside the Penetration Assembly

The redundant Class 1E and Non-Class 1E instrumentation cables are not routed through common feed-throughs. The feed-through steel casing forms the separation barriers between redundant Class 1E and Non-Class 1E feed-throughs. The size of the cables is #16 AWG. Electrical separation is maintained between redundant Class 1E and Non-Class 1E cables per E-1406, Section 2.1.2.3, "Enclosed Raceways and Cable Trays", paragraph a.1.

b. Inside the Penetration Box

The redundant Class 1E cables are enclosed in stainless steel flexible conduits from the point they leave the feed-throughs up to a connector inside the Conax isolation junction box; Therefore, these are treated as enclosed raceways. The Non-Class 1E cables are considered dropout cables inside the Conax isolation junction box per E-1406, Section 2.2. In addition, all the cables in the

isolation box are #16 AWG. Therefore, separation is maintained between redundant Class 1E and Non-class 1E cables per E-1406, Section 2.2.3, Paragraph 1, "Separation Between Dropout Cables and Enclosed Raceway".

Although no RPS cables have been found mixed with ESF or Non-Class 1E cables in the subject penetrations, please be informed that, per E-1406, Section 2.1, Raceway Separation paragraph 2.1.1.a, Class 1E raceway is defined as ESF and RPS raceways. Therefore, RPS cables are treated as Class 1E and, as such, are separated from Non-Class 1E and ESF cables per E-1406, Sections 2.1.2.3 and 2.2.3 which is consistent with the FSAR, Section 6.1.6.1.14.a.1.

In addition, a review of the rest of the penetration assemblies for separation has been performed and our findings are similar to those described above.

We conclude that there is continuity between IEEE 384-1974, the LGS FSAR Section 8.1.6.1.14, paragraph b.8, and E-1406, and proper electrical separation has been maintained. Consequently, there is no indication of a programmatic breakdown in physical separation of Class 1E and non-Class 1E cables for Units 1 or 2.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.5.2.1

Concern

The haphazard routing of cables and conductors in the main control boards made the boards congested and did not reflect the workmanship observed in other plant control panels. This condition appeared to be the result of the large number of GE design changes issued for these panels. The NRC did not inspect the panels in detail, and therefore did not identify specific construction deficiencies. However, the inspectors believed that the condition of these panels merits additional attention by the licensee. In particular, the licensee should assure that cable installation requirements such as bend radius, separation, fire stops, and absence of cable damage, have been maintained.

Response

This concern is not applicable to Unit 1.

The cited condition is programmatically addressed as part of the final separation and color coding inspection of electrical equipment performed by Quality Control (QC) personnel on Unit 1 and Unit 2 in accordance with the requirements of Specification E-1412. These inspection attributes include, but are not limited to the following.

- Replacement equipment is the correct type and installed in the proper location with no damage.
- Components removed to provide access for modification work are properly reinstalled.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

- Debris removed.
- Work activities have been performed without damage to adjacent components or material.
- Separation of components is maintained.
- Permanent wire I.D. is installed.
- Cable/wire size, type and dressing is correct.
- Correct lugs or pins are installed.
- Conductors are terminated at correct terminal point and are tight; soldering has been properly performed.
- Wires are properly color coded.
- Separation of wires and raceways is correct.

This inspection has been satisfactorily completed on all Unit 1 and Unit 2 Main Control Boards.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.5.2.1

Concern

Valve HV-52-2F001C contained vendor supplied motor leads that appeared to be undersized for the application. Leads T1, T2, and T3 were number 18 AWG wire supplied by Belden Wire Company and provided interface between the actuator motor and the field power cable. Additionally, the use of Belden J, Type AWM crosslink wire in an environmentally qualified (EQ) valve was questioned by the NRC team.

To ascertain whether the identified wire was of the type and size required for this application, the NRC inspectors requested copies of environmental reports for this valve. Discussions with PECo and Bechtel personnel indicated that EQ packages had not been completed for the Unit 2 valve operators. The inspectors then attempted to review EQ packages for Unit 1 valve operators on the basis of similarity of design and purchase requirements. However, although it was initially indicated that these documents were on site, it was determined that all of the EQ packages were kept in the Philadelphia Office and thus were not made available to the inspectors.

On the basis of this lack of information and the questionable type and size of installed wire, the NRC inspectors considered the quality and the environmental qualification of valve operator HV-52-F001C to be indeterminate.

Response

This concern is not applicable to Unit 1.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

Limitorque has informed us that the Peerless AC Motor, (Serial Number UA54184WM) and the Belden motor leads are qualified in accordance with their Qualification Report B0003. Therefore, this concern is not indicative of any problems regarding Unit 1 motor leads.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.5.2.1

Concern

Examination of valve operator HV-55-2F002 disclosed a discrepancy in the termination of cable 2DB22418B. This cable was the power feed for the actuator motor and was terminated in accordance with the Bechtel connection list. Functionally the termination was correct and reflected the conductor-to-terminal point configuration specified on the connection list. However, the phase identification did not match connection list details in that Phase 'A' and 'B' had been reversed.

