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STN-50-529 Palo Verde Nuclear Station, Unit 2, Arizona Publi 05000529
STN-50-530 Palo Verde Nuclear Station, Unit 3, Arizona Publi 05000530
AUTH.NAME AUTHOR AFFILIATION
VAN BRUNT,E.E. Arizona Public Service Co.
RECIP.NAME RECIPIENT AFFILIATION
KNIGHTON,G. Licensing Branch 3

SUBJECT: Forwards response to 830808 summary of site audit for environ qualification of equipment & to Section 3.4 of NRC 831011 review of environ qualification of equipment.

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TITLE: OR/Licensing Submittal: Equipment Qualification

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AUTH.NAME AUTHOR AFFILIATION
Arizona Public Service Co.
RECIP.NAME RECIPIENT AFFILIATION
Licensing Branch 3

SUBJECT: Forwards response to [illegible] of site visit for environmental qualification of equip [illegible] to Section 3.11 of [illegible] [illegible] review of environ qualification of equipment.

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EXTERNAL: ACRS	[illegible]	8	8	[illegible]	[illegible]	1	1
[illegible]	[illegible]	1	1	NSIC	[illegible]	1	1
NTIS	[illegible]	1	1				

Arizona Public Service Company
P.O. BOX 21666 • PHOENIX, ARIZONA 85036

December 1, 1983
ANPP-28332 - WFQ/RJP

Director of Nuclear Reactor Regulation
Attention: Mr. George Knighton, Chief
Licensing Branch No. 3
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Palo Verde Nuclear Generating Station
(PVNGS) Units 1, 2 and 3
Docket Nos. STN-50-528/529/530
File: 83-056-026; G.1.01.10

References: 1. Summary of Site Audit for Environmental Qualification of Equipment, E. A. Licitra, NRC, dated August 8, 1983.

2. Letter from G. W. Knighton, NRC, to E. E. Van Brunt, Jr., APS, dated October 11, 1983. Subject: Staff Review of Environmental Qualification of Equipment for Palo Verde.

Dear Mr. Knighton:

The attached material is provided in response to Reference (1), and Section 3.4 of Reference (2). APS believes this information closes out Section 3.4 of Reference (2) and fully answers the questions in Reference (1).

If you have any questions, please contact me.

Very truly yours,

E. E. Van Brunt

E. E. Van Brunt, Jr.,
APS Vice President,
Nuclear Projects
ANPP Project Director

EEVBJr/RJP/sp
Attachment

cc: E. A. Licitra (w/a)
A. C. Gehr "

A048
1/42

December 1, 1983
ANPP-28332 - WFQ/RJP

STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

I, Edwin E. Van Brunt, Jr., represent that I am Vice President, Nuclear Projects of Arizona Public Service Company, that the foregoing document has been signed by me on behalf of Arizona Public Service Company with full authority to do so, that I have read such document and know its contents, and that to the best of my knowledge and belief, the statements made therein are true.

Edwin E. Van Brunt, Jr.

Sworn to before me this 1st day of December, 1983.

Nora E. Meadors
Notary Public

My Commission Expires:

My Commission Expires April 6, 1987

A. GENERAL COMMENTS

Position

(1) Of the eleven files audited, the staff found four acceptable, had a minor comment on two and identified some problems with four. For the remaining one, the staff did not complete its audit due to the condition of the file. The specific comments on the files are discussed further below.

PVNGS Response

(1) No comment required, observation only.

Position

(2) The applicant has put in a lot of effort in establishing an equipment qualification file. However, additional effort is required to complete the work. For example, the arrangement and information contained in the files were difficult to follow in some instances. Also much of the pertinent information was neither contained in the files nor reference made to it. The applicant should review this situation and advise us of how it will be corrected.

PVNGS Response

(2) APS understands that this comment was mainly directed at the ASCO qualification program which contains a significant amount of information. It is our experience that most qualification programs require a significant amount of time to review the qualification reports in sufficient detail to follow the step-by-step testing procedures performed. This is, however, not considered significant, since there are no limiting time constraints on report reviews when performed by APS and Bechtel during the normal course of work. Also many reports are inherently confusing due to the supplier's written text. Therefore, we consider this observation understandable.

