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Mr. T. T. Martin, Director
Division of Engineering and Technical Programs
U.S. Nuclear Regulatory Commission
Region I
631 Park Ave.
King of Prussia, PA 19406

SUSQUEHANNA STEAM ELECTRIC STATION
MEETING WITH REGION I
ER 100450 FILE 841-4
PLA-1275

Docket No. 50-387

Dear Mr. Martin:

Attached are the handouts provided in our August 25, 1982, meeting with you and your staff. Included with these handouts is PP&L's "Report on the Investigation of Unit One Small Piping System Design, Installation and Inspection-Program Adequacy and Implementation."

Very truly yours,

B. D. Kenyon
Vice President-Nuclear Operations

WEB/mks

Attachment

cc: G. Rhoads - USNRC
R. Perch - USNRC

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US NRC
REGION I

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8/25

SUSQUEHANNA ALLEGATIONS AND FINDINGS

QUESTION 1. - Stress Intensification Factor

On site simplified calculations did not analyze weldolet/socket connections with large pipe. An SIF of 1.3 was used for fitting/small pipe interface. Fitting/large pipe interface was analyzed with large pipe stress analysis.

RESPONSE -

Methods used to account for stress intensification in small piping design and in branch connections on large piping were explained at a PL/NRC meeting on 8/11. NRC concurred on the approach with only one remaining NRC concern which will be resolved if either the requirements of footnote 6 of NC-3673.2b are being met or PL demonstrate a safety factor of 2 for the worst case weldolet/sockolet branch connection calculated stress Bechtel is responding to this remaining concern by:

- (1) Comparing weld profiles of weldolets/sockolets used in SSES with ASME Section III, 1974 edition requirements of NC-3673.2b-2 and corresponding footnote 6.
- (2) Performing analyses to demonstrate safety factor of 2 in branch connection stresses (worst case).

STATUS - .

NRC has concurred with the approach used during the meeting on 8/11/82.

Additional response information will be presented to NRC on 8/25/82.

QUESTION 2. -

Nozzle loads on equipment were ignored on all SBP analyzed on site. If the allowable nozzle loads were supplied by the manufacturer, the piping loads were compared to it. If it was not provided it was not compared. The licensee contends that pipe load on equipment is not critical for nonsensitive equipment because there is enough conservatism built into the analysis and the placement of the first support.

Licensee will supply a list of all equipment that was analyzed for NRC review.

RESPONSE -

In 8/11 meeting with NRC, PP&L and Bechtel made a presentation concerning the above. The NRC indicated they had no further concerns with this issue and consider the item closed.

PP&L did promise to provide by 8/25 a list of equipment for which detailed small pipe nozzle loads analysis were performed.

STATUS -

The above will be presented to NRC on 8/25/82.

PP&L considers this item closed.