Discussions with Bechtel personnel indicated that phase conductors may be reversed in accordance with Specification E-1412. Section 4.22 of the specification stated that "for 480V, 3 phase motors the field may reverse two of the 3 phase conductors of the motor feeder cable at the MCC in order to obtain proper rotation of the motor. Revision of the connection list for this change is not required."

Reversing feeder cable conductors to achieve proper motor rotation is a common industry practice. However, such actions should be reflected in design documents to ensure accurate representation of existing field conditions. Without formal updating of the Bechtel connection lists and wiring diagrams future system and component modifications may be adversely affected. The licensee should ensure that all conductor phase rotations are noted and incorporated into plant design documents.

Response

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

This concern is not applicable to Unit 1.

The motor leads for Unit 1 equipment have not been color coded in accordance with Field Change Request EL-2557-E. However, it was a common practice during Unit 1 construction to swap labels on motor leads when they were reversed, thus, maintaining correct phase identification to the motor leads.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.5.2.2.

Concern

In general, the installation of Class 1E cables was found to be in accordance with specified criteria. The routing of examined cables accurately followed the path shown on engineering documents and QC inspection records. Attributes such as cable size, type, and identification were also specified on design documents. However, several cable installations were identified that did not meet the LGS FSAR requirements for electrical separation. The examples observed involved Class 1E cables that left design designated raceways and ran "free-air" through walls or into electrical equipment. The inspectors noted that in many instances these cables did not maintain the required physical separation from redundant Class 1E cables and raceways and had not been protected through the use of fire barriers or cable wrap as required.

This issue was discussed with Bechtel personnel to determine the status of the cables in question. Bechtel's responses indicated that electrical separation would be addressed at the time of facility turnover through the use of Quality Control Instruction (QCI) E-3.0, "Raceway Barriers and Seals." This instruction provided for the inspection of cable and raceway installations to ensure compliance with all attributes of electrical separation. Specific guidance was provided for inspection of "free-air" cables and the application of approved fire barriers. While the content of this document appeared thorough, the inspectors noted that aggressive implementation would be required in order to assure that Class 1E cable installations met FSAR separation criteria.

Response

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

This concern is not applicable to Unit 1.

The cited Unit 2 condition is programmatically addressed as part of the final facility electrical separation walkdown which aggressively assures cable separation in accordance with QCI E-3.0. These inspection attributes include, but are not limited to the following.

- Verify the methods used to meet minimum separation between redundant Class 1E raceway, or Class 1E and Non-Class 1E raceway are acceptable.
- Verify the methods used to meet minimum separation between exposed cables or exposed cable and raceway.
- Verify that dropout cable wrapping has been properly installed where required by design drawings.
- Verify that the proper type of raceway covers have been correctly installed at the required locations.
- Verify covers of proper typed are installed on conduit fittings, panels and boxes. Where gaskets are required, verify they have been provided.

Therefore, this condition is a result of ongoing Construction Activities prior to final walkdown and is not of concern for Unit 1.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.6.2

Concern

In the case of pipe support DCA-418-H8, the NRC team measured less than a 1/2 inch gap in the east-west direction between the 3-bolt pipe clamp (part number 6), which moves with the pipe, and the east side flange of a W6-20 column (part number 8). The potential interference was previously identified by the licensee via a Potential Interference Notification (PIN) and Disposition Form (PIN No. 2328, dated November 21, 1987). However, the PIN cited a gap of 3 5/8 inches versus the 1/2 inch measured by the NRC team. Bechtel Project Engineering had reviewed the PIN and determined that the reported gap was acceptable in view of analyzed piping displacements being less than the existing gap. The NRC inspector's review of the as-analyzed pipe displacements, however, revealed that seismic displacements as well as thermal pipe displacements exceeded the gap observed during the NRC inspection.

The single finding related to potential piping and pipe support interferences suggested the need for greater emphasis on interference checks in the final stress walkdown inspections of piping systems.

Response

This concern is not applicable to Unit 1.

The cited Unit 2 condition is attributable to the fact that Construction Engineering personnel mistakenly transposed dimensions and supplied erroneous information to Project Engineering for evaluation on PIN Number 2328.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

The existing gap between the pipe clamp and the east side flange of the W6x20 column exceeds 1/2 inch. This was documented on PIN Number 4331 which supersedes PIN number 2328 and was submitted to Project Engineering for evaluation. Project Engineering has concluded that the 1/2 inch clearance satisfies design requirements.

This condition would have been identified in the course of the final stress walkdown. Specification P-403, Section 10.1, indicates that the purpose of this walkdown is to review, by means of a visual inspection of the installation:

a) The capability of the piping system to perform its design function, and

b) Interferences which would prevent free thermal expansion of the piping system.

