U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

Division of Quality Assurance, Vendor, and Technical Training Center Programs

Quality Assurance Branch

Report No.:	50-440/84-29, Supplement 1
Docket No.:	50-440
Licensee:	Cleveland Electric Illuminating Company P. O. Box 5000 Cleveland, Ohio 44101
Facility Name:	Perry Nuclear Power Plant
Inspection at:	Gilbert/Commonwealth, Reading, Pennsylvania
Inspection Conducted:	February 27, 28, and March 1, 1985.
Inspection Team Members:	
Team Leader	D. P. Norkin, Senior Inspection Specialist, IE
Mechanical Systems	S. M. Klein, Consultant, WESTEC Services
Mechanical Components	W. F. Anderson, Senior Mechanical Engineer, IE A. V. duBouchet, Consultant, Harstead Engineering
Civil/Structural	G. A. Harstead, Consultant, Harstead Engineering H. Wang, Inspection Specialist, IE
Electrical Power	C. J. Crane, Consultant, WESTEC Services G. W. Morris, Consultant, WESTEC Services
Instrumentation and Control	J. E. Kaucher, Consultant, WESTEC Services

Donald P. Norkin — 3/21/85
Donald P. Norkin
Team Leader, IE
Date

Approved by: James L. Milhoan — 3/21/85
James L. Milhoan
Section Chief, Quality Assurance Branch
Date

8504040392 850326
PDR ADOCK 05000440
Q PDR

PERRY IDI FOLLOW-UP REINSPECTION

1. Background and Persons Contacted

The NRC conducted an Integrated Design Inspection of the Perry Nuclear Power Plant between August 6 and October 12, 1984. The inspection report was issued on December 12, 1984. The applicant responded to the report on January 24, 1985. The NRC reviewed the response and an NRC letter dated February 25, 1985 identified IDI items to be addressed in an NRC reinspection on February 27 through March 1, 1985. The applicant's letter dated March 8, 1985 documented additional actions and clarifications discussed during the reinspection.

This report lists each item addressed in the reinspection. For each item, the first sentence summarizes the deficiency identified in the IDI report. Items are indicated as closed based on the information provided in either the reinspection or in the March 8, 1985 letter. For items remaining open, the required action is indicated. Items not listed in this report were closed out based on NRC review of the applicant's January 24, 1985 letter.

The team contacted the following personnel during the reinspection:

Name	Organization	Position
*F. R. Stead	CEI	Manager, Nuclear Engineering
*G. R. Leidich	CEI	General Supervising Engineer
R. L. Vondrasek	CEI	General Supervising Engineer
E. C. Willman	CEI	Senior Engineer
J. E. Meyer	CEI	Engineer
R. A. Pender	CEI	Senior Engineer
M. R. Kritzer	CEI	Unit Supervisor
W. J. Leininger	G/C	Project Manager
N. R. Barker	G/C	Vice President
C. C. Paschall	G/C	Manager, Quality Management
H. A. Manning	G/C	Manager, Corporate QA Programs
F. G. Boutros	G/C	Mechanical Department Manager
P. B. Gudikunst	G/C	Consultant
R. W. Alley	G/C	Project Structural Engineer
S. M. Gresdo	G/C	Control Systems Engineer
R. T. Getty	G/C	Project Control Systems Engineer
J. Ioannidi	G/C	Site Manager
R. A. McNabb	G/C	Project Electrical Engineer
C. W. Whitehead	G/C	Project Piping Engineer
R. J. Sheldon	G/C	Project Mechanical Engineer
R. P. Cronk	G/C	Electrical Dept. Section Manager
G. Arauz	G/C	Piping Analyst
J. Zalewski	G/C	Lead Piping Analyst
T. Hatch	G/C	Piping Analyst
S. Ferrarello	G/C	Piping Analyst
T. Shih	G/C	Piping Analyst
U. N. Sinha	GE	Manager, Piping Stress Analysis
M. D. Potter	GE	Principal Engineer, Piping
P. Douglass	G/C	Support Designer
B. Stevens	G/C	Lead Support Designer

Name	Organization	Position
P. Rieck	G/C	Structural Engineer
R. Pages	G/C	Structural Engineer
W. Sawruk	G/C	Structural Engineer
K. Murray	G/C	Structural Engineer
B. Kohout	G/C	Electrical Engineer
S. Louie	CEI	Relay Engineer
R. Svotelis	G/C	Structural Engineer
M. Z. Lee	G/C	Supervisor, Piping Engineering (Analysis)
R. Rentschler	G/C	Engineer
J. Holton	G/C	Engineer
N. Barker	GE	Project Electrical Coordinator

*Exit Meeting Only

2. Mechanical Systems

(Closed) Deficiency D2.1-1, Inadequate Consideration of Factors Affecting Emergency Service Water Inlet Temperature

There were no calculations to substantiate the maximum cooling water temperatures supplied by the emergency service water system. The team reviewed new calculations of maximum temperatures supplied to equipment in the emergency service water system, which factored in heat loads rejected to the discharge tunnel when the discharge tunnel is used as the source of cooling water. The 85 degrees F maximum temperature established was evaluated for all equipment served and found to be acceptable.

(Open) Deficiency D2.1-3, Failure to Document Substantiation for Emergency Service Water Pump Vacuum Breaker Check Valve Size

No calculations existed to substantiate the size of the check valve vacuum breaker and other design measures to preclude the effects of potential water hammer loads on piping and supports in the emergency service water system. The initial response stated that the Perry Preoperational Test Program (TS P45, Addendum E) will monitor for occurrence of water hammer. The team reviewed the test procedure and concluded it did not adequately address potential water hammer events. The team held a conference with CEI and Gilbert to discuss conditions for potential water hammer in the ESW system, e.g., pump trip and restart timing variations and column separation and voiding. A revised response stated that the Perry Preoperational Test Program will be modified to require observation of the system performance with regard to water hammer. A detailed water hammer test program, which includes the system operational transients and conditions which could cause water hammer, will be issued by April 1, 1985. This test program will provide additional assurance that the system design precludes the occurrence of water hammer. This item remains open pending IDI team review of a revised water hammer test program.

(Closed) Deficiency D2.1-4, Inadequate Documentation to Support Overpressurization Protective Devices

There were no calculations or other documentation to confirm the adequacy of relief valves for equipment in the emergency service water system. The team reviewed new calculations P45-28 and P42-12 which indicated that the relief valves were sufficiently sized to accommodate required flow rates without exceeding design pressures. A calculation confirming the size of the chilled water cooler relief valve is in process.

(Closed) Deficiency D2.1-6, Failure to Provide Antirotation Protection for the Emergency Service Water Pumps

No provisions existed to prevent the emergency service water pump impellers from rotating counter to their normal direction. The IDI response stated that Preoperational Test Program TSP45, Addendum E has been modified to confirm that reverse rotation will not occur during the period after a pump trip in which the pump could be automatically restarted. The team considers that this test will adequately address the technical issue, and therefore the item is closed relative to IDI team followup. However, the Region will monitor the testing and any resultant corrective actions.

