

CONFIRMATORY ACTION LETTER
UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
THE ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60131

RESIDENT
JAN 28 1983
~~423~~

FEB 2 1983

Docket No. 50-546
Docket No. 50-547

Public Service Indiana
ATTN: Mr. S. W. Shields
Senior Vice President
Nuclear Division
Post Office Box 190
New Washington, IN 47162

Gentlemen:

This refers to problems identified during the special inspection conducted January 24-28, 1983, in the area of safety-related electrical work at the Marble Hill facilities. The findings from this inspection resulted in your voluntary stop work in the electrical area. Based on discussions between Mr. R. C. Knop of the Region III staff and Mr. L. Ramsett of your staff on February 2, 1983, with respect to the electrical stop work, it is our understanding that you will:

1. Continue the stop work order as specified in Public Service Indiana letter to Commonwealth-Lord Joint Venture number QDR-0283-83, dated January 28, 1983, with the following clarification: the stop work encompasses fabrication and installation of electrical auxiliary steel; cable tray and conduit hangers; and cable tray and exposed conduit.
2. Review all CARs, MCARs, NCRs, and inspection reports as related to Item 1 above, and verify that all nonconforming conditions are documented as part of the NCR system and control (tag) all nonconforming items identified.
3. Review and revise electrical contractor procedures (CWPs, QWPs, QCPs, etc.) as necessary to ensure that all Regulatory, SAR, specification, and code and standard requirements are addressed.
4. Develop an adequate system for inprocess and final work activities that includes as a minimum: completion of verification and hold points and other required signoffs prior to the item being considered complete; referencing or attaching NCRs, deficiency reports and other related documents; and listing calibrated tools or instruments utilized in the work/inspection activity. Review the closed traveler packages

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Public Service Indiana

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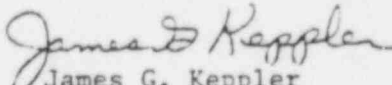
- and identify all open items. Convert the existing open travelers and closed travelers with open items into the revised system. Develop a system for determining the status of inspections, tests, and final acceptance of work activities performed by the electrical contractor.
5. Provide documented evidence of personnel training (engineering, quality and construction, including craft) prior to implementing the revised procedures.
 6. Audit all aspects of the corrective action taken by your electrical contractor to correct and prevent recurrence of the items identified by the NRC, PSI, and the electrical contractor.

We further understand that the stop work order will remain in effect until your program for improved control over the electrical construction program as set forth above, is approved by the Region III office.

Partial work releases in areas defined by the licensee are permitted with the concurrence of Region III, provided that the prerequisites, as outlined above, are completed for that sequence of work.

Please let us know immediately if your understanding differs from that set forth above.

Sincerely,


James G. Keppler
Regional Administrator

cc: W. M. Petro, Executive Director
Nuclear Project Management
DMB/Document Control Desk (RIDS)
Resident Inspector, RIII
LeBoeuf, Lamb, Leiby & MacRae
Dave Martin, Office of Attorney
General
John R. Galloway, Staff Director
Environment, Energy and Natural
Resources Subcommittee
E. P. Martin, Wabash Valley Power
Association
Thomas M. Dattilo, Save the Valley
J. Axelrad, ELD
E. Jordan, DEQA
J. Taylor, DRP

ACTION PLAN IN RESPONSE TO

NRC CONFIRMATORY ACTION LETTER

OVERVIEW

This document covers the activities that will be accomplished in order to address and resolve all items identified in the NRC Confirmatory Action Letter regarding the stop work order in effect on the CLJV Construction Program. The listing of these activities constitutes the action plan itself and does not constitute any attempt to establish policies or philosophies relating to the final resolution of these matters.

The action plan is broken into five separate areas related to the NRC Confirmatory Action Letter items 2,3,4,5 and 6. The points brought up in the NRC Exit Meeting on January 28, 1983, relating to the inspection portion of the meeting will be addressed in the final resolution to each item as applicable. Item 3 will address inspection points 1 and 3. Item 4 will address inspection point 2.

FOIA-84-293

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ACTION PLAN IN RESPONSE TO
NRC CONFIRMATORY ACTION LETTER

(ITEM #2)

PURPOSE

Review of MCAR's, CAR's, NCR's and Inspection Checklists pertaining to fabrication and installation of cable tray, exposed conduit, cable tray hangers, conduit hangers and auxiliary steel. Verify that all nonconforming conditions are documented as part of the NCR system and tag all nonconforming items identified.

