March 5, 1971

Mr. C R. Stephens, Acting Chief
Public Proceedings Branch
Office of the Secretary of
the Commission
U.S. Atomic Energy Commission
Washington, D.C. 20545

In the Matter of Consolidated Edison Company of New York, Inc.
Indian Point Nuclear Generating Unit No. 2
Docket No. 50-247

Dear Mr. Stephens:

Reference is made to your letter dated February 26, 1971, relative to the receipt by your office of pertinent documents in the above captioned matter.

I am enclosing herewith copies of the following documents filed by this office which do not appear on your docket file inventory:

a. Enclosure (Detailed Statement on the Environmental Considerations) to my letter to the board dated November 20, 1970.

b. My letter dated January 11, 1971, to Anthony Z. Roisman responding to questions 21, 30 and 44 of the first series of questions submitted by him.

Our records indicate that your office was on the service list for distribution of both of the missing documents.

Sincerely,

Myron Karman
Counsel for AEC Regulatory Staff

Enclosures:
As stated

bbc: OGC Files Beth/G'twn/Docket
REG Files

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memo

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SURNAME ▶	MKarman/rmh					
DATE ▶	3-5-71					

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N. C. Moseley, Senior Reactor Inspector, Region I, CO
THRU: H. R. Denton, Chief, Technical Support Branch, CO

ASSIST INSPECTION - INDIAN POINT 2
DOCKET NO. 50-247

The enclosed inspection report of the piping and piping support systems is a result of an assist inspection conducted on January 20-21, 1971, by L. L. Beratan, Senior Structural Engineer, CO:HQ, and R. A. Lofy, Consultant, Parameter, Inc. Copies of the consultant's report have been sent directly to you by Parameter, Inc.

The design of the main system was a Westinghouse (W) function. The design was checked internally but received no independent outside review. Design parameters were generated by W and analyzed by the use of a proprietary computer code. Two different codes were used to check the design and W reports good agreement. The system was designed for the anticipated transients as outlined in the FSAR and in accordance with B31.1, except that dynamic effects on the system were not specifically considered.

The auxiliary systems were designed by United Engineers and Constructors (UE&C). Westinghouse received a copy of all design calculations and drawings. It is our and our consultant's impression that the W review was superficial at best. There is no complete set of computational documentation for the auxiliary systems at the site. The type of support for each of the systems was factored into the design; in many cases a reevaluation of the design was requested by ConEd and is now in progress. The original design considered the system all hot or cold. In reality some portions of a system can vary considerably in temperature from the main sections.

The stress levels were checked in 11 systems from the computer printout. It was found that the stress levels were within acceptable limits as described in B31.1. The highest stress rated was in the ACS line No. 9 at point 5 which reached a level of 20,729 psi. In all the systems looked at, the most stressed point was at an elbow or a tee connection. However, hot functional testing was in progress and many of the systems were not supported as assumed in the computer analyses.

IS/RHE 2/25/71

There appears to be a lack of formal design control between UE&C and W; the control by UE&C over Bergen-Paterson Pipe Support Company (B-P) appears to be minimal. Shop fabrication drawings are checked by UE&C for structural adequacy and interference.

The support systems were not complete and were cause for some concern, since hot functional testing was in progress. Many spring hangers have not been hung and some temporary rigid hangers are in place where spring hangers are indicated. Where rigid hangers are in place, the pipe movements should be watched for signs of excessive restraint. The main steam lines which have the pipe whip restraints in place should be maintained in a loosened condition so as not to restrict the pipe and steam generator movements.

Only 17 points of pipe movement measurements are being made. In our opinion, this will not provide adequate information of the systems' movements during hot functional testing. At the H. B. Robinson plant, in excess of 50 points were observed and approximately 34 did not move as anticipated, requiring revision to the support system and additional flexibility analyses to be run. It is our impression UE&C does not plan to reanalyze any of the systems unless very significant changes take place.

L. L. Beratan
Senior Structural Engineer
Technical Support Branch, CO

Enclosure:
Assist Inspection Report
Indian Point 2

cc w/encl:
A. Giambusso, CO
L. Kornblith, CO
R. H. Engelken, CO
J. P. O'Reilly, CO
J. B. Henderson, CO

OFFICE ▶	CO:TSB	CO:TSB				
SURNAME ▶	LLBeratan:dm	HRDenton				
DATE ▶	2/24/71	2/24/71				

Report of Assist Inspection

Licensee: Consolidated Edison Company
Indian Point 2
Docket No. 50-247

Inspected by: L. L. Beratan — 2-24-71
L. L. Beratan, Senior Structural Engineer — Date

Reviewed by: H. R. Denton — 3/24/71
H. R. Denton, Chief, Technical Support Branch — Date

Proprietary Information: None

SCOPE

An announced inspection was conducted by G. Madsen, Reactor Inspector, CO:I; R. Lofy, Consultant, Parameter Inc., and L. L. Beratan, Senior Structural Engineer, CO:HQ at the Indian Point 2 site on January 20, 21, 1971. The purposes of the authors participation in this inspection was to assist in the examination of the pipe support systems and to obtain information pertaining to the engineering criteria used in the design, fabrication and installation of piping support systems. This was one of several inspections conducted which were recommended by the Technical Support Branch in our memorandum of May 11, 1970.