(Closed) Deficiency D2.1-8, System Operating Data Not Supported by Design Calculations

There were no calculations confirming temperatures on operating data system diagrams. Mechanical calculations have been performed to confirm these temperatures. Preliminary interface reviews identified no problems as a result of any higher temperatures identified in the new calculations. No equipment design temperatures were exceeded.

(Closed) Deficiency D2.3-2, Unconservative Design Input and Assumptions Used in Calculation of the Temperature Profiles Within an ECCS Pump Room

The calculation of temperature profiles within the high pressure core spray pump room was based upon an assumed temperature for zone FB-1 which was later proven unconservative. The IDI report stated that the calculations did not clearly identify those assumptions that must be verified as the design proceeds, i.e., the specific locations where the assumption was used to calculate results were not identified nor marked within the calculation. The IDI response stated that such repetition was not required to meet applicable Gilbert procedures, and, in fact, the assumption requiring verification was identified on the cover page of the calculation. The team agrees with this response.

(Closed) Deficiency D2.3-5, Inadequate HVAC Calculations to Confirm Temperature Profiles in Zone AB-4 Following a LOCA Inside Containment

An undocumented assumption that the peak temperature during the shutdown cooling mode would bound the post-LOCA cooldown condition was used in the calculated temperature profiles in zone AB-4. The team reviewed revised calculations based on computer modeling of the various adjacent zones for both the shutdown cooling and post-LOCA suppression pool cooling modes. Time-temperature plots indicated that the shutdown cooling case was more severe. The results of calculations for both modes verified the original assumptions.

ECN #20938-51-21 dated 5/30/84 provided additional insulation to piping within the RHR pump room. The calculation reviewed during the IDI had not accounted for this. The latest calculation does and makes some refinements with the result that the worst case calculated peak temperature was reduced to 151 degrees F. A revision to the FSAR will indicate this as the temperature for which equipment in the area must be qualified. The response to D2.3-2 stated that equipment qualification packages will be revised, as necessary, to incorporate new temperature profiles.

(Closed) Deficiency D2.3-6, Unconservative Heat Transfer Coefficients.

The method in deriving heat transfer coefficients from hot air to cold piping was not conservative because it was based on methods more appropriate to heat loss from hot piping and did not account for insulation on the piping. The team reviewed revised calculations which properly accounted for the heat transfer coefficient from hot air to cold piping and the anti-sweat insulation on the piping. Heat transfer coefficients for cold pipe were substantially reduced. A computer run during the reinspection, assuming no heat removal by cold pipes, indicated that cold pipe removed less than 4% of the heat load compared to 28% in the original calculations. No design changes were necessary.

(Closed) Deficiency D2.3-7, Unconservative Input and Assumptions Used in Calculation of Environmental Conditions in Zone AB-6 of Auxiliary Building

This item concerned unconservative inputs and assumptions used in the calculation of the temperature profile for a corridor of the auxiliary building. The team reviewed revised calculations which modeled adjacent buildings and HVAC zones for loss of offsite power with LOCA and the safe shutdown earthquake. No credit was taken for operation of non-safety related ventilation systems during loss of offsite power modes. Orthographic drawings, rather than unverified piping composite drawings, were used. Other concerns for this item were addressed in responses to other HVAC related IDI items. The overall response to this item is acceptable.

(Closed) Deficiency D2.4-4, Pipe Displacement Drawings Prepared Without Appropriate Design Controls.

The pipe break and jet displacement study was conducted using unchecked drawings and informally documented information. The response committed to documentation and verification of this information. The team confirmed this response by reviewing calculations consisting of verified jet target lists and jet maps resulting from the pipe displacements for the postulated pipe ruptures.

(Closed) Deficiency D2.4-5, Deviation From a Technical Approach With Respect to Jet Impingement Envelopes

This item concerns the potential for excluding some targets which should have been included in increased jet impingement envelopes due to pipe displacements. The response stated that all jet study drawings would be reviewed to identify safety-related targets located in discontinued band zones (not previously identified). The team reviewed new calculations which included targets (a valve and several conduits) not previously identified in these expanded envelopes. The targets are being evaluated to determine the need for shielding.

(Closed) Deficiency D2.4-7, Jet Impingement Envelopes Not Increased Due to Pipe Displacements

The jet patterns for main steam line breaks SA3C, SB3C, SC3C, and SD3C had not accounted for pipe movement during rupture. The team reviewed revised drawings which now accounted for pipe movement during rupture.

(Closed) Deficiency D2.5-2, Interface Review and Design Verification of Engineering Change Notice 22140-85-292

This deficiency concerns the interface review for an Engineering Change Notice issued in the field. The response indicated that the design basis for the change was a calculation (not the ECN), which was not properly reviewed for potential interaction effects. This review has now been performed. The team reviewed new calculations documenting targets identified as a result of this review of potential interaction effects of the sheared platform column. The calculations indicated that no shielding for these targets was required. This response is acceptable.

3. Mechanical Components

(Closed) Deficiency D3.1-1, Unconservative Fluid Operating Temperature in Stress Analysis.

An unconservative Lake Erie water design temperature had been specified at the suction side of the emergency service water pump. The team confirmed that the Gilbert design specification for the emergency service water system and the piping system analysis were correctly revised to reflect the worst case thermal differential. The revisions did not result in any unacceptable component or nozzle stresses.

(Closed) Deficiency D3.1-2, FSAR Commitment.

An FSAR commitment to dynamically model flexible equipment had not been implemented in the design specification for each piping system. The team reviewed the design specifications for the residual heat removal and emergency service water piping systems; these design specifications now require that flexible equipment be dynamically modeled. This item is closed; however, deficiency D3.2-5 remains open pending completion of reanalysis to reflect dynamic modeling.

(Closed) Deficiency D3.1-3, Heat Exchanger Nozzle Loads (Faulted Condition).

Gilbert had failed to implement an FSAR commitment requiring that faulted condition nozzle load combinations for the residual heat removal heat exchangers supplied by General Electric include thermal effects. The team reviewed Gilbert's reanalysis of the residual heat removal heat exchangers and adjacent piping. The revised heat exchanger nozzle loads for the faulted condition contain a thermal component, and have been confirmed by GE as acceptable.

(Closed) Deficiency D3.1-4, RHR - Natural Frequency.

This item concerned an incorrect FSAR value for RHR heat exchanger natural frequency (greater than 33 hz), which resulted in not dynamically modeling the equipment as required for the correct natural frequency (14 hz). The team reviewed a heat exchanger reanalysis which was correctly based on dynamic modeling. Calculated nozzle loads on the heat exchangers exceeded initial GE allowables, but GE judged them acceptable after review. The FSAR will be revised to show correct natural frequencies for GE equipment.

(Closed) Deficiency D3.2-1, Use of Unconservative Gradient in Stress Analysis.