The qualification files are intended to be as "stand alone" as practical. Much of the supporting documentation, such as correspondence with the supplier, specifications, deficiency evaluation reports (DER's), drawings, instruction manuals, and maintenance manuals are on file within the appropriate Nuclear Engineering Departments and are part of the permanent plant records. Retrievability of these records will be maintained, although they may not be kept specifically with the qualification central files.

The equipment qualification files will not become dead files, even after the initial qualification work is considered complete, due to requirements to maintain qualification and purchase qualified replacement parts. They will be maintained as working files throughout the life of the plant. As a result, knowledgeable personnel will continually be available concerning the initial qualification effort, in addition to the qualification history.

Position

(3) The applicant's maintenance and surveillance program appears to be moving in the right direction. Much work remains to be done, such as completing information entry from the qualification files, establishing trend analyses, and establishing the criteria to determine the beginning of qualification life. All such information and the procedures should be in place prior to an operating license.

PVNGS Response

(3) Progress on the Qualification Maintenance Program (QMP) continues to proceed satisfactorily. The foundation for the QMP is identifying and collecting information on safety related life limiting components, and replacement/corrective maintenance components. Safety related life limiting components are to be purchased as quality Class Q items. The replacement and corrective maintenance

components, are classified as safety related or non-safety-related, based on analysis performed by the supplier or APS personnel in Nuclear Engineering or Operations Engineering as appropriate, and are to be purchased as Q, R, or S quality class items dependent on safety function. This information is to be entered into the Station Information Management System/Materials Management Information System (SIMS/MMIS) data base for work scheduling requirements, and for purchasing future qualified spare and replacement parts. For replacement of life limiting components, APS will use the date at which power ascension operation commences, since this will be the specific point in time that the equipment will begin to experience the environmental conditions upon which environmental qualification was based.

The initial data collection for spare and replacement parts on the BOP and NSSS scope of equipment has been completed. Resolution of the open items as identified on the initial BOP effort is currently underway. The open items identified in the initial NSSS program will be resolved upon completion of the BOP open items. The QMP is a continuous on-going effort and the SIMS/MMIS data base will be updated as new information is received or revised.

APS presently has several procedures to address maintenance, surveillance, and trend analysis requirements for all plant equipment. These programs are:

a. the Equipment History Program No. 30PR-0ZZ05 which describes the procedure for collecting, storing, and retrieving historical maintenance information on station equipment,

b. the Maintenance Program No. 30PR-9ZZ01 which establishes the system whereby components, systems, structures, and equipment are installed, maintained, repaired, and replaced in a safe, efficient and cost effective manner,

c. the Preventive Maintenance Program No. 30AC-9ZZ02 which describes the procedure by which Preventative Maintenance actions necessary to maintain structures, systems, equipment and components at the quality level required for them to perform their intended functions,

d. the Operating Experience Review Procedure No. 73AC-9ZZ03 which describes the system by which all operating experience information supplied to the Independent Safety Engineering Group (ISEG) is evaluated, classified, summarized, distributed, tracked, and resolved to ensure and promote overall nuclear plant safety, and

e. the Surveillance Testing Program No. 73AC-9ZZ04 which controls surveillance testing in order to assure compliance with Technical Specification surveillance requirements and to ensure operability of essential plant systems during all modes of plant operation.

In summary, the five listed plant procedures encompass all provisions for maintenance, surveillance, and establishing trend analysis.

Position

(4) During the plant walkdown, two items (Rockbestos cable inside containment and the pre-amplifier for the ex-core detectors) could not be located and one item (ASCO solenoid valve) didn't have a name plate attached. The applicant should address and correct this situation.

PVNGS Response

(4) Rockbestos 600V power cable is used at PVNGS for Class IE 480V-AC and 125V-DC power service in containment. The physical locations of the containment entries, Type II Penetration Assemblies, for these

power cables is approximately 10' above floor grade at both the 100' (ground level) and the 120' elevations, thus making physical inspection difficult. This arrangement is in accordance with the PVNGS Design Criteria Manual (Part II, Sections 4.4.I, 4.4.J and 4.6) which requires that "trays for cables of different voltage levels shall be stacked in descending order with the highest voltage above". This is also true for containment penetrations.