SCOPE

1) REVIEW

A) MCAR's CAR's Surveillance Reports

- i) PSI Review and give status to CLJV on all CAR 's and Surveillance Reports written against CLJV.
- ii) Review MCAR's, CAR's, and Surveillance Reports to assure that nonconforming conditions are documented as required by QCP-C10.
- iii) Initiate NCR's, as required, in accordance with latest revision of QCP-C10.

B) NCR's

- i) Provide a status of all NCR's, i.e. location, state of completion.
- ii) Review NCR's to determine if hold tag/flag and work release tagging/flagging is required, reference QCP-C10 latest revision.

- iii) Verify that all tags/flags for open NCR's are applied, where required, or removed if the NCR is closed.
- iv) Revise NCR's, as necessary, to meet the requirement stated in Item 2 above.

C) Inspection Checklists

- i) Review QA Records Log and determine Scope of Review.
- ii) Review to assure all nonconforming conditions are identified, properly referenced, and documented.
- iii) Review NCR's referenced on checklists and compare nonconforming conditions with stated unsatisfactory condition on Inspection Checklist.
- iv) Conditions which are not properly documented shall be documented in accordance with QCP-C10 latest revision.

2) DOCUMENTATION REVIEWED BY

- A) Inspection Checklists, including referenced NCR's, shall be reviewed by a certified Level II or III Inspector.
- B) NCR's shall be reviewed by a certified Level II or III Inspector. Statusing NCR's shall be accomplished by the QA Records Group.
- C) MCAR's, CAR's and Surveillance Reports shall be reviewed by a Quality Assurance Engineer.

3) DOCUMENTATION OF REVIEW

This review shall be documented and shall contain the following:

- A) Review document number.
- B) Reference to specific instructions followed during the review as required by MCAR 017.
- C) Deficiencies found and corrective action taken in accordance with approved procedures.
- D) Signature, title, and level of person performing the review.

Documentation review sheets shall become part of MCAR 017.

ACTION PLAN IN RESPONSE TO
NRC CONFIRMATORY ACTION LETTER

(ITEM #3)

PURPOSE

PSI will develop a Special Process Procedure (SPP-35) to address the review of all Commonwealth-Lord J.V. (CLJV) Construction Work Procedures (CWPs), Quality Work Procedures (QWPs) and Quality Control Procedures (QCPs) to ensure that all Regulatory, SAR, specification, and code and standard requirements are addressed.

SCOPE

- 1) SPP-35 will be issued by 2-9-83.
- 2) The review of all CLJV CWP's, QWP's, and QCP's identified in SPP-35 will be completed by 2-18-83.
- 3) All comments generated by SPP-35 will be processed and implemented through the PSI Procedure Review Board.
- 4) CLJV will address and disposition all Gilbert/Commonwealth audit recommendations and be completed by 2-18-83. PSI will review and comment before final acceptance.

CLJV has established a list (copy attached) of procedures required to restart specific activities of the Work. The review conducted under SPP-35 will be prioritized based on CLJV's list.

CLUV Procedures Required For Restart

<u>Procedure No.</u>	<u>Title</u>
CWP-C3B	Fabrication and Installation of Electrical Supports
CWP-C7	Routing Segregation & Identification Label Installation
CWP-C8A	Welding Procedure (General)
CWP-C8B	Welder Qualification
CWP-C8C	Welder Filler Material Control
CWP-C8D	Welding Procedure (Specific)
CWP-C8G	Welding Procedure (Welded Stud Bolts)
CWP-C14B	Seismic Cat. I Conduit System Installation
CWP-C16	Seismic Cat. I & II Concrete Expansion Anchor Installation
CWP-C19	Control of Measuring & Testing of Equipment
QWP-C2	Electrical Equipment Location Layout
QWP-C42	Electrical Installation Traveler
QWP-C43	Training
QCP-C2	Cable Tray & Hanger Inspection
QCP-C5	Inspection Checklist
QCP-C9	Inspection of Concrete Expansion Anchors
QCP-C10	Nonconformance Reporting, Statusing and Corrective Action
QCP-C17	Exposed Conduit Installation Inspection
QCP-C20	Visual Weld Inspection
QCP-C22	Inspection of Material Heat Code Traceability