An incorrect thermal differential had been used to analyze piping and equipment in the emergency service water system. The team reviewed Gilbert's reanalysis and confirmed that an acceptable thermal gradient was used; resulting component stresses remained within ASME code allowables.

(Closed) Deficiency D3.2-2, Equipment Thermal Growth.

This deficiency addressed the incorrect coding of an axial thermal displacement imposed on a leg of pipe which connects the pump and strainer in the emergency service water system. The team reviewed Gilbert's reanalysis of the piping and equipment, which included explicit mathematical models of the pump and the strainer, and confirmed that the models properly account for equipment thermal growth.

(Closed) Deficiency D3.2-3, Ball Joint Rotation Controls, GAI.

This item concerned control of ball joint rotations induced by installation, misalignment and service conditions to avoid exceeding the rotation limit of $\pm$ 7.5° arc. A revised analysis indicates that ball joint rotations under various service conditions do not exceed 4.5° arc. The team reviewed the field report which shows that all ball joint positions have been measured and more that 4.5° arc is available for rotation under service conditions.

(Closed) Deficiency D3.2-4, Ball Joint Rotation Control, GE.

This item concerned control of ball joint rotation induced by installation misalignment and service conditions to avoid exceeding mechanical limits. The team reviewed GE Plant Piping Design Memo #123-8418, Rev. 0 which contained representative calculations for the rotation in a ball joint in one SRV discharge line from steam line A. Calculations for a ball joint in another SRV line (from steam line C) show predicted rotations under service conditions of 4.65° arc. The team reviewed field inspection reports which show that the field installation alignment limit of 3° arc was satisfied, and some joints had been predeflected to accommodate greater than 7.5° rotation in service. These GE actions to assure satisfaction of the limit of 7.5° arc are acceptable.

(Open) Deficiency D3.2-5, Interface Between Piping and Equipment.

This item concerns failure to include (1) equipment with a fundamental frequency less than 33 Hz in seismic analyses of piping and (2) thermal loading in emergency and faulted conditions for NSSS equipment. An evaluation of GE and HVAC equipment is being performed to determine pieces of equipment which require flexible modeling. No hardware modifications have been required for reanalyses which have been completed to date using a flexible model. For 16 pieces of equipment remaining to be reanalyzed, 12 will be modeled flexibly with sufficient attached piping to predict dynamic interaction effects, and

4 are HVAC Plenums which will be flexibly modeled or will be stiffened to establish a natural frequency higher than 33 Hz. This work is scheduled to be completed by May 1, 1985.

Gilbert has recalculated nozzle loads for all GE equipment attached to Gilbert analyzed piping to include thermal loading in the emergency and faulted conditions. All but one (RHR pump) have met allowable loads. One nozzle on the RHR pump exceeds the allowable by 12%. GE evaluated this, and their internal letter dated March 19, 1985 confirmed the nozzle loads were acceptable. This issue is closed subject to GE formally documenting this position in a letter to Gilbert, with distribution to the team.

The thermal loading deficiency occurred because Gilbert failed to incorporate a GE interface requirement for evaluating NSSS equipment nozzles into the piping design specification. To address the root cause of this deficiency as it pertains to design changes, Gilbert has made programmatic changes which stress the joint responsibility of the Project Mechanical Engineer and the Project Engineer Piping and the need for the two to formally resolve discrepancies between interfacing documents and the design specifications.

Deficiency D3.2-5 remains open pending the team's reinspection of the flexible modeling effort.

(Closed) Deficiency D3.2-6, <u>Safety Relief Valve Discharge Line Anchor Loads.</u>

This item was concerned with ensuring that loadings on support anchor H016 reflected the latest loading conditions, including loadings due to ball joint behavior (see also Deficiency D3.3-7). The team reviewed a new calculation based on new loadings and a revised model of ball joint behavior, which resulted in acceptable loadings and stresses.

(Closed) Deficiency D3.3-1, <u>Modeling Procedures.</u>

This deficiency addressed the incorrect coding of an imposed axial thermal displacement at a boundary point modeled with springs. Gilbert had intended this modeling procedure to account for a thermal growth component of the emergency service water strainer. The team reviewed Gilbert's reanalysis which includes explicit mathematical models of the pump and the strainer, and confirmed that the equipment mathematical models properly account for equipment thermal growth.

(Closed) Deficiency D3.3-2, <u>Piping Analytical Model.</u>

This item indicated that the emergency service water pump, which has a fundamental frequency of approximately 9 Hz, had been modeled as a rigid piece of equipment. The team reviewed Gilbert's reanalysis of the piping and equipment, and confirmed that the pump vendor's spring-mass seismic model of the emergency service water pump has been correctly incorporated into the reanalysis.

(Closed) Deficiency D3.3-3, <u>RHR Heat Exchanger Analytical Model</u>. This item concerned implementation of the thermal growth criteria specified by General Electric for the residual heat removal heat exchangers. The team reviewed Gilbert's reanalysis of the residual heat removal heat exchangers and adjacent piping, and confirmed that the revised heat exchanger analytical model correctly implements the General Electric thermal growth criteria.

(Closed) Deficiency D3.3-4, Nozzle Load Upset Condition.

Gilbert excluded a thermal component from the upset condition load combination for the residual heat removal heat exchanger tube-side nozzles. The team reviewed Gilbert's reanalysis of the residual heat removal heat exchangers and adjacent piping, and confirmed that the upset condition load combination for these nozzles now includes a thermal component; nozzle loads remain acceptable.

(Closed) Deficiency D3.3-6, Shear Lug Qualification.

Computation of pipe stresses induced by shear lugs had not accounted for the as-built configuration. The team reviewed a new Gilbert calculation for the pipe support (1P45-H515), and confirmed that it reflected the as-built configuration. Resulting stresses were within allowables. In addition, Gilbert has revised Piping Engineering Standard DS-5 to clarify the distinction between primary and secondary pipe stresses due to shear lug load transfer.

(Closed) Deficiency D3.3-7, Ball Joint Analysis Model, GAI.

This item was concerned with the potential underestimating of calculated forces on adjacent anchors and supports since the ball joint was assumed to rotate with zero breakaway force. The team reviewed new calculations for each of the Gilbert lines containing ball joints. Bending moments were applied equal to the breakaway bending moment of the ball joint. Results of these calculations met code design allowables.

(Closed) Deficiency D3.3-8, Ball Joint Analysis Model, GE.

This item was concerned with modeling ball joint behavior in a potentially unconservative manner for predicting ball joint deflections or anchor and nozzle loads. The team reviewed revised calculations, which used an improved model for predicting ball joint rotation, and the results of a parametric study of reaction loads on the piping based on this new model. The revised calculations and parametric study results are acceptable.

(Closed) Deficiency D3.4-2, Snubber Support Steel.