A subsequent equipment walkdown performed September 20, 1983 verified the identities and physical location of this power cable. The cable installed conforms to both P.O. specified material, and the cable tested in the qualification report.

The excore safety channel detector preamps, Channels C and D, are located at the 91' elevation of the Containment Building as shown on the plant Electrical-Physical Drawing 13-E-ZCC-007 Rev. 20 (Attachment 1). The post-accident (RG 1.97) excore preamps, Channels A and B, are located in the unit Auxiliary Building to ensure long term post DBE operability by removal of the sensitive electronics from the harsh environment of containment. The locations were verified in a walkdown performed by an APS qualification engineer. Qualification of the post-accident units is currently underway.

The ASCO solenoid valve nameplate, which was found to be missing during the Environmental Audit Walkdown, was probably misplaced during the construction phase of the project. To assure that this situation does not go uncorrected, an inspection is included as part of Design Change Packages (DCP), which have been issued to refurbish the ASCO solenoid valves and install conduit seals on them. This work is scheduled to be completed prior to fuel load for the In-Containment Building units, and at or before the first refueling for those in the Auxiliary Building.

B. SPECIFIC COMMENTS

1. Rockbestos Cable

Position

(a) According to Test Report E 058-13-4, radiation aging for this cable was completed by July 1976. However, the DBA test was not performed until February 1978. An explanation of what occurred in between should be provided.

PVNGS Response

(a) This one-year and seven-month delay has no effect upon the cable's qualification results or status. The time delay was due to test facility scheduling and availability. Consequently the only effect of this delay is to add real time to its pre-accident aging, thus adding conservatism to its qualification for which no credit has been taken.

Position

(b) Temperature and pressure profiles do not envelop the required profiles. No explanation is provided in the files regarding the acceptability of these profiles.

PVNGS Response

(b) It should be clarified that the profiles that were not met were our test specification profiles, which are much more severe than the computed LOCA/MSLB profiles contained in Figures 6.2.1-3 and 6.2.1-20 of the PVNGS FSAR. Attachments 2a and 2b provide a comparison of the test specification profile to the computed LOCA/MSLB profile and the Rockbestos test profile for both temperature and pressure.

The test specification profiles were designed to give considerable margin to the computed LOCA/MSLB profile. Therefore, the small discrepancies between the Rockbestos test profiles and the test specification profiles are considered insignificant. With consideration given to these discrepancies and the existing margin between the test specification and the computed LOCA/MSLB profiles, there is a high degree of confidence that the cable will work as intended in the highly unlikely event of a LOCA or MSLB event.

Position

(c) No margin is included for the temperature and pressure parameters, nor is justification provided in the file.

PVNGS Response

(c) As described in 1.b above, there is considerable margin built in to the test specification profile. Between this margin and the conservatism used in calculating the computed LOCA/MSLB profiles, it is believed that sufficient margin beyond anticipated actual LOCA/MSLB profiles is displayed.

Position

(d) Required operability time for the cable is 30 days, but the test duration was only 16 days. An explanation should be provided on how 30 days operability, with margin, was achieved.

PVNGS Response

(d) See the analysis in Attachment 3. This analysis extrapolates the excess temperature used in the LOCA/MSLB test to extend the time operability of the LOCA/MSLB test. The calculation is based upon Arrhenius methods to relate the time/temperature effects on the subject cable. The results indicate a post-accident operability of 116.8 days which is more than adequate to meet the 30 day operability period.

Position

(e) The status of the cable is listed as qualified in the file. However, APS has not approved the file. Also the date for the qualified listing is prior to the date that resolution was reached for an outstanding deviation on the cable. This should be clarified. Also, the applicant should confirm that there are no outstanding deviation reports for other files listed as qualified.