1. Review of procedures:

- a. CWP-C3B, Rev. 4, 10/26/82, Fabrication and Installation of Electrical Supports
 - (1) 4.2.3 - An "H" plate connector, Std. EB-802, shall be installed on the cable pan general notes and installation detail drawings. Mr. Love suggested this be reworded.
 - (2) 4.2.9 - Indicates that no welding can be performed on the cable tray after cabling has been installed. Mr. Love suggested PSI consider developing a cable protection procedure for cases where raceway needs to be reworked after cables have been installed.
- b. CWP-C4A, Rev. 3, 10/27/82, Document Control - no comment.
- c. CWP-C4B, Rev. 2, 12/3/82, Document Control (Correspondence) - no comment.
- d. CWP-C6B, Rev. 0, 9/2/80, Cable Installation and Termination Documentation
 - (1) 4.2.1.1 and 4.2.3.2 - Reference CWP-C6A, which has not been issued as of this date.
 - (2) 4.2.2.4 and 4.2.2.6 - Mr. Love suggested the addition of words in these paragraphs about cable sidewall pressure calculations. He noted that when sidewall calculations have been added in the installation procedure, it should carry over to C6B.
- e. CWP-C6C, Rev. 2, 7/23/82, Cable Installation
 - (1) 4.1.3 - States that QC inspects Category I installations, and Engineering inspects Category II, except those designated as partial pulls. Mr. Love felt this is incorrect.

- (2) 4.9.1 - Mr. Love stated that Engineering needs to determine minimum sheave size to ensure not to exceed minimum bend radius and maximum sidewall pressure. Also see EB-146, 7.4.2, about installing additional pull box, regarding sidewall stress.
- (3) 4.8 - Mr. Love stated that again we need some work on sidewall calculations.
- (4) 4.9.19.1 - Problem with 3 feet of rooting point noted in procedure. Mr. Love questioned if tray edge softness will be qualified for nuclear use.
- (5) 4.9.29 - Mr. Love noted that this discusses separation between IE and BOP cables, but not redundant cables.
- (6) Mr. Love stated that when using black-jacketed cables, the cables should be marked every five feet with color coding per IEEE 384. Color coding of support cables every 35 feet in risers was not addressed.
- (7) 4.9.30 - Stated soap was used as a cable pulling lube. This needs to be rewritten.
- (8) 4.9.31 - Mr. Love asked how PSI planned on certifying break links.
- (9) 4.9.36 - Procedure discusses "combing" cables to bring them below the top of the tray. Mr. Love suggested we consider training cables during installation. This is being done at Clinton. Suggested trip to Clinton by key personnel to review this process.
- (10) 4.9.46 - Procedure states craft and QC to enter badge numbers. Mr. Love asked if the same badge numbers are ever reissued.
- (11) 4.11 - Cable Removal - Mr. Love questioned protection of cables remaining in the raceway, and asked if tension is monitored and recorded during pull-out.
- (12) 4.12.3 - Mr. Love suggested we consider using two ropes or saddles to support coiled cables.
- (13) EB-146, 6.2.2 - "Supports shall be dedicated to the same safety-related division or channel as the Class IE circuits installed in the respective conduit being supported." BOP conduit installation crews, as well as S.R. crews, should be aware of this requirement.

f. QWP-C42, Rev. 2, 12/29/82 - Electrical Installation Traveler

- (1) 4.2.1 - Changes to Traveler by a Field Engineer - Need to make it clear when a traveler has to go back thru review cycle.
- (2) 2.1 - no comment.
- (3) 4.4.4.1 - Traveler steps need not be performed in sequence; however, each step must be signed-off before next can be started.

g. QCP-C2, Rev. 6, 11/4/82 - Cable Tray and Hanger Inspection

- (1) 2.1 - Needs to be expanded to include Category I non-safety-related tray to hanger attachments and tray splice bolts.
- (2) 4.4.2 - Lists hanger horizontal member tolerance for bolted connections as \pm one-half inch; however, does not address welded connections.

h. QCP-C4, Rev. 1, 7/23/81, Inspection Report - no comments.

i. QCP-C5, Rev. 7, 11/8/82, Inspection Checklist - no comments.

