

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report Nos. 50-528/84-45, 50-529/84-32, 50-530/84-22

Docket Nos. 50-528, 50-529, 50-530

License Nos. CPPR-141, 142, 143

Licensee: Arizona Public Service Company
P. O. Box 21666
Phoenix, Arizona 85036

Facility Name: Palo Verde Nuclear Generating Station Units 1, 2, 3

Inspection at: Palo Verde Site, Wintersburg, Arizona

Inspection Conducted: October 1 thru November 30, 1984

Inspectors:

J. Miller for
G. H. Hernandez Senior Resident Inspector

1/21/85
Date Signed

Approved by:

J. Miller
L. R. Miller, Chief, Reactor Projects Section 2

1/21/85
Date Signed

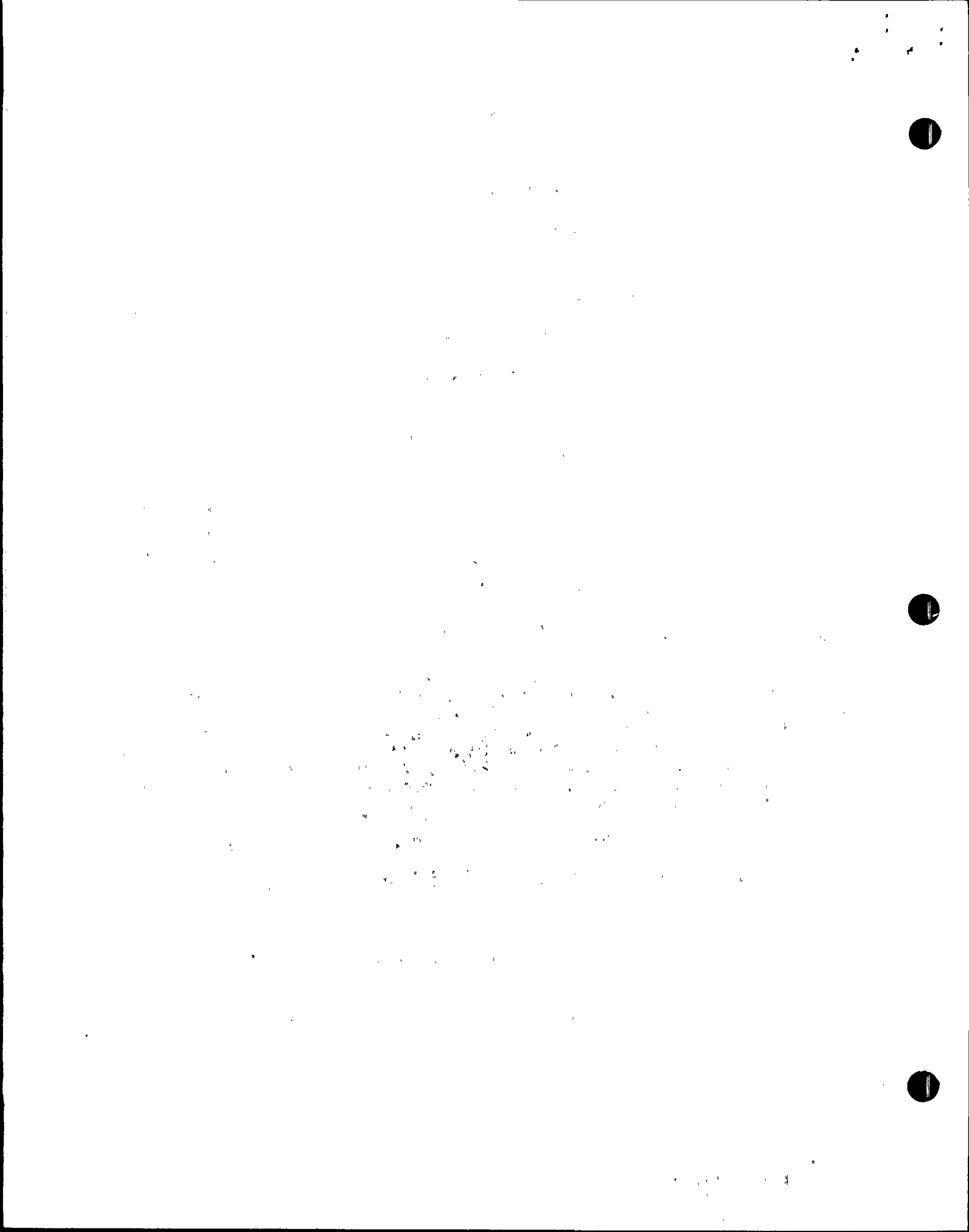
Summary:

Inspection on October 1 thru December 13, 1984 (Report Nos. 50-528/84-45 and 50-529/84-32 and 50-530/84-22).

Areas Inspected: A routine, onsite inspection by the resident construction inspector of activities associated with the following: a review of the Bechtel onsite and corporate design audit program, assessment of the Bechtel onsite design organization, the training program for engineers assigned to the design organization, resolution of an allegation related to testing activities on the HVAC system, and general activities in progress throughout the plant during the reporting period.

The inspection involved 292 inspector hours onsite by one NRC inspector.

Results: No violations of NRC technical requirements were identified.



DETAILS

1. Persons Contacted

a. Arizona Public Service Company (APS)

- *E. E. Van Brunt, Vice President-Nuclear Production
- D. B. Karner, Assistant Vice President-Nuclear Production
- *W. E. Ide, Corporate Quality Assurance Manager
- L. A. Souza, Assistant Corporate Quality Assurance Manager
- J. R. Bynum, Plant Manager
- D. B. Fasnacht, Nuclear Construction Manager
- W. F. Quinn, Licensing Manager
- W. J. Jump, Startup Program Control Manager
- *C. N. Russo, Quality Assurance Audits/Monitoring Manager
- R. J. Burgess, Field Engineering Supervisor
- E. C. Sterling, Configuration Control Supervisor
- *R. J. Kimmel, Transition Engineer
- *R. L. Hamilton, Quality Monitoring Supervisor
- *T. S. Bloom, Licensing Engineer
- L. Coleman, Startup Engineer

b. Bechtel Power Corporation (Bechtel)

- S. M. Nickell, Project Superintendent
- J. Black, Chief Resident Engineer
- R. Randel, Startup/Operations Resident Engineer
- D. Freeland, Pipe and Pipe Support Resident Engineer
- R. Elias, Chief Engineer
- D. R. Hawkinson, Project Quality Assurance Manager
- *H. D. Foster, Project Quality Control Engineer
- *T. L. Horst, Project Field Engineer
- R. H. Roehn, Lead Quality Assurance Engineer
- H. Mear, Assistant Project Quality Control Engineer