Personnel Contacted
Management Interview 1/20/71

Consolidated Edison

J. A. Corcoran - Proj. Supt.

P. G. Leo - Supt.

S. Austin - Sr. M.E.

A. J. Nesterok - Assoc. M.E. - ConEd

Westinghouse

E. U. Powell - Vice Pres. - Engineering - WEDCO

W. J. Francy - Assist. to Vice Pres., Unit #2 - SEDCO

H. J. Thailer - Sr. Engr. - W NES

R. Salvatori - Mgr. Licensing - W NES

H. C. Huang - Sr. Engr. - W NES

R. A. Wiesemann - Mgr. Licensing-IPP - W

United Engineers & Constructors

F. A. Cook - Engr. Mgr. - Pow. Div.

A. T. Molin - Engr. Consultant

U. G. Tuvida - Engr.

G. C. Duerr - Engr.

D. H. Rhoads - Engr.

Bergen - Paterson Pipe Support Company

H. R. Erikson - Chief Engr.

L. Vandenbosch - Dist. Mgr.

A. Polack - L. Design

Atomic Energy Commission

G. L. Madsen - Reactor Inspector - CO:II

L. L. Beratan - Sr. Struct. Engr. - CO:HQ

R. Lofy - Consultant-Parameter, Inc.

SUMMARY

1. The design of the recirculation loops was the responsibility of W. The flexibility analysis was checked and verified by an independent analysis.

2. All other systems were designed by UE&C there were no independent analyses to verify their design. The flexibility and seismic analyses performed by UE&C appeared to be a minimum effort.

3. Approximately 1200 pipe supports have not been installed. Most of these are seismic restraints. Some pipes are supported by temporary hangers which can restrict movement of the piping in some directions during heatup.

4. The flexibility analyses take into account the temperature and pressure transients described in the FSAR, but no dynamic analysis of the systems has been conducted. Otherwise the systems were designed in accordance with B31.1 piping codes.

5. B-P designed, fabricated and installed the pipe supports for the auxiliary systems. UE&C designed the restraints for the primary loops.

DETAILS

1. The inspectors questioned W on the division of responsibility in the design of the recirculation piping system. It was established that the stress analysis for the piping was a W responsibility. The output on their computer analysis was transmitted to UE&C who were responsible for the design of the seismic restraints and the main support systems. The location of the supports and pipe lengths were established by W. The support system was modeled into the analysis and designed to satisfy the criteria established in the pressure piping code B31.1. An independent analysis was made for blowdown and seismic stresses. An additional flexibility analysis was run using another computer code to check the results which W got from using their own proprietary code. All parts of the system were reported to be stressed within the allowable limits set by the code. A review of the stresses within the system is given in the report by Parameter, Inc.

2. To design the auxiliary systems, information in the form of line diagrams and specifications are transmitted by W to UE&C. This information is the expected operating temperature, pressure and transients the system is expected to see. The critical loading combinations are selected and flexibility analyses run. Designs are sent to W along with a set of computer calculations for review. It was not possible to ascertain the extent of review. Some systems were designed without the benefit of a flexibility analyses the design was based upon experience and engineering judgment. No independent third party review of any of the systems was made. All systems were reported by the licensee to have been designed in accordance with B31.1 pressure piping code. There is no formal documentation of the computations at the site; however, there are some sets of computer printouts of the flexibility analyses of some of the systems.

3. For seismic design, UE&C imposed loadings to establish the critical frequncy. The static loading approach was used where seismic analyses were conducted. A table of allowable spans was prepared for pipe not in resonance with a frequency of 13 cycles per second or less and the allowable stress in the pipe was 3000 psi. Tables of span length approved by UE&C were used to set the control points of the piping. For piping three inches and larger support points are individually designed by for 2-1/2 inches and less the system was considered to be field run piping.

4. Pipe restraints, type and location were specified by UE&C. B-P detailed the fabrication and installation. Pipe whip restraints were designed and located by UE&C which were then detailed and installed by B-P.

5. Pipe hanger and seismic restraints are designed, detailed, fabricated and installed by B-P. The information in the form of flexibility analyses, structural drawings and insulation drawings are used by B-P to design the pipe support systems. Control is exercised over B-P by UE&C who must approve all fabrication drawings. Where structural and other interferences require that a support be moved, a new flexibility analyses may be run to determine its effect on the predicted movements and stress levels.

6. The stresses within some of the pipe systems for which flexibility analyses are available were reviewed. The system and highest stressed point in the system are as follows:

System	Point	Stress
ACS line No. 9 (outside Cont)	28	12,583 psi
ACS line No. 9	5	20,729 psi
ACS line No. 10	29	9,134 psi
Line No. 70	34	9,754 psi
Pressurizer hot all lines cold	179	10,261 psi

One power relief valve PCU 465 open all others closed stressed maximum at a Tee.