Inspection attributes of this walkdown include, but are not limited to the following.

- Piping layout configuration consistent with that used in the stress analysis.
- Free thermal expansion of the piping system not blocked by interferences with other commodities, i.e: HVAC, cable trays, other pipe supports, floor or wall penetrations, grouted-in penetrations, etc.
- Existing branch lines have been considered in the stress analysis and are shown on the walkdown isometric drawings.

- Pipe support type, line of action or location correct with respect to the stress analysis.

- Addition or missing pipe support(s) with respect to the stress analysis.

Emphasis has been placed on the interference checks and formal training sessions have been conducted to assure program compliance.

This concern is not indicative of a programmatic breakdown in pipe support installation on Unit 1 or Unit 2.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.7.2.1

Concern

The team conducted a review of selected Long Term Maintenance (LTM) requirements as established under Bechtel Procedure CP-G-3, "Storage/Maintenance/Lubrication Requirements for Long Term Storage of Installed Equipment Prior to Turnover," Revision 8, dated August 23, 1988. This procedure required that, as a minimum, the vendor recommended maintenance would be performed at the required interval. Deviations from the vendor recommendations were allowed, if supporting documentation was provided to justify the change.

CP-G-3 required, in part, that deviations noted during the performance of LTM activities be documented on either an In-Process Rework Notice (IPRN) or if of a more significant nature, on a Nonconformance Report (NCR). This procedure also required that steps be taken to correct the deficiency and that action be taken to prevent its recurrence.

The team reviewed the list of outstanding preventative maintenance actions for the week of September 23, 1988. One safety-related maintenance action had not been performed within the required time interval. In reviewing the background of this delinquent maintenance action, the team noted that the pressure in the Hydraulic Control Unit (HCU) accumulators was required to be checked, on a sampling basis, one a month. The total number of HCU's installed in the plant was 185, and the LTM program required checking 4 HCU accumulators each month. During the review of the maintenance records, the team noted the following facts.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

DATE	CONDITION	ACTION TAKEN
6/10/88	HCUs 30-19 and 38-47 nitrogen pressure below minimum acceptable value	Accumulators recharged to 25 psig
7/7/88	HCU's 30-19 and 38-47 nitrogen pressure below minimum acceptable valve	Accumulators recharged to 25 psig
8/2/88	HCUs 30-19 and 38-47 nitrogen pressure below minimum acceptable value	Accumulators recharged to 25 psig. IPRN 2417 issued to investigate leakage problem
8/19/88	HCUs 30-19 and 38-47 nitrogen pressure below minimum acceptable value	Accumulators recharged to 25 psig. HCU 38-47 leak checked with liquid soap solution
8/24/88	HCUs 30-19 and 38-47 inspected by QC. Pressure was within the acceptable range (10-25 psig)	IPRN 2417 closed out

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

DATE	CONDITION	ACTION TAKEN
9/29/88	HCUs 30-19 and 38-47 checked in response to and NRC request. Pressure in the accumulator units was 8.2 psig and 0.4 psig respectively	NCR 13908 issued

Vendor Manual C11-D001-K001 required maintaining a nitrogen purge pressure between 10-25 psig to prevent corrosion of the HCU accumulator internals. The NRC team noted that no record of the as-found or the as-left pressure was recorded on the Maintenance Action Card (MAC) for the accumulators in question, with the exception of the pressure check performed on 8/19/88. Additionally, the corrective action taken to correct the leakage problem and prevent its recurrence was not documented when IPRN 2417 was closed out.

Vendor Manual C11-D001-K001, Section 4-19, authorized the use of only two approved leak detection liquids. The vendor manual also required rinsing the fittings with demineralized water after the leak check was completed to prevent corrosion of accumulator metals. However, because no work instructions were used to conduct the leak check, it could not be determined if either of the approved leak detection fluids was used. As documented in NCR 13908 a demineralized water rinse was not performed following the leak check made on August 19, 1988.

Vendor Manual C11-D001-K001, Section 3/27,F, specified a torque value of 150 to 200 inch-pounds for the nitrogen charging connector cap. However, the MAC card, which was routinely used to check the accumulator pressure and recharge it

accordingly, did not specify any torque values. Additionally, the NRC inspector noted that a torque wrench was not used in reinstalling the connector cap on September 29, 1988.

The team determined that the Bechtel Quality Control department failed to identify the HCU leakage problem as a nonconforming condition. The Bechtel QC Department closed out the lower tiered correction document, IPRN 2417, without taking appropriate measures to prevent its recurrence. It was not until the NRC inspector requested Bechtel to recheck the pressure in the HCUs in question that an NCR was issued to resolve the nitrogen leakage problem.