This deficiency concerned the deflection of a pipe support supplementary steel beam exceeding the maximum deflection criterion. The team reviewed a Gilbert engineering change notice which adds a post to the pipe support configuration, and confirmed that the additional support limits the pipe support deflection to less than the established criterion.

(Closed) Deficiency D3.4-7, Pipe Support Calculation Check.

This item concerned verification of pipe support designs in subsystem 1P45G58. The team confirmed that the alternate calculations, which cover critical design items for the pipe supports, have been verified.

(Closed) Deficiency D3.4-8, Design Control.

Gilbert had not revised a calculation to reflect a change in the type of pipe clamp used. The team reviewed a revised calculation, which reflected as-built conditions and confirmed that the pipe wall stresses due to shear lug load are within allowable values.

(Closed) Deficiency D3.4-9, Support Change Justification.

This item concerned lack of a calculation to justify a change to the geometry of a support. During the reinspection, the team reviewed calculations which justified the change. These had been available during the IDI, but were overlooked because they were not correctly identified to the support member in question. The team also reviewed a new calculation which confirms the adequacy of the support with revised loadings, based on the new ball joint analytical model.

(Closed) Deficiency D3.5-1, Pump Qualification by Analysis.

This item concerned failure to use the applicable ASME Code stress intensification factor in calculating stresses on the ESW pump. The team reviewed reanalysis of the pump, which considered revised loads resulting from reanalysis of the connected piping (see Deficiency D3.3-1), and found that the new loadings and stress intensification factors were treated adequately.

(Closed) Deficiency D3.5-2, Ball Joint Qualification, GE.

This item concerned discrepancies between GE specifications for ball joint qualification and the vendor qualification reports. GE Plant Piping Design Memo #123-8418 was prepared for the GE Design Record File #123-0005-1, Rev. 0 to resolve these discrepancies generically. The team reviewed this memo and, subject to agreed upon changes, found that it satisfactorily resolved the discrepancies. The revised IDI response stated that Memo #123-8418 has been revised to reflect discussions during the reinspection pertinent to Deficiencies D3.2-4, D3.3-8, and D3.5-2.

(Closed) Unresolved Item U3.2-1, Thermal Conditions for Design RHR-HX.

This item concerned temperature conditions used in the analysis of the interconnecting pipe for the two RHR heat exchangers. The team confirmed that a reanalysis of the interconnecting piping used adequate temperature gradients. As indicated for Deficiency D3.1-4, some nozzle loads on the heat exchanger exceed initial GE allowables, but were judged acceptable.

4. Civil/Structural

(Closed) Deficiency D4.2-1, Failure to Document Assumption for the Reactor Building Seismic Analysis.

The original analysis assumed all reactor building structures were axisymmetric, even though the drywell has eccentricities. The team reviewed new calculation CIC #2:01.7.2 and found that the eccentricities in the drywell had an insignificant effect on the reactor building seismic analysis.

(Closed) Deficiency D4.2-2, Failure to Update Seismic Analysis to Incorporate Structural Changes.

This item concerned the inconsistency between the seismic model for the auxiliary building and dimensions for the foundation mat. Gilbert reviewed all Category I structures and found that four buildings have had significant dimensional changes such that revisions to their seismic models were warranted. They are the reactor building, auxiliary building, radwaste building, and diesel generator building.

The founding material for the reactor building has a shear wave velocity over 4000 ft./sec. Therefore, a fixed base seismic analysis is permissible (ref: NRC Standard Review Plan, Section 3.7). The Gilbert reanalysis was based on a simulated fixed base model and indicated insignificant changes to the existing floor response spectra curves. The team reviewed the reanalysis and found it acceptable. We reviewed the reanalysis of the auxiliary building and found that the original analysis had been conservative. For the diesel generator building, Gilbert determined that the dimensional changes had no significant effect on the results of the seismic analysis. The team agrees. It is noted that, as part of its review, Gilbert found an error in soil spring representation, and is reviewing this for design impact.

(Closed) Deficiency D4.2-3, Omission of Mass Moment of Inertia in Seismic Analysis.

Except for the foundation mat, Gilbert omitted the mass moments of interia in its seismic analyses of Category I structures. The response stated that the seismic analysis model for the auxiliary building (CIC #2:01.7.25) was revised to include all rotational inertias. The new model confirmed that mass moments of inertia are insignificant for all seismic Category I structures. The team reviewed the model and agreed with this conclusion.

(Closed) Deficiency D4.2-4, Calculation of Shear Area in Seismic Analysis.

Gilbert had not justified its assumed shear area coefficient of 0.5 in its seismic analysis for the Intermediate and Fuel Handling Buildings. The team reviewed Gilbert's reanalysis (CIC #2:01.7.6). We found that the calculation of shear stiffness was acceptable and the revised shear stiffness had a negligible effect on the original seismic analysis.

(Closed) Deficiency D4.2-5, Violation of FSAR Commitment;
(Closed) Deficiency D4.2-6, Seismic Analysis Based on Earthquate with Lower Peak Acceleration.

Deficiencies D4.2-5 and D4.2-6 concerned use of the Golden Gate Earthquake in the ESW intake and discharge tunnel seismic analysis, instead of the earthquake identified in the FSAR. The response stated that the Golden Gate Earthquake was only used to confirm the adequacy of the finite element model and boundary conditions. The earthquake identified in the FSAR was used for the final seismic analysis. The team confirmed this by reviewing the computer results. (Run #IERIC, AJ0014, 12200, dated 8/13/74).

(Closed) Deficiency D4.2-8, Inconsistency of Damping Value Used in Diesel Generator Building Seismic Analysis.

This item concerned the technical basis for use of a 10% damping value for reducing seismic loads in the diesel generator building. The team reviewed new calculation CIC #2:01.7.1, which showed that the structural responses are dominated by soil modes, and therefore the 10% damping value is appropriate.

(Closed) Deficiency D4.2-11, Calculation of Lateral Soil Springs in Emergency Service Water Pumphouse Model.

Formulas used to calculate lateral soil springs were not referenced in the calculations. The team found this has been corrected.

(Closed) Deficiency D4.5-2, Concrete Strength of Reactor Building Mat.

This item concerned the calculation of overall concrete strength for the reactor building mat by considering data for the four outer sections, but not for the inner section. The team reviewed a calculation of the as-built strength for the inner section, which indicated greater concrete strength than the previously calculated overall mat strength (6535 vs 5275 psi).

(Closed) Deficiency D4.7-1, Incorrect Spacing for Stirrups.

Some of the stirrup spacings provided in fuel handling building and auxiliary building wall design calculations exceeded maximum spacing criteria per the ACI-71 Code. Gilbert reviewed stirrup spacings for all seismic Category I structures and identified other cases where spacing exceeded code allowables. Supplemental calculations (CIC #2:01.7.4) demonstrated that stirrups were not required at all in these cases. The team reviewed these cases (approximately 24) and agreed with Gilbert's conclusions.