QUESTION 3. -

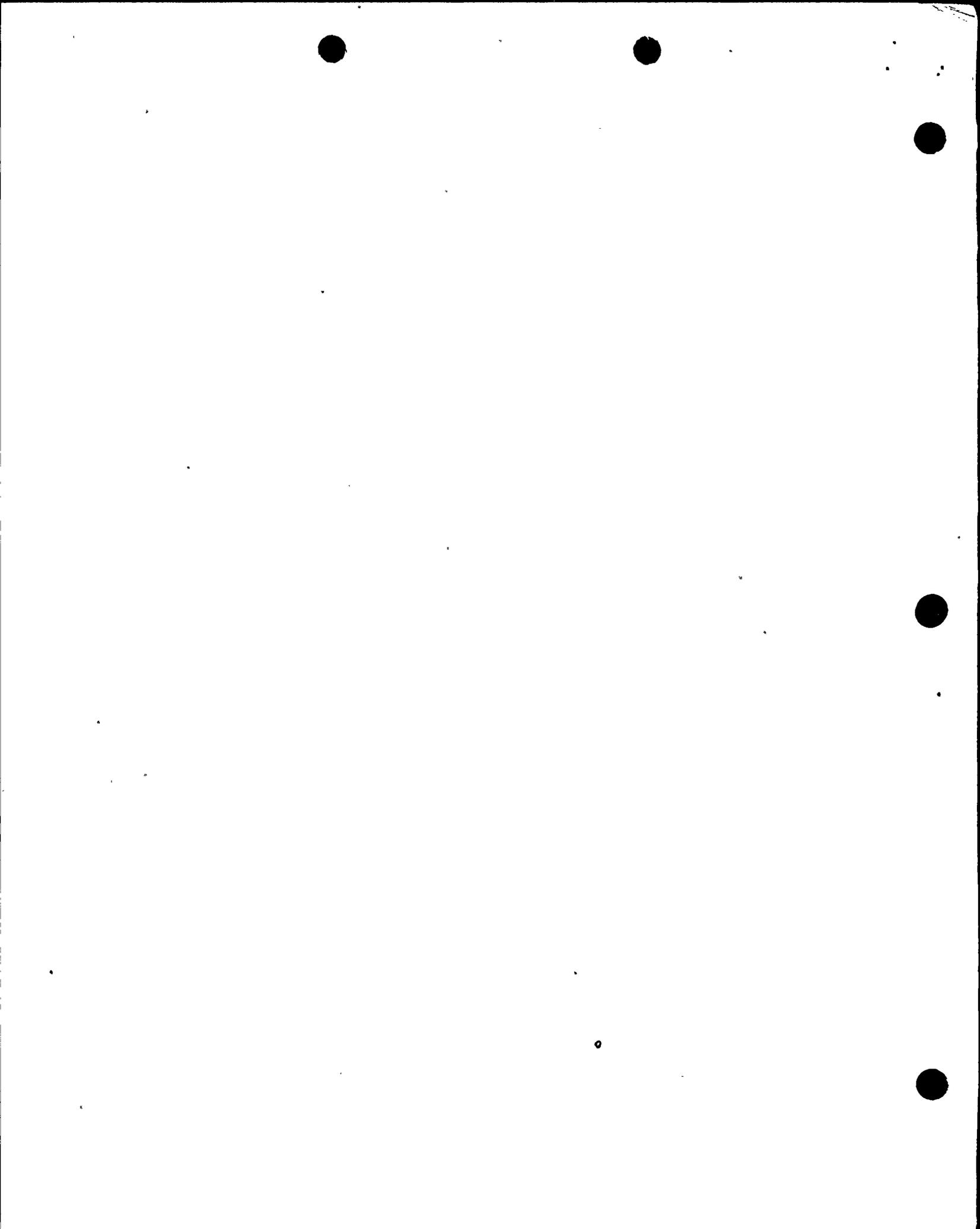
The licensee grouted pipe sleeve penetrations after the piping was analyzed for stress. The licensee contends that the penetrations have been inspected and documented by the "as-built" verification program.

RESPONSE -

In 8/11 meeting with NRC, PP&L and Bechtel made a presentation concerning the above. The NRC indicated that they had no further concerns on this issue. Item is considered closed.

STATUS -

This item is closed.



QUESTION 4. -

Small pipe anchors, per Bechtel Detail 600 and SPA-1312, do not provide restraint in three directions (x,y,z). There are three drawings of this hanger (Detail 600, SPA-600, SPA-1312). Due to fabrication tolerances, the clamp may not have an interference contact to resist axial and torsional slippage.

RESPONSE -

Anchors were reworked as necessary to insure sufficient contact to resist axial & torsional slippage. Calculations were performed to justify the shimming of the anchors in order to enable them to carry the required load. These calculations showed that all stresses are acceptable.

PP&L has performed a 100% inspection following all required rework and has verified required contact between the pipe and the anchor as well as proper gap between the two halves of the anchor.

STATUS -

The above will be presented to NRC on 8/25/82.

PP&L considers this item closed.

QUESTION 5. -

A generic bolt size problem exists with all 1" hangers (Detail 600, SPA-600, SPA-1312). The bolt shoulder specified extends through both ears of the pipe clamp. This causes the bolt to shoulder out before the clamp is adequately torqued.