3. Procedure QCP-C10, Rev. 5, 10/12/82

- 4.2.1 - When an undocumented nonconformance is detected, it shall be documented on the nonconformance report form....
- 4.2.2 - All "hardware" items at the Marble Hill Nuclear Site that are determined to be nonconforming shall have one or more hold tags affixed to or adjacent to them....
- 4.2.3 - Documentation or procedural nonconformances will not be hold tagged or segregated. However, the physical items affected by documentation errors shall be controlled as required by 4.2.2.
- 3.2 - Hold Tag - A tag that may be affixed to or adjacent to a nonconforming item, and unless modified by a work release tag, used to prevent nonconforming items from being moved, further processed, installed, tested or operated.

NCR 233, dated 6/1/82, indicates that hold tags were not attached to cable tray hangers H003, H009, H050, and H097, auxiliary-steel. This auxiliary steel was identified as nonconforming because welding was being performed without a traveler being issued for the items. This NCR was closed 6/2/82 on the basis that MCAR-004 was issued on 6/2/82. Mr. Love asked how these items were controlled to prevent further processing

NCR 392, 9/15/82 - No hold tags. Attachment "A" added to copy presented to NRC 1/27/83.

NCR's 331 and 396 - no comment.

ACTION PLAN IN RESPONSE TO
NRC CONFIRMATORY ACTION LETTER

(ITEM #4)

PURPOSE

To develop an adequate system for inprocess and final work activities that will, as a minimum, address the following areas: Completion of verification and hold points and other required signoffs prior to the item being considered complete, referencing or attaching NCR's deficiency reports and other related documents, list calibrated tools or instruments utilized in the work/inspection activity. The system will control documentation generation and flow from the point of issue to point of completion and turnover to PSI. The system will also have the capability to status inspections, tests, and final acceptance of work activities performed by CLJV. All existing travelers, both open and closed, will be reviewed and deficiencies will be identified. Conversion of existing travelers into the new system will be accomplished as necessary.

SCOPE

- 1) Develop list of all specific types of physical construction work activities done by CLJV and prioritize for review.
- 2) Review each work activity and define how the documentation generated for installation/inspection will be tied to PSI's area/subsystem turnovers outlined in TPAP 103.
- 3) Determine all existing procedures that are applicable to each work activity.

- 4) PSI develop project position on status, in-process and traceability requirements for the system.
- 5) Review existing procedures for each work activity to determine applicability to requirements stated in NRC Confirmatory Letter Item #4 and criteria established in Steps #2 and #4 above.
- 6) Begin revising procedures for prioritized activities, including comments from the SPP-35 program, to meet criteria addressed in Step #5 above and all QA Program requirements, including: Completion of verification and hold points and other required signoffs prior to items being considered complete, referencing NCR's deficiency reports and other related documents, and listing calibrated tools or instruments utilized in the work/inspection activity.

The revision shall include a comprehensive description of requirements for documentation generation, flow and control from point of issue to point of completion. The revision shall also contain a comprehensive description of a system to status inspections, test, and final acceptance of work activities performed by the Electrical Contractor.

- 7) For work activities that will not require any special documentation "traveler" system, write a comprehensive statement on how program requirements are met and the statement shall include necessary revisions to those applicable procedures. The statement shall include all QA program requirements, including: Completion of verification and hold points and all required signoffs prior to the item being considered complete, referencing NCR's, deficiency reports and related documents, and listing calibrated tools or instruments utilized in the work and inspection activity. The statement shall also describe the system for determining the status of inspections, tests, and final acceptance of these work activities performed by the electrical contractor. The statement shall also contain all necessary decisions for procedurally describing the statusing system.
- 8) CLJV review and resolve any problem areas on each procedure.
- 9) Call for PRB meeting on each procedure resulting in approval of procedure.
- 10) Institute training on each procedure (Item #5)
- 11) In parallel with Steps 1 through 7 above, review all existing travelers (NCR 1377/1402 for closed travelers, NCR 1390 for open travelers) and identify deficiencies.
- 12) Review converting existing travelers into revised system resulting from Steps 1 through 8. The QC Inspection Checklist will be attached to each traveler.