The NRC team reviewed the results of the SWEC ICA effort in the LTM and Procurement areas. SWEC found some problems in the maintenance records for major RHR components. On the basis of a review of the LTM program for HCRs and the findings of the SWEC ICA review, the team was concerned about Bechtel's attention to detail in maintaining the material condition of safety-related components. The attention given the maintenance of these components was not consistent with the operational safety importance of the HCUs.

Response

This concern is not applicable to Unit 1.

Unit 1 has been in operation since February 1986. No abnormal problems have developed during the operational phase of the HCUs which would indicate any deficiencies in their Long Term Storage prior to Unit 1 operation.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.8.2.4 Concern

The NRC inspector reviewed and compared a sample of hydrostatic and pneumatic pressure tests to the requirements of the pressure testing procedure CP-M-2 and the ASME code requirements. Documentation for hydrostatic tests 2M-49A-12, 2M-45A-16, 2M-44B-10, 2M-45A-59, 2M-45A-10, and 2M-52A-06 was reviewed. Pneumatic test 2M-83-75 for HCC-234-E24 and HCC-234-E25 at 240 psi was observed in progress. During these reviews and observation, two potential problems were identified with the pneumatic test process. First, although the pneumatic test was conducted in accordance with the CP-M-2 procedure and Section III of the ASME Code, the leak detection fluid was applied to the pipe welds just before the examination for leaks rather than during the examination. This practice reduced the sensitivity for leak detection such that there was a slight possibility that a leak, if present, might not be observed. Second, the leak detection fluid (Snoop) was not removed from the stainless steel piping of HCC-234-E24 after completion of the examination. This omission was in conflict with page 1.4-1 of Boiling Water Reactor (BWR) Operations Manual NEDE 20583A, dated November 1978 which recommends complete removal of Snoop from stainless steel after use.

Response

This concern is applicable to Unit 1.

The inspection using Snoop are conducted in accordance with procedures for pneumatic testing which meet the requirements of ASME III MB/NC/ND-6000. Snoop solution is applied to the joints just prior to or at the time of inspection. The inspectors reapply the fluid if they feel it is warranted.

Attachment 2

Applicability of Unit 2 Independent Construction

Assessment (ICA) NRC Inspection Findings to Unit 1

Snoop is comprised primarily of deionized water containing a surfacant of the alkyl aromatic class. Snoop has less than (1) ppm total halogens. The total content of the low melting point metals mercury and lead is less than (2) ppm. Snoop contains none of the low melting point metals bismuth, antimony, tin or zinc. The vendor has concurred that Snoop is not deleterious to stainless steel.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.9.2.1

Concern

RHR pump differential pressure transmitter PDT-51-2N058B: The team found one of four Unistrut nuts securing the transmitter to the Unistrut channel in rack 20C027 was not fully engaged with the Unistrut track. The bolt was snug and appeared to have been tightened with the Unistrut nut misaligned. Bechtel prepared a work package to correct the discrepancy during this inspection.

The team identified 11 instruments with at least one loose or misaligned Unistrut mounting nut. These QC accepted installations did not meet the requirements of Bechtel Specification M-830-G0000, paragraph 8.7.

On the basis of this NRC finding, Bechtel instrument engineers performed a walkdown inspection of all instrument racks in Unit 2 to determine the extent of the deficiency and to identify additional misaligned Unistrut spring nuts. Bechtel wrote Startup Nonconformance Reports 283C-385/S-132-J and 251A-673/S-133-J to document and resolve the discrepancies. The NRC inspector reviewed the Startup Nonconformance Reports and determined that they adequately resolved the technical issue. However, the team believes that the root cause determination for such a large number of deficiencies in installations that were inspected and accepted by QC should be evaluated, and measures should be taken to prevent recurrence.

Response

This concern is applicable to Unit 1.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

Spring Nuts on seven (7) Unit 1 GE instrument racks were inspected and identified as deficient. An evaluation of the significance of the cited condition is documented in the response to COR-09 and COR-28. This evaluation shows that the cited conditions are acceptable "as-is."

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.9.2.1

Concern

Emergency Service Water (ESW) pump pressure switch PSL-12-001D: The team found two anchor bolts for the baseplate of hanger H1 were missing flat washers under the nuts. Washers were recommended by Section 3.3 of Specification M-8031-C-64 and were present on other installations. The washers were also recommended by vendor manuals.

The panel nuts securing the two drain valves to their respective valve brackets were loose, preventing the brackets from holding the valves securely.

The external cover protecting the pressure switch adjustment mechanism was loose.

The level instrument was QC accepted and in service supporting LGS Unit 1 operation. The licensee issued Apparent Discrepancy Notification (ADN) Form L-72 to identify and document the discrepancies of this instrument installation.

Response

The concern identifies two conditions that are unrelated and must be addressed individually. As a means of differentiation, they are referred to as Concern #1 and Concern #2.

