

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report Nos. 50-528/84-59, 50-529/84-39 and 50-530/84-28

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

License Nos. NPF-34, CPPR-142 and 143

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

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

Inspection at: Palo Verde Site, Wintersburg, Arizona

Inspection conducted: November 26, 1984 through January 25, 1985

Inspectors: RC Jensen 3/27/85  
for J. Eckhardt, Senior Resident Inspector Date Signed

RC Jensen 3/27/85  
for A. Hon, Reactor Inspector Date Signed

Approved By: RC Jensen 3/27/85  
for L. F. Miller, Jr., Chief Date Signed  
Reactor Projects Section 2

Summary:

Inspection on November 26, 1984 - January 25, 1985 (Report Nos. 50-528/84-59  
50-529/84-39 and 50-530/84-28)

Areas Inspected: Routine follow-up of various allegations. This inspection involved 184 inspection hours by two inspectors onsite and in office.

Results: No items of noncompliance or deviations were identified.

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## DETAILS

### 1. Persons Contacted

\*W. Ide, APS Corporate QA/QC Director  
N. Hallas, APS Quality Assurance Engineer  
D. Wittas, APS Quality Assurance Engineer

The inspectors also interviewed other licensee and contractor engineers, technicians, and craft workers during the inspection.

### 2. Inspection Methodology

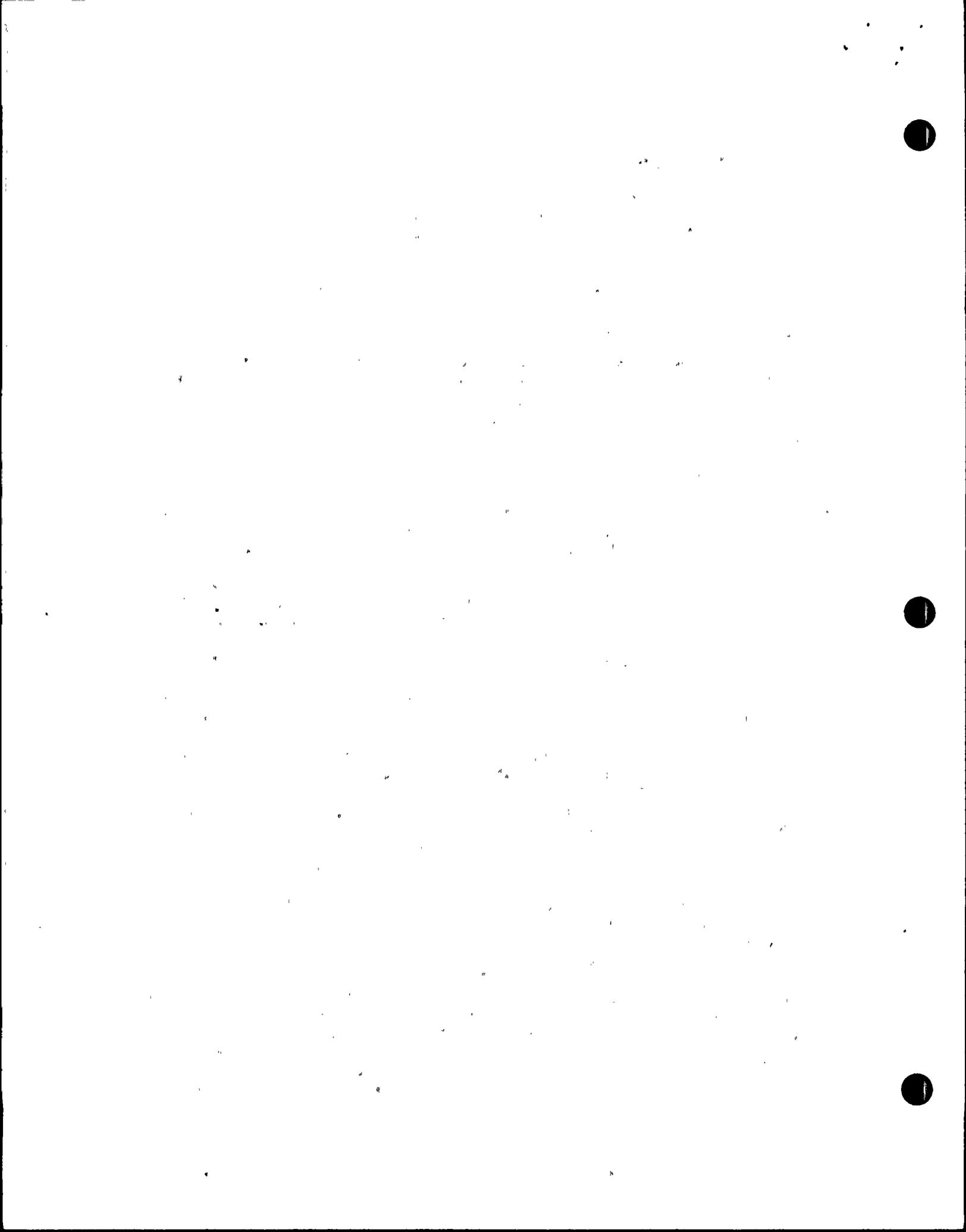
The allegation characterization statements contained in this report are either a paraphrasing of the staff's understanding of the alleged's concern or statements taken from the allegation source documents. The characterization statements do not represent a staff assessment, conclusion, or position.

APS first received the allegations from an alleged. This report refers to these allegations as the "A" list. NRC Region V interviewed the alleged. During this interview on August 23, 1984, the alleged provided a list of allegations (without detailed explanation of their significance or meaning). This list of allegations is referred to as the "B" List. An Allegation Board meeting was held on November 9, 1984, and summarized the key technical issues, which are referred to as the "C" List. This inspection addressed most of the items from these three lists.

APS originally received most of these allegations, and investigated them extensively. The staff reviewed APS's findings, and conducted independent inspections where necessary. The allegations were reviewed in three categories. The first category was those allegations which were investigated, and substantiated by APS, but which clearly did not appear to be safety significant. The second category was those allegations which were investigated, but not substantiated by APS. These two categories were relatively simple to review, and, thus, are concisely summarized in this report. The third category was those allegations which may have had potential safety significance. The assessments of these are more detailed.

### 3. Substantiated, But Not Safety Significant Allegations

The staff found that the following allegations were addressed and resolved by APS as a result of the APS investigation. The staff's assessment of the allegations below centered primarily on assessing the completeness and adequacy of the rather extensive APS evaluations. The staff found that the allegations below were deemed, by APS, to be not potentially significant to the design, construction or operation of the plant. The staff considers this position to be appropriate and acceptable. Although the APS evaluations of these issues was extensive, only a brief statement of the APS conclusion is provided below. The staff's position is that the technical issues were acceptably addressed by the APS evaluation and that APS management acted in a responsible



manner in the conduct of activities addressed by the allegations below. No further staff action on these allegations is required.

a. Characterization

A calibration equipment inventory has never been taken ("A" List No. 1).

Results of APS Investigation

This was not specifically required by the Quality Assurance requirement of Appendix B to 10 CFR 50.

b. Characterization

Responsibility for calibration laboratory training was unclear ("A" List No. 8).

Results of APS Investigation

Bechtel's calibration laboratory was staffed principally by APS personnel, and Bechtel was not responsible for all of their qualification and training. However, these APS personnel went through an APS screening and training program, including testing of personnel qualifications. When special or new procedures are involved, on-the-job training was provided.

c. Characterization

Quality Control inspects quality class items only ("A" List No. 15).

Results of APS Investigation

10 CFR 50, Appendix B and ANSI N45.2 only require that safety-related equipment (Quality Class) be inspected.

d. Characterization

Bolts were put in to a concrete mixer with sand to remove rust ("A" List No. 51).

Results of APS Investigation

This item appears to be the same as an allegation investigated by the NRC already, and documented in Inspection Report 50-528/84-04, 50-529/84-04 and 50-530/84-03. That allegation was substantiated. However, it presented no safety significance because those bolts were used on a building that is not safety-related.

e. Characterization

Personnel who calibrate optical equipment were not certified ("A" List No. 57).

Results of APS Investigation

APS verified that the individual who performed optical calibration was trained and qualified, but not certified. There was no requirement, or APS regulatory commitment that the person performing optical calibration should be certified.

4. Unsubstantiated Allegations

The following allegations, which appeared to be potentially significant (if true), have been investigated, and found to be unsubstantiated, by APS. The staff reviewed APS's investigation and concurred with APS's determination that they were unsubstantiated. No further NRC action on these allegations is required.

a. Characterization

"Crows feet" were not used properly ("A" List No. 11).

Results of APS Investigation

When a "crows foot" was used with a torque wrench, the actual torque was adjusted to the calculated value based on the standard force-distance formulae. These formulae from the torque wrench supplier were verified by tests, and it is a common industrial practice to use them.

b. Characterization

Torque multiplier calibration procedure was applied incompletely ("A" List No. 12).