1. Traveler Review

- a. CI-JV vault copies of traveler packages for hangers E-0-3051H012, E-1-3061H011 and H012, presented as completed packages:

(1) H028

- (a) No QC sign-off for material verification and for hanger completed. Traveler had been signed off as being complete and acceptable by Construction, Engineering, and Quality Assurance.
- (b) Procedure states that if a block (under QC sign-off) is N/A, the inspector shall initial and date the N/A. Mr. Love stated he did not remember seeing an N/A initialed and dated.
- (c) Mr. Love asked when auxiliary steel and hanger weld would be painted.
- (d) Heat/lot number of filler material listed. Certifications for this rod were satisfactory.

(2) H011

- (a) Heat/lot numbers were missing. Referenced to MCAR 013, dated 12/21/82. Review of MCAR 013 indicated that hanger H011 is not included in the attached NCR's.
- (b) Hanger traveler signed off at bottom. No NCR's were listed on traveler. Back-up documentation referenced NCR-392; however, hanger H011 not listed on copy of NCR presented. Mr. Love stated that they finally found listing in closed NCR 277.
- (c) Mr. Love questioned the painting of welds.

(3) H012 - same as H011.

Mr. Love noted that from information obtained, no hold tags were attached to indicate that hangers were on hold.

- b. Reviewed 25 travelers in Auxiliary Building, 426' elevation, E-0-3051 series.

- (1) Torque wrench used by craft not identified.
- (2) No sign-off space on traveler for torquing of tray splice bolts.
- (3) H034 appeared to be in blue ink; however, could not read many of the entries as they were smeared. Item lined out with no initial or date.
- (4) During initial review of travelers, FE, Superintendent, and Quality not dating their review.
- (5) H016 - Auxiliary steel material listed, quantities were deleted. Hanger material quantities deleted. Mr. Love questioned what material was used.

c. Reviewed 30 travelers in the Auxiliary Building, 439' elevation, E-0-3062 series:

- (1) H002, 9/14/82 - Three changes made in reference document column on 1/17/83 by MC, traveler not revised and sent back through the traveler review cycle.
- (2) H004, 9/14/82, modified 1/17/83 - MC - no revision.
- (3) H006, 9/14/82, modified 1/17/83 - MC - no revision.
- (4) H008, 9/14/82, modified 1/17/83 - MC - no revision.
- (5) H022, 9/14/82, FCR #E-5623 added - no initials, date, revision.
- (6) H028, 9/15/82, modified 1/17/83 and 1/18/83 - MC - no revision.
- (7) Nine additional travelers checked - same problems.
- (8) Same type items identified with E-1-3061 series travelers.

d. Same type items identified with E-203002 series travelers in Auxiliary Building, 346' elevation.

- (1) H517 was revised per FCR-E-5321 on 12/8/82 (Rev. 1). Revision 2 was issued 1/21/83. FCR's E-5307 and 5275 added; no initial, date, revision.

(2) H511, 10/28/82.

(a) Hanger fit-up signed off by Construction 11/3/82.

(b) Note attached to traveler stated: "Can't complete fit-up until A12 panels arrive, cut A-12 plates."

e. Auxiliary Building 383' E-2-3002 series travelers.

(1) H027

(a) Rework supplement added to traveler because QC had identified a weld overlap problem.

(b) Rework was completed 1/11/83. QC signed off the rework on 1/14/83, but failed to note an inspection report number or discrepancy number in space provided. Mr. Love stated he was unable to determine if accepted or rejected.

Mr. Love asked the following question: "Per the CL-JV procedures, if two violations are allowed before an NCR is prepared, how is this trended?"

ACTION PLAN IN RESPONSE TO
NRC CONFIRMATORY ACTION LETTER

(ITEM #5)

PURPOSE

To develop a training program that would be applicable to all CLJV personnel (QA/QC, Engineering and Construction). This program will address the formulation of supervisory and other CLJV personnel as qualified instructors for training class presentations. This program will be documented and be traceable to the vault. This program will address and establish all aspects necessary for successful and effective implementation of a training program including lesson plans, lesson guides, training schedules, training matrices, and documentation requirements.