Response to Concern #1

This concern is applicable but not a problem on Unit 1.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

Specification M-8031-C-64, paragraph 3.3, states that, "washers may be omitted when...hole size is no larger than the bolt diameter plus 3/16 inch," and paragraph 3.5 requires bolt holes to be nominal anchor/ bolt diameter plus 1/8 inch.

Response to Concern #2

This concern is not applicable to Unit 1.

A subsequent inspection has been performed of an additional 30 Unit 2 instruments involving 71 valves for loose "Dragon" drain valve panel nuts at bracket attachments and pressure switch adjustment mechanism external covers; one isolation valve panel nut was found loose. Therefore, this concern is viewed as an isolated instance and not indicative of programatic breakdown in the installation practices of instrumentation on Unit 1 or 2.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.9.2.1

Concern

RHR 'B' loop flow transmitter FT-51-2N015B: The team found one of three support bolts holding the "Dragon 3" valve manifold to the instrument support was loose. Section 8.19.9 of Construction Specification M-830-G000, Sheet 14, required bolt torque to be in accordance with the manufacturer's specifications. In the absence of specific vendor recommendations, M-830-G000 provided general specifications for various bolt sizes. Bechtel instrument engineers prepared Startup Nonconformance Report 249A-2065/S-129M which documented the discrepancy and approved the corrective action of tightening the bolt to design requirements.

Response

This concern is not applicable to Unit 1.

A subsequent inspection of an additional 24 Unit 2 instrument installations with valve manifolds installed (a total of 72 bolts) was completed with no discrepancies found. Therefore, this condition is considered isolated and not indicative of a programmatic breakdown in the installation of valve manifold supports on Unit 1 or Unit 2.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.9.2.1

Concern

TE-76-223B for unit cooler 2BV210: The field lead terminal lugs at the temperature element had insulation damage on the terminal lug barrels caused by inadequate clearance between the inside of the threaded cover and the wiring and terminal lugs. Three other air cooler temperature detectors had similar or more severe damage on the field wires, detector wire, or terminal lugs and are discussed in Section 4.9.2.2.

Response

This concern is applicable to Unit 1.

This concern is addressed in our response to the first concern discussed in Section 4.9.2.2.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.9.2.1

Concern

Local control panel for unit cooler 2BV210: The white conductor (wire 388) on point 10 of terminal board TB-1 was bent excessively. The bend radius of the wire was only 1.5 to 2 times the wire's outside diameter. The NRC inspector was informed by Bechtel and PECo Staff that the Limerick Station did not have a construction requirement for the bend radius of single conductors. The inspector was concerned that without a standard, no assurance could be provided that vendor recommendations and requirements for safety-related wire bend radii would be maintained in future modifications and installations.

Response

This concern is not applicable to Unit 1.

The cited condition has been evaluated by Project Engineering for acceptability. The criteria for minimum bending radius (4 x O.D. of conductor) is contained in ICEA Standard S19-81 under Ozone Resistance Test. This is a generic criteria and it stipulates the use of conductors under worst case service conditions. Based upon specific usage, the following observations have been made.

- The ICEA minimum bending radius criteria is based on cables carrying rated current while the conductors in question are for instrumentation circuits and carry only a small fraction of rated current.

- The ozone resistance properties of the conductor insulation used at LGS (Ethylene Propylene Rubber) reduces the probability of insulation degradation as does the inherent conductor protection provided by the equipment enclosure.

For these reasons, the installed radius of the subject wires are considered acceptable. The wire manufacturer (Fluorocarbon) has also given their concurrence in this matter.

Although formal bend radius criteria are not provided as a requirement, wires are always trained in a craftsman like manner to avoid extreme bends which would cause sharp points.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.9.2.2

Concern

The team found wire damage in all four (4) Unit 2 compartment air cooler resistance temperature detectors (RTDs): TE-76-223F, 223H, 224F, and 224B. The damage was due to abrasion from the RTD threaded cover that was supposed to protect the wiring and terminal board. The configuration of the connections caused the lugs and wires to protrude and come in contact with the cover whenever the cover was installed or removed. Although the team found wires or terminal lugs showing evidence of abrasion from the cover in all four (4) RTDs, the most severe damage was noted in TE-76-223F. The insulation of field wire number 2 in this RTD was worn to the point of exposing bare conductor. A bare wire in contact with the terminal board screw and the cover could short circuit the RTD and make the air cooler fan control circuit inoperable.

The NRC team identified the problem to PECo and Bechtel staff, along with the concern that the problem may be generic to all air coolers in both Limerick units and RTDs of that type and manufacture. Bechtel issued NCR 13911 to document and correct the air cooler RTDs with the damaged cables in Unit 2, and ADN Form D-50 to evaluate the air coolers in Unit 1. The NRC inspector reviewed the nonconformance report and the ADN. The NCR, although addressing the specific RTDs, did not address the probable generic nature of the problem for all similar installations in Unit 2. The generic nature of this issue should be addressed for all safety-related RTDs of this type.