Service Water Lines:		
11d	7.9	3,130 psi
12d	9.9	5,496 psi
Safety Injection Line #356		
Condition 1 normal operation:	7	5,281 psi
Condition 2 core cooling:	7	2,751 psi
Auxiliary coolant system:		
Line 10 @ 400° line 57 @ 70°	24	7,356 psi
Line 57 @ 280° line 10 @ 70°	28	10,387 psi

A listing of maximum safe end stresses will be identified in our consultant's report.

Inspection of the Drywell: The inspectors made an inspection of a portion of the drywell. The areas examined were one of the steam generators and pumps; the pressurizer structrual support and surge line hangers and restraint systems, pipe burst and pipe whip restraints on major lines including the main steam; some secondary piping systems and structural modifications being made not to restrict pipe and pump movements. At the time of the inspection hot functional testing was in progress and the first plateau of heatup had been reached and they were holding at 150°F.

The reactor vessel had reached its required skin temperature and the head studs were tightened. Movement of the various piping systems were being observed by a team of ConEd and W personnel. All movements had to be reconciled with computed values or the reason for the deviation determined and corrected before the next level of heatup would be permitted.

The observations of the discrepancies noted during this inspection are discussed in the exit interview.

EXIT MEETING

The list of attendees of this meeting is attached. The following observations and concerns were expressed by the inspectors as a result of the information gained from the initial meeting, the review of some of the documentation and an inspection of the drywell of the plant.

1. Some of the whip restraints on the steam generators and main steam lines were installed and snugged up. The inspectors expressed concern that the cables would restrict movement and could cause some local overstraining at the points of restraint. The licensee was asked what procedure was to be used to monitor the strain on the cables.

   The reply to the above by W was that the cables would be checked at each plateau of heat and relaxed as required so that the pipe would not be restrained. Other whip restraints which are not installed yet would be installed at a later date and set when the plant is completely heated up.

2. It was observed by the inspectors that many of the auxiliary systems did not have spring hangers but were supported by solid rod type hangers. These hangers restrict movement in the vertical direction. It was also noted that a pipe line in the area of recirculation pump No. 23 appeared to be unsupported. This line was identified by the constructor as Line 17.

   The W reply to the above observation was that the rigid hangers observed were only temporary and that they were in the process of being replaced. The number of hangers involved was not known at this time. It was stated that approximately 1200 supports of which 1000 are seismic restraints remain to be installed. The unsupported line would be investigated and that spring hangers would be installed as rapidly as possible.

3. The base of the recirculation pumps and steam generators rest on lubrite plates which have oval holes through which anchor bolts pass. Nuts on the anchor bolts are supposed to be loose, some were checked and found to be tight. The base plates are designed to move about ± one inch in the horizontal plane. The space is packed with dirt and debris and is unprotected from objects such as nuts, pieces of pipe or wrenches from becoming lodged and restricting movement.

   The W reply to the above was that all anchor bolts would be checked to make sure they are in a loosened condition. All spaces would be cleaned and the dirt and debris removed and that a protective cover would be devised to prevent objects from becoming lodged and preventing free movement of the base plates.

4. Not all auxiliary systems are analyzed by flexibility analysis. The systems were considered to be hot or cold but under some operating conditions a branch of a system could be cold while the main system hot and vice versa. It was observed that there is no formal requirement that a set of all system calculations be at the site. Copies of some of the system calculations have been requested by the licensee and these are available at the site.

UE&C reply to the hot and cold branch cases was that at the request of the licensee some special cases are being reanalyzed, and that this information is being supplied to the licensee. It was UE&C's position that copies of flexibility analyses of all systems are not required to be onsite. All systems are being designed in accordance with B31.1 with the design parameters selected by UE&C engineers. At the request of ConEd five or six additional systems are to be analyzed via flexibility analysis.

5. Measurement of pipe movement is to be monitored at 17 points during the hot functional testing. The licensee was informed that this was significantly below the 50+ points observed at H. B Robinson, a similar plant. Of the 50+ points observed 34 did not move as predicted in the flexibility analysis.

   The W reply to this concern was that in their judgement, 17 points would be an adequate number but that they would take increasing the number under consideration.

Exit Meeting-Persons Attending

Consolidated Edison

A. Corcoran - Proj. Supt.

P. G. Leo - Supt.

S. Austin - Sr. M.E.

E. P. Burke - Engr.

Westinghouse

E. U. Powell - V.P. Engineering - WEDCO

W. J. Francy - Asst. to V.P. Unit #2 - WEDCO

H. J. Thailer - Sr. Engr. - W NES

R. Salvatori - Licensing Mgr. - W NES

H. C. Huang - Sr. Engr. - W NES

R. A. Wiesemann - Mgr. I.P. Licensing - W

R. M. Harper - Field Engr. - W

United Engineers & Constructors

G. C. Duerr - Engr.

U. G. Tuvida - Engr.

D. H. Rhoads - Engr.

Bergen-Paterson Corporation

H. R. Erikson - Chief Engr.

A. Polack - Lead Designer

Atomic Energy Commission

G. L. Madsen - Reactor Inspector - CO:II

L. L. Beratan - Sr. Struct. Engr. - CO:HQ

R. Lofy - Consultant - Parameter Inc.