U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-373/81-44

Docket No. 50-373 License No. CPPR-99

Licensee: Commonwealth Edison Company
Post Office Box 767
Chicago, IL 60690

Facility Name: LaSalle County Station, Unit 1

Inspection At: LaSalle Site, Marseilles, IL

Inspection Conducted: December 22-23, 29-30, 1981; and January 7, 14, 27-29, 1982

Inspector: D H Danielson for J. T. Yin 2/10/82

Approved By: D H Danielson for D. H. Danielson, Chief 2/10/82
Materials and Processes Section

Inspection Summary

Inspection on December 22-23, 29-30, 1981; and January 7, 14, 27-29, 1982 (Report No. 50-373/81-44)

Areas Inspected: Review of startup vibratory test procedures for piping systems; inspection of large bore and small bore seismic restraint installations; review of support installation and inspection records; evaluation of snubber design considerations and suspension system functionabilities. The inspection involved 48 inspector-hours onsite by one NRC inspector.

Results: Of the areas inspected, one apparent violation was identified. (Inadequate design control and consideration in placement of safety related seismic mechanical snubbers - Paragraphs 1 and 2).

DETAILS

Persons Contacted

Commonwealth Edison Company (CECo)

*. B. B. Stephenson, Project Manager
*. D. L. Shamblin, Staff Assistant - Project Manager Office
*. R. Cosaro, Project Construction Superintendent
. T. E. Quaka, Site QA Superintendent
. B. R. Shelton, Project Engineering Manager
*. D. J. Skoza, PCD Engineer
. R. M. Matheny, Technical Staff Engineer
. M. A. Peters, Test Staff Engineer
* B. J. McAndrew, Project Mechanical Supervisor
* G. E. Groth, PCD Engineer
R. Vine, QA Engineer
* R. L. Scott, Project Engineer
B. Annis, Project Engineer
M. Richter, Technical Staff

Sargent and Lundy Engineers (S&L)

*. R. J. Mazza, Project Director
*. B. R. Parduhn, Mechanical Project Engineer
R. H. Pollock, Mechanical Project Engineer
D. A. Gallagher, Field Coordinator
*. G. T. Kitz, Head Engineering Mechanics Division
S. O. Killiam, Project Engineer
J. M. Nosko, Mechanical Engineer
J. Smetters, Testing Staff
P. Odisho, Testing Staff
D. Olsen, Testing Staff

Morrison Construction Company (MCCO)

*J. Hamilton, Project Manager
*M. Wherry, QC Supervisor

USNRC-Region III

. C. C. Williams, Acting Chief, Engineering Inspection Branch
. D. H. Danielson, Chief, Materials and Processes Section
. R. D. Walker, Senior Resident Inspector
. I. T. Yin, Reactor Inspector

. Denotes those attending the technical discussion held in the Region III office on January 14, 1982.

*Denotes those attending the management exit interview on January 29, 1982.

Licensee Action on Previously Identified Items

(Open) Unresolved Item (373/81-2[illegible]-01): The CECo STP-17 did not include requirements for measuring gap clearances between the process pipe and the surrounding pipe whip restraint structural assemblies. The subject inspection responsibility was transferred from CECo startup group to construction staff. A procedure, "Hot Linewalk Inspection Procedure" is in the process of review and approval.

(Closed) Unresolved Item (373/81-29-02): Procedures for vibration measurements for RPV level, RCIC, and MS flow instrumentation lines, as required in NUREG-0519, Supplement No. 1, had not been developed by CECo. The inspector reviewed the revised CECo test procedure, STP-33, "Drywell Piping Vibrations," Revision 1, dated January 11, 1982, and had no adverse comment.

(Closed) Unresolved Item (373/81-33-01; 374/81-17-01): Questionable S&L design of tack welds on support components. This item was reviewed by a RIV Contractor Inspector (see RIV Report No. 99900507/81-04 for details).

(Closed) Unresolved Item (373/81-38-01): Questionable welding design on Restraint No. HG06-1080G. The inspector reviewed the S&L evaluation of the problem including corrective actions stated in ECN No. FM-5974-LS, dated October 9, 1981, and had no adverse comment.