RESPONSE - Bechtel Response:

Bolt length used along with the gap and component thickness could lead up to bottoming out of the nut on the bolt threads without achieving the torque. FCR P-4066 and PL-NCR (82-728) have provisions for adding washers to preclude bottoming out of the nut on the bolt.

PP&L performed 100% inspection of the subject bolts. All required rework has been performed, i.e., washers were added as necessary to bolts not passing acceptance criteria to preclude them from shouldering out.

STATUS -

PP&L considers this item closed.

QUESTION 6. -

Bolts specified on Detail 600 are SA-307 but SPA-600 and SPA-1312 are SA-325. SA-325 bolts are of higher strength.

RESPONSE -

Bolt material was not specified on Detail 600, however, standard SA-307 bolts were supplied and installed. A study Calculation was performed which justifies the use of SA-307 bolts for the installed Unit 1 anchors. This was discussed in a telecon between NRC, PP&L and Bechtel on 8/17/82. As the result of this discussion, PP&L agreed to submit to NRC the justification calculation. This was done on 8/19/82 along with a written response.

STATUS -

Justification calculation and a written response submitted to NRC on 8/19/82.

PP&L considers this item closed.

QUESTION 7. -

The upgrade of Detail 600 to the SPA-1312 design caused distortion of the clamp because of welding stresses.

RESPONSE -

Four line contact and proper bolt torquing result in required clamping forces which preclude the effects of distortion caused by weld stresses. The justification for four line contact and proper bolt torque is discussed in the responses to questions (4) and (5) respectively

STATUS -

The above response will be presented to NRC on 8/25/82.

PP&L considers this item closed.



QUESTION 8. -

The "ears" of large bore pipe hanger clamps were trimmed to prevent interference. This has not been incorporated into the design. Example:
HBC-101-H210

RESPONSE -

The GBC-101-H210 clamp trimming was shown conceptually on the as-built detail and judged to be adequate during the as-built reconciliation.

STATUS -

The above response will be presented to NRC on 8/25/82.

PP&L considers this item closed.

QUESTION 9. -

SBP Systems on Unit 1 may be too rigid. The hangers required for Unit 1 were analyzed by the simplified method and resulted in about 700 supports. The hangers for Unit 2 were computer analyzed and resulted in about 270.

RESPONSE -

This was discussed in an 8/17 telecon between PP&L, BT and NRC. During meeting on 8/18 between PP&L & NRC; PP&L was informed that this item is closed.

STATUS -

This item is closed.



QUESTION 10. -

Structured steel beam flange warpage and web damage due to dead load placed on beams at elevation 749' near outboard MSIV.

RESPONSE -

In a meeting between PP&L and NRC on 8/18, PP&L was informed that this item is closed.

STATUS -

This item is closed.



QUESTION 11. -

A design change on December 21, 1981 revised Detail 600 to SPA 600 but the new design was not distributed for work or inspection.

RESPONSE -

The installation and inspection of Detail 600 type anchors was done in accordance with Detail-600 Rev. 1 while a drawing superseding it (SPA-600) existed at the site. This occurred because SFHO issued the superseding drawing, SPA-600 on December 21, 1981, without first issuing the cancellation revision to Detail 600. The cancellation for Detail 600 was issued June 2, 1982. Although SFHO issued SPA -600 before the cancellation revision for Detail 600, they did make a note on SPA-600 that it superseded Detail 600. However, due to inadequate document review at the site, this note was overlooked. The cancellation revision should have been issued prior to issuing SPA-600. In addition, a better document review should have been done.

All differences between SPA 600 and Detail 600 have been reconciled with the design requirements, confirming that the existing installations are adequate.

To avoid this problem in Unit 2, SPA's are not being utilized.

Individual pipe support details are being generated like large pipe supports. All drawings for installation and inspection will be issued and controlled by established field procedures, which will include requirements, as applicable, to ensure appropriate time constraints and documentation requirements for field review and implementation of design changes.