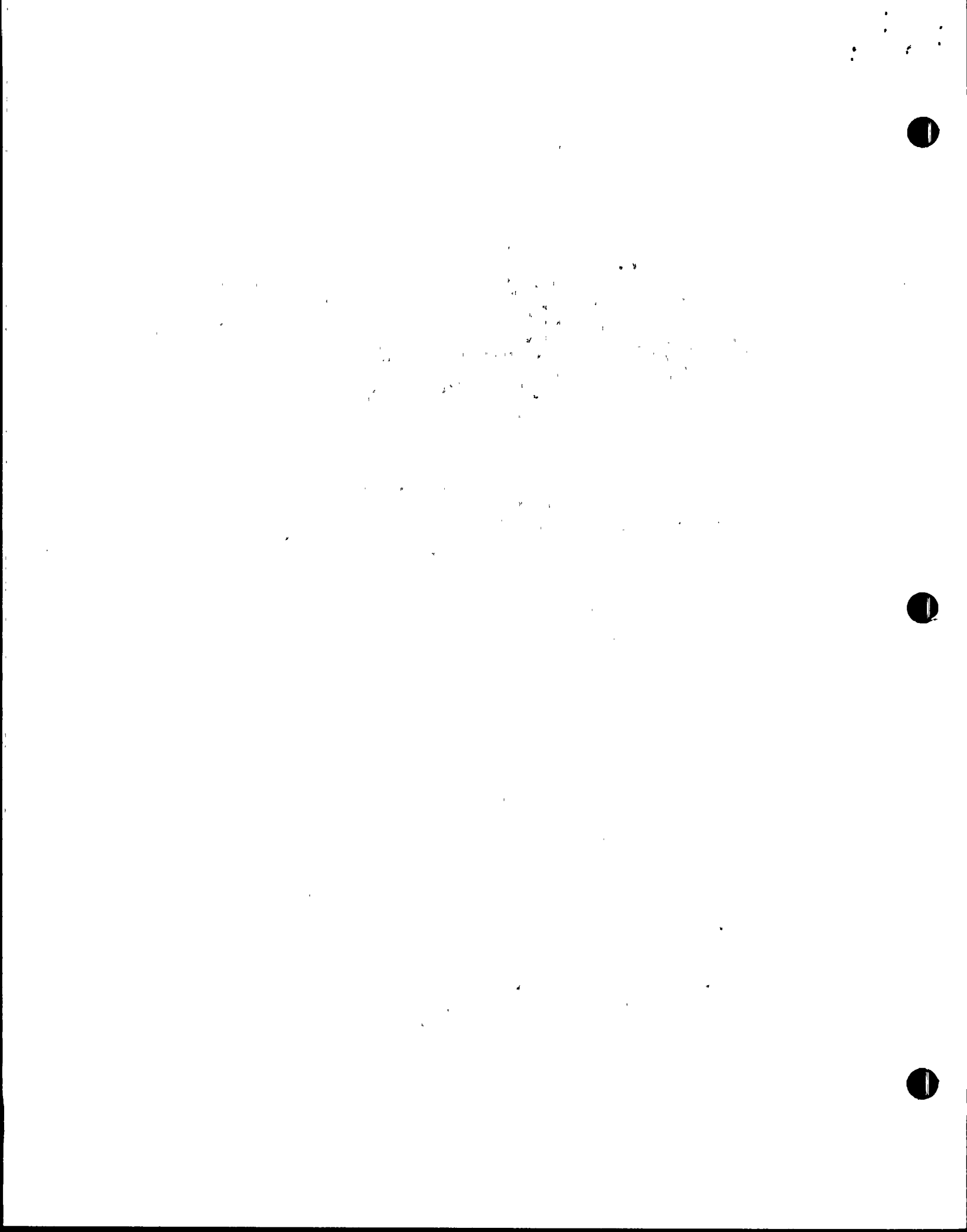
c. Engineering Air Balance Company (EAB)

- W. L. Lipski, President of EAB/Project Manager
- C. G. Conaway, Project Superintendent

*Denotes personnel attending the NRC Exit Management Meeting conducted on December 13, 1984.

2. Plant Status

Unit No. 1: The majority of all pre-operational testing has been completed, with only miscellaneous testing on-going. At present, Unit No. 1 has a targeted fuel load date of December, 1984. Construction completion of Unit No. 1 is estimated at 99.7%.



Unit No. 2: Significant safety-related pre-operational testing is on-going, with approximately 10% of the testing completed at this point. Cold hydrostatic testing of the primary and secondary systems were satisfactorily completed in November, 1984, with hot functional testing tentatively scheduled for March, 1985. Integrated leak rate testing is tentatively scheduled for January, 1985.

At present, Unit No. 2 has a scheduled fuel load date of December, 1985.

Construction completion of Unit No. 2 is estimated at 99.5%.

Unit No.3: All major components and equipment have been installed. The only major activity on-going is the installation of electrical cable and instrumentation terminations which is estimated at 80% complete.

At present, Unit No. 3 has a scheduled fuel load date of March, 1987.

Construction completion of Unit No. 3 is estimated at 94.6%.

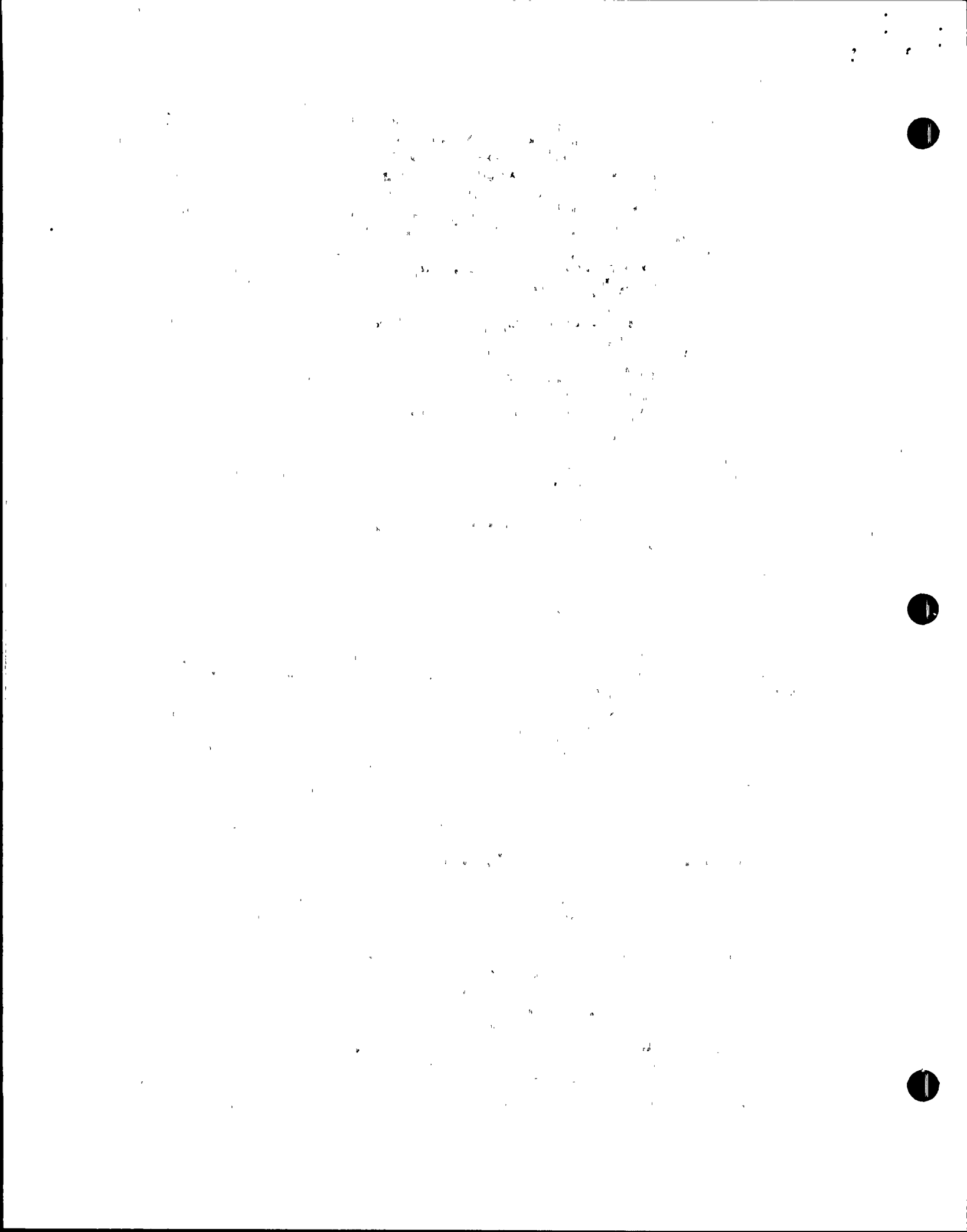
3. Review of Resident Engineering Activities