(Open) Unresolved Item (373/81-38-02): Licensee implementation of a program to improve MCCO inspection of safety related support installations was completed. Questionable small bore piping component installation documentation was further identified by the inspector during the December 22-23, and 29-30, 1981 inspections. The specific problems and the licensee's followup are enclosed in an Exhibit to this report. During inspection conducted on January 27-29, 1982, snubbers No. M-1302-SH24-138, and-137, rigid struts No. RI09-1037X and -1038X were selected for review in the areas of installation and QC inspection. No deficiencies were identified. The overall licensee corrective program and its implementation will be further reviewed during a future inspection.

(Closed) Unresolved Item (373/81-38-03): SER NUREG-0519, Supplement No. 1, Paragraph 3.9.2.1, states that, "The reactor pressure vessel level instrumentation lines and the control rod drive lines inside containment will be visually inspected to identify any excessive vibration in conjunction with Startup Test Procedure 34, Vibration Measurements." In discussion with the site operation staff, the inspector was told that the STP-34 is for incore vibration measures. Whether or not STP-34 will refer to STP-33 and PI-SI-102 for the line vibration test or will include the requirements in STP-34 itself will be determined by the licensee. The inspector reviewed CECo test procedure, STP-34, "Reactor Internal Vibration," Revision 1, dated January 13, 1982, where PT-SI-102 requirements were referenced in Paragraph 10.2.A, Item 34.

(Open) Unresolved Item (373/81-38-04): Piping configuration drawings were being prepared by CECo for the line vibration tests. However, the packages had not been fully developed, reviewed, and accepted by the responsible personnel.

(Closed) Unresolved Item (373/81-38-05): Seismic motions could have adverse effects on instrument accuracy. The inspector reviewed the S&L to CECo letter, dated December 31, 1981, subject, "NRC Region III Inspection Report No. 50-373/81-38-05: Vibration of Instrumentation," where it stated that instrumentation lines were seismically supported to minimize the potential for pipe vibration effecting the instrument readings. In discussion with the CECo representatives, the inspector stated that he had no further questions at this time.

Functional or Program Areas Inspected

1. Inadequate Snubber Design Considerations - Part I

The inspector observed snubber and restraint installations at High Pressure Core Spray (HPCS) Pump Suction and Standby Liquid Control (SC) systems, and had the following findings:

HPCS System

Five snubbers were installed so close to the one rigid single directional pipe guide that the functionability of these snubbers could be adversely affected. The mechanical snubbers require approximately 1/8" travel to close all open spaces, which exist inside the snubber unit, and the outside structural gaps such as the ball bushings in the structural and piping connections, before lock-up initiation and loading up to their design capacities. The zero gap observed at the pipe guide will not allow the required snubber travel. The components observed included:

- A pair of snubbers HP01-1014S (7,382 lb_f) and HP01-1012S (5,837 lbD_f) installed horizontally on the 24" diameter pump suction, 52.5" from a pipe guide, 45° to the pipe run.

- A pair of snubbers HP01-1004S (22,699 lb_f) and HP01-1003S (21,245 lb_f) installed horizontally on the 24" diameter pipe riser, 28" above the pump suction line. The tee connection is 21.5" from the pipe guide. The orientation of the snubber is 45° to the suction line.

- Snubber FHP-1203-H02S installed horizontally on the 2" diameter branch line, approximately 4'-6" away from the connection to a 24" diameter line and near a pipe guide, is in the same loading direction as the pipe guide.

- The horizontal directional pipe guide described above is HP01-1019X, with design load of 11,821 lb_f.

SC-1201 System (Line No. 1SC06A-1 1/2")

- Snubber FSC-1201-H07S is only 15" away from rigid pipe guide FSC-120-1H08G.

- Snubber SC02-1004S is only 4" away from rigid pipe restraint SC02-1003R.

. Snubber SC01-1007S is only 12" away from rigid pipe restraint SC02-1003R.

. Snubber SC02-1001S is only 21" away from rigid pipe restraint SC02-1002R.

The problems observed can be concluded in threefold:

(1) The operability of the snubbers were impaired by the close proximity of the rigid restraints and guides.

(2) The non-functional snubbers could mean load increases at the affected rigid restraints and guides.

(3) The piping thermal movements at these locations are minimal, the lines can be restricted without causing unacceptable increases in the secondary pipe stresses. The selection of these snubbers could be considered to be unjustifiable.