STATUS -

The above response will be presented to NRC on 8/25/82.

PP&L considers this item closed.

QUESTION 12. -

The proposed fix of Detail 600 hangers does not appear to be acceptable (line contact on pipe, not full length).

RESPONSE -

A calculation has been made to justify the acceptability of four line contact. The calculation shows that a two inch contact on each side is acceptable resulting in stresses that are below the allowables.

STATUS -

The above response will be presented to NRC on 8/25/82.

PP&L considers this item closed.

QUESTION 13. -

One pipe support attached to two seismically independent structures.

Three supports have been identified connected between the reactor building and primary containment.

RESPONSE -

PP&L transmitted sets of calculations to NRC on 8/19/82 indicating that the correct response spectra and seismic anchor movement analysis were used.

This was provided along with a written response.

STATUS -

PP&L considers this item closed.

QUESTION 14.-

Snubber, SP-HCC-136-H-2003 was installed such that the support can be deflected several inches laterally.

RESPONSE -

We have inspected the support after the question was raised. The support frame is flexible in the north-south direction, i.e.; in the axial direction of the pipe. It maintains rigidity in the east-west direction. Since the design requirement of the axis of restraint is east-west only, the support is considered to meet its intended purpose. Therefore, the as-built support is technically sound.

STATUS -

The above will be presented to NRC on 8/25/82.

PP&L considers this item closed.



QUESTION 15. -

Lack of clearance between snubber end and clamp ear.

RESPONSE -

There may be a lack of sufficient clearance on the size 35 snubbers.

Therefore a 100% inspection for clearance will be done on all size 35

snubbers. In conjunction, a 10% inspection for clearances will be done

on the balance of snubbers in Unit #1.

STATUS -

The above response will be presented to NRC on 8/25/82.

PP&L is currently pursuing this course of action. A corrective action

will be taken prior to heat up exceeding 200°F.

QUESTION 16. -

Site fabricated rear brackets of snubbers did not provide adequate clearance for lateral movement of the snubber.

RESPONSE -

There are no site fabricated rear brackets for snubbers at SSES Unit #1.

STATUS -

The above response will be presented to the NRC on 8/25/82.

PP&L finds the above response satisfactory and considers this item closed.

QUESTION 17. -

Falsification of records: QC inspection on acceptance of SPA-1312 bolting.

RESPONSE -

The small pipe hanger detail drawing for hangers utilizing the SPA-1312 clamp does not identify material type for the bolts in question, therefore, it was not required to be verified. The specific activity on the Quality Control Inspection Record was signed because it deals with other attributes in addition to material type such as material size of rods, clamps, saddles, clevises, etc.

QC. inspection of inaccessible items takes into account the sequence of installation to allow inaccessible items to be inspected.

Where items which are required to be inspected per design drawings/ Quality Control inspection Records are found inaccessible, they are identified on Nonconformance Reports or P-20 exception forms for pipe supports as quality indeterminate.

STATUS -

The above response will be presented to NRC on 8/25/82.

PP&L considers this item closed.

QUESTION 18. -

Division of responsibility between Field Engineering and Resident Engineering.

RESPONSE -

There have always existed distinct organizations and division of responsibilities between the field engineering and resident engineering. The Resident Engineering has a dual reporting relationship within engineering as they report to the Project Resident Engineer and to the Project Engineering Group Supervisor primarily for technical guidance. There have been instances where resident engineers were loaned to field engineers to work in the field engineering organization and perform field engineering duties and functions.

Around February 1982, a Hanger Design Coordination Team was formed to promote better communication, and to improve efficiency and productivity of the installation interference resolution process. Normally, crafts present an interference problem to Field Engineering and Field Engineering in turn passes on the problem to Resident Engineering after they make an evaluation to decide that Resident Engineering's involvement is needed.

The Resident Engineering branch of the team worked as a separate entity in the manner they do when they work from Resident Engineering's work location. The team was physically situated in one trailer to expedite the documentation process and also to get prompt involvement of the Resident Engineering by bringing them to the close proximity of the Field Engineering organization. Resident Engineering members during these operations reported to the Resident Engineering Group Supervisor and received technical as well as administrative guidelines from him.