Background

As a result of problems identified at other Near Term Operating Licensees (NTOL) with resident engineering, the NRC contracted with Lawrence Livermore National Laboratory (LLNL), to examine both onsite and home office Bechtel engineering design activities. This report covers only the inspection of the onsite Bechtel design activities examined by the Senior Construction Resident Inspector and of activities examined during November 27 and 28, 1984, with the aid of Dr. L. Shieh of LLNL. The examination of Bechtel onsite and home office design activities was examined by a separate LLNL group (Dr. L. Shieh was not involved) and that group's findings will be issued by Region V in a separate report.

A. Resident Engineering Training Programs:

During a NRC team inspection conducted during the period of August 27 through September 15, 1984, (see NRC Report No. 50-528/84-38) the inspector examined the training programs for APS and Bechtel resident engineers. One violation was identified which concerned Bechtel engineering training, wherein 30 out of 160 Bechtel project engineers did not have training records to substantiate compliance with training requirements. On November 16, 1984, the licensee responded to the Notice of Violation. The licensee's response is currently under review by the staff. Additionally, the inspector interviewed eight Bechtel and seven APS resident engineers. None of the engineers expressed any dissatisfaction with their management or their ability to raise and resolve any safety issue through their



immediate supervision or through their organization. Further, all engineers interviewed expressed their satisfaction with their in-house training program.

B. Audits of Resident Engineering Design Activities

APS: During the NRC team inspection conducted during the period of August 27 through September 15, 1984, (see NRC Inspection Report No. 50-528/84-38) the inspector examined APS audits of Bechtel design activities. This examination found the audits to be comprehensive and of sufficient depth to identify and correct problems found in the areas being audited. However, as a result of discrepancies found during this reporting period with onsite Bechtel engineering, and as discussed below, the inspector determined that both the APS and Bechtel audit schedules do not audit certain areas of resident and home office engineering. The licensee, in response to the NRC Notice of Violation, on the training of resident engineers (see item A. above) has reached a similar conclusion, and has taken action to identify and correct other omissions in the Project Quality Assurance Audit Schedule.

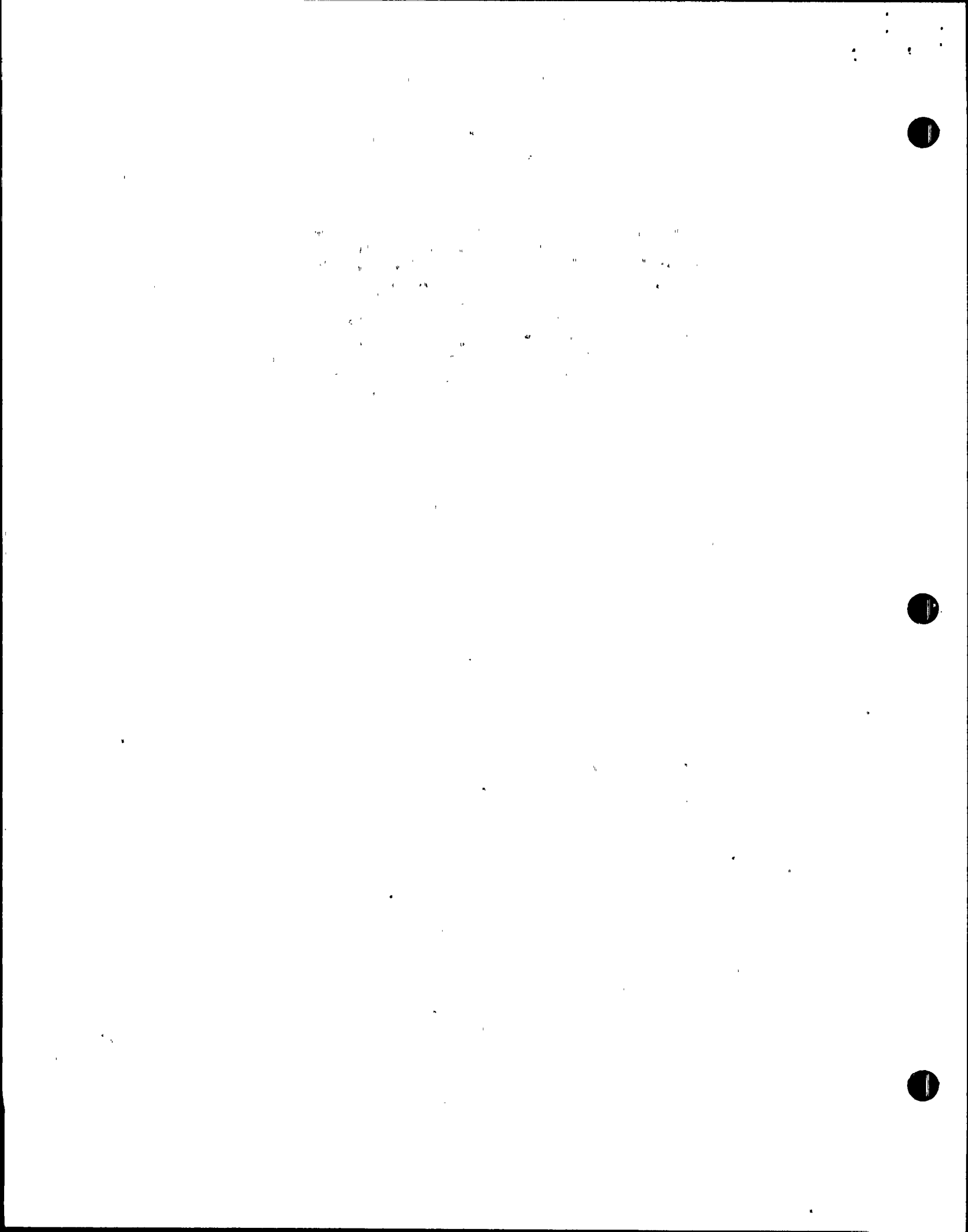
Bechtel: The inspector examined the following audits of Bechtel resident engineering conducted by the Bechtel Onsite Quality Assurance Organization:

<u>1984</u>	<u>1983</u>
◦ UA-S-84-12	◦ 88-S-83-6
◦ 77-S-84-17	◦ 80-S-83-41
◦ 107-S-84-18	◦ 86-S-83-46
◦ UA-S-84-30	◦ 19-S-83-47
	◦ 91-S-83-63
	◦ 59-S-83-67
	◦ UA-S-83-69

Also examined were 12 Corrective Action Reports (CAR) generated during 1983, and 30 CARs generated during 1984, which dealt with Bechtel engineering.