PVNGS Response

(e) Safety-related equipment is considered qualified once the qualification report is given a Status 1 by Bechtel which indicates that all APS and Bechtel comments have been resolved. When the final qualification documentation was transmitted to APS for final filing, one comment concerning the testing of the KXL-420 insulation repair was generated and subsequently resolved. The resolution to the comment was received and placed into the file, but the rerouting of the qualification file for the final two signatures was inadvertently omitted. However, the test program still remained a Status 1. The qualification package was subsequently rerouted for the final two signatures.

The NRC requested that APS clarify why the date for the qualified listing (we assume this to be the E.Q. Report) is before a DER concerning Rockbestos Cable was resolved. The Environmental Qualification Report, where Rockbestos cable was reported as qualified, was transmitted to the NRC on February 7, 1983 by letter ANPP-22850-WFQ/MSN. The DER concerning the KXL - 420 insulation rework was closed out with the NRC on November 5, 1980 by letter ANPP-16691-BSK/JAR. The Qualification Report for the KXL-420 insulation rework, dated July 10, 1981, was given a Status 1 by Bechtel on June 9, 1982. All work on the Rockbestos cable was therefore completed by the time the Environmental Qualification Report was submitted on February 7, 1983.

It was also requested that APS confirm that there are no outstanding deficiency evaluation reports (DERs) for other files listed as qualified. The difficulty with committing to this request lies in the fact that most DERs are not related to qualfication problems but are directed to all specification and equipment deficiencies which could adversely affect the safety of operations of the power plant. DERs generated for specific equipment typically involve misapplication or equipment malfunctions, not associated with age related failure mechanisms or DBA testing, and can be generated for any deficiency whether it involves a Class IE System and components or not. DERs may be generated at any time after the equipment arrives on site, and in many instances evaluation is required to determine whether equipment qualification is affected or if it is merely a malfunction/misapplication concern. It can be stated that, at present, there are no outstanding DERs for equipment that is considered qualified which specifically involves a known age related failure mechanism, although the evaluation process on outstanding DERs could change this. Also, DERs are generated and resolved by Bechtel and APS QA/QC with appropriate input from departments as required to resolve deficiencies. All DERs are kept on file in APS Quality Assurance.

Position

(f) The check sheet should identify the applicability and restriction of the different test reports in the files, e.g., Report E 058-40-3 is kept in the files for reference but does not appear to be applicable to Palo Verde. Report E 058-39-3 is only applicable for cable outside containment.

PVNGS Response

(f) The PVNGS review sheets do address the applicability and restrictions of the various test reports that support qualification for a particular item of safety-related equipment by providing for identification of the worst case environment and the specific equipment or component involved. Report E058-40-3 was submitted for irradiation cross linked polyethelene (IXLPE) insulated cable. However, PVNGS presently only uses chemically cross linked polyethelene (CXLPE) insulated cable, as provided in report number E058-13-4. APS is not opposed to having the report for IXLPE in the file for the reason that it only adds flexibility to the variety of Rockbestos cable insulation which may be installed for all nuclear uses, and does not limit PVNGS to CXLPE in the event IXLPE should be desired.

Report number E058-39-3 covers the qualification of KXL-420 insulation rework for use inside containment although APS undertook measures to limit its use outside containment and to prevent its use inside containment. In summary, these reports cover the plant for all contingencies.

Position

(g) The file was not arranged in a logical manner and much of the correspondence relating to qualification, e.g., outstanding deviation report and its resolution, was not included.

PVNGS Response

(g) The final qualification file for Rockbestos cable contains only four qualification test documents:

1. E058-2-3; CXLPE prototype test data and aging characteristics.
2. E058-13-4; CXLPE test report.
3. E058-40-3; IXLPE test report.
4. E058-39-3; KXL-420 insulation rework test report.

In addition to the four test documents, the following are found in a bound volume:

1. FAP-14; revision history to the final report.
2. Submittal history of all qualification documents.
3. Environmental and seismic requirements as applicable.
4. Preliminary review sheets.

Contained within the final report folder are:

1. Final Bechtel review sheets and signoff.
2. Final APS review sheets and signoff.

APS is satisfied that all the individual qualification files are organized to the optimum level required for document research.