(Closed) Deficiency D4.8-1, Shear Capacity of T-Beams;
(Closed) Deficiency D4.8-2, Incorrect Moment Capacity of T-Beams;
(Closed) Deficiency D4.8-3, Negative Moment Redistribution;
(Closed) Deficiency D4.8-4, Structural Adequacy of Roof Girder.

The ESW Pumphouse had been reanalyzed to ensure it could withstand increased hydrostatic pressure due to malfunctioning weepholes. These four items concern deficiencies with this reanalysis. In response, a finite element analysis (CIC #2:01.7.29) was performed using the computer program NASTRAN. The relative stiffness was based upon the unreinforced and uncracked full depth of concrete. This is a common assumption and is consistent with ACI 318-71. The model was initially run elastically. For regions of overstress, the model was changed such that plastic hinges represented the areas of overstress. The reanalysis indicated no spreading of areas of overstress. The team reviewed the reanalysis and agreed that this procedure is consistent with ACI 318-71 and that the reanalysis shows that the ESW walls have sufficient strengths for design loads.

(Closed) Deficiency D4.9-1, Computer Program Documentation.

This item concerned the fact that, since the SLAM and MASS computer programs did not provide results at boundaries (for mats, slabs, and wall bending problems), bending moments and shears may be underestimated at the boundaries. The response stated that shears and moments at the boundaries were obtained by extrapolation. Gilbert's review (CIC #2:01.7.9) confirmed that the original analyses did not underestimate bending moments and shears at the boundaries. Gilbert stated that differences in Poisson's ratio between MASS and SLAM would have an insignificant effect on maximum bending moments. The team agrees with these conclusions.

(Closed) Deficiency D4.9-3, Design Verification.

This item concerned lack of verification of an alternate calculation pertinent to shear reinforcing for the floor and walls of the steam tunnel in the auxiliary building. The team confirmed that the alternate calculation (CIC #2:07.2) has now been verified.

(Closed) Deficiency D4.9-4, Axial Tensile Forces.

This item concerned Gilbert's decision to omit tensile forces in the beam flexural and shear calculations for the auxiliary building steam tunnel floor. The team reviewed drawings D412-221, Rev. T and D412-222, Rev. T, which indicated that walls are present which would prevent the development of tensile forces in the beam.

(Closed) Deficiency D4.9-5, Auxiliary Building Counterforts Lap Splice of Dowel and Mat Bars.

The vertical reinforcing bars in the auxiliary building counterfort, which are embedded in the foundation mat, were not fully lapped with the bottom mat reinforcing. The team reviewed a new calculation (CIC #4:05.2, pages 339.4 and 339.5) which indicated the counterfort could resist the redistributed moments even if no bending moment restraint was provided at the counterfort to mat interface.

(Closed) Deficiency D4.10-1, Inconsistencies Among Design Documents, Construction Drawings, and Reinforcing Steel Lists.

This item concerned inconsistencies among design documents, construction drawings, and reinforcing steel lists for the diesel generator building. Gilbert issued an ECN to correct discrepant drawings and performed calculations as necessary to confirm that as-built reinforcements are conservative. The team reviewed the ECN and calculations and found them acceptable.

(Closed) Deficiency D4.10-2, Discrepancy Between Design Documents and Construction.

This item concerned an inconsistency between the calculation and construction drawing with respect to horizontal shear reinforcement. The team confirmed that the calculation has been revised to indicate that #9 bars (shown on the drawing) provide shear reinforcement.

(Closed) Deficiency D4.10-4, Diesel Generator Building Wall Design Loads.

This item concerned the assumption for the diesel generator building wall design calculation that loads from the E-W walls are carried to the wall below through the perpendicular crosswall. The team reviewed new calculation CIC #2:01.7.21 and found the perpendicular crosswall had adequate capacity to carry the load.

(Closed) Deficiency D4.10-5, Use of ACI 318-63 Instead of ACI 318-71.

This item concerned the use of ACI 318-63 rather than the FSAR committed code (ACI 318-71) for design of two-way slabs. The team confirmed that new calculation CIC #2:01.7.22 was performed based on the provisions of ACI 318-71 and demonstrated that the slabs were adequate.

(Closed) Deficiency D4.11-1, Anchor Bolt Preload Control.

This item concerned the torquing of A354 anchor bolts for ESW pumps. A letter by a Gilbert senior welding and materials engineer dated February 28, 1985 stated that torquing values for A307 bolts could be used for A354 bolts because, for the specific environment, "their susceptibility to hydrogen embrittlement and stress corrosion cracking are minimal." This response is acceptable.

(Closed) Deficiency D4.11-2, Seismic Pump Reactions.

There was an undocumented engineering decision to ignore horizontal seismic loads transmitted to the ESW pumphouse interior wall from the ESW pump supports. The team reviewed a supplemental calculation (CIC #2:01.7.15) which confirmed the validity of this decision.

(Closed) Deficiency D4.11-3, RHR Heat Exchanger Supports.

This item concerned GE specified loads on the supports for the RHR heat exchanger. Gilbert reviewed GE loading tables for other equipment supported on structural steel. The team reviewed revised GE load data, which clearly distinguish seismic loading and direction, and new calculations which confirmed the adequacy of supporting steel for revised loads.

(Closed) Deficiency D4.12-1, Equivalent Static Load

Gilbert had provided no justification for using a factor less than 1.5 to calculate design acceleration. A factor of 1.0 had been used. The team reviewed calculation CIC #2:01.7.12 for a typical structural support which indicated that the factor of 1.0 was conservative.

(Closed) Deficiency D4.12-2, Conduit Supports.

There was no calculational or experimental basis for assuming that conduit will not fail under jet impingement pressure normal to the wall. The team reviewed calculations (CIC #2:01.7.5) which confirmed that conduit will perform its intended function of protecting the cable from applied jets and concurrent earthquake loading. An internal Gilbert memorandum indicated that openings at couplings will not jeopardize the electrical cable under these loadings.

(Closed) Deficiency D4.12-3, Conduit Supports.

This item concerned the approach used to determine allowable bending stresses in the design of angle supports for electrical conduit. To eliminate inconsistencies, Gilbert has revised its design criteria on design of angle frame supports. The stiffness properties of commonly used angles have been calculated for the weakest axes, instead of making reductions in allowable stresses. Gilbert's detailed review of angle support calculations (CIC #2:01.7.8) determined that existing designs are conservative. The team reviewed the new criteria and calculations, and considers this action acceptable.

(Closed) Unresolved Item U4.2-9, Discrepancy in Seismic Models.

This item concerned confirmation that structural interaction effects in the N-S model for the diesel generator building seismic analysis had been adequately considered. The team reviewed new calculation CIC #2:01.7.11 which confirmed that incorporation (into the seismic model) of adjacent buildings north and south of the diesel generator building had negligible effect on the original seismic results.

(Closed) Unresolved Item U4.10-3, Assumption Made Without Documentation in Designing Slabs with Trench

This item concerned the technical basis for selecting the worst case slab sections (trenches). The team reviewed new documentation which adequately justified the technical basis for selection of the worst case slab sections for slab design.