This examination determined that the Bechtel onsite audits are conducted by auditing the work against the Bechtel Work Plan Procedures/Quality Control Instructions (WPP/QCI's). Therefore, (for Bechtel onsite engineering) the only areas actively audited by Bechtel Quality Assurance are document control and engineering design changes (Field Change Requests [FCR's] and Design Change Packages [DCP's]). Additionally, a Bechtel home office auditing group exists, which audits resident engineering. An examination of three audits conducted by this group determined that they are auditing design calculations, though still from a programmatic viewpoint. The following audits were examined:

- Audit No. PVH-5/83-08, dated November 10, 1983
- Audit No. PVH-5/84-11, dated July 10, 1984
- Audit No. PVH-5/84-14, dated September 21, 1984



In conclusion, the inspector notes that the Bechtel audits are conducted in accordance with the approved Bechtel Project Quality Assurance Manual, and that the audits did identify and take adequate corrective action to prevent recurrence of identified problems, for the areas audited. Further, as a result of items identified with resident engineering and as discussed in paragraph C of this report, the licensee has expanded their audit program to include such areas as engineering training, engineering references and technical reviews of engineering calculations.

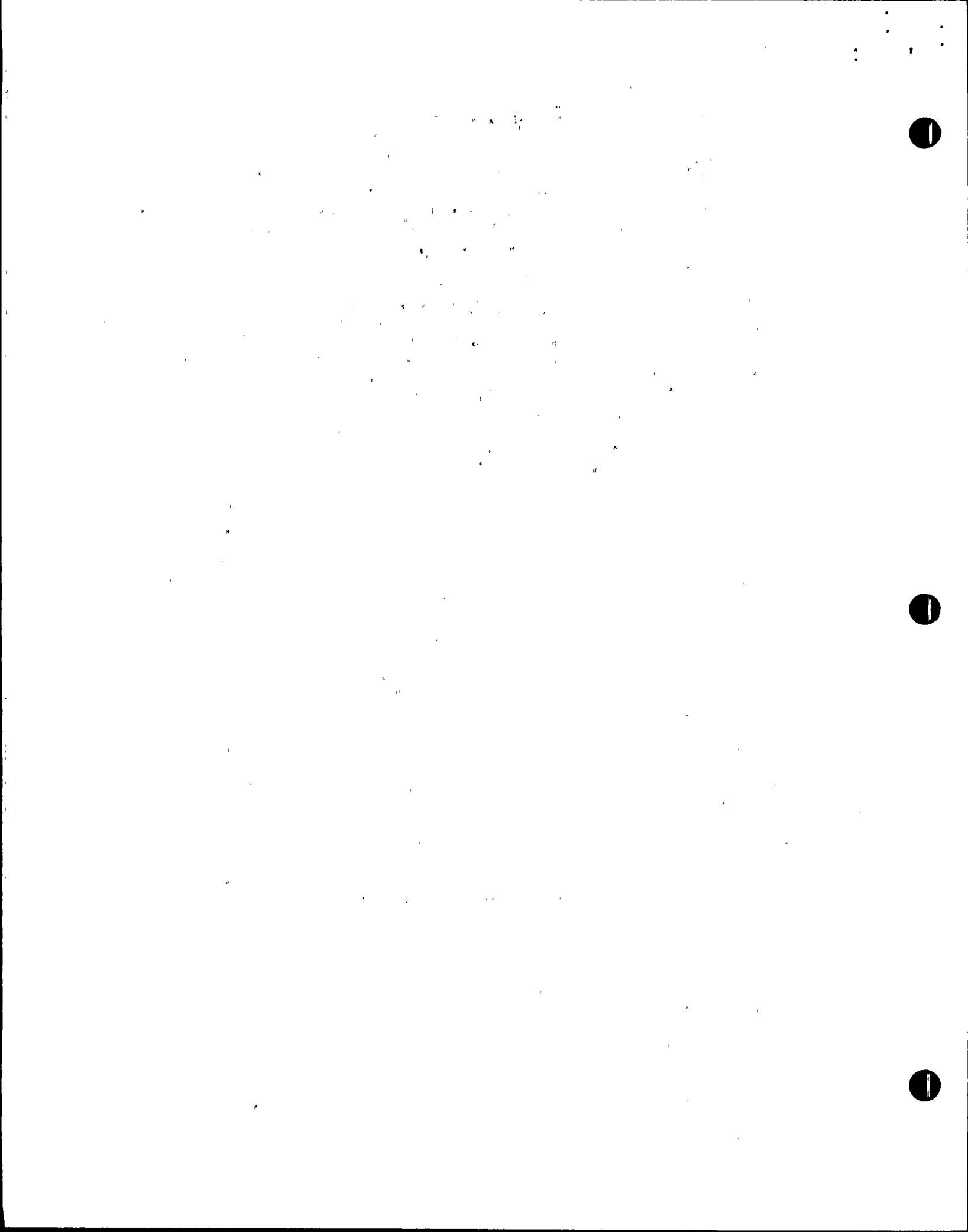
C. Onsite Design Organization Activities (Bechtel)

In this area, the inspector assessed the onsite organization's method for handling and resolving field initiated design changes to assure that onsite field design changes are later reconciled with prior calculations, and verified that resident engineers had proper and controlled procedures for performing design calculations.

Discussions with the Bechtel engineering staff determined that only the Piping and Pipe Support Group Supervisor has the authority to approve final design calculations. All other groups perform only preliminary calculations, with the final review and approval of calculations performed at the Bechtel home office. At present, all calculations for Unit Nos. 1 and 2 are complete. The only final calculations being performed by the Piping and Pipe Support Group are for modifications, which result in design changes for Unit Nos. 1 or 2. Calculations for Unit No. 3 are still being performed. The Piping and Pipe Support Group supervisor has the authority to approve final calculations, however, all calculations, whether final or preliminary, are reviewed at the Bechtel home office. On an approximately six month schedule, a stress analysis is performed to assure that any new hanger loads, or new hanger locations, have not affected the design basis.