Results of APS Investigation

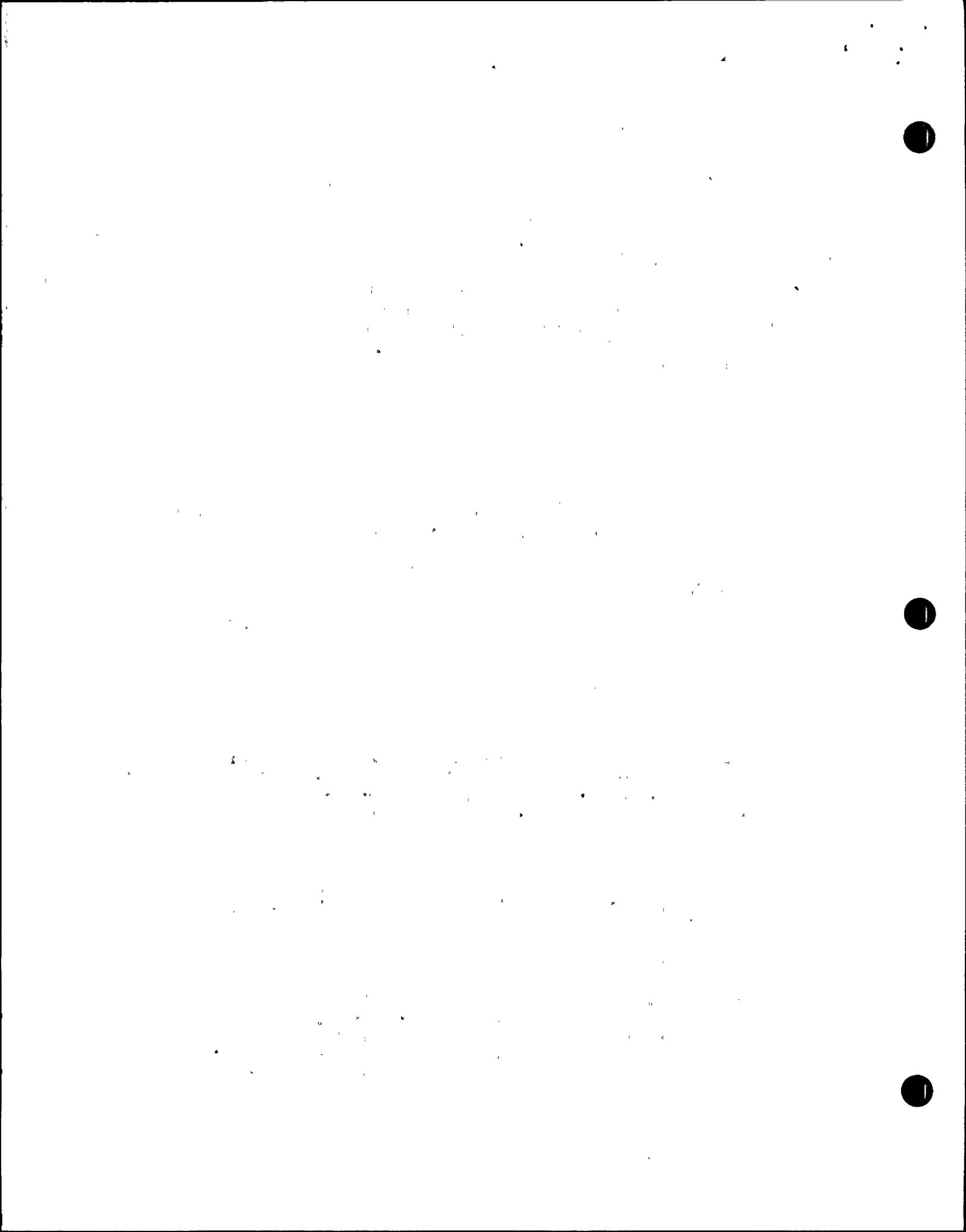
The Bechtel calibration laboratory calibrated the torque multiplier as part of the torque wrench. The APS calibration laboratory used the theoretical multiplication factor for correction instead. The APS practice was acceptable since it was verified by bench test.

c. Characterization

The "Point-of-Click" method for using the Torque Wrench was inadequate to indicate the torque applied ("A" List No. 13, "C" List No. 12).

Results of APS Investigation

Apparently, the allegor referred to a Federal Specification GGG-W-686b, "Torque Wrench," February 5, 1963. According to this specification, the torque applied shall be indicated visually, audibly, or by a combination of both. However, neither APS nor the commercial nuclear industry in general were committed to this specification. Furthermore, use of a ratcheting type torque wrench



("point of click" type) is a common practice in commercial nuclear plant construction.

d. Characterization

Electropolishing of the Fuel Pool liner was needed because it was damaged by improper usage of flapper wheels by Bechtel ("A" List No. 14).

Results of APS Investigation

The electro-polishing process was not used to remove flapper wheel scratches but for general smoothness of the surface. The use of wheels is a standard industry practice and was authorized per procedure 13-CM-340.

e. Characterization

Craft workers lacked knowledge of M&TE (measuring and test equipment) and tools ("A" List Nos. 20, 52, "C" List No. 11).

Results of APS Investigation

The APS investigator monitored the following M&TE tools in use during November 9 - November 15, 1984:

- ° Manual torque wrenches, hydraulic torque wrenches and adjustable air impact wrenches.
- ° Skidmore-Wilhelm bolt tension indicators.
- ° Manual and hydraulic crimp tools.
- ° Cable pulling tensionometers.

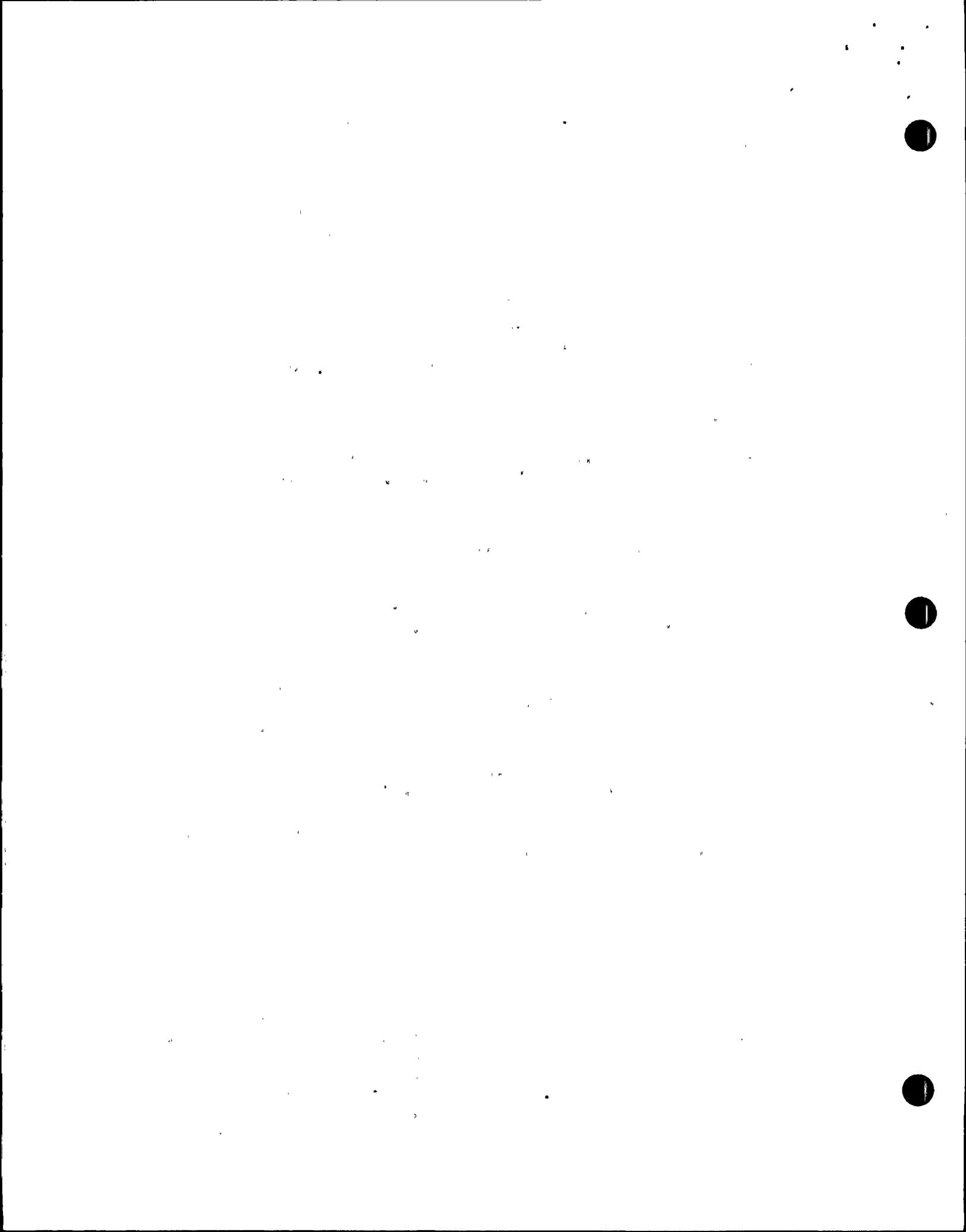
Craft workers observed included iron workers, electricians, pipefitters and carpenters. They were either familiar with the use of M&TE, or knew how to contact other craft workers, including their foreman, for the detailed use of a particular tool. No improper tool usage was observed.

f. Characterization

Vendor performed calibrations beyond its capability ("A" List No. 23).

Results of APS Investigation

This allegation apparently referred to the calibration of megohm meters by Arizona Electronic Standards. The vendor's calibration capability for these meters was thought by the allegor to be up to  $10^{12}$  ohms, while the megohm meter to be calibrated was capable of accuracy to  $10^{14}$  ohms. APS found that the maximum requirement used at the Palo Verde job was  $10^{12}$  ohms. Furthermore, the vendor indeed



had the capability to calibrate ohm meters in the  $10^{12}$  to  $10^{14}$  ohms range.

g. Characterization

The bolt torque audit using a calibrated torque wrench was inadequate. Only an electronic torque measurement instrument, GSE Model 238, should be used ("A" List Nos. 24, 25, 26, "B" List No. 4) to check bolt torque.

Results of APS Investigation

Using a calibrated torque wrench to check breakaway torque is a common industry practice, and was appropriate as long as the wrench selected were calibrated, of the proper size, and were used by qualified personnel.

h. Characterization

Back-up nuts were improperly used as locking fasteners ("A" List No. 27, "B" List No. 27).

Results of APS Investigation

The practice at Palo Verde was to first install and torque the regular nut to carry the load, then a smaller nut was installed as locking device. This is a common industry practice to install nuts and bolts. (The allegation suggested the smaller locking nut should be installed before the regular nut).

i. Characterization

Reactor Coolant Pump bolts were rusty ("A" List No. 54).