Response

Attachment 2

Applicability of Unit 2 Independent Construction

Assessment (ICA) NRC Inspection Findings to Unit 1

This concern is not applicable to Unit 1.

RTD Connection Loads, terminal blocks and wiring are inspected every 18 months. During these inspections any deficiencies are corrected using the Maintenance Request Form (MRF) process. Therefore, any deficiencies on Unit 1 RTDs would have already been corrected.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.9.2.2

Concern

The team found that the instrument tubing supports for drywell pressure transmitters PT-42-2N091B, PT-42-2N094F, and PT-42-2N050B in rack 20C027 exceeded the maximum allowable span. Construction Specification M-830-G038, Note 1, specified a maximum span of five feet (60 inches) for 3/8 inch diameter tubing. The team found that the tubing for these instruments had an unsupported span of about 80 inches. Bechtel instrument engineers confirmed the overspan condition with the NRC inspector. Since the instruments were in a rack supplied by G.E., Bechtel staff told the inspector that the installation would be evaluated in conjunction with G.E.

Response

This concern is not applicable to Unit 1.

The Unit 2 investigation subsequently discovered that only one of the subject tubing runs exceeded the allowable span. Following additional analysis this tubing run was determined to be adequately supported. All thirty (30) Unit 2 GE instrument racks (approximately 160 bulkhead connections) were reinspected for overspan conditions with none identified. Therefore, this concern is viewed as an isolated occurrence and is not indicative of a programmatic breakdown in the installation of instrument tubing on Unit 1 or Unit 2.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.9.2.2

Concern

The NRC inspector found a loose support strap on the instrument tubing bulk-head connector for pressure transmitter PT-40-2N055 in rack 20-C073. The inspector also noted that the instrument tubing contacted safety-related conduit 2DI059. Construction Specification M-830-G000, Sheet 14, required torquing of clamp bolts and specified the torque requirements. Section 5.11 of M-830-G000, Sheet 7, required instrument lines be protected from mechanical loads and wear.

Bechtel prepared FDDR J-196 in response to the NRC inspector's finding. The FDDR identified the discrepancy and proposed torquing the clamp to the required 72 inch pounds. Securing the clamp properly should eliminate the contact between the tubing and conduit. The inspector reviewed the FDDR and concluded that the proposed action was adequate to address the technical issue.

Response

This concern is not applicable to Unit 1.

The cause of this Unit 2 condition was determined to be unauthorized alteration which occurred during the construction phase. The support straps did not work themselves loose and the Unit 2 problem is viewed as construction related and is not indicative of a programmatic breakdown in the installation of instrument tubing.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.9.2.2

Concern

During field inspections of instrument tubing and supports, the NRC inspector noted that galvanized materials welded or cut in the field were left untreated. Construction Specification M-830-G038, Sheet 1, Note 8 required that "field cut or welded surfaces of galvanized materials shall be treated with galvanizing spray to protect the surfaces".

Bechtel responded to the NRC inspector's finding by initiating Balance of Plant Condition Report J400. The condition report identified and documented the discrepant condition for future correction.

Response

This concern is applicable to Unit 1.

Cause:

The cited Unit 2 condition is attributable to a misunderstanding on the part of Construction Engineering of the requirements in M-830-G038 to coat the ends of cut-off galvanized material. The general notes of M-830, Paragraph 8.4, state that for painting and welding, refer to project requirements. Construction Engineering understood this to mean that general project painting requirements should apply to cut or welded Unistrut.

Extent of Condition:

Not applicable based upon action taken to prevent recurrence.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

Significance:

This condition has been evaluated and we have determined that non-treated field cut or welded surfaces of galvanized materials are not detrimental to the plant.

Corrective Action:

Balance of Plant Condition Report J-400 was issued and has been dispositioned by Project Engineering to "Use-As-Is." This disposition applies to both Units 1 and 2.

Action to Prevent Recurrence:

FCR MI-758-J removed this requirement from Specification M-830-G038.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

Section 4.9.2.2

Concern

The NRC's inspection also identified a number of fastener discrepancies that consisted of missing flat washers on base plates anchor bolts and missing lock washers on instrument attachment bolts.

- Hanger H2 for ESW pressure switch PSL-12-001B tubing: missing flat washer on one baseplate anchor bolt attachment.
- ESW pressure transmitter PSH-12-004B: missing lock washer on one support bracket bolt.
- ESW pressure transmitter PSH-12-004D: missing lock washers on two support bracket bolts.
- Conduit hanger CI-1485: missing flat washers under all four anchor bolt nuts for the hanger baseplate.