On November 27 and 28, 1984, the inspector and a LLNL consultant, Dr. L. Shieh, examined the onsite design activities of the Piping and Pipe Support Group. This examination resulted in the identification of three discrepancies, as follows:

- ° A document termed, "Pipe Support Bulletin No. P/S-58", entitled, "Design Guide for Two Inch and Smaller Piping", was found in use by the engineers. No official sanction could be found for the use of this document at Palo Verde. P/S-58 was also found to be the first four chapters of a generic Bechtel document termed, "MS-100," which also had the same title as P/S-58. Additionally, it was found that in May, 1984, Bechtel decided to control this document by assigning it a Control and Revision Number (Calculation No. 13-MC-ZZ-007, Revision 0). In August, 1984, the records indicated that Calculation No. 13-MC-ZZ-007 was received onsite as a microfiche document, however, no attempt was made to notify all holders of P/S-58 that they now possessed an uncontrolled document, nor was any attempt made to provide all applicable users with controlled documents. Discussions with cognizant Bechtel engineers



indicated that the document (P/S-58) had been in use since February, 1978, to the present (November 1984) without any revisions or changes.

- ° On examining the various references used by the piping and pipe support engineers, a volume entitled, "Design Spectra Curves" was found. This volume contained an extract of design spectra curves for the different structures of the plant, which are contained in the Design Criteria Manual. The existence of this volume raised the question of its potential misuse, since no controls were in-place to assure that the volume was current with respect to the design spectra curves contained in the controlled copy of the Design Criteria Manual.
- ° The third problem involved a question by Dr. L. Shieh concerning one of the engineering calculations, wherein a reduction factor (the "instructurel ratio") was apparently also used for the piping response being calculated. The reduction factor is defined as the ratio of OBE instructure spectral acceleration (1% damping) to SSE instructure spectral acceleration (2% damping). Bechtel computed the SSE piping response based on the envelope of the instructure response spectrum of 2% damping with 2% piping damping by using the ME-101 computer code. Bechtel then applied the reduction factor to this SSE piping response to obtain OBE piping response. This approach is conservative only if the reduction factor is maximum within the frequency range of the pertinent piping system. The concern was whether Bechtel used the maximum value to adjust the calculated piping response.

Discussions with licensee management representatives on the above three items indicated, that all uncontrolled documents would immediately be purged from the piping and pipe support trailer or clearly labeled as uncontrolled documents. All engineers would be polled to determine if the uncontrolled design spectra curves were used instead of the curves contained in the Design Criteria Manual.

On December 7, 1984, a meeting was held in Walnut Creek, wherein, Bechtel responded to these inspection findings and also, questions raised by the LLNL group reviewing the Bechtel home office design review process. Bechtel and APS management officials stated that all uncontrolled documents had been purged from the onsite resident trailers and from the home offices. A review conducted of all calculations performed by the site engineering group in question, from January to November, 1984, determined that all calculations had been subsequently revised at the Bechtel home office. Therefore, the question of the possible misuse of the uncontrolled design spectra curve volume was determined not to be a concern. Additionally, since all calculations performed by this onsite group were revised, Dr. Shieh's question was also determined not to warrant further concern. However, Bechtel's review of the engineering technique, that led to Dr. Shieh's question, determined that the appropriateness of the technique needed further clarification. Bechtel stated that they would provide further



clarification on this subject in writing to the NRC by December 17, 1984.

The licensee also committed, that their own and Bechtel's audit checklists would be revised to include the resident engineering activities previously omitted. These licensee stated actions, including the response to Dr. Shieh's question, will be reviewed and reported in a future inspection report.
(Followup Item No. 50-528/84-45-01))

No violations or deviations were identified.

4. Followup to Allegation No. RV-84-A-112

Characterization: Falsification of Test Data on Air Balancing for Heating, Ventilating and Air Conditioning HVAC Systems

On October 23, 1984, an anonymous individual telephoned the Palo Verde NRC Resident Inspector's office alleging that three individuals might be falsifying test data on the air balancing for the HVAC System. The three named individuals were alleged to work for Engineering Air Balancing Company (EAB), the company performing the air balancing for the HVAC system. The anonymous individual stated that test data taken at night was apparently changed during the day shift when the three named individuals were on duty.

Implied Safety Significance to Plant Design, Construction, or Operations:

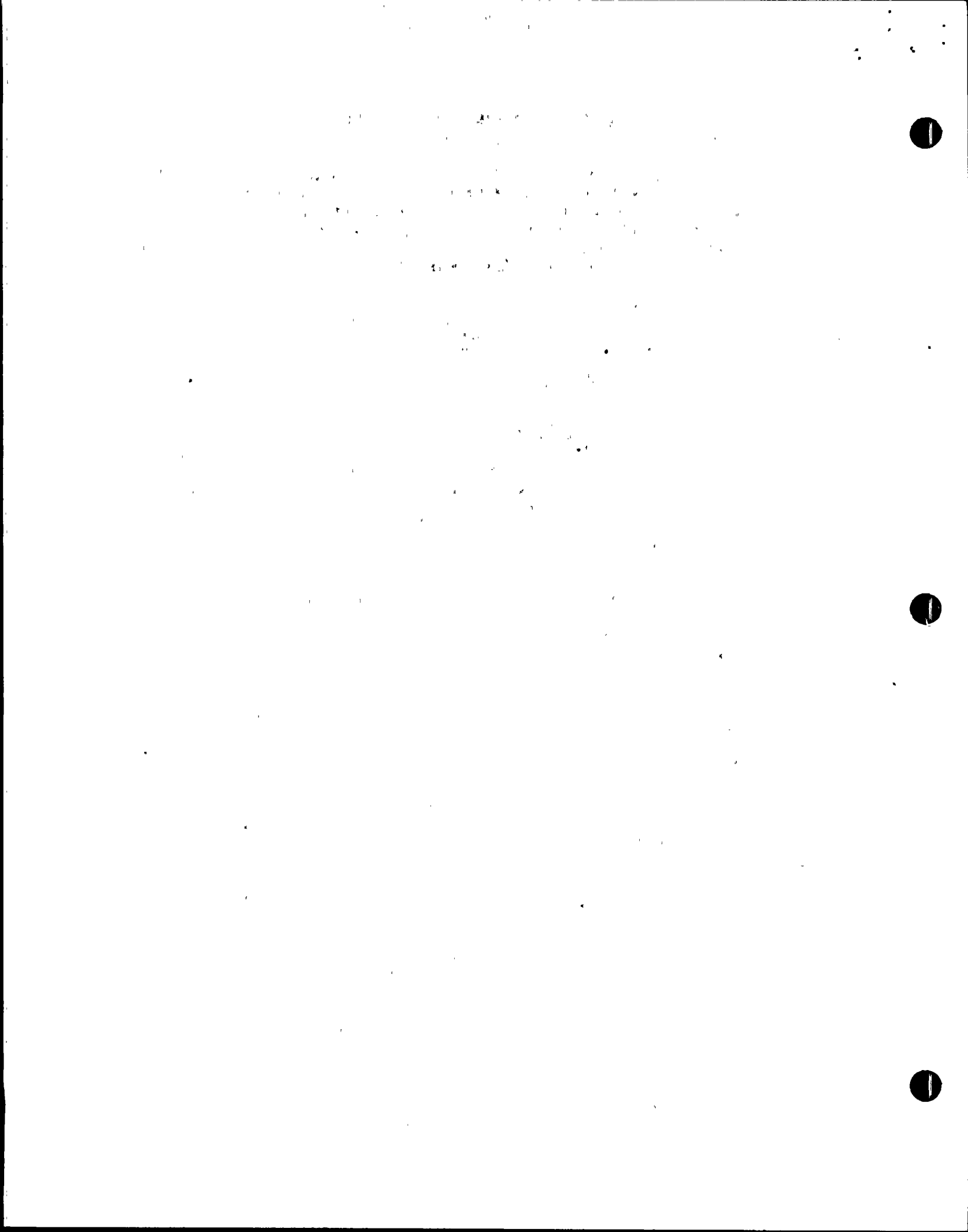
Failure of the HVAC System to perform as intended could affect the safe operation or the safe shutdown of the plant during an emergency.