Thus, there is no instance where the organizational and division of responsibilities charter was violated during the Unit 1 hanger program.

STATUS -

The above response will be presented to NRC on 8/25/82.

PP&L considers this item closed.

QUESTION 19. -

Field engineering's initialing of check/approve entries on field drawings.

RESPONSE -

- i) The Lead Field Piping Engineer's (LFPE) initials were often entered by others in the "APPROVED BY" block on hanger drawings, without the identity of the actual approver being indicated. This specific discrepancy was previously addressed and corrected via Bechtel Q.A. Audit PFA-24-4-10, QAF #4.

FP-P-11 Paras. 4.3.6 (small pipe isometrics), 5.3.1.2.c (large pipe hanger details), and 6.2.7.2.c (small pipe hanger details) all require approval of the LFPE or his designee; but do not clearly specify the method of initialing (i.e., whose initials are entered).

Early in the project, various individuals are designated to sign/approve these drawings for the LFPE. The designees were generally supervisors involved in the drafting effort, but other piping supervisors were also delegated this authority.

NOTE: "Approval" of Field piping drawings - although not actually defined in any of the procedures, actually signifies concurrence that required design reviews/checks have been performed (i.e., checker's initials on the drawing) and formal authorization to issue the drawing.

The requirements of FP-P-11 were understood by some of the designees involved in field hanger "design"* to mean that the signature (or initials) of the LFPE himself must appear on the drawings. Consequently, several of the designees/approvers entered only the initials of the LFPE to document their approval of the drawing. This method of documenting approval, although contrary to standard quality verification conventions was not considered by the individuals involved to reflect improper drafting conventions.

*Although referred to as Field hanger "design", in actuality the Field performed varying degrees of configuration revision and drafting but in all cases Project Engineering was considered the final approval authority.

- ii) In some cases the person reviewing/checking hanger drawings was the originator of the drawing, who entered fictitious initials ("E.D.") in the "BY" block and ("D.E.H.") in the "CHECKED" block. FP-P-11 omits specific checking requirements for Field revisions to small pipe hanger details. (Although independent checking was the established practice.) Paras. 4.3.5 (small pipe isos) and 5.3.1.2b (large pipe hangers) imply separate and independent checks, but are not really specific. Nonetheless, the revision block entries on

the drawings do imply that a separate individual must check the drawing. Entry of the originator's initials in both the "BY" block and the "CHECKED" block, as well as entry of fictitious initials can only reflect ignorance on the part of the person involved, and attempts by that party to take a shortcut.

- iii) In some cases the checkers entered the Small Pipe Hanger supervisor's initials ("A.G." or "T.G.") in the "CHECKED" block. The entry of the SPH supervisor's initials in the "CHECKED" block involved an independent checker who was qualified but who was not formally designated as a checker, so he entered his supervisor's initials - again without any ill intent or attempt at deceit.
- iv) When Field Engineering performs field inspection of hangers, they inspect the installation against the detail drawing to verify agreement. This, in effect is a review/check of the hanger detail. Upon verifying agreement (or correcting the drawing) the drawing is presented to Quality Control who inspects the installation for compliance with the drawing and vice-versa. Any discrepancies identified during this additional "check" are identified and the drawing is corrected accordingly (either by red-line or by revision) and the correction is rechecked/verified by Quality Control prior to their acceptance of the installation. Therefore, even if an independent drafting check was never performed (our investigation indicates that this happened only in isolated cases) subsequent Field Engineering and Quality Control checks did occur after the drafting and checking of the drawings, and any resultant design discrepancies would have been resolved during as-built verification. (The adequacy of the as-built verification was substantiated under separate audit programs involving PP&L QA, Bechtel Quality Control and a special audit team within Field Engineering.) Thus, the procedural discrepancies would have no effect on the validity of the as-built drawing actually reflecting the as-built conditions and as used by engineering to perform the as-built reconciliation.