Bechtel prepared ADN Form L-72 to document the NRC observations for the transmitters and tubing support. The NRC inspectors discussed baseplate anchor flat washer discrepancies with the Bechtel Lead and Assistant Electrical Lead Engineers and was presented with information from Specification 8031-C-64 for anchor installations. The specification recommended the use of washers for all expansion anchor installations and that washers could be omitted when the plates hole size is no greater than the bolt diameter plus 3/16 inch. It further stated that all bearing surfaces shall be plane surfaces to ensure that tightening of the nut has the desired seating effect on the anchor. The NRC

inspectors had the following concerns regarding this portion of the specification.

- Since omission of flat washers for expansion anchors was allowable, then the expansion bolt hole size for those baseplates should be a quality attribute that should be QC inspected and recorded during assembly.

- The specification did not provide criteria to determine if surfaces were plane and, therefore, that determination was left to the judgement of the installation craftsmen.

- The specification's exception for the use of washers was independent of the anchor's use and expected load. The exception was also inconsistent with vendor recommendations, drawings, and qualification testing for specific anchors.

The NRC inspectors noted that most baseplate anchor bolts had flat washers installed and it appeared that a few isolated electrical conduit supports were missing washers. The team also noted that the intent in constructing the plant was to install washers under nuts on all anchor bolts. The NRC team recommended that PECo and Bechtel evaluate the appropriateness of Specification C-64 requirements for expansion anchors.

Response

This concern is applicable but not a problem on Unit 1.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

The cited condition has been evaluated and our conclusions with respect to Unit 1 are as follows.

Expansion anchor allowable loads contained in Specification C-64 are independent of the anchor's use. Omission of washers, as permitted by the specification, is similarly independent of the anchor's use and expected load. Washer omission at anchors installed to achieve specified torques does not have significant affect on anchor capacities. This has also been confirmed by the anchor manufacturer.

Anchor qualification testing and vendor recommendations do not identify washers as a significant parameter. Drawings for commodity support connections using expansion anchors do not specifically require washers. Expansion anchor hole sizes in baseplates are inspected as required by Section 3.6 of Project Quality Control Instruction (PQCI) 18240/C-1.50. Criteria to determine if bearing surfaces are plane is given in Section 3.3 of Specification C-64 by the requirement that the minimum allowable angle between the axis of the anchor and the bearing surface shall be 85 degrees. This criteria is addressed in Section 2.1.B.1(b) of the PQCI. The PQCI, in Section 3.5, also requires that proper nut contact with the bearing surface be verified in accordance with Section 3.3 of Specification C-64. Therefore, we conclude that Specification C-64, for use of expansion anchors, is adequate and appropriate.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.9.2.2

Concern

The NRC inspector noted an apparent interaction violation between an uninsulated steam pipe and a safeguards junction box and safety-related conduit 2AJ170. The uninsulated pipe, EBD-205-E3, with a design surface temperature of 550 degrees Fahrenheit, was routed within 2 inches of the face of the junction box. Construction Specification M-830-E1406, Section 2.9 required that uninsulated pipe with surface temperatures above 200 degrees Fahrenheit be evaluated by Project Engineering for adequate clearance from electrical raceways.

The NRC inspector discussed the installation with Bechtel staff who provided NCR 13913 and PIN 369 dated August 11, 1987. The inspector had the following concerns after reviewing the NCR and PIN.

- o PIN 369 stated that conduit 2AJ170 was reworked to achieve 3-1/4 inches separation between the bare pipe and the junction box. The PIN also required two (2) inches of insulation on the pipe. The NRC field inspection of the installation found the pipe uninsulated and only 2 inches of clearance between the pipe and the junction box.
- o The PIN did not indicate any QC or QA action or acceptance.
- o The PIN was signed off as being "closed out" with "N/A" indicated in the "Action Completed By" block.

The NRC inspectors concluded that the installation was not in accordance with requirements or the PIN, and had not been reworked as stated in the PIN.

Additional review and evaluation of corrective action for this deficiency were warranted.

Response

This concern is not applicable to Unit 1.

The PIN program was not in use on Unit 1. However, any Unit 1 interaction violations would have been identified in the course of the final stress reconciliation walkdown performed by Project Engineering. Therefore, this Unit 2 concern is not indicative of a programmatic breakdo in the installation of Unit 1 piping or equipment.

Attachment 2

Applicability of Unit 2 Independent Construction

Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.9.2.2

Concern

The team found all four (4) mounting bolts for pressure transmitter PT-11-003B loose. The transmitter measured the unit common emergency service water B loop discharge header pressure. The bolts did not appear to have been tightened.

The NRC inspector reviewed ADN Form L-73 which the licensee prepared in response to the teams finding. The team noted that the form identified and documented the discrepancy but had not yet been evaluated for appropriate action by PECo QA. The NRC team recommended that the root cause of the discrepancy be determined and that measures be taken to prevent its recurrence.

Response

This concern was identified on a Unit 1 instrument.