Assessment of Safety Significance:

The inspector, in order to resolve this allegation took the following course of action:

- . Reviewed the scope of work and responsibility for Engineering Air Balance Company (EAB) at Palo Verde.
- . Reviewed the qualification and certifications of personnel working for EAB.
- . Reviewed the Bechtel/APS oversight activities with respect to EAB work activities.
- . Reviewed the test results generated by EAB during the months of April thru October, 1984. Also, payroll records of employees from April thru October, 1984, were reviewed.
- . Informally interviewed the three named individuals, alleged to have been altering the test data.

The inspector found that EAB, during the course of initially setting up a system for balancing, generated a great deal of preliminary data. When



EAB decided that a system had been brought into conformance with design requirements, EAB notified APS and Bechtel to witness the final set of data, and this data became the permanent record and all previous data was discarded.

Discussion, with EAB, Bechtel, and APS cognizant individuals indicated that they were aware that all data generated prior to the final data was considered preliminary information. All individuals contacted noted that EAB's Contract Specification No. 13-MM-634 and the Palo Verde Station Manual Procedure No. 91FB-OXX01 both stated that interim data had no value and was to be discarded. Further, the inspector found that when EAB notified Bechtel and APS to witness the final data results, all individuals recorded the same information, at the same time. The inspector verified this by examining final test results for three systems in Unit No. 1 and comparing the data recorded and retained by EAB, Bechtel and APS. To date, EAB had only generated final data on HVAC systems for Unit No. 1, with only preliminary data being generated for Unit No. 2.

In order to determine if EAB was generating final test results at night, the inspector examined payroll records of EAB employees, and confirmed that EAB personnel had not worked at night since April, 1984.

Lastly, the inspector determined that only two of the named individuals worked for EAB, with the third individual being employed by APS. Informal discussions with these individuals indicated that they were knowledgeable individuals and aware of their responsibility, especially with regard to status of the preliminary and final test results.

Staff Position:

The inspector found no evidence to conclude that final test results had been falsified. The allegation was not substantiated and is closed.

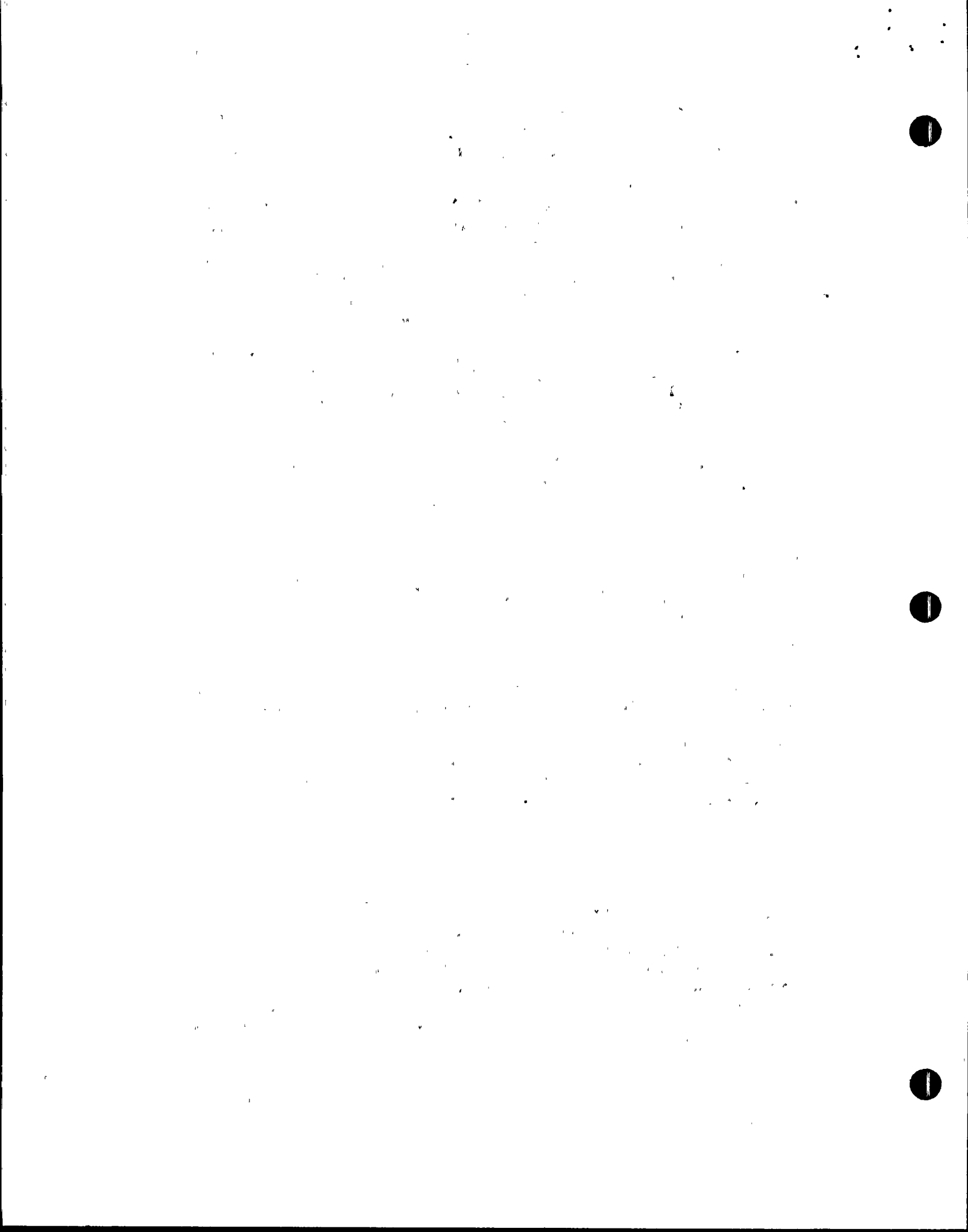
However, the inspector did find discrepancies with EAB's Quality Program and Bechtel's monitoring of EAB Quality Program. This item is discussed further in paragraph 5 of this report. These discrepancies do not change the conclusion regarding the allegation as discussed above.