This is an apparent violation (373/81-44-01). During the exit meeting on January 29, 1982, S&L management stated that they had identified a number of similar conditions and determined that some of these snubbers would not function under present conditions.

2. Inadequate Snubber Design Considerations - Part II

On December 30, 1981, the inspector reviewed the S&L "Piping Loads Data List" prepared for the LaSalle Unit 1 small bore piping restraints. Among the 268 snubbers required, 53 were found to have thermal movement at the pipe connection of 1/16" or less, and 16 with movement of 1/8" or less. The licensee agreed to conduct a review to determine the total number of snubbers within the same conditions. During the January 14, 1982, meeting at Region III office, the licensee presented the following data:

Unit 1 Support Review

Total = 20,105
ANCR = 77
SNUB = 2,025
STRT = 1,568
GUID = 8,788
CONS = 215
VAR = 1,029
RIGD = 6,403

Unit 1 Snubber Review

. Total Number of Supports = 20,100
(S&L/NSC = 12,200)
(MCCO = 7,900)

. Total Number of Snubbers = 2,025
(S&L/NSC = 1,670)
(MCCO = 355)

. Total Number of Snubbers With Movements Equal To or Less than 1/16" = 439
(S&L/NSC = 350)
(MCCO = 89)

. Total Number of Snubbers With Movement Larger Than 1/16", 1/8" = 144
(S&L/NSC = 110)
(MCCO = 34)

Snubbers With Movements Equal To or Less Than 1/16"

Snubber Size	S&L	NSC	Total
PSA-1/4	37	26	63
PSA-1/2	15	9	24
PSA-1	27	42	69
PSA-3	53	51	104
PSA-10	46	18	64
PSA-35	23	3	26
	201	149	350

	S&L	NSC	Total
Small bore	35	6	41
Large bore	166	143	309

The inspector stated that radiation exposures received by plant personnel while performing required Technical Specification snubber visual inspection and functional tests for these snubbers with little or no thermal movements, could be avoided if these snubbers were replaced by rigid restraints that require only minimum ISI inspection and no functional testing. This design use of mechanical snubbers inplace of rigid supports does not appear to have been adequately reviewed for ALARA considerations. ALARA design review guidance is contained in Regulatory Guides 8.8 and 1.70. This matter was discussed in the exit interview and will be reviewed further in a future inspection. This is an open item (373/81-44-02).

3. Gaps on Large Bore Reinforced Pipe Clamps

The inspector observed large gaps (up to 1/2 inch) on the following LaSalle Unit 1 multi-load pipe clamps:

. 24" clamp for snubber LP01-1010S, and rigid strut LP01-1011X.

. 24" clamp for snubbers HP01-1012S, and HP01-1014S.

In review of S&L Drawing No. M-1100, Sheet 30, "Component Support General Notes and Details," Revision A, dated November 12, 1980, requirements had not been established for a field inspection of these gaps. In discussion with the MCCO staff, it was shown that a ITT-Grinnell Interoffice Correspondence, Subject, "Fit-Up of Pipe Clamp Around Pipe," dated June 3, 1980, was used as QC inspection criteria. While the inspector did not have any adverse comments on the ITT-Grinnell correspondence, he considered that the reinforced clamp had changed the characteristics of the basic pipe clamp, and that the instruction stated in the correspondence was invalid for the inspection of the modified pipe clamps. Subsequently, S&L issued a ECN No. M-621-LS, dated December 23, 1981. The ECN stated, in part, that "Clamp/piping out-of-roundness is permitted without welded attachments provided there is at least two point contact between the pipe and clamp." The adequacy of the ECN inspection requirements will be reviewed further, because two point contacts on 20" clamp for VGC1-0003, 20 clamp VG07-1003, and 24" clamp for SC21-1004X were found very close together, and were both located on one side of the loading direction. This is an unresolved item (373/81-44-03).

4. Observation of CRD Vibration Testings

Engineering Inspection Branch inspectors performed the subject inspection on January 7, 1982. The findings were as follows:

Procedures Reviewed

LST-81-106

Test Observed	Location of Observation
SRP-1 (3407-48)	Near D2
SRP-2 (3407-48)	Between D3-D4 and S1-S4
SRP-3 (3407-48)	Between D3-D4 and S1-S4
SRP-4 (3407-24)	Near D6
SRP-5 Full Scram	Near D2

All tests were witnessed at the particular sensing device and the visual inspections were witnessed both before and after each scram. During the single control rod scram, pipe movement was hard to detect visually, and no deformation of the piping or supports was detected.