Documentation such as routine correspondence and deficiency evaluation reports (DERs) are not kept within the qualfication files. Routine correspondence is already on file in the specification files and to include them in the qualification reports would be a duplication of effort. DERs, as discussed in 1.e, are a quality assurance function and are kept on file in the QA Department. The fact remains that the DER which was generated for the KXL-420 insulation rework was generated for rework found in non-safety related cable and no such rework was ever found in safety related cable, although there was a potential for their existence. However, due to the nature of the DER process, even if there had been no 600 volt Rockbestos power cable used for safety related purposes, a DER would probably have been generated.

2. ASCO Solenoid Valves

Position

(a) The aging analyses didn't take into account the temperature rise for the valve caused by the energized condition. During the plant walkdown, a thermometer placed on the surface of an energized valve indicated a temperature of about 140°F while the ambient temperature was only 98°F. Temperatures inside the valve (coil and seat) were probably higher. Therefore, the applicant should include an aging analysis that takes into account the temperature rise caused by the energized condition.

PVNGS Response

(a) An In-Situ Test was performed on these solenoid valves, as documented in APS Test Report 13-EC-SI-A01, Rev. 01 to establish the temperature rise associated with continuous coil energization.

This data has been factored into an analysis that was performed to determine the effect of coil temperature rise on the qualified life of ASCO solenoid valves. The analysis is based on the operation of associated pneumatic valves, i.e., normally open or normally closed. It was concluded that the temperature rise affects only the pneumatic valves that are normally open since the ASCO solenoid valve is required to be energized to maintain the pneumatic valve in the open position.

The analysis shows that the only pneumatic valves normally open, with the ASCO solenoid valve energized, are CH-505 and CH-523 outside containment and CH-506, CH-507, CH-515, CH-516 and CH-240 inside containment. All other pneumatic valves are normally closed and the ASCO solenoid valves de-energized.

The results of the analysis demonstrate that the qualified life remains 40 years, except for coils inside containment that are energized (CH-506, CH-507, CH-515, CH-516 and CH-240), in which case the qualified life is 18.8 years.

A copy of this analysis will be included in the ASCO solenoid valve audit folders. The summary sheets will be changed to reflect the change in qualified life and indicate that replacement is required every 18.8 years for coils on CH-506, CH-507, CH-515, CH-516 and CH-240.

A draft copy of this analysis and the Temperature Rise Test Report is included for your information (see Attachments 4 and 5).

Position

(b) There are three test reports included in the files for the solenoid valve. The informational relationship between test reports could not easily be followed. The check sheet should refer to the specific report and paragraph from which information is used. Also, if Report AQS 2678 is used for valves outside containment only, this should be so stated.

PVNGS Response

(b) Document V-PAK-250 has been reissued to show specific reference to the origin of data summarized. ASCO Report AQS21678/TR, Rev. 01 can be utilized for both inside and outside containment conditions, only if the test parameters envelope the required plant parameters. For Palo Verde, it can only be used for outside containment conditions.

A copy of the reissued document has been included in the ASCO solenoid valve audit folder and the summary sheets changed to reflect this document.

3. Solenoid Valve for Feedwater Isolation Valve

Position

The qualification test for this valve did not envelop the required pressure profile since the steam test was performed at atmospheric pressure whereas the required pressure was 21 psig. The file did not contain any justification for this deficiency in the test report.

PVNGS Response

APS and Bechtel have been aware that the submitted test report for the actuator did perform a steam impingement test in an open chamber without addressing the steam pressures obtained. Since this test report is not considered final due to open items, not all deficiencies are covered by supplier justifications and documented within the test report, at this time. When the report becomes final, all deficiencies and their justifications will be documented and contained within the final report file folder. However, the following justification for this file is provided.

The effect of steam impingement through the conduit seal of the solenoid valve will cause either a short in the terminal and/or coil, or an open circuit either of which will ultimately result in interruption of electric service to the valve. The valve actuator is designed "Power Fail to Close", hence the valve will close and perform its safety function. Additionally, a short or open circuit in the terminal boxes, due to steam impingement on other components (pressure switches, limit switches and accumulator N_2 pressure transmitter), will neither affect the safety function of the valve nor open the valve once it is closed. The safety function of the valve does not require the valve to be opened after closure, and it will remain closed unless manually reset (See FSAR Section 10.3.2.2.2, page 10.3-7).