Additionally all hanger drawings have received, after final as-built, a final LFPE/designee approval documented on the drawing per Para. 8.1.2 of FP-P-11. Any discrepancies in previous LFPE approvals documented on the hanger drawings are therefore irrelevant because the final LFPE/designee approval covers the final QC-verified as-built drawing.

Also, Project Engineering has reconciled the field as-built hanger details with the design and signed the drawings per Para. 8.1.2 of FP-P-11. This involves final verification that the as-built drawing represents an adequate structure based on the stress analysis.



Finally, we believe that piping drawings prepared by the field do accurately reflect the installation. In addition, we believe that Quality Assurance programmatic requirements were adequately controlled by the engineering and field programs.

Based on the above described checking and approvals accomplished after final issuance of the hanger detail drawings by the field hanger groups, no further remedial corrective action should be necessary to address completed Unit 1 hangers.

With respect to other drawings used for piping as-building and design verification, review with applicable personnel indicates that the LFPE initials were not entered on FCI's (large pipe as-built drawings) and small pipe fabrication isometrics (used for small pipe as-building); that it was standard practice for the checkers and approvers to enter their own initials.

Action to Preclude Recurrence

The basic cause of the problems identified is lack of clear direction concerning defining the review/checking and approval functions involved with field drafting, and identifying concisely the requirements for documenting these functions. All Field Procedures involving Field Design (all disciplines) will be reviewed for similar lack of direction, and appropriate revisions to the Procedures will be processed. In addition, all persons responsible for drafting, review, and approval functions will be instructed as to the importance of adhering to these requirements to ensure similar discrepancies do not occur in the future. Corrective action will be completed by September 30, 1982.

STATUS -

The above response will be presented to NRC 8/25/82.

With implementation of the above corrective action,

PP&L considers this item closed.

Question 20 -

PP&L was requested to determine whether PP&L and Bechtel Q.A. Programs covered the areas of concern identified during the PP&L Investigation of Small Pipe Design/Installation.

Response -

A. Bechtel Q.A.

Generally, the audits performed by Bechtel were of enough detail and depth to indicate that there was sufficient review of the particular aspect of the system being audited. Bechtel MCAR's (Management Corrective Action Report) and QAR's (Quality Action Report) are written for any particular discrepancy (outside an audit scope) that requires corrective action and follow-up. The following are examples of audit findings and QAR's that indicated problem areas related to those found during the PP&L investigation:

1. Audit #24-4-10, February, 1982, contained a finding that noted a noncompliance with the procedure for "voiding" drawings. (Another finding in this audit, although not related to the Investigation Report, reported that supervisor's signature (initials) being misused.)
2. Audit #'s 30-3-4, 30-3-5, 30-3-6, and 30-9-2, dated March, 1981; August, 1981; April 1982; and May, 1982; respectively, discovered various instances of lack of controls for procedural implementation and engineering interfaces.
3. Audit #24-4-9, June, 1981, contained findings that indicated various areas in which the "as-built" configuration of the piping did not agree with the drawings.
4. QAR #859, July 30, 1982, dealt with Field Engineering not reviewing SPA Drawings in a timely manner.
5. QAR #856, July 22, 1982, deals with the deficiency identified in the design of "SPA 600" hanger.

B. PP&L Q.A.

During the period under review, there were seven (7) formal and seven (7) unannounced audits relating to the small pipe program. These audits covered such areas as document control, Q.C. Inspection, and design control (related to interface control and the use of the latest information for design verification). Numerous findings were identified during these audits and several of these still remain open. Some of the audits in which the findings were similar to those of the PP&L Investigation are:

1. Audit #C-82-14 (joint audit with Bechtel), April, 1982, in which some procedural control were lacking in the Resident Engineering Group.

2. Audit #C-81-06, January, 1982, identified problem areas in the Field Engineering locating hanger deficiencies in this walkdown.
3. Unannounced Audit #111, September, 1981, discovered various areas of procedural and implementation problems in the design portion of the small pipe program.
4. N-5 Package Review Audit #'s CL-48, May, 1982; CL-34, May, 1982; and CL-34, June 1982; indicated areas in which there were drafting errors.