The full scram produced a greater volume of noise, but no noticable deformation of piping or supports. Inspections were made at random points on both the north and south sides of containment.

The insert line for 3407 is located within 1/4" of some structural steel supports at a point about two feet downstream of D3 and D4. The line appears to be susceptible to wear due to vibration. Wear in this line could cause 3407 to lose its ability to insert the rod. Consideration should be given to the location of this line when water hammer aspects are analyzed in LST 81-106.

During the management exit meeting conducted on January 29, 1982, the inspector stated that during a future inspection he will review:

a. Maximum line movement due to water hammer and SSE events at the locations discussed above.

b. Maximum system water hammer stresses in combination with the primary stresses calculated by RCI/EES.

This is an unresolved item (373/81-44-04).

5. Shear Lugs for Small Bore Piping

During an inspection conducted on December 22, 1981, a pair of snubbers FHP-1201-H04S installed on the 1HP21A-1 1/2" line were observed not to have shear lugs on the pipe. The question as to whether or not shear lugs were required for small bore piping subjected to axial dynamic loading conditions, was raised by the inspector. Studies were made by the S&L design engineering department and concluded that normal friction between the pipe and pipe clamp was sufficient to prevent any slippage under load. The inspector reviewed the following S&L documents:

a. S&L Calculation No. EMD-035109, "Minimum Required Installation Torque For Clamps - 2 Inch and Under," dated December 29, 1981.

b. S&L letter to CECo, subject, "PSA Clamps," dated January 12, 1982.

The inspector stated that he had no further questions at this time.

Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of noncomplinace, or deviations. The unresolved items disclosed during this inspection are discussed in Paragraphs 3 and 4.

Exit Interview

The inspector met with licensee representatives at the conclusion of the inspection on January 29, 1982. The inspector summarized the scope and findings of the inspection. The licensee acknowledged the findings reported herein.

During the last 2 weeks of 1981, NRC Inspector, Mr. I. T. Yin identified several areas of concern at LaSalle. These are detailed as follows:

a) FHP 1201-H02S - QC picked up a drafting error during inspection and signed off noting the error. Even though this was eventually run thru S&L, the inspector felt it was an example of inadequate QC training and control.

b) FHP 1201-H04S - QC corrected a drafting error without initiating an FSCA to have it reviewed.

c) FSC 1201-H08G - A review of the documented work indicates a change was made before the FSCA was approved.

Evaluation of the above occurrences indicated that two potential problems exist. FSC 1201-H08G indicated that Morrison production had apparently drilled holes for a knee brace anchor plate and finished the hanger prior to approval of design change by S&L on FSCA 1893. FHP-1201-H04S and FHP 1201-H02S indicated that Morrison Q.C. may have made an engineering judgement and accepted a hanger without obtaining engineering resolution of an apparent drafting error and further there is evidence on at least one occasion that Q.C. erred in not properly documenting the results of their inspection activity. The two general concerns are as follows:

(A) Morrison's production is installing small bore hangers without engineering approval and
(B) Morrison Q.C., on occasion, has improperly accepted work and/or inadequately documented the results of their inspection activity.

As the result of a CECo QA commitment made to the NRC in October 1981, QA has increased it's surveillance of Morrison's Q.C. inspections of supports/restraints and Q.C. final line walk activities. Attachment A includes copies of surveillances performed during November and December 1981 for these specific areas of Morrison activity. In review of this information it can be noted that no similar problems to the production or QC ones identified above, occurred.

Therefore, during the first week of January 1982, CECo. Q.A. reviewed Morrison's installation records to specifically address these concerns. The results of these reviews are documented on surveillance 82-8 and 82-10.

Surveillance 82-8 verified for each support reviewed (15 total) that Morrison production installed the support after FSCA approval. No case similar to FSC 1201-H08G was identified. Surveillance 82-10 indicated that in no case were there problems similar to those identified for FHP-1201-H04S and FHP-1201-H02S. It should be noted that the sample taken in 82-10 was for QC work performed after retraining of the MCCo QC inspectors in November.