4. ROTORK AC Motor Operators

Position

(a) The data identified as the specified test environment was used as the qualification data rather than the actual test data.

PVNGS Response

(a) Page X-3, Wyle Report No. 43979-1 of Bechtel Log Number P221A-165-6, the next to the last paragraph states that stabilized conditions of 385°F and 75 psig were maintained for two hours. This is in excess of the specification requirements and is accurately reported in Table 4.1-1 of the Summary Report.

Position

(b) The wrong number of test cycles was performed on the valve.

PVNGS Response

(b) This comment apparently refers to some informal handwritten notes that an APS or Bechtel reviewer placed in the margin of the test report as notes to himself. These notes are not intended to be auditable data but merely flags for where potential comments may need to be addressed to the supplier. The number of test cycles performed, as reported in Table 4.1-1 of the Environmental Qualification Summary Report under 13-PM-221A, accurately reflects the data in the ROTORK Qualification Report.

Position

(c) The 10°C rule was used for aging analysis without any justification given.

PVNGS Response

(c) ROTORK did use 0.8eV as the activation energy to establish an aging time and temperature to age to a desired qualified life and service temperature. However, on page 15 of Rotork Test Report TR-3029 and page 16 of Test Report TR-3030, they list the activiation energies of the non-metallic components used in ROTORK Actuators. The lowest listed activation energy was 0.89eV with the highest value listed as 1.91eV. The aging parameters, based upon 0.80 eV activation energy, were therefore considered conservative as well as justified.

5. Weed Instrumentation (RTDs and Thermocouples)

Position

The qualification data sheet (#41) submitted for these items states that the review of this qualification file is complete and that submergence is the only outstanding item. However, the check sheet in the file identifies many open items which are still unresolved. As a result, the staff did not complete its audit of this file. The applicant should review the status of this qualification file and inform the staff of the resolution of this issue.

PVNGS Response

The status of JM-556 was reported to the NRC as "review complete." This classification was given in accordance with the discussed agreement between APS and the NRC at the March 9, 1983 meeting in Bethesda. The three classifications and their definitions as explained by the NRC to define the status of qualification reports were:

a. Qualified - Qualification reports are technically acceptable and there are no outstanding comments or resolutions required.

b. Review Complete - A report has been submitted from the supplier and has undergone at least one review by APS and Bechtel with resolution to outstanding comments required.

c. Not Qualified - Testing is in progress or has not started.

The status given to this qualification report as "review complete" was consistent with the definition provided by the NRC.

6. Pneumatic Low Leakage Damper

Position

The testing sequence for this item was radiation first followed by thermal aging. Since radiation is the only harsh environment (excluding seismic) that this item could be subjected to, the applicant should explain this testing sequence.

PVNGS Response

The various models and configurations of the low leakage dampers were irradiated prior to thermal aging. The Class IE dampers are all located in the Auxiliary Building, Fuel Building, and MSSS. All of these locations have increased radiation as the only harsh environmental parameter which changes significantly due to a design basis accident, with the temperature remaining essentially constant. Consequently, APS has no objections with irradiation being performed prior to thermal aging. Additionally, to support this position, preliminary test results, as reported by Sandia Laboratories, on common insulating materials for cables suggest that irradiation performed prior to thermal aging produces more material

degradiation than the reverse test sequence and approximates the amount of material degradiation if thermal aging and irradiation are performed simultaneously. Since the tested equipment did not experience any age related failures, we are confident that reversing the test sequence would not have had any adverse effect on operability, or the results of seismic testing performed.

7. Barton Level and ΔP Transmitters

Position

The file for this item identified possible problems with lead corrosion and a recommended fix. However, correspondence to and from the manufacturer regarding the problem and documentation regarding whether the applicant will perform the recommended fix were not included in the file.