No violation or deviations were identified.

5. Subcontractor Program Review

While investigating an allegation regarding falsification of HVAC air balance test results, (see paragraph 4) the inspector found that the Engineering Air Balance Company's (EAB) procedure for the qualification and certification of personnel did not make reference to ANSI N45.2.6, did not conform with certain ANSI N45.2.6 documentation recommendations, and the procedure as written did not clearly define what the qualification and certification requirements were for Level I, II and III test personnel.

A review of EAB's Contract Specification No. 13-MM-634, indicated that paragraph D.3.1 included ANSI N45.2.6-1973, "Qualifications of

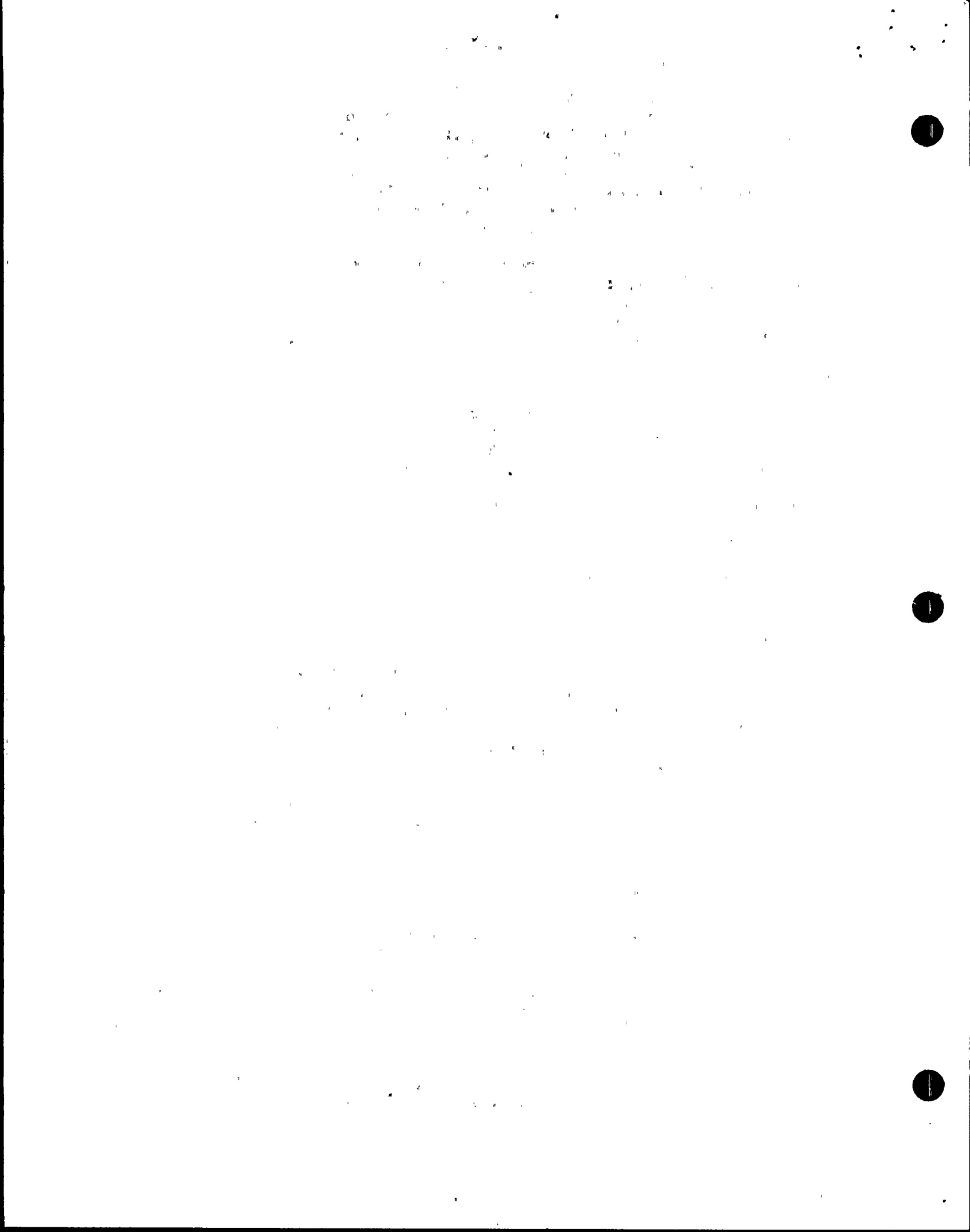


Inspection, Examination and Testing Personnel for the Construction Phase of Nuclear Power Plants," as one of the applicable codes. On December 2, 1982, a Specification Change Notice (SCN) No. 3253 changed the applicable year of ANSI N45.2.6 from 1973 to 1978. The difference between the different years of the standard, was that the 1978 version of the standard decreased the educational and experience requirements for the three levels of certification as described in the standard.

EAB's Quality Assurance Procedure No. EAB-634-Q10, "Qualification and Certification Program," Revision 0, dated March 19, 1984, described an internal EAB four year training program to qualify personnel in testing, adjusting and balancing of HVAC systems. The capability of other personnel, who have not completed the internal training program for certification as a Level I, II or III testing person, was not clearly defined in the procedure.

Discussion with EAB supervisory personnel indicated that at Palo Verde, due to union agreements, EAB utilized local sheet metal workers and not their own personnel. However, EAB stated that they had initially, and had continued to assure that all local union members who worked for EAB were experienced in HVAC work and exceeded the requirements for Level I or II certification as defined in ANSI N45.2.6. The inspector's review of personnel records indicated that all personnel who worked or who had worked for EAB complied with the requirements for Level I or II certification in accordance with ANSI N45.2.6-1978. A review of EAB supervisory personnel records indicated that all supervisors had met the requirements for Level III certification as defined in ANSI N45.2.6-1978. However, other programmatic problems were found during this inspection as described below.

- During the review of the personnel qualification records, the inspector noted that the requalification date on the record simply included a statement, which stated that the certification was good, "until re-qualification". ANSI N45.2.6 states that records shall include, "The date of certification and the date of certification expiration."
- No records of physical examination were contained in the records. The usual physical examination record for persons certified to ANSI N45.2.6 is an eye exam, with the requirement that a re-examination be performed within one or two years.
- A review of the equipment calibration logs, indicated the use of "white-out" (in one instance), mathematical errors, and blanks in the monthly calibration comparison logs. The EAB procedure for calibration calls for a standard which is calibrated and has documentation traceable to the U.S. Bureau of Standards (NBS). The standard is used to compare, on a monthly basis, equipment used in the field. The discrepancies found tended to fall into the category of sloppy bookkeeping and did not affect equipment or the use of the equipment in field.
- A review of the Bechtel Audit Schedule indicated that EAB was not on the Bechtel audit schedule and had not been audited by Bechtel.



Discussion with the licensee indicated that a licensee Audit No. 84-028 dated November 20, 1984, had also discovered this item, and an audit of EAB was started on November 30, 1984.