It is therefore concluded that based on the surveillances performed since October 1981 and surveillance 82-08 and 82-10 that the items identified by I. T. Yin in late December appear to be isolated occurrences in that Q.A. was not able to substantiate additional occurrences.

EXHIBIT

FHP-1201-H02S

MAXIMUM LOAD: 28#

PROBLEM: Angles of 45° 37° 34° and 26.5° were Present in Inspection Records

DRAWING	ACTION	DATE
Rev. 0	S & L Approved (no record)	
	Issued Production	11/8/78
Rev. A (S&L)	Approved S & L	2/8/79
	Issued Production (45°)	2/2/79
	Q.C. Inspection (did not find angle discrepancy)	7/27/79
Rev. B (S&L)	MCCo Sent to S & L (Never Issued to Production or Approved by S & L)	9/9/80
Rev. A (NSC)	Comments by NSC (Change strut to snubber) Snubber Angle 26.5°	11/80
Rev. C	MCCo Incorporated NSC comments (MCCO Revision left Incorrect Angle of 45°)	
	NSC Approved	6/12/81
	Issued Production	6/18/81
	Q.C. Measured 34° and wrote on drawing angle should be 37°	7/23/81
	Line Walk	7/23/81
FSCA 1102	Change angle to 26.5° Approved NSC	7/25/81
Rev. C (NSC) FSCA 1102	Q.C. Inspection (Inspection did not crossout 34° from previous inspection)	7/27/81
Rev. D (NSC)	MCCo Incorporated FSCA 1102 (Snubber Angle 26.5°)	
	Approved NSC	8/6/81
Rev. E (NSC)	For Record Document (Snubber Angle 26.5°)	
	Approved NSC	12/1/81
	Hanger closed by MCCo Subsystem HP-62	12/19/81

FHP-1201-H04S

MAXIMUM LOAD: 33#

PROBLEM: Q.C. Inspection Accepted 60° Angle, Which Was Out Of Tolerance

DRAWING	ACTION	DATE
Rev. 0	Never Approved S & L or Issued Production	-
Rev. A (S&L resp.)	Approved S & L Issued Production	12/8/79 12/2/79
Rev. B (S&L)	MCCo Issued to S & L (strut angle 45°) Never approved by S & L or issued to Production	9/9/80
Rev. A (NSC)	Comments by NSC (change strut to snubber) (snubber angle 45°) Received MCCo	11/80 2/81
Rev. C (NSC)	MCCo Incorporated NSC comments (snubber angle 45°) Approved NSC Final Q.C. Inspection (Inspector crossed out apparent drafting error to show 60° field installation. Final line walk	6/12/81 7/16/81 7/23/81
Rev. D	For record document issued to NSC showing 60° angle. Approved NSC	12/18/81
	Hanger closed by MCCo Subsystem HP-62	12/19/81

FSC -1201-H07 (R or S)

S & L drawing Rev. A rejected to indicate snubber is required	7/29/81
Piping load computer listing issued to indicate a restraint	8/7/81
Rev. B of drawing sent to S & L by M.C.Co.	8/19/81
Drawing received from S & L approved (snubber indicated on drawing)	9/12/81

Analytical Drawing M-1044-1, Sheet 3, indicates snubber is required

FSC-1201-H08G

MAXIMUM LOAD 265#

PROBLEM: Knee Brace Moved Without Design Approval

DRAWING	ACTION	DATE
Rev. 0	S & L Approved	1/79
	Issued Production	2/79
	QC Inspection Base Plate	3/4/80
Rev. A	MCCo sent to S & L	9/8/81
	Approved S & L (changed)	9/11/81
	Issued Production	9/25/81
FSCA 1796	Approved S & L	10/9/81
	Drill holes for Knee Brace Anchor Plates and finished hanger	10/13/81
FSCA 1893	Initiated Knee Brace Change	10/17/81
	Approved S & L	10/19/81
Rev. A FSCA 1796 & 1893	QC Inspection	10/21/81
	Final Line Walk	10/26/81
Rev. B	MCCo. Incorporated FSCA 1796 & 1893, Issued to S & L	10/30/81
	Approved S & L	11/2/81
Rev. C	For record document (Drawn but not yet sent to S & L)	-

Hanger open
Subsystem SC-01C