An inspection of all pressure switches and transmitters in the spray and pump house was completed. No additional cases of loose mounting bolts were discovered.

The fact that all four (4) of the mounting bolts were discovered on the one pressure transmitter PT-11-003B and not one (1) mounting bolt was found loose on the additional instruments inspected indicates that the most probable cause of this event was unauthorized reworked to the common pressure transmitter during Unit 2 construction. As no other similar occurrences were discovered this condition is viewed as an isolated occurrence and is not indicative of a programmatic breakdown in the installation of Unit 1 or Unit 2 instrumentation.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.9.2.2

The NRC inspection identified loose flexible conduit fittings in the installations of seven (7) instruments. Bechtel Instrument Engineers prepared a FDDR that documented the deficiencies identified by the team. The NRC inspector reviewed the FDDR and concluded that it adequately addressed the problem.

Response

This concern may be applicable to Unit 1 but is not a problem.

G.E. has evaluated this condition and considers it to be insignificant since the flex connector cannot unscrew from the device with conduit attached to it. There is no impact to plant safety or system function as a result of this condition nor does it affect the qualification of the instrument rack.

Attachment 2

Applicability of Unit 2 Independent Construction

Assessment (ICA) NRC Inspection Findings to Unit 1

NRC Inspection Report Section 4.9.3

Concern

The inspector gained additional insight on the involvement of site QC inspection personnel in the construction process during review of completed work packages and QCIRs. The NRC inspector noted that QC personnel were involved in the work activities from work planning to final inspection of the activities. However, the deficiencies identified by the NRC team in the mechanical, HVAC, and instrumentation areas, particularly the equipment mounting discrepancies, indicated that QC activities were not completely effective in all cases.

The number of discrepancies found during NRC field inspections of instruments both within and outside the SWEC sample generally indicated that the quality of work by craftsmen were above average. The type of discrepancies found on QC-accepted installations would suggest weaknesses in attention to detail in acceptance of completed installations or lack of detailed checklists for final verification.

Response

This concern is not applicable to Unit 1.

We have reviewed the cited conditions and conclude that the vast majority of the valid concerns were noted to be isolated cases which were assessed by PECo to be minor in nature, and can be categorized as follows.

- Deficiencies associated with QC acceptance of commodities.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

- o Deficiencies associated with the degradation of commodities after QC acceptance.

- o Specification interpretation.

The only discrepancies attributable to the first category are those identified in the area of mechanical equipment mounting. As discussed in the response to each of the specific hardware concerns related to this subject, conflicting/confusing design requirements and lack of attention to detail during drawing review were the root causes of the problem. We have determined that this condition is isolated to this issue as has been demonstrated by the SWEC IDCA and this NRC Inspection Report. We provide a graduated program of assurances that a level of quality is maintained on safety related equipment sufficient to assure its function. Each program provides controls to ensure that the work receives that appropriate inspection. The controls for Bechtel Construction are provided in the Construction Procedures (CPs). These controls ensure the work package is routed through QC for the preparation of their inspection documentation. When blue tag testing is in progress, the controls are established in PECo Electrical Engineering Procedures (EEs). These procedures require the rework notice to be routed through QC for inspection documentation. Startup Work Orders (SWOs) are used by the Startup organization to authorized all work. Their controls are noted in the Startup Administrative Procedures and they include provisions for QC inspection. These control functions ensure that all work on systems and facilities are carefully controlled under our quality program.

The discrepancies attributable to the second category are also discussed in the responses to each of the specific concerns. In addition, our quality program

recognized the possibility of inadvertent damage after QC inspection. Two programs have been developed to ensure that the damage does not go undetected.

The first is a system turnover program. Prior to system turnover to Startup, a walkdown is performed by a multidiscipline team of Construction Engineers, QC Engineers and Startup personnel. This walkdown is done to ensure that all construction is complete or noted as an exception and that any damage is documented. In conjunction with the walkdown, a QC records review is performed to ensure all inspections are completed and all open items are entered on the punchlist. Once turned over to Startup, the system is tagged to clearly identify that the system is under Startup control.

The second system developed is the facility turnover process. Again, a walkdown is performed by a multidiscipline team. This team ensures that the facility and its components are damage free and note that all construction is complete or documented as an exception. These areas are then locked-down to the extent possible to prevent unauthorized entry.

The two (2) walkdown programs are described in Bechtel Construction Procedures CP-T-1 and CP-T-2.

Assurance that the design is maintained after post acceptance testing is recognized as an important element of our Startup Administrative Procedures. These documents assure that all design changes are properly controlled. In addition, these controls include provision for QC inspection and retest after work completion.

Attachment 2

Applicability of Unit 2 Independent Construction Assessment (ICA) NRC Inspection Findings to Unit 1

Although concern was expressed regarding the acceptability of interpretations of some specifications, analysis has shown these specification interpretations to be acceptable to meet requirements and therefore "use-as-is."