Results of APS Investigation

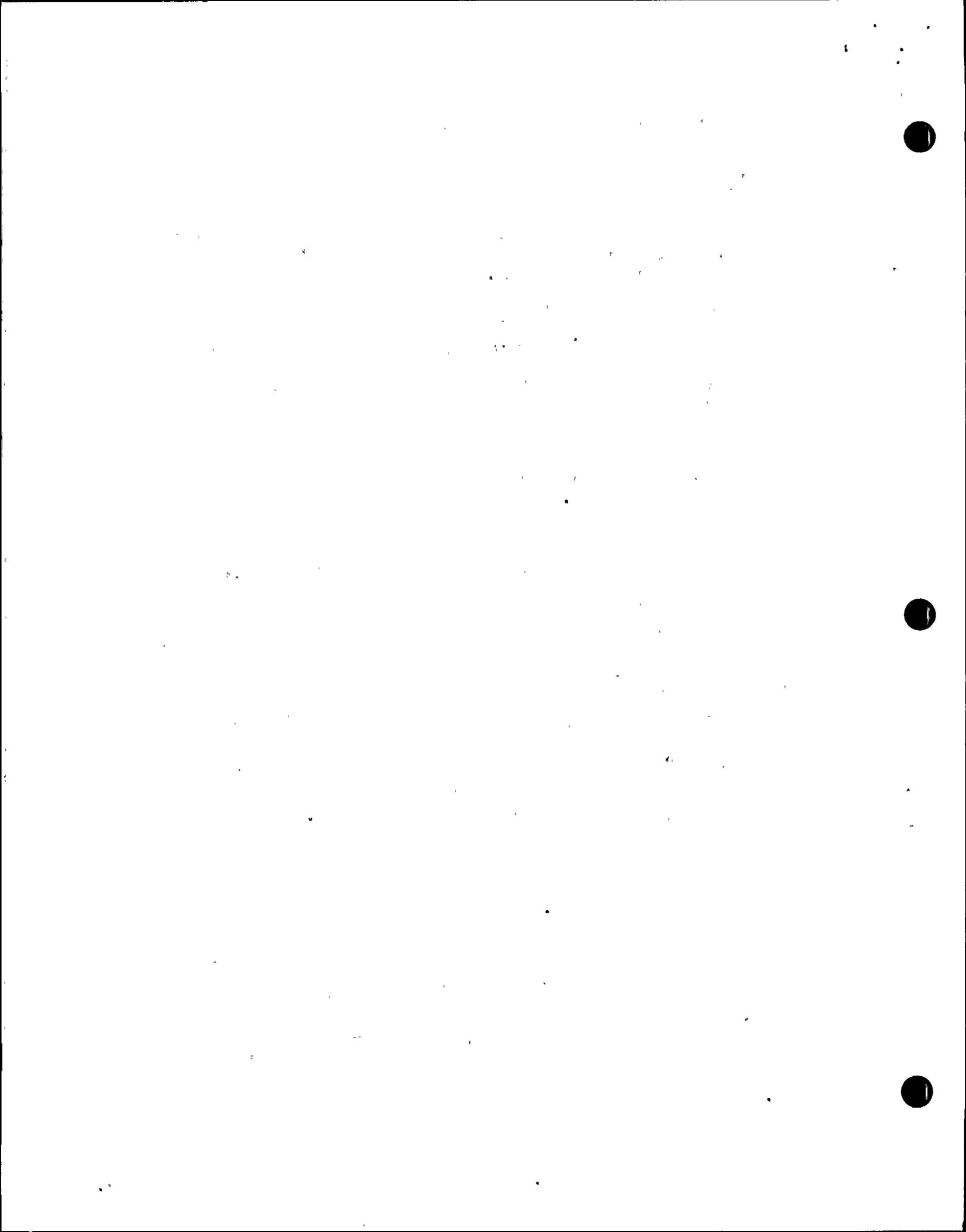
There was no evidence of rusty bolts when the Reactor Coolant Pumps were disassembled after hot functional testing.

j. Characterization

Air impact wrench bolt torquing was inadequate when low air pressure was used ("A" list No. 58).

Results of APS Investigation

The air impact wrenches used at Palo Verde were adjusted to have the ratchet slip at the desired tension as verified on the Skidmore-Wilhelm bolt tension indicator. The ratchet slipping can be heard and felt by the user. Low air pressure simply slows down the ratcheting process, or stops it completely before the ratchet slips. Thus, low air pressure would not have been resulted in inadvertently undertorqued bolts.



k. Characterization

Field Test Instrument Requests (FTIR) were used on only Safety-Related Equipment ("A" List No. 62).

Results of APS Investigation

Procedures WPP/QCI No. 7.0 and PCN No. 44 to WPP/QCI No. 7.0 show that FTIR's are applicable to all Quality Classes (Q, S and R). Sample records reviewed showed that the procedures were being followed.

l. Characterization

0-10 inch/pound torque wrenches were not calibrated properly by the National Calibration Laboratory because they did not have the required equipment to calibrate them ("A" List No. 65).

Results of APS Investigation

The National Calibration Laboratory was audited by Bechtel on July 18, 1984. National Calibration Laboratory was found to be capable of calibrating torque wrenches in the specified range.

m. Characterization

Pressure gauges on selected torque wrenches should be calibrated to one percent accuracy which will give an accuracy of five percent for the wrench. When the gauge was downgraded to a four percent accuracy requirement, it resulted in only 20 percent accuracy for the wrench ("A" List No. 66, "B" List No. 5, "C" List No. 8).

Results of APS Investigation

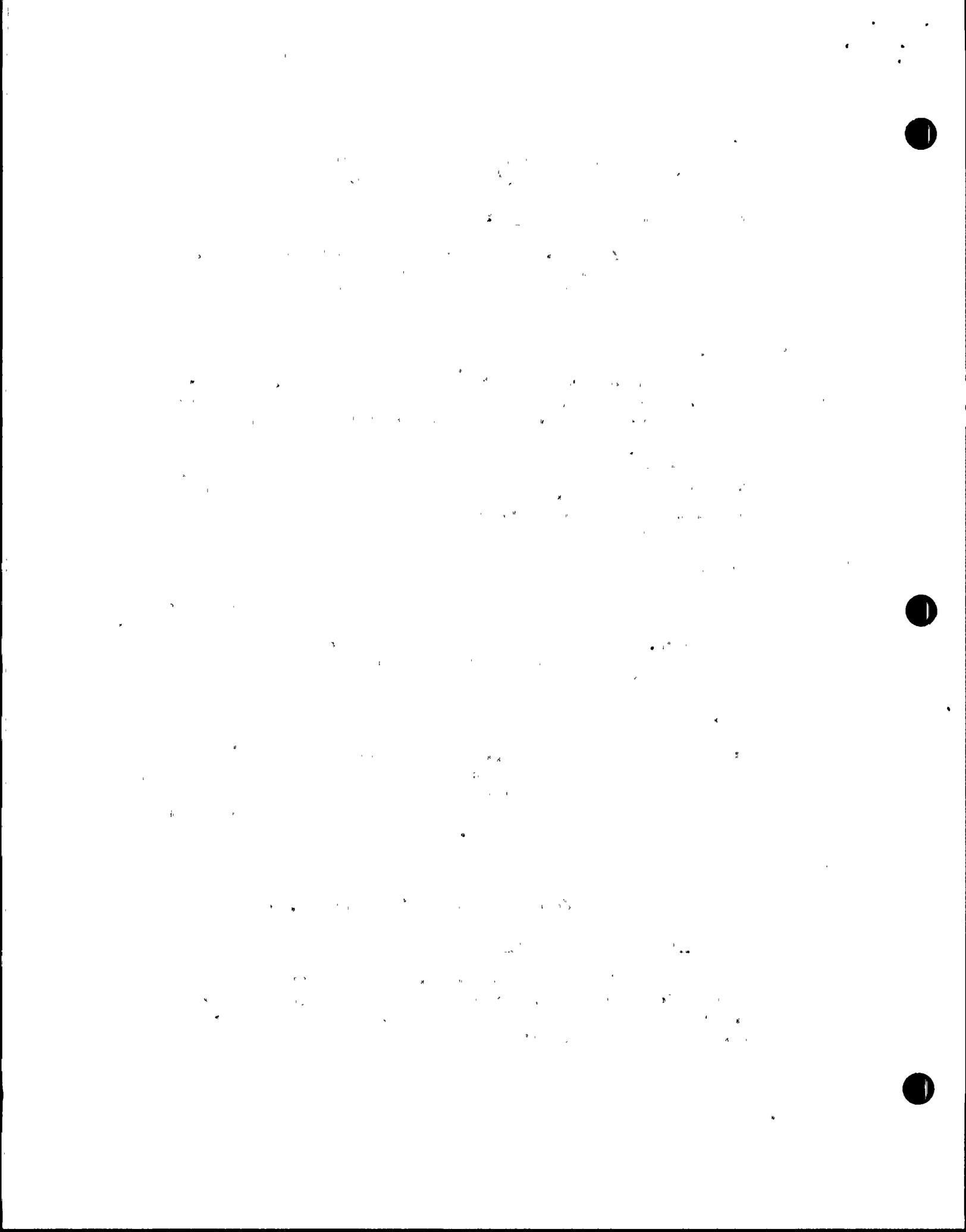
All hydraulic torque wrenches in the Bechtel M&TE laboratory and the field were reviewed. They were found to be fitted with gauges of one percent or better accuracy. Gauges degraded to four percent were never used on hydraulic torque wrenches due to their accuracy being greater than one percent.

n. Characterization

There were no procedures for optics ("A" List No. 5).

Results of APS Investigation

The APS investigator audited the optical facility in the Bechtel Calibration Laboratory. He found three procedures related to the Bronson Model 270 BN, which was used to calibrate optical maintenance and test equipment.