IV. CONCLUSIONS

- A. PP&L and Bechtel audits covered the programmatic/procedural aspects of the small pipe design/installation program, but did not include a technical review of these aspects.
- B. The Investigation Team had the benefit of technical support. The majority of the concerns identified during the Investigation were a result of the technical review. As a consequence of PP&L and Bechtel audits not having technical support, it cannot be expected that they would raise the same concerns that the Investigation Teams did.
- C. The reviewing of PP&L and Bechtel audits reveal that their frequency did not increase in proportion to work being accomplished during the "final hectic period" (April-June 1982). But both Bechtel and PP&L QA coverage of small pipe program existed in the forms of Bechtel QA surveillance of hanger as-built installation (from Oct. 1981) and PP&L N-5 Package Review, which occurred from September, 1981, through July, 1982. These activities increased in proportion to the work being accomplished during the "final hectic period." These activities and any discrepancies were formally documented.

STATUS

PP&L considers this item closed.

August 23, 1982

FILE MEMO

SUSQUEHANNA STEAM ELECTRIC STATION
INVESTIGATION OF SMALL PIPING SYSTEMS PROBLEMS

A meeting was held on August 18, 1982 between the Nuclear Regulatory Commission and PP&L concerning the small piping program. Certain questions were raised concerning the program and PP&L committed to investigate these. The NRC questions and PP&L responses follow:

Question: 1. Why had Bechtel QC accepted (signed-off) certain attributes of hangers which were inaccessible and thus not inspectable?

Response: The NRC made reference to the "detail 600" clamps which were modified per SPA 1312. The modifications were of such a nature that the clamp bolt heads were concealed after the modification and thus it is not possible to verify that the markings on the bolt head indicate the correct material (A-325)..

The Bechtel QC inspector sign-off in Section 3.0 of the Inspection Report (IR) does not indicate that the attribute of bolt material was inspected, only that the "detail 600" clamp is at that location. This is consistent with the inspection program in that the bolting material is not identified on the unique hanger detail drawings and, therefore, was not a required QC verification. The bolts are inspected by the Bechtel QC Receiving Group upon receipt at Susquehanna for material type.

If the bolting material had been an attribute to be inspected, the fact that it was uninspectable would have been noted on a non-conformance report for resolution. The PP&L Investigation Teams noted this type of Bechtel QC action during the Investigation since non-conformances were generated for areas where plate thickness could not be measured due to grouting completion or where structural tubing thickness could not be measured due to construction close-up. These types of items were resolved by UT measurements or by drilling a hole to permit thickness measurement.

In summary:

- a. All attributes of modified friction clamps (SPA-1312) required to be inspected were accessible.

- b. The inaccessibility noted by the NRC involved an attribute (bolting material) which was not required by Project Engineering to be inspected by OC.

Question: 2. Are the Bechtel Field Engineering and Resident Engineering personnel working together and reporting to the same Group Supervisor?

Response: The Field Engineers and Resident Engineers were located in the same facility for the purpose of expediting changes required during the installation of the small bore piping systems and hangers. The Investigation Team reviewed the reporting functions, organizational chart and names of personnel involved in those organizations. The conclusion of the Investigation Team was that for Unit 1 Field Engineers and Resident Engineers worked closely together for efficiency sake but had different reporting supervision.

The area of Resident Engineering personnel being "lent" to Field Engineering and returning sometime later to the Resident Engineering group was investigated. This organizational system applies only to Unit 2. There are no Bechtel program requirements preventing its implementation. The concern that the same individual may perform the initial design as a Field Engineer and subsequently perform the verification calculations as a Resident Engineer was investigated. The Resident Engineering calculation procedure requires that a checker and Supervisor review and sign the calculation after the originator performs the initial calculation. This series of reviews and signatures provides assurance that the calculation is performed accurately and correctly.