The inspector expressed his concern, at the NRC management meeting held with licensee representatives on December 13, 1984, that this contractor was apparently able to start safety-related work activities without a thorough audit of their program and procedures. However, based on the licensee's own identification of the Bechtel audit schedule deficiency and a review of the preliminary licensee audit results, the inspector considers that the programmatic discrepancies with EAB are being identified and corrected, including the three items discussed above. The inspector will review the final results of this audit to assure that the licensee has taken adequate and appropriate corrective action. (Followup Item No. 50-528/84-45-02)

No violations or deviations were identified.

6. Technical Adequacy of Engineering Dispositions

The licensee established a program to assure that engineering dispositions for the various documents used onsite had been processed in accordance with established program procedures and that the dispositions had an adequate basis and were technically supportable. The licensee's program examined the following documents:

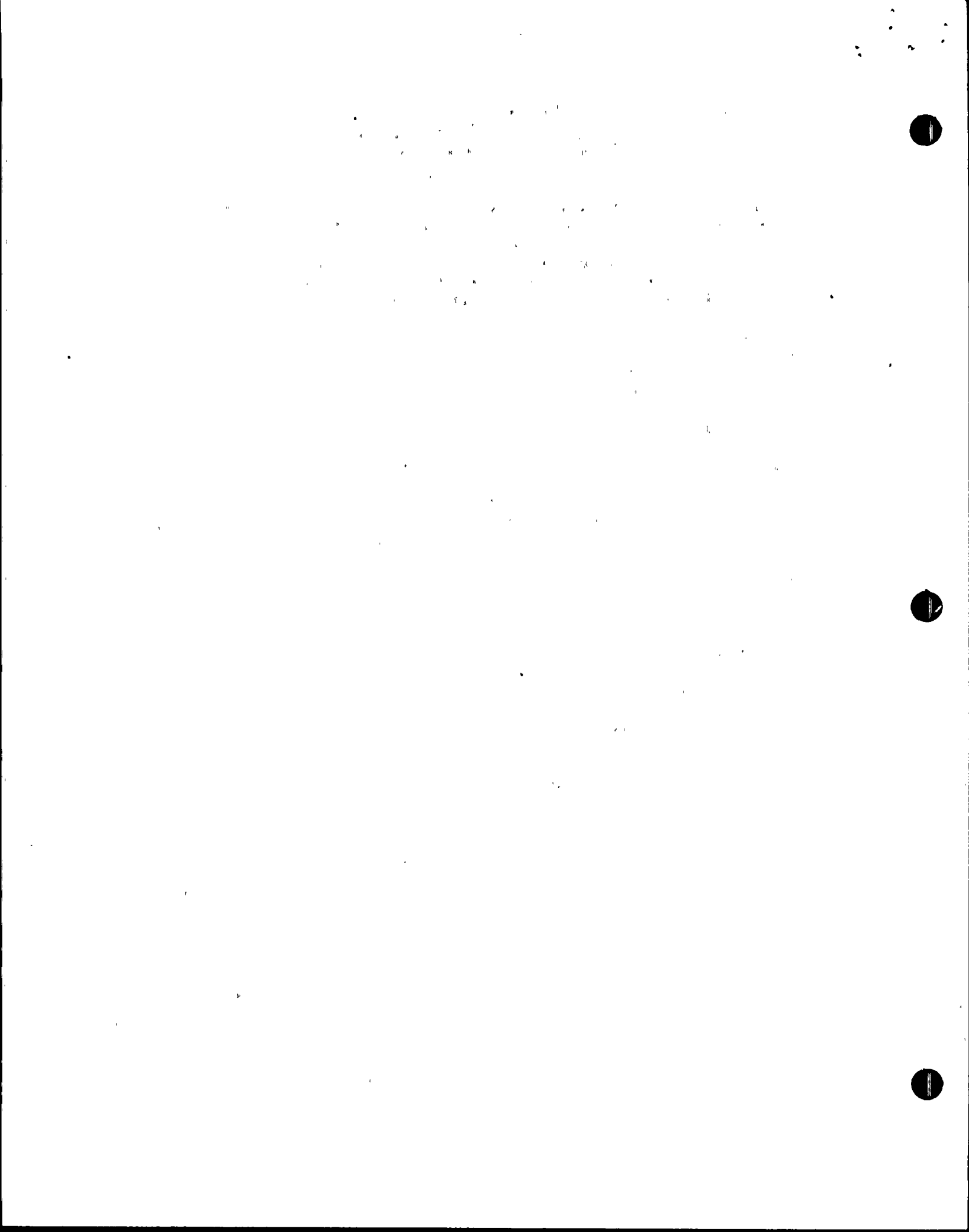
- Startup Field Reports (SFR)
- Nonconformance Reports (NCR) (Construction, Startup and Operations)
- Work Orders (WO)
- Startup Work Authorizations (SWA)
- Modification Change Notices (MCN)
- Outstanding Items List
- Startup Test Log
- APS Operations Log
- Engineering Evaluation Requests (EER)
- Field Change Requests (FCR)
- Design Change Packages (DCP)
- Subcontractor Nonconformance Reports
- APS Corrective Action Requests (CAR)
- Bechtel Corrective Action Requests (CAR)

The inspector determined that the program accomplished its intended objectives and that a sufficient number of documents had been reviewed to assure that the remaining documents had been properly handled in accordance with the program requirements.

No violations or deviations were identified.

7. Information Notice No. 84-30: HVAC Units Supplied by the Bahnson Company

Information Notice No. 84-30 discusses potential deficiencies with safety-related HVAC units supplied by the Bahnson Company. Discussion with licensee personnel indicated that by letter dated July 31, 1984, the



licensee stated that six HVAC units supplied by the Bahnson Company are installed in Units Nos. 2 and 3. Two HVAC units are installed in Unit No. 2 and four HVAC units are installed in Unit No. 3.

Inspections by the resident inspector indicated that all HVAC units in Units No. 1, 2, and 3 are identified by a tag indicating manufacture by a company called "CTI-Nuclear". CTI-Nuclear apparently subcontracted the work of a number of HVAC units to Bahnson Company. The inspector will review purchase orders for the HVAC units to assure that no Bahnson supplied HVAC units are installed in Unit No. 1 and no discrepancies, such as those identified in the Information Notice, exist with HVAC units installed in Unit No. 1.

The results of this inspection will be reported in the next resident inspector's report.

No violations or deviations were identified.

8. Inspection Tours (Plant and Site)

At various times during this inspection period, the inspector toured the site in order to observe general housekeeping conditions, care and preservation of equipment, handling of components, tagging and identification of material, absence of welding electrode stubs lying around the various work areas, presence of caps over pipe openings not being worked on, and presence of cribbing under stored equipment.

No violations or deviations were identified.

9. Management Meeting

On December 13, 1984, the inspector met with the licensee and Bechtel representatives identified in Paragraph 1. During the meeting, the inspector summarized the scope of the inspection activities and reviewed the inspection findings as described in this report.