(Closed) Observation 04.7-2, Load Factor for Dead Load.

This item concerned confirmation that concrete structures are adequate based on the more conservative dead load factor of 0.9 in ACI 318-71, as opposed to the factor of 1.2 committed to in the FSAR. The team reviewed supplemental calculations (CIC #2:01.7.7). These indicated that existing designs are based on a FSAR committed earthquake load factor which is more conservative than the factor in ACI 318-71. The net effect of the two factors is that the FSAR resulted in a more conservative design than would have resulted by use of factors in ACI 318-71.

5. Electrical

(Closed) Deficiency D5.3-1, Flame Test Documentation Unreviewed.

Test documentation on flame retardant characteristics for internal wiring of 480 volt class 1E motor control centers was not reviewed and approved to confirm acceptability of the design and compliance with the FSAR commitments. The team reviewed an Internal Memorandum to Specification SP-557 file dated January 15, 1985, which confirmed the flame retardant properties of General Electric Vulkene SIS switchboard wire in accordance with UL-44, Para. 85.3-85.13; ICEA S-61-402, Para. 6.5; and ICEA S-19-81, Sec. 6.19.6. Gilbert concluded that the flame test documents were acceptable and were applicable to the General Electric SI-57275 internal wiring used in the motor control center design. This response is acceptable.

(Open) Deficiency D5.4-1, Battery Voltage Selection.

This concerned failure to consider the minimum acceptable equipment voltage during the selection of battery voltage. The response indicated that, as a result of the voltage drop review performed in response to an INPO recommendation, the equipment covered by this deficiency would perform its required functions. The team reviewed calculation R42-10E, which indicated a number of DC motor operated valves with starting voltages at the valve motor which were below the 90 volt minimum voltage rating. The team also identified a generic problem with the voltage drop calculation for DC motor operated valves where the analysis failed to consider the additional cable run required for the motor's series winding. This may result in a voltage drop approximately double that calculated by Gilbert, and applies to all (11) safety-related DC motor operated valves. This item remains open pending completion of a voltage drop study and follow-up inspection. A revised calculation is scheduled to be completed April 1, 1985.

(Closed) Deficiency D5.4-2, Direct Current Power Cable Sizing.

This deficiency questioned the ampacity given for DC power cables in the Design Criteria. The team reviewed calculation CAL-R31-003 which confirmed that the values for DC power cable used in Design Criteria Table 2.7.7 were acceptable.

(Closed) Deficiency D5.4-3, Battery Sizing Calculation.

This item concerned errors in the battery sizing calculation. The team reviewed new calculation CAL-R42-11 which confirmed that the sizes of the Class 1E batteries are acceptable.

(Closed) Deficiency D5.4-7, Battery Room Temperature.

This item questioned the battery room temperature alarm setpoint. The team reviewed the proposed change to the technical specification, which raised the minimum acceptable electrolyte temperature to 72°F to be consistent with FSAR Environmental Tables, and the revised response to this deficiency which stated that the purpose of the high temperature alarm was to warn the operator about a loss of ventilation not loss of battery capacity. This response is acceptable.

(Open) Deficiency D5.6-1, 4000 Volt Motor Overload Protection.

This item concerned (1) a failure to follow a FSAR commitment in the sizing of the emergency service water pump motor overload protection, and (2) review and design control for all 4000 volt relay settings. The ESW pump motor relay settings have been appropriately revised. This item remains open pending completion of a motor protective relay study (scheduled for April 1, 1985) and follow-up inspection.

(Open) Deficiency D5.6-2, 460 Volt Motor Overcurrent Protection.

Overcurrent protection for 460 volt motors was inconsistent with the FSAR commitment. New breaker settings have been made as appropriate. Calculations for 460 volt motor protection will be included in an overall protective relay study. This item remains open pending completion of the protective relay study and follow-up inspection.

(Open) Deficiency D5.6-4, Motor Control Center Breaker Coordination.

This deficiency identified that the breaker coordination for the motor control center feeders failed to account for the normally connected and running loads. The team reviewed a preliminary coordination study for a motor control center other than that cited in the deficiency. This item remains open pending completion of the protective relay study, which will consider normally connected and running loads, and follow-up inspection.

(Open) Deficiency D5.6-5, DC Fuse Characteristic Curve.

This item concerned coordination studies which did not use the correct fuse curve and the minimum tolerance band of the relay curve. Cleveland Electric has committed to use the vendor submitted fuse curves and the minimum tolerance band of the relay curve in the protective relay study now in progress. This item remains open pending completion of the protective relay study and follow-up inspection.

(Open) Deficiency D5.7-1, Inadequate Cable Voltage Drop Calculation.

This deficiency concerned substantiation that class 1E AC motor operated valves could perform during bus low voltage and motor starting conditions, considering cable voltage drop. The team reviewed CAL-R24-007 dated October 5, 1984; Design Verification DVR-R24-007 dated October 18, 1984; and Design Input DI-R24-007 dated October 5, 1984. The calculation addressed the capability of a total of 208 class 1E AC motor operated valves to deliver required torque under degraded bus voltage during starting and running conditions, considering cable voltage drop. The ratio of maximum torque provided and required was assessed. The calculations confirm that class 1E AC motor operated valves can perform safety functions during starting and normal running conditions, subject to confirmation of a generic assumption that the degraded bus low voltage is 442 volts at the 480 volt bus. This will be confirmed upon the completion of the load flow calculations to be completed by April 1, 1985, in response to item D5.14-1. D5.7-1 remains open pending follow-up inspection.

(Open) Deficiency D5.7-3, Inadequate Review of Maximum Allowable Circuit Lengths.

Circuits entering containment were not correctly evaluated for allowable circuit length, and there was no comprehensive program to identify and evaluate circuits which exceed allowable length. The team reviewed Gilbert's formal program (Design Input Record DI-R31-010 dated February 27, 1985) to evaluate voltage drop on class 1E power and control circuits. We identified that the program description in DI-R31-010 required clarification with respect to review of elementary diagrams, minimum voltage requirements for motor operated valves, and final battery discharge voltage. Gilbert agreed, and the revised response addresses these. The following calculations were prepared: R24-007, AC Motor Operated Valves; R31-004, Control Circuits; R31-007 and 006, Switchgear Control Circuits; R31-005, Control Circuits; R31-008, Containment Circuits; and R31-001, Cable Voltage Drop. The voltage drop evaluation program is scheduled to be completed by April 15, 1985. This item remains open pending its completion and the team's follow-up inspection.

(Closed) Deficiency D5.7-6, Cable Pulling Calculations.

This deficiency concerned (1) undocumented extrapolations for the calculation of maximum cable pulling tension for cable in duct banks and (2) hand pulling cables through cable trays without performing the tension calculations required by the electrical installation specification. A revised response indicated that (1) a review of safety related cables pulled through the duct banks determined that no cables were pulled above their allowable tension, and (2) the electrical installation specification would be revised to reflect the contractor's cable pulling procedure, i.e., hand pulling without calculating pulling tensions. This response is acceptable.