SCOPE

- 1) Deletion of CWP-C43, Rev. 0, training procedure, after approval of QWP-C43.
- 2) Write QWP-C43 training procedure.
 - A) This procedure has been written and is in approval cycle. (should be 3 days max to final approval).
- 3) Revise QCP-C1, Rev. 3.
 - A) This procedure is now under revision - to define training department responsibilities and training department control. (should be 7 day max to final approval).
- 4) The following forms for training documentation purposes have been developed or consolidated into a single form, as attachments to the new training procedure:
 - A) CLJV Qualified Instructor Certification.

- B) CLJV M/H Lesson Guide.
 - C) Quality Training Attendance Record.
 - D) CLJV Training Department Examination.
 - E) CLJV New Hire Indoctrination Record Sheet.
- 5) Procedure Lesson Guides have been developed for all current CLJV Procedures - QAP's, QCP's, QWP's and CWP's. Procedure Lesson Guides will be revised, as necessary, to follow any revisions resulting from Item #4, Steps 5, 6 and 7.
- 6) An Individual Required Procedure/Document Reading Program is now implemented for all CLJV personnel down to the foreman level and is operating smoothly in respect to traceable documentation. The Required Reading Program consists of the following:
- A) Individual Required Reading Matrix, which is submitted to supervisors for their input to the training department, showing what procedure/documents their personnel are required to read in what priority - 1st Issue, 2nd Issue, and so on.
 - B) Three folders were developed for each individual:
 - i) Folder "A"
- was transmitted to the vault, for filing completed reading notification acknowledgements and associated Document Quiz.
 - ii) Folder "B"
- is kept in the training department files containing a Required Reading Record, which tracks the documents on Issue to the individual, the date documents are issued, date completed and date tested. This folder contains Issues of all documents that have been established by priority and quantity by the individual's supervisor.
 - iii) Folder "C"
- is a folder that travels between the individual and the training department. This folder contains a letter of introduction to the "Required Reading Program," an Individual Required Reading Notification, a copy of each document on the Notification, a Document Quiz and Instructions for completion and return.

- 7) New Hire Indoctrination - has been revised under the new QWP-C43 procedure to establish subject material to be covered in the Indoctrination and is documented - traceable to the vault.
- 8) Instructors - a preliminary list of CLJV instructors has been established and teaching sessions will be assigned according to subject that the instructor is certified/qualified in.
- 9) Training schedules will be established under the new QWP-C43 training procedure provisions to be preventative training, tracking the construction schedule and be traceable to the vault.
- 10) Training files - due to the revised provisions of QWP-C43 can now be maintained and be traceable to the vault.

ACTION PLAN IN RESPONSE TO
NRC CONFIRMATORY ACTION LETTER

(ITEM #6)

AUDITS

CLJV will assign an auditor to audit all aspects of the corrective action taken to correct and prevent recurrence of items identified by the NRC, PSI, and CLJV as related to all work performed addressing items 2,3,4, and 5 in the NRC Confirmatory Letter. PSI will conduct surveillances as necessary to assist CLJV during the development and completion of actions to address items 2,3,4, and 5 in the NRC Confirmatory Letter. After completion of all work relating to all items addressed in the NRC Confirmatory Letter, PSI will conduct a comprehensive audit prior to close-out of PSI CAR-008.



376-4908

February 8, 1983

Mr. Ken C. Carroll
EG&G Idaho, Inc.
P.O. Box 1625
Idaho Falls, ID 83415

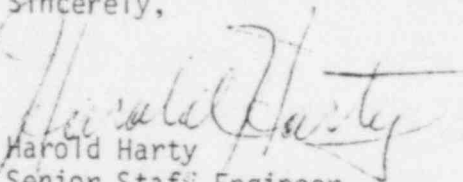
Dear Ken:

Attached is my appraisal of the Marble Hill project engineering/design/purchasing activities based on the 20 key indicators. I also added a numerical rating for each indicator that I could assess.

I am very interested in how all our appraisals fit together.

I'll try to complete a similar appraisal for Diablo Canyon soon.