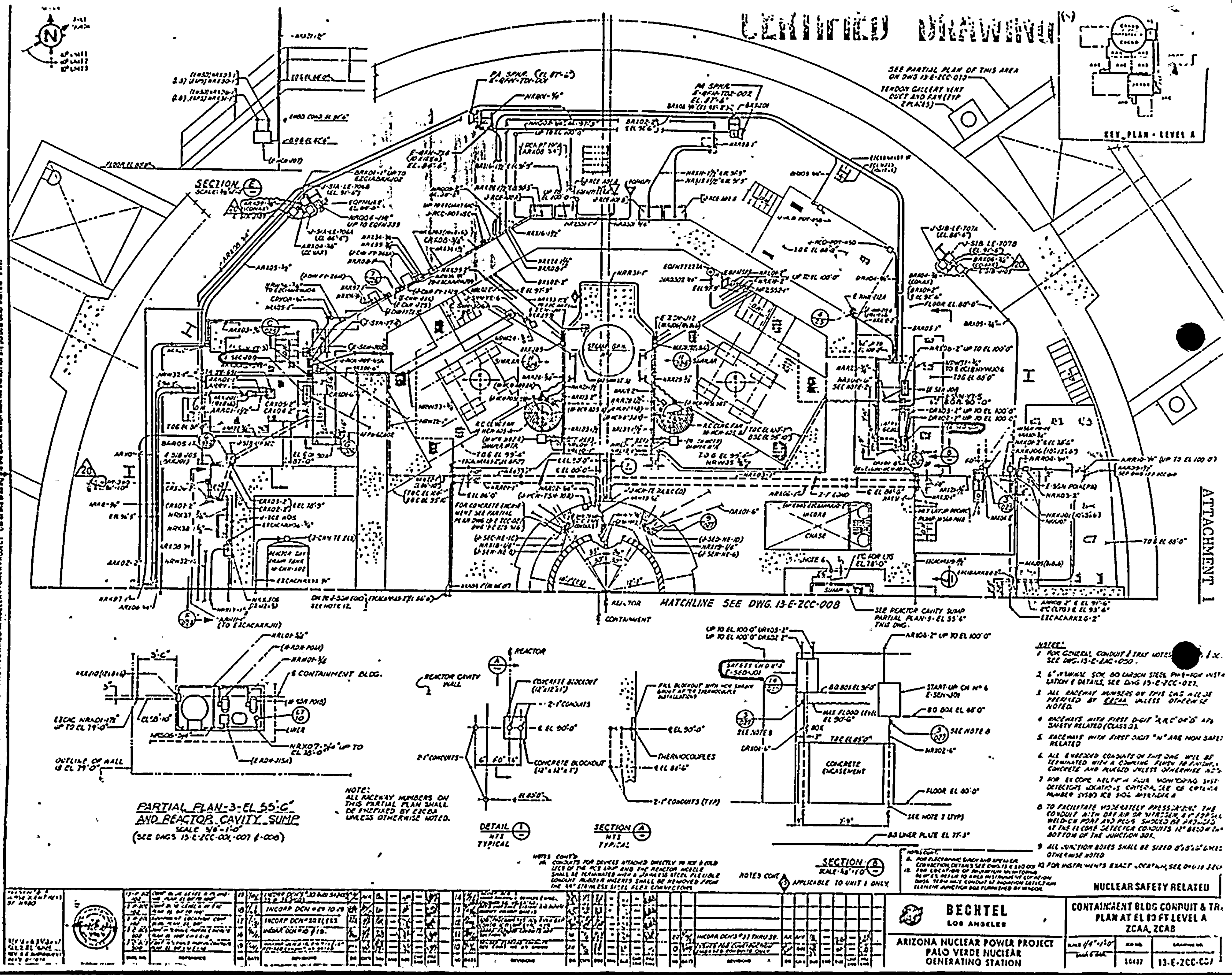
PVNGS Response

The broken lead wire anomaly has been evaluated and following conclusions drawn:

(1) As identified in the ITT Barton Instruments Notice of Deviation No. 0034, dated March 22, 1982, the lead wire break occurred during transportation to the Post-Accident Environmental Simulation Facility, which was after completion of the LOCA/MSLB simulation.