(Closed) Deficiency D5.7-7, DC Control Cable Sizing.

This deficiency identified an extremely long control circuit for the ESW pump which resulted in an excessive voltage drop. This circuit has been modified by ECN 25802-86-1077, Revision B, to use an interposing relay to eliminate the long run in the close coil circuit. This is acceptable. Generic implications of this voltage drop problem are addressed under Deficiency D5.7-3.

(Closed) Deficiency D5.8-3, Control Fuse Calculation Omission.

Sizing of class 1E control circuit power fuses was based on undocumented engineering judgment instead of calculations based on established criteria, circuit load, coordination and wire size. The team reviewed the Project Electrical Design Criteria, Revision 5, which requires that power circuit fuses be sized in accordance with referenced tables, switchgear fuses to assure short circuit protection, and control circuit fuses so that interrupting rating is not less than the maximum available short circuit current of the control circuit. The revision adequately addresses the team's concern.

(Open) Deficiency D5.9-1, Control Room Duct Fill Criteria Inadequate and Unjustified.

This item concerned confirmation that the practice of completely filling cable ducts does not result in cable damage. An analysis to be completed by April 1, 1985 is intended to establish an acceptable duct fill criterion. The team suggested to GE that the analysis consider the worst case duct loading using full height PGCC ducts to establish the maximum temperature in cable insulation. This item remains open pending completion of the analysis and follow-up inspection.

(Closed) Deficiency D5.10-1, Electrical Separation Criteria Deficiencies.

This deficiency identified errors, omissions and inconsistencies in project electrical design criteria and construction criteria documents with respect to electrical separation criteria. A revised response stated that a section has been added to the project design criteria to address separation of class 1E components within panels. This, in addition to the initial response, adequately addresses the team's concerns.

(Open) Deficiency D5.10-3, Electrical Separation Violations in PGCC Floor Section Raceways.

This deficiency identified that non-class 1E fire protection circuits contained in flexible steel conduit used as a barrier are in direct contact with class 1E cabling in PGCC floor section ducts, in violation of GE specification 22A3728 and IEEE STD 384-74. General Electric test report A00-794-6 was presented as the basis for resolving the separation deficiencies. The revised response included additional information on the applicability and validity of the GE report to the specific separation deficiencies. On March 19, 1985, Gilbert provided the team additional information, e.g., on thermal gain of the barrier.

The team considers that the test report and subsequent clarifications resolve the separation concerns. This item remains open pending formal documentation of information provided to the team on March 19, 1985.

(Closed) Deficiency D5.10-4, Electrical Separation Violation in Local Control Panel 1H51-P037.

This deficiency identified two cases within control panel 1H51-P037 where flexible steel conduit containing non-class 1E wiring has class 1E wiring touching or less than 1 inch distance from the conduit, in apparent violation of IEEE STD 384-74. A revised response stated that a letter has been issued instructing the appropriate site personnel to separate the Division 1 and 2 cables a minimum of 1 inch from the flexible steel conduits containing the non-class 1E wiring. This revised response is acceptable.

(Closed) Deficiency D5.10-5, Electrical Separation Violation Within Control Room Panels.

In PGCC panels 1H13-P601 and 1H13-P702, flexible steel conduit used as separation barriers contained class 1E or non-class 1E wiring. Redundant class 1E wiring touched or was less than 1 inch from the conduit, which violates General Electric specification 22A3728 and IEEE STD 384-74. This item has been acceptably resolved, similarly to item D5.10-3, based on GE test report A00-794-6, the revised response, and additional information provided on March 19, 1985.

(Closed) Deficiency D5.10-6, Cable Separation Violation at the Recirculation Pump Switchgear.

This deficiency identified an isolated case where no separation was provided between redundant control circuits and a non-safety related cable tray. The team reviewed the non-conformance report (NR-LKC-4922) prepared in response to this problem and the evaluation submitted by Gilbert's site electrical engineer, and found the evaluation acceptable.

(Closed) Deficiency D5.12-1, Reduced Starting Voltage Criteria Inconsistency.

The project electrical design criteria, FSAR and procurement specification SP-568 were inconsistent with respect to criteria concerning reduced voltage starting capability for class 1E motors used as valve actuators. The team reviewed FSAR sections 8.3.1.1.4.1 (b) and (c), which have been revised by Amendment 15 to indicate that the 75% starting voltage criterion is not applicable to motor operated valves. Design Input Record DI-R31-010 states that the cable voltage drop should in no case result in a motor terminal voltage less than 90% of 460 volts for motor operated valves and 75% for all other motors. The team also reviewed calculation CAL-R24-007 dated October 5, 1984, which demonstrates acceptability of the design.

(Closed) Deficiency D5.12-3, Fuse Sizing Criteria Inadequate.

The team had been concerned that motor operated valve fuses may be oversized and not provide adequate protection because the Perry fuse sizing criterion appeared to result in fuse ratings for time delay dual element fuses far in excess of 225% of full load current. The team reviewed with Gilbert the method of sizing fuses for motor operated valves. The 3 point plotting method (e.g., time in seconds corresponding to valve operation time) is used. We determined that selection of an operating point at least 300% of motor full load current during the normal run time interval of the valve results in selection of fuses rated no greater than 225% of motor rated full load current. The revised response reflecting this point is acceptable.

(Closed) Deficiency D5.12-4, Failure to Confirm Motor Operated Valve Operation at Reduced Voltage.

There was no documented technical basis to substantiate that the class 1E motor operators will produce required torque output under accident conditions at 10% below rated nameplate voltage at the motor terminals. The team reviewed Gilbert internal memorandums, vendor correspondence, Design Input Record DI-RGO-003 dated February 12, 1985, and calculation CAL-R60-003 dated October 5, 1984, which demonstrated that all AC motor operators develop required torque at 90% of rated voltage, as required by the design.

(Closed) Deficiency D5.13-1, Seismic Equipment List.

This deficiency identified documentation errors in the seismic equipment list and seismic qualification review team forms for the emergency service water pumps. Gilbert corrected the errors, and a revised response committed to sampling the forms to confirm this was an isolated error. This response is acceptable.

(Closed) Deficiency D5.13-2, Vertical Motor Required Response Spectra.

This deficiency identified that incorrect seismic response spectra were included as attachments to the specification for the ESW vertical pump motors. A revised response stated that a memorandum will be included in the vertical pump motor purchase order file (SP-550) identifying the correct seismic input which should be used for any future motor purchase, e.g., replacing an installed motor with one of a different design. This response is acceptable.

(Open) Deficiency D5.14-1, Class 1E Motor Operating Voltages.