5. Allegation No. "A" List Nos. 2, 30, 61, "C" List No. 12

a. Characterization

Improper use of tools resulted in a high incidence of reported damaged or mishandled Maintenance and Test Equipment (M&TE).

b. Implied Significance to Plant Design, Construction or Operation

Inadequate installation could result from improper tool usage.

c. Assessment of Safety Significance

APS investigated this allegation, and reviewed Defective Instrument Reports (DIRs) issued by M&TE calibration lab during the August 22, 1984, to October 25, 1984, period. It was found that 13 of the 56 DIRs identified damage or mishandling as a cause of the defect. This appeared to be an unusually high percentage, and a Corrective Action Report CAR No. CE-84-0298 was issued to preclude recurrence. The field engineer evaluated these DIRs, and accepted or rejected the work performed. The APS justifications appeared proper to the inspector. Furthermore, APS issued CAR CA-84-0344 on November 12, 1984, for an extensive audit of completed Construction Inspection Plans. This audit will identify M&TE used for Quality Class "Q" work (see item 7 of this report). Thus, the work performed outside the August 22 - October 25, 1984, period will also be evaluated for any possible effect of damaged M&TE.

d. Staff Position

The staff concurs with APS that this allegation was substantiated in that improper use of tools resulted in tool damage. However, because the work performed by these tools was evaluated for acceptance or rejection, no safety significance has yet been attributed to this allegation. Nevertheless, APS should complete the resolution of CAR CA-84-0344.

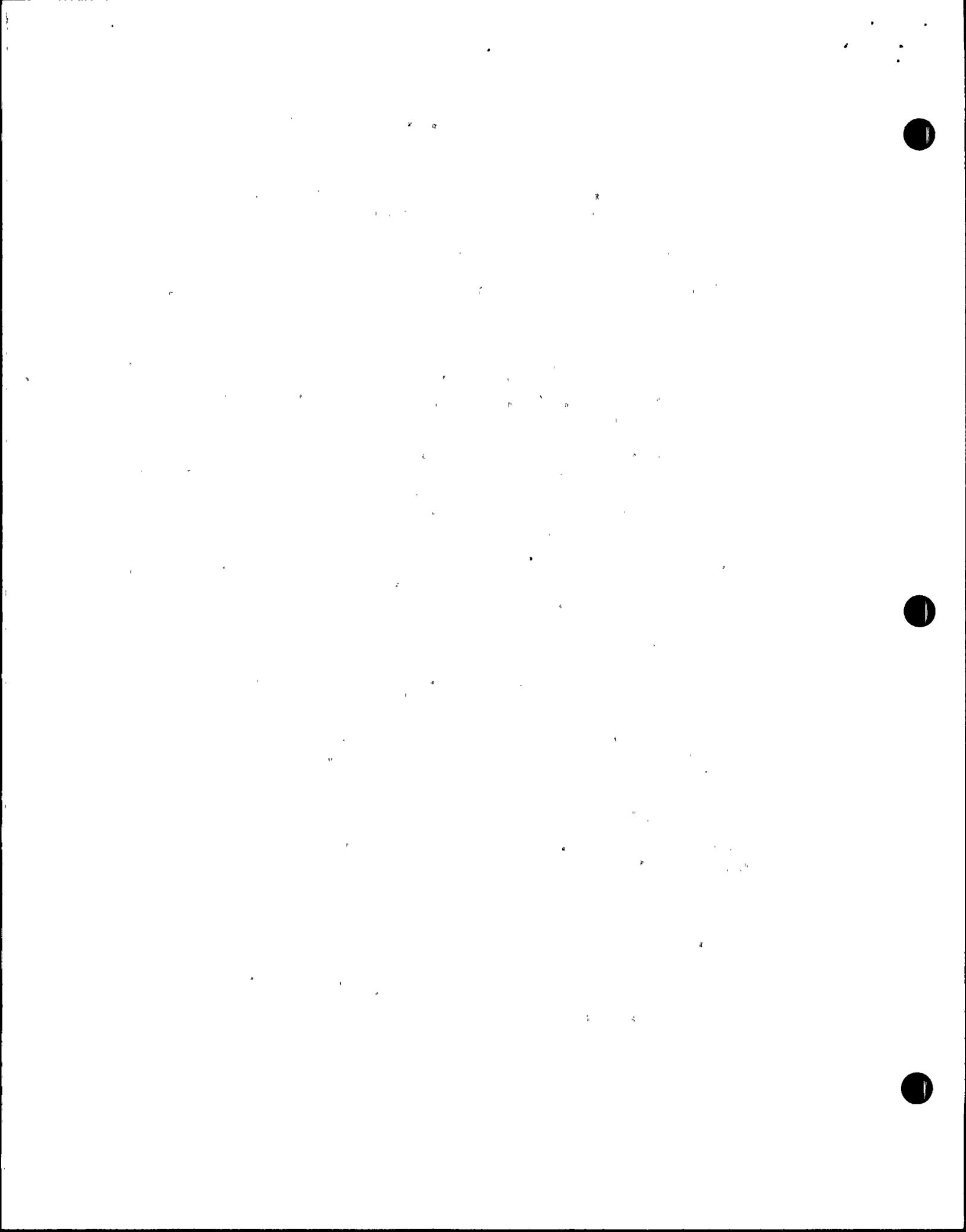
e. Action Required

The staff will review APS's resolution of CAR CA-84-0344 (OI-84-59-01).

6. Allegation No. "A" List 3, 31, 59

a. Characterization

Overtorquing occurred due to jerking of the torque wrench and improper cleaning and lubrication of bolts. QA/QC does not check for bolt overtorquing.



b. Implied Significance to Plant Design, Construction or Operation

Improperly torqued bolts may affect the structural integrity of the joints.

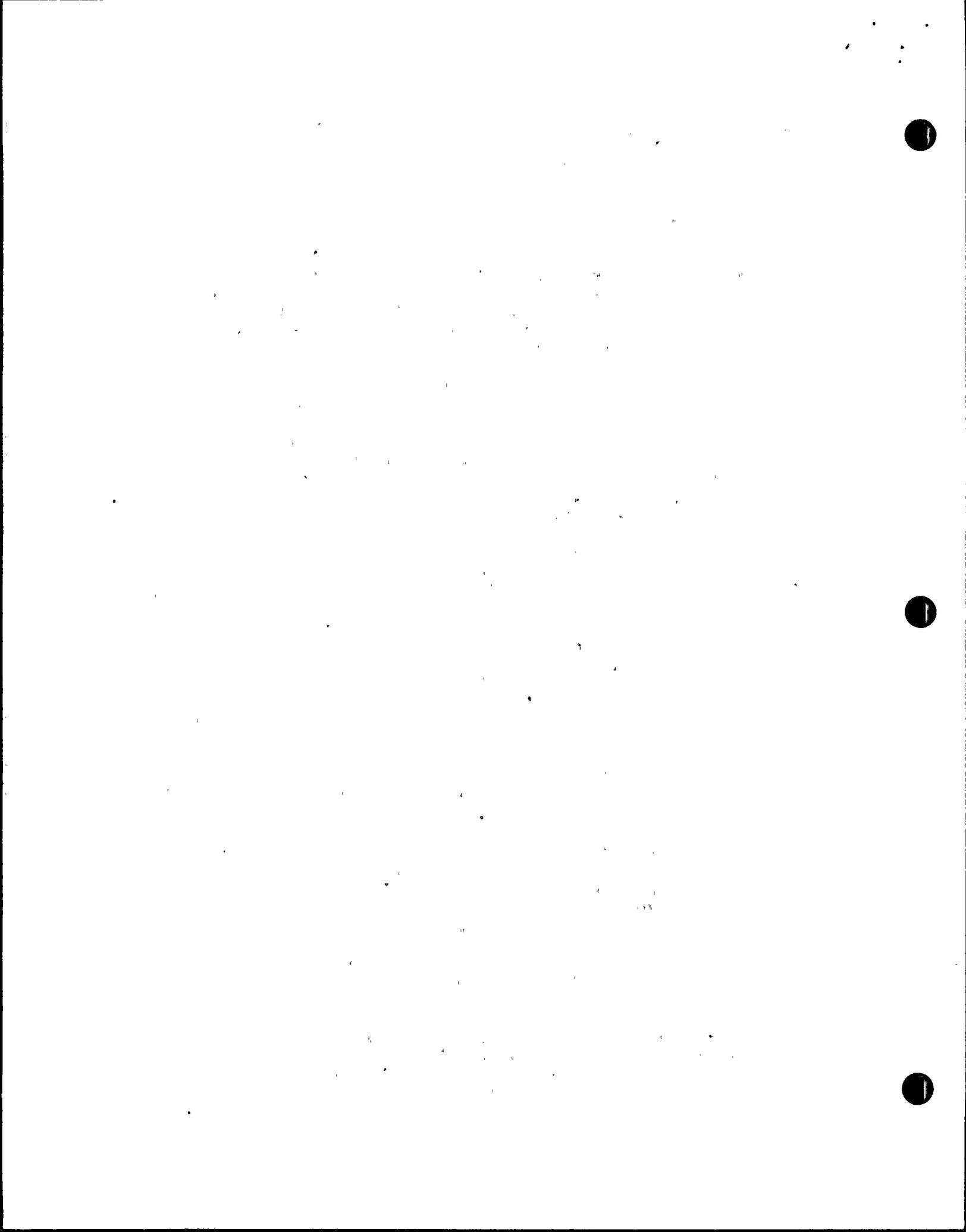
c. Assessment of Safety Significance

APS investigated this allegation and did observe some "tugging" action by the wrench operators in order to reach the specified torque. However, the field engineer and QC personnel explained that in order to assure the high strength A-325 and A-490 bolts reached the minimum required tension, the practice was to torque the bolts to the specified minimum tension plus five percent, as a conservative measure. It was also confirmed that QA torquing audits only checked that the minimum torque was achieved, not the maximum torque. In fact, there was no maximum tension specified.

To address the overtorquing concern, APS obtained an expert consultant in structural integrity to independently evaluate this issue in terms of the potential failure mechanisms of stress cracking corrosion, overload and fatigue. The consultant's preliminary conclusions were:

- i) Stress cracking corrosion was eliminated as a concern at Palo Verde because bolting stresses for the materials used were below the corrosion failure threshold.
- ii) Bolt stresses during torquing were generally higher than in service, because of the shear stresses added by the torquing operation. In a properly designed joint, the bolt stress at installation is the highest the bolt will experience and if the bolt does not fail then, and stress cracking corrosion is not a concern, then overtorque will not lead to failure during service.
- iii) Fatigue failures of bolts due to stress and relaxation cycles are much more likely to occur when bolts are undertorqued (insufficient pre-load). In fact, high preload is an effective way of limiting alternating stress ranges and mitigating fatigue. The staff reviewed and found these conclusions appear to be consistent with current knowledge of bolts. In fact, most bolt suppliers specify the minimum preload torque to be from 70% - 100% of the ultimate yield strength without specifying maximum torque.

As for cleaning and lubrication of bolts prior to installation, the APS investigator did observe bolts which were not thoroughly cleaned. However, this would not result in overtorquing because due to the additional resistance to turning of the nut, the same torque will not result in more tension on the bolt but less tension. Bechtel was also conducting a bolt verification program in response to a previous NRC construction Assessment Team Inspection finding related to undertorqued bolts.



Staff Position

The staff recognized that the allegor was correct that APS/Bechtel QA/QC did not check for overtorqued bolts, the wrench operator sometimes used the torque wrench with a "jerking" motion which may have torqued bolts above the specified value, and some of the bolts were not thoroughly cleaned. However, based on the evaluation of APS's consultant's report, the staff concluded that the deficiencies implied by this allegation were not safety significant.

Action Required

None. This item is closed.

7. Allegation No. "A" List 4, 19, and 56 , "B" List No. 25, "C" List No. 5

a. Characterization

During previous audits performed by APS and Bechtel QA on the M&TE Calibration Laboratory, problems have been identified resulting in changes to correct the specific problems. However, the corrective action was only marginally successful, did not correct previous errors, did not evaluate the effect of lost tools on the acceptability of previous inspections, and resulted in incomplete "Field Test Instrument Request Multiple Use Logs" (FTIR-MUL).

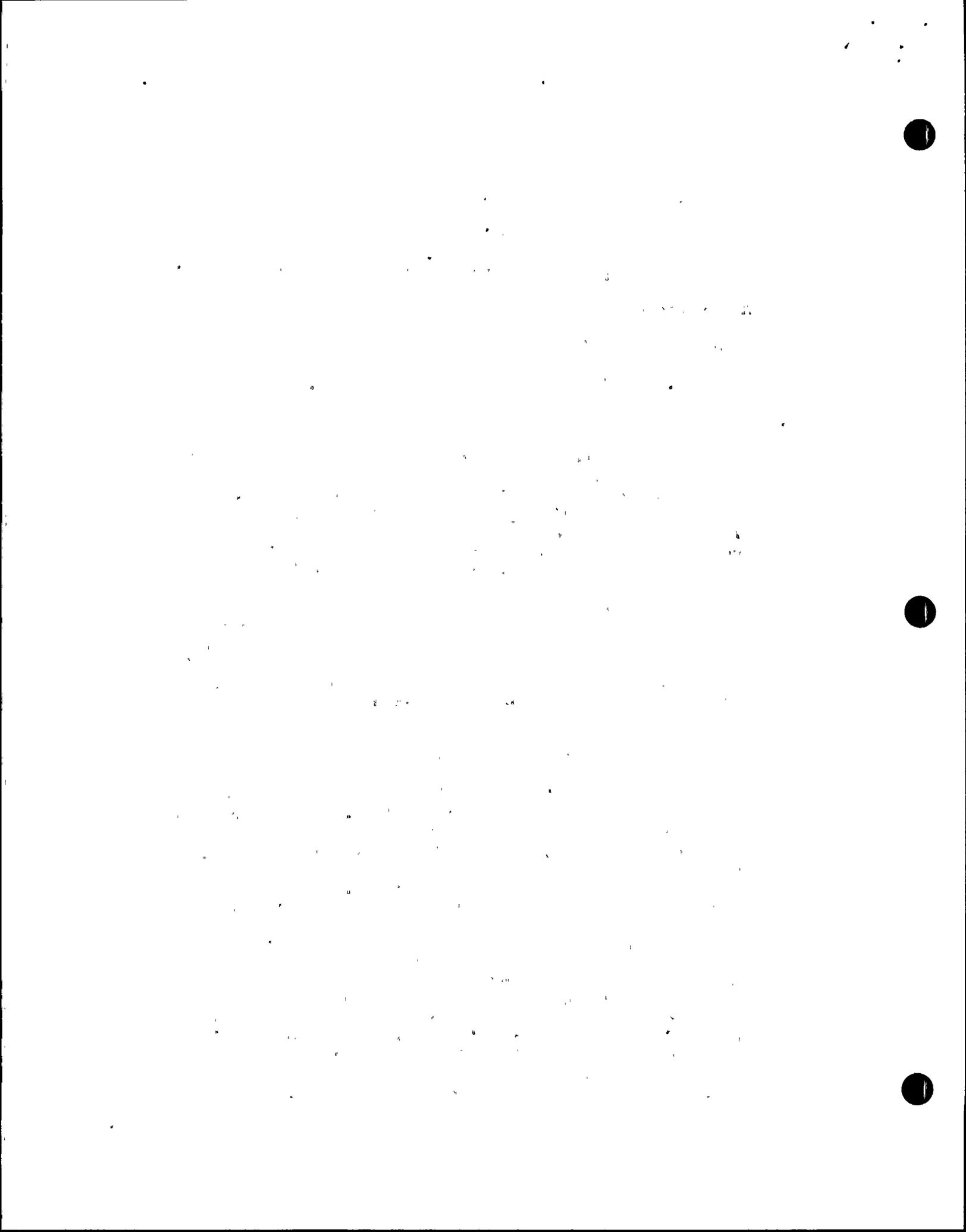
b. Implied Significance to Plant Design, Construction, or Operation

Not properly addressing previous problems could have resulted in work that has been performed with M&TE which was not in calibration and/or has not been properly evaluated for acceptability. This could affect the ability of systems required to achieve and maintain the designed safety functions.

c. Assessment of Safety Significance

The staff addressed this allegation by reviewing the licensee's investigation and supporting documentation. Audit Report No. C83-3, which reported an APS QA Department audit performed on February 7 - March 18, 1983, of the Bechtel M&TE Calibration Laboratory, was reviewed. This audit identified several problems that had been identified in prior APS and Bechtel audits. The allegation appears to be similar to certain portions of this audit report.

Subsequently, on November 12, 1984, the licensee wrote CAR No. CA-84-0334, and recommended that Bechtel "perform an extensive audit of completed Construction Inspection Plans (CIPs) from the QC vault in order to identify M&TE used for Quality Class "Q" acceptance and verify the existence of calibration records showing the validity of test results." The audit was scoped to include several different discipline CIP's and several different types of M&TE, and verify that lost tool reports and DIR's have been evaluated for their effect on acceptance of completed work.



The purpose of this recommendation was apparently to ensure that previously identified problems (including this allegation) had been properly identified and corrected/evaluated.

d. Staff Position

Based on the above assessment, the staff concluded that the actions recommended by CAR No. CA-84-334 need to be completed. Nevertheless, the staff considers the APS's actions to date to be proper and responsive to the concern.

e. Action Required

APS should promptly complete the response to CAR-84-334, and provide this information to the NRC. The staff will review APS's response during a future inspection. (OI-84-59-01)

8. Allegation No. "A" List 6, 44, 45, and 46

a. Characterization

This allegation concerned cleaning, removal of rust, and lubrication of structural bolts. Specifically, the allegor was concerned that improper bolt cleaning, such as using a solvent that would remove all lubrication, could cause bolts to break when they are torqued. Also, there is no procedure for removal of rust on bolts, and phosphoric and muriatic acid were used to clean bolts in the carpenter's weld shop.

b. Implied Significance to Plant Design, Construction, or Operation

If a solvent was used to clean bolts prior to installation, the lubricant may have been removed. The bolt actually installed and torqued would then have been unlubricated, so that the resulting tension on the bolt might be less than expected. This may have resulted in installations which do not conform to the design.

c. Assessment of Safety Significance

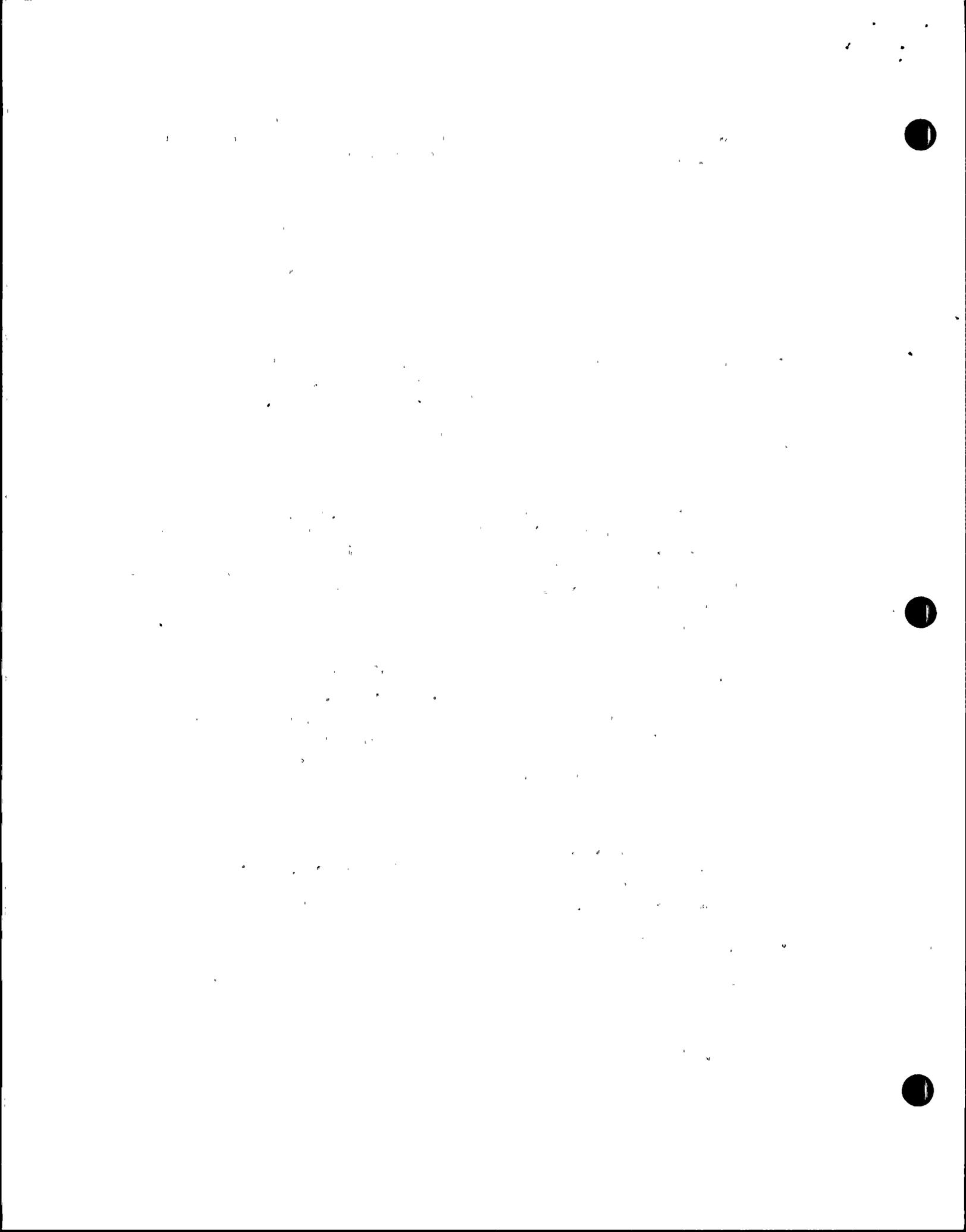
APS retained a consultant to address this issue. The consultant concluded that neither condition resulted in overtorquing, and also concluded that undertensioning was not a problem at Palo Verde due to the typical design margins for bolted connections.

d. Staff Position

The staff reviewed and concurs with the consultant's conclusion.

e. Action Required

None. This item is closed.



9. Allegation No. "A" List 18a. Characterization

The allegor was not confident concerning the information contained in the M&TE manual tracking system, and implied that a computer system was necessary to ensure reliable data.

b. Implied Significance to Plant Design, Construction, or Operation

If documentation was not reliable, then the confidence that M&TE used in the field was properly calibrated was eroded. If the equipment was not properly calibrated, then the ability of systems required to achieve and maintain the designed safety functions may have been adversely affected.

c. Assessment of Safety Significance

This allegation was similar to findings documented in APS QA Audit No. C83-3 performed on the Bechtel M&TE calibration laboratory during February 7 - March 18, 1983. CAR C84-053N was generated to improve the weaknesses identified by the audit. Bechtel's response to this CAR resulted in changes to WPP/QCI 7.0, "Calibration and Control of Construction M&TE" to upgrade the documentation in this area.

CAR C84-0334 was also written to identify and correct deficiencies which had resulted from the earlier calibration control system.

d. Staff Position

The licensee's audits verified that some information in the M&TE manual tracking system had deficiencies. The staff concluded that the corrective action identified by Bechtel in response to the APS audit findings, and this allegation, was satisfactory in that it should adequately strengthen the M&TE documentation system and correct the deficiencies identified by the APS audit.

e. Action Required

This allegation is closed. The staff will follow the resolution of CAR C84-0334 during future inspections (OI-84-59-01) to ensure the corrective actions identified are completed.

10. Allegation No. "A" List 22, 37, "B" List No. 32)a. Characterization

The electricians used pocket knives to strip cable insulation. The wire strippers used were not calibrated.

b. Implied Significance to Plant Design, Construction or Operation

Improper use of wire stripping tool may damage the cables and result in circuit malfunctions.

c. Assessment of Safety Significance

It was verified that a knife was, in fact, on the electrician journeyman's tools list, and used for wire stripping. This is a common practice and listed by various cable installation literatures. Cautions are usually mentioned that when stripping the insulation from a conductor, care must be taken not to nick the conductor with the knife blade. Wire strippers are not included in Bechtel or APS M&TE calibration because they are treated as tools like screwdrivers or pliers.

The inspector concluded that it was reasonable to expect qualified electricians to know how to use knives and wire strippers properly to strip cable insulations.

d. Staff Position

The staff recognized that this allegation was true in that pocket knives were sometimes used for stripping wire, and wire strippers used were not calibrated. However, based on the above assessment, the staff concluded that this allegation was not safety significant.

e. Action Required

None. This item is closed.

11. Allegation No. "A" List 28, 53, "B" List 10

a. Characterization

Some bolts broke while being torqued.

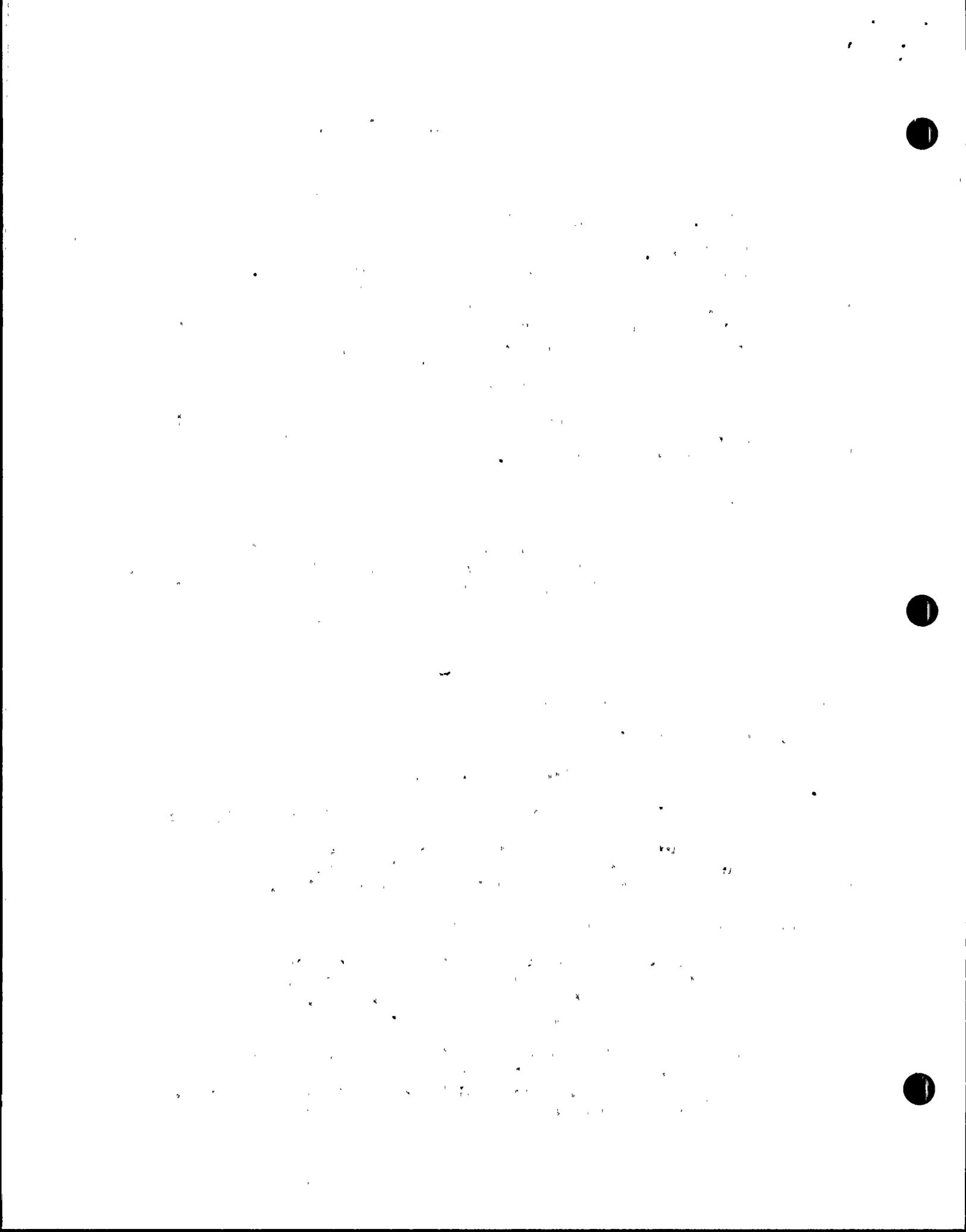
b. Implied Significance to Plant Design, Construction or Operation

Overtorquing, if due to improper torque wrench calibration or operation, could affect the quality of torqued joints, and consequently the structural integrity of the plant.

c. Assessment of Safety Significance

Apparently, this allegation refers to a Nonconformance Report, NCR No. C-C-3993, and a Deficiency Evaluation Report, DER 83-30. Both reports addressed bolt failure during torquing, and they were evaluated by Bechtel.

In the case of NCR No. C-C-3993, Bechtel's evaluation found that the torque wrench used in this particular anchor bolt installation had been checked and found to be within calibration requirements. The root cause of this deficient condition was attributed to the



specified torque being which was excessive for the desired tension. This caused the bolt to be stressed beyond its ultimate yield strength and fail. Corrective action specified an alternate column base anchoring detail using side straps and core-drilled through-bolts in lieu of the embedded anchor studs. To determine why the torque value had been excessive, the torque specification method was evaluated by a testing program to check the tension/torque relationship. The testing revealed that the tension/torque correlation coefficient was not accurate enough and resulted in higher than expected tension for the specified torque. To correct this, a more accurate correlation coefficient was specified based on the test. In addition, Bechtel's evaluation determined that the bolts already installed by using previous values were not affected, because the highest stress that the bolt would experience was during torquing to preload the bolt. Thus, once a bolt was preloaded and did not fail when being torqued, it was considered to be properly torqued.

In the case of DER 83-30, which took place at approximately the same time as the above case, the same type of anchor bolt was broken during installation torquing. However, this bolt was installed on a different system. Bechtel's evaluation and corrective action for this deficient condition was the same as the above case.

d. Staff Position

The staff agreed that broken bolts indeed may have occurred as alleged. The staff assessed and concurred with the licensee's evaluation discussed above. Furthermore, neither of these cases were caused by improper torque wrench calibration. No violations or deviations were identified.

e. Action Required

None. This item is closed.

12. Allegation No. "A" List 29, 42

a. Characterization

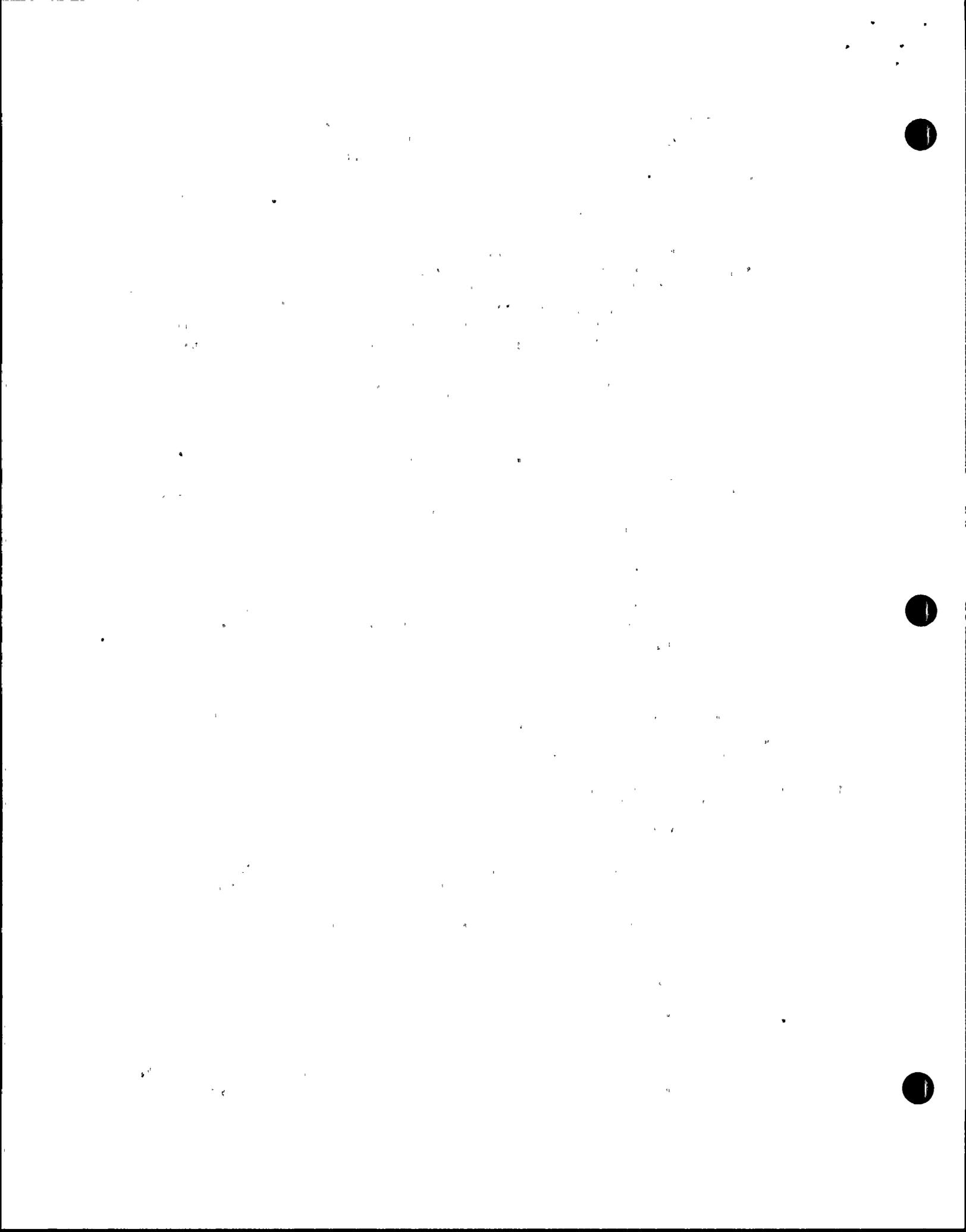
Unit 3 Polar Crane bolts were broken while being torqued because they were washed with "M-6" (a cleaning fluid) and reassembled dry.

b. Implied Significance to Plant Design, Construction or Operation

Improperly installed bolts may affect the structural integrity of the plant.

c. Assessment of Safety Significance

Apparently, this allegation refers to a Nonconformance Report, NCR C-C-2918. The NCR disposition identified a specified torque value which was too high and provided a revised calculation for the torque



value to resolve the problem. The effect of cleaning fluid was not identified as the cause of bolt breakage.

d. Staff Position

The staff recognized that this allegation was true in that there was a bolt failure related to polar crane installation. However, the cause of bolt failure was determined to be an improper torque specification. The specification apparently resulted from an inaccurate coefficient used in the torque/tension correlation as revealed by a testing program discussed in paragraph 11. An NCR was issued and dispositioned. The use of cleaning fluid did not appear relevant or significant to this bolt installation.

e. Action Required

None. This item is closed.

13. Allegation No. "A" List 32, 41, and 48

a. Characterization

Bolts were being stored outside, were rusted, factory wax had worn off, and the (Unit 2) bolt shack contained rusted bolts.

b. Implied Significance to Plant Design, Construction or Operation

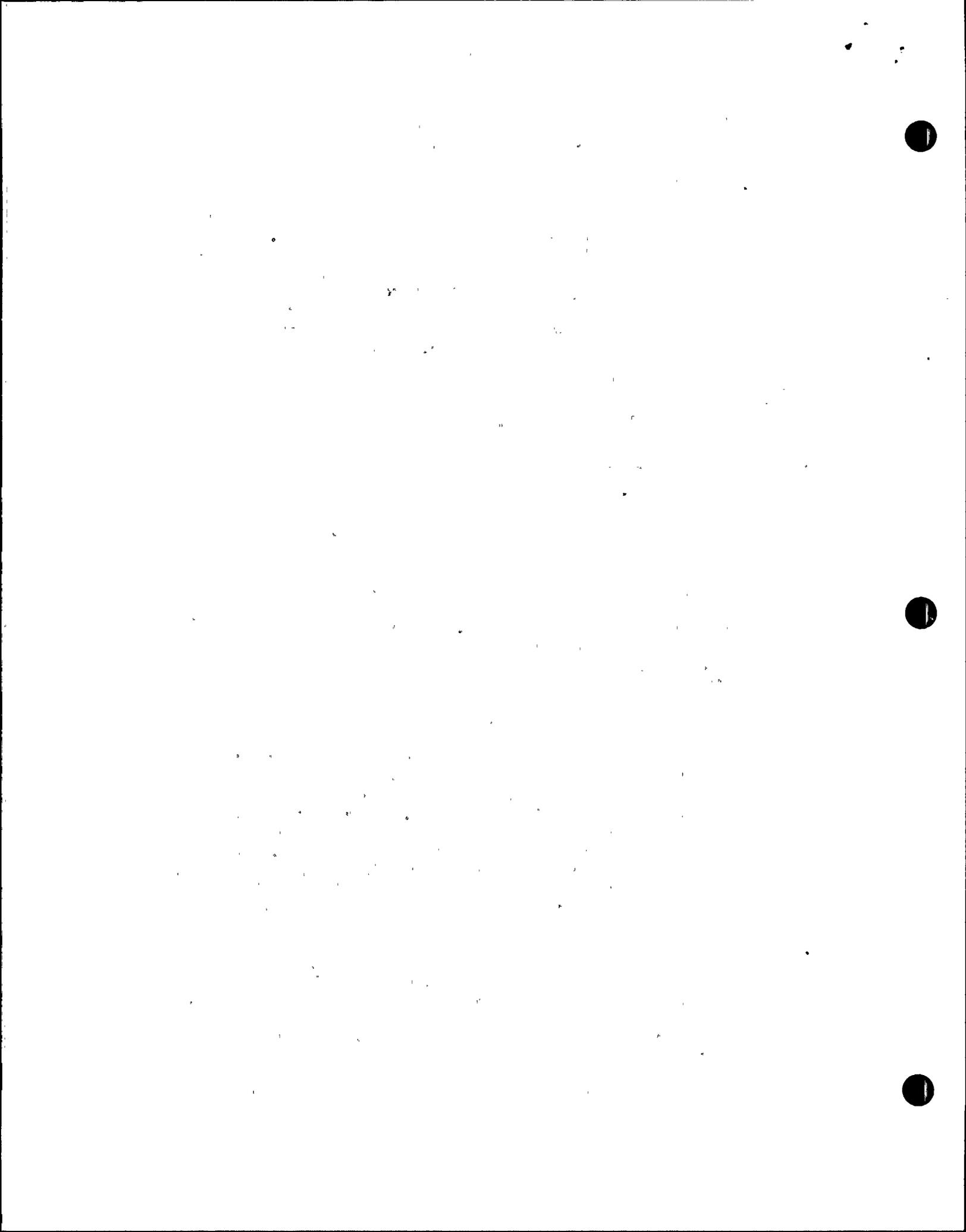
Using severely rusted bolts could result in required torque being applied during assembly which would result in insufficient tension to the bolt. This may result in installations which do not conform to the design.

c. Assessment of Safety Significance

Based on the staff's observations, the allegation was true in that rusty structural steel bolts (both A-325 and A-490) were observed. The staff observed four buckets containing bolts in the Unit 3 bolt shack and six bolts lying on a temporary suggest structure near the personnel entrance of the Unit 3 containment which were rusty. The buckets in the Unit 3 bolt shack were segregated from unrusted bolts in bins and appeared to be sorted according to rust severity. The licensee also substantiated the allegation in that they had observed rusty bolts at various locations onsite, including the Unit 2 bolt shack.

The staff did not observe any severely or moderately rusted bolts installed in any safety-related structures. However, some slightly rusted bolts were observed to be installed. Also, during numerous prior inspections since 1977, the staff has not observed any severely or moderately rusted bolts installed in any safety-related systems or structures.

The Bechtel structural steel procedures did not (until recently) specify any storage requirements for structural steel bolts. It is



noted that the ANSI standard governing storage of materials specifies that structural steel should meet Level D storage requirements outside and on dunnage. Recent changes to the Bechtel structural steel procedure now specify that bolts be stored inside.

The staff observed a test performed by Bechtel where they measured the torque required to establish a specified tension on both a lubricated bolt which was not rusty and a moderately rusted bolt which was not lubricated. The torque values were approximately the same. The inspector concluded that a slight to moderate layer of rust was not detrimental to establishing the required tension, and actually acted as a lubricant.

The staff concludes based on prior observations that the likelihood of any severely rusted bolts installed in safety-related structures was remote. Also, for any slightly or moderately rusted bolts that may have been installed, the rust was not detrimental to establishing required bolt tension.

d. Staff Position

Based on the above safety assessment, the staff concluded that the allegation was substantiated, but did not represent a significant safety concern or adversely impact safe operation of the plant.

e. Action Required

None. This item is closed.

14. Allegation No. "A" List 34 and 43

a. Characterization

Various lubricants were used on bolts. There is no clear understanding of what lubricants were approved and should be used. In particular, WD-40 was being used on bolts as a lubricant and WD-40 was not authorized for jobsite use.

b. Implied Significance to Plant Design, Construction or Operation

Use of unapproved lubricants on bolts may result in chemical degradation of the material, which in turn could result in installations which do not conform to the design criteria.

c. Assessment of Safety Significance

Review of Bechtel WPP/QCI No. 14.0, "Approved Materials for Construction Nuclear Compatibility," showed that WD-40 was listed as an approved cutting fluid but was not shown on the approved lubricants list.

However, Bechtel Memorandum C.7.13, dated March 15, 1983, recommended use of WD-40 as a lubricant for structural steel bolts. The chemical composition of WD-40 apparently does not restrict its

use for structural steel applications. APS QA Department requested per QAD No. 84-QSE-139/TDS dated August 31, 1984, that the Nuclear Engineering Department further evaluate the use of WD-40 as a lubricant on structural steel bolts and address other more general questions regarding lubricants.

d. Staff Position

Bechtel's recommendation for using WD-40 as a lubricant for structural steel bolts appears to be acceptable. However, the APS Nuclear Engineering Department needs to complete their evaluation per QAD No. 84-QSE-139/TDS. If WD-40 was determined proper, then it should be explicitly specified in WPP/QCI No. 14.0. This item remained open pending the resolution of the above evaluation.

e. Action Required

The staff will review the APS Nuclear Engineering Department's evaluation during future inspections. (OI-84-59-02)

15. Allegation No. "A" List 21, "B" List 9

a. Characterization

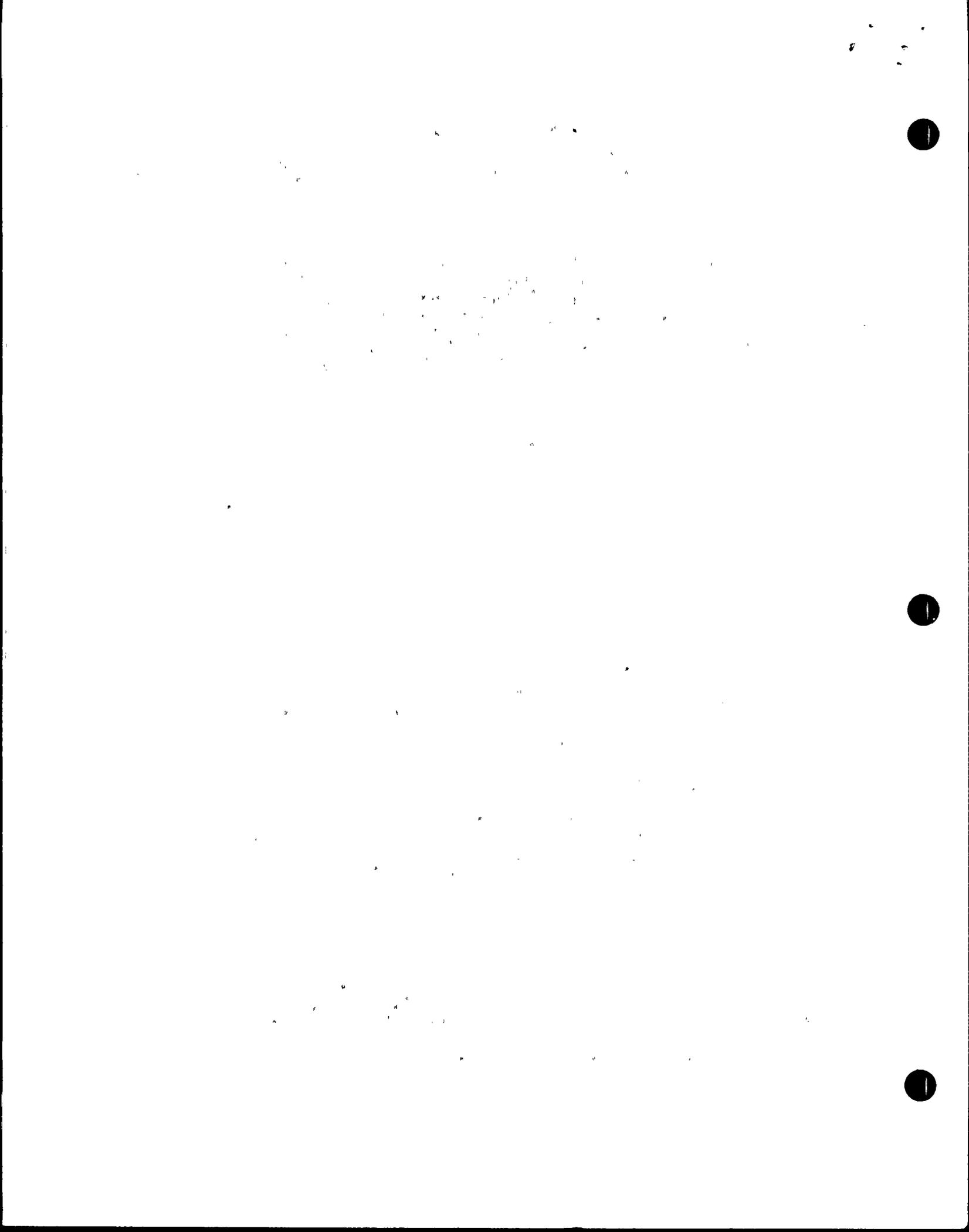
Cable tie wraps were installed with normal lineman pliers, which resulted in tightening the cable wrap such that cold flow of the cable insulation took place.

b. Implied Significance to Plant design, Construction, or Operation

It was implied that if the cable tie wrap was over tightened, then the cable insulation could possibly be damaged. This could possibly result in shorting of adjacent cables, or shorting between individual conductors in a multi-conductor cable. This could affect the ability of systems to meet their design criteria.

c. Assessment of Safety Significance

The licensee wrote CAR No. CA-84-0147 dated August 4, 1984, regarding the question of cable tie wrap installation. They noted that the applicable specifications and construction procedures do not provide guidance for installation of cable tie wraps. Bechtel's reply to the CAR indicates that... "tie wraps may indent or extrude the outer cable jacket, but due to the design pliability and functional durability of the outer cable jacket, conductor insulation damage will not occur." In the field, the inspectors observed instances of slight indentation of cables where tie wraps were located. The inspectors were not aware of any electrical codes, specifications, or cable manufacturer guidance that indicated cable tie wraps could damage cable. The APS QA organization has requested per QAD No. 84-QSE-139/TDS that their Nuclear Engineering Department evaluate this concern.



d. Staff Position

Damage to cable, caused by overtightening of cable tie wraps, was not apparent. However, the licensee's Nuclear Engineering Department should evaluate the potential for such damage.

e. Action Required

Review the Nuclear Engineering Department's evaluation during a future inspection (OI-84-59-03).

16. Allegation No."A" List 38, "B" List 14

a. Characterization

Bechtel Field Engineers sign termination cards, but do not look at the terminations.

b. Implied Significance to Plant Design, Construction, or Operation

It was implied that if the electrical terminations were not properly inspected by the Field Engineer, inadequate terminations might result. This could affect the ability of systems required to achieve and maintain the design safety functions.

c. Assessment of Safety Significance

A similar concern was previously addressed by Bechtel in response to APS Allegation Hot Line Report No. 84-3. During that investigation, Bechtel determined that there were instances of Field Engineers signing the termination cards at their desks based on input from others who had actually looked at the work. The Bechtel investigation resulted in several reinspections of completed work by qualified individuals who then properly signed the documentation. It was noted that Field Engineers signing for the inspection were limited to Quality Class R and S work. QC inspectors, not Field Engineers, inspected and signed for the inspection of Quality Class Q work.

d. Staff Position

The allegation was substantiated for some Quality Class R and S terminations, but all quality related terminations eventually received adequate inspections by Bechtel.

e. Action Required

None. This item is closed.

17. Exit Interview

The inspectors met with the licensee management representatives denoted in paragraph 1 on November 30, 1985. The scope of the inspection and the inspectors' preliminary findings as noted in this report were discussed.



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