Sincerely,


Harold Harty
Senior Staff Engineer

HH:nb

c: W. D. Altman - NRC Hq
Richard Kleckner - Kist & Associates
M. G. Patrick - BCL
S. W. Heaberlin - PNL

FOIA-84-293

K 1108

EVALUATION OF GENERIC KEY INDICATORS
FOR PROJECT ENGINEERING/DESIGN/PROCUREMENT ACTIVITIES
AT MARBLE HILL NUCLEAR POWER STATION

1. The organization is fully committed to a program for assurance of quality. Senior management are actively engaged in assuring that adequate quality is built into the plant. They have backed up their intent with time (in site visits and meetings on quality) and funds (by providing adequate levels of staffing). Management works with QA/QC staff to improve their approach to decision making. Rated 5.
2. Responsibility and authority appear to be clearly defined and properly implemented. Procedures are in place governing responsibilities and authorities, and personnel are required to acknowledge in writing changes which pertain to them. There is an acceptance at the working level (nonsupervisory professionals) of the procedures. There is a significant involvement of QA personnel in the planning of the construction work. "Whistle blowing" is actively encouraged. Rated 5.
3. A well-qualified professional engineering staff was assigned to Marble Hill. Most have significant experience appropriate to their present positions. Some are on the cutting edge of their technology (e.g., on cost and schedule monitoring). Not all personnel in key positions were PSI employees, however, so some projects strengths may be lost to the company as the plant becomes operational. Rated 5.
4. Instructions, procedures, and drawings were well controlled and appeared current. There was an effort to ensure a consistent approach to quality down to the craft/laborer level. Rated 5.
5. Having been burned badly in the matter of assurance of quality early-on in the project, evidences that might suggest a compromise of quality appear to be closely monitored. There is a management information system on quality of construction-related activities, but its usefulness to upper management was not determined. There is an attitude within the PSI project staff toward quality that is very positive, and which suggests that quality deficiencies are promptly identified and corrected properly. Rated 5.

6. The corrective action program, to the extent observed, appeared effective. The management, in particular, seemed tuned to root cause detection and/or eradication. Staff training in assurance of quality was an emphasis. Rated 5.
7. Information on independent design reviews per se was not obtained. The PSI project engineering staff reviews all the "top level" drawings issued by Sargent and Lundy (S&L), but not "all 60,000 drawings and 210 (?) specifications". Project engineering does review all design changes. Some type of design review may occur within S&L as a matter of course as the Byron design is replicated at Marble Hill. Design changes resulting from field changes are all reviewed by Sargent and Lundy prior to release to the field for construction. S&L is increasing their staff at Marble Hill from about 20 to over 100 in early 1983 in recognition of the importance of processing change orders expeditiously without compromising design quality. Rated 4.
8. Information on control of design input data, per se, was not obtained in detail. The design control process appeared to be adequate. However, there was concern that the "replication engineers" at S&L were not as knowledgeable of the background of the design as were the Byron engineers at S&L who did the original design. Rated 4.
9. The organizational structure was relatively straightforward and appeared to be understood by those interviewed. The formation of construction management teams at Marble Hill appears to have removed much organizational ambiguity that had previously existed. Rated 5.
10. The planning, scheduling, and budgeting activities are excellent. Good coordination exists among construction, engineering, procurement, inspection, etc. The Marble Hill cost-schedule integration system is a cut above anything else that exists in the industry. Not only does it provide an estimate of job completion and cost to complete, but it also shows where there is a breakdown in productivity and changes in critical path scheduling. Rated 5.
11. Not assessed in detail. See items 7 and 8.
12. Not assessed in detail. See items 7 and 8.

13. All contracts are processed through a single organization at Marble Hill. S&L reviews technical specifications and quality aspects. The purchasing organization monitors the contract, change orders, and delivery. All information pertaining to the purchasing process is forwarded to the records management function for filing and storage. The purchasing function is audited twice a year by consultants. Rated 5.
14. Not assessed.
15. Not assessed.
16. Not assessed.
17. Not assessed.
18. The records control for Marble Hill is excellent with respect to control and distribution of design drawings, specifications, and related project materials. All materials are logged in, photographed, distributed, and controlled from a control organization. Outdated material is retrieved and the process is documented. Records are stored in a fireproof vault. Rated 5.
19. Audits appear to be made for many of the functions at Marble Hill, including purchasing (by outside consultants) and project engineering (internal, management QA, and NRC audits). Audits seemed to be quite common at Marble Hill. Rated 5.
20. Corrective action seems to be adequate. Cost and schedule are acknowledged as important considerations, but not as important as quality, at least at this time in the project history. There is no reluctance to inform management of needed changes and there appear to be ample opportunities to do so. Rated 5.