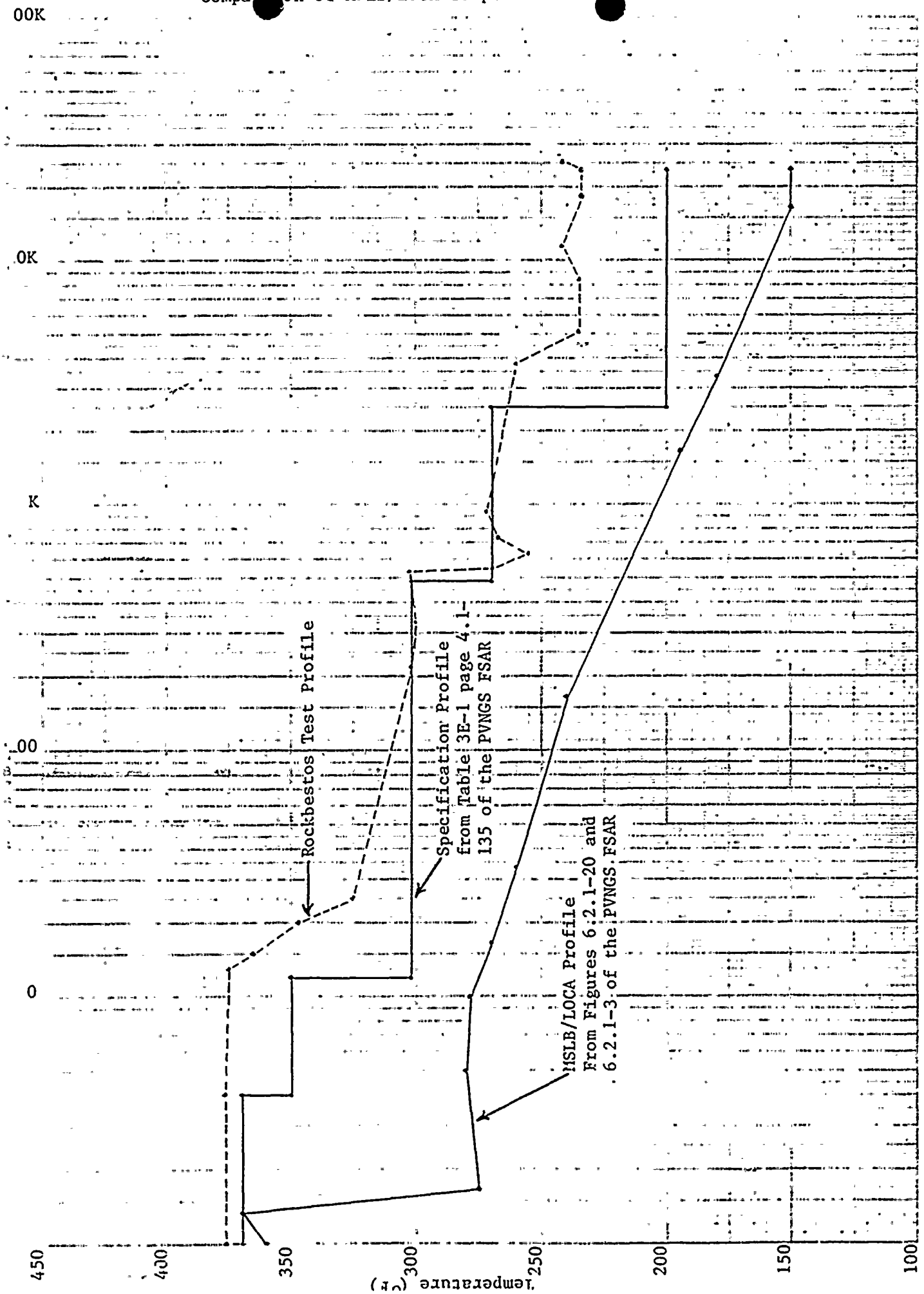
(2) An evaluation of the failure was performed by Hi-Rel Laboratories for Barton. It was determined that the lead wire had become weakened through "intergranular corrosion of the copper wire strands which reduced the cross sectional area of the wire resulting in reduced tensile strength. Ultimate failure however, was due to tensile overload".