This deficiency identified the failure to determine the minimum operating and starting voltages at the terminals of the 460 volt motors during both degraded grid conditions and loading the diesel generator. This item will remain open pending completion of a 480 volt voltage regulation study (scheduled for completion by April 1, 1985), which will address these items, and follow-up inspection.

(Open) Unresolved Item U5.2-1, Motor Accelerating Time.

This item concerned the ability of motors connected to the diesel generator to attain rated speeds before the next loading step on the diesel generator begins. The response stated that an evaluation had demonstrated that large motors would attain rated speeds before the next loading sequence period begins. The team reviewed this evaluation (calculation R43-002) and found that the acceleration times of the large non-Class 1E motors were not determined, nor did the evaluation consider the effect starting these motors would have on the next loading period. This item remains open until the accelerating times of all large motors connected to the diesel generators are determined (scheduled for completion by April 1, 1985) and evaluated in a follow-up inspection.

6. Instrumentation and Control

(Closed) Deficiency D6.1-2, Safety-Related Instrument Loop Components Shown as Non-Safety Related on Both Design Documents and Design Information Documents.

The IDI response had no commitment to update GE elementary diagram device lists to remove classification conflicts between documents for components added by engineering change notices. The revised response stated that the GE device list will be updated and maintained via the Document Control Transfer Program. This response is acceptable.

(Closed) Deficiency D6.1-9, Logic Diagrams are not Being Updated by the Engineering Change Notices.

Logic diagrams are not being updated to reflect changes in control system logic indicated by engineering change notices. A revised response stated that a review of all safety-related elementary diagrams affected by ECNs written prior to February 25, 1985 will be made, after incorporating those ECNs, to confirm agreement with logic diagrams or to correct functional design requirements prior to changing the status of the logic diagrams to "information only". This response is acceptable.

(Open) Deficiency D6.2-1, Failure to Meet the Single Failure Criterion for Loss of Off-Site Power from Loss of Divisional Bus Sensors.

This item concerned logic for actuating emergency equipment from at least one electrical division in the event of Loss of Off-Site Power (LOOP), LOCA, and single failure. The IDI determined that both divisions of emergency equipment could be lost due to single failure of the division 1 battery. The team confirmed that the design has been revised to correct this (ref: ECN 21138-86-403, Rev. C, dated 12/14/84). In reviewing the design change, the team questioned the adequacy of physical separation and electrical isolation at the contacts for loss of bus undervoltage relays 1R22-27X1B, 2R22-27X1B, 1R22-27X2B, and 2R22-27X2B. Gilbert's preliminary analysis dated March 18, 1985 concludes that a failure which results in division 1 and 2 contacts of the undervoltage relays becoming electrically connected does not prevent the division 1 and 2 undervoltage circuits and "LOOP" logic from performing their safety functions. The team agrees. This item remains open pending formal documentation and verification of this analysis, with distribution to the team.

(Open) Deficiency D6.2-2, Main Steam Line Leak Detection Circuit Separation.

This item concerned failure to satisfy physical separation and electrical isolation requirements in redundant electrical circuits for main steam line leak detection annunciators. Gilbert analysis E31C8501, Rev. 0, dated 2/27/85 concluded that postulated faults in the panel interwiring will not prevent a trip from the main steam line leakage detection system. The team identified potential isolation problems not addressed in the 2/27/85 analysis. These have been addressed in a preliminary analysis completed the week of 3/18/85; the conclusions of the 2/27/85 analysis were confirmed. This item remains open pending formal documentation and verification of the 3/18/85 analysis, with distribution to the team.

(Closed) Deficiency D6.3-1, Lack of Documentation of Setpoint Calculations and Lack of Control of Setpoint Data and Support Data.

This item concerned documentation and control of vendor setpoint information. The team reviewed vendor setpoint data for both the diesel generator systems and the safety-related chiller units and setpoint tolerance calculations. CEI issued a procedure to control and verify changes to the setpoint list, and is preparing one to control setpoint list distribution. The response is acceptable.

(Closed) Deficiency D6.4-2, Inadequate Electrical Equipment Qualification of the Hydrogen Analyzer Cabinet.

This item concerned documentation of the 40 year qualified life of the hydrogen analyzer cabinet. The team reviewed a letter from the manufacturer which adequately establishes the 40 year life of the analyzer cabinet based on the accomplishment of a required maintenance and replacement schedule.

(Closed) Deficiency D6.6-1, Inadequate Calculation Verifying the Scram Discharge Volume Scram Setpoint and Rod Block Setpoint.

This item concerned a Gilbert calculation which was not formalized or verified, yet established safety limits for scram discharge volume scram and rod block setpoints. The team reviewed new calculation C11-C05 and all calculations which use this calculation as input, and found the results satisfactory.

(Closed) Deficiency D6.6-3, Incorrect Location of Backup Scram Level Instruments for the Scram Discharge Volume.

The physical locations of the backup scram level instruments are such that the required setpoints were out of the range of the instruments. The team reviewed revised calculation C11-C03 which recalculated the technical specification limits and setpoints. The revised setpoints are still out of the range of the instruments as installed. Internal adjustment, per the manufacturer's instructions, will provide some correction. CEI stated that, if this is not sufficient, the instruments will be relocated. The Region will follow-up to ensure instruments are relocated, if appropriate.

(Closed) Deficiency D6.7-3, Seismic Qualification of Instrumentation Components in Balance of Plant Power Generation Control Complex Panels.

Components added to GE power generation control complex panels by engineering change notices had no documented evidence of seismic qualification. The team reviewed Gilbert's reanalysis of seismic requirements for added components, in which the seismic qualification of each was compared to the worst case condition in the panel. Each such component was determined to be qualified for any location within the panel.

(Closed) Deficiency D6.8-1, Flexible Conduit Separation at Rack H51-P1124.

This item concerned two flexible conduits, containing safety and non-safety wiring respectively, which may come in contact during a seismic event. Gilbert has provided two GE test reports (DRFA-42-53, dated 4/7/82 and A00-794-6, dated 2/24/82) which confirmed that, in the event the two conduits are in contact during a faulted condition in one cable, the other cable suffers no degradation. The response is satisfactory.

(Closed) Deficiency D6.8-2, Cable Separation Within Panel 1H13-P904B.

Division 1 cables within panel P904B are in physical contact with a separation barrier housing Division 2 cables. The team reviewed two GE test reports (DRFA-42-53, dated 4/7/82 and A00-794-6, dated 2/24/82) which confirm that no damage is sustained by a cable in contact with the outside of a metal barrier inside which a worst case overcurrent condition exists. The team considers this equivalent testing to be acceptable for this case. The revised response provided confirming information on items D6.8-1 and D6.8-2.

(Closed) Unresolved Item U6.6-1, Lack of Documentation Confirming that the Scram Discharge Volume Piping is Adequately Sized.

The team reviewed calculation C11-6, dated February 26, 1985, which confirms that the scram discharge volume piping is adequate for its intended safety function. The need for this calculation was identified by Gilbert prior to the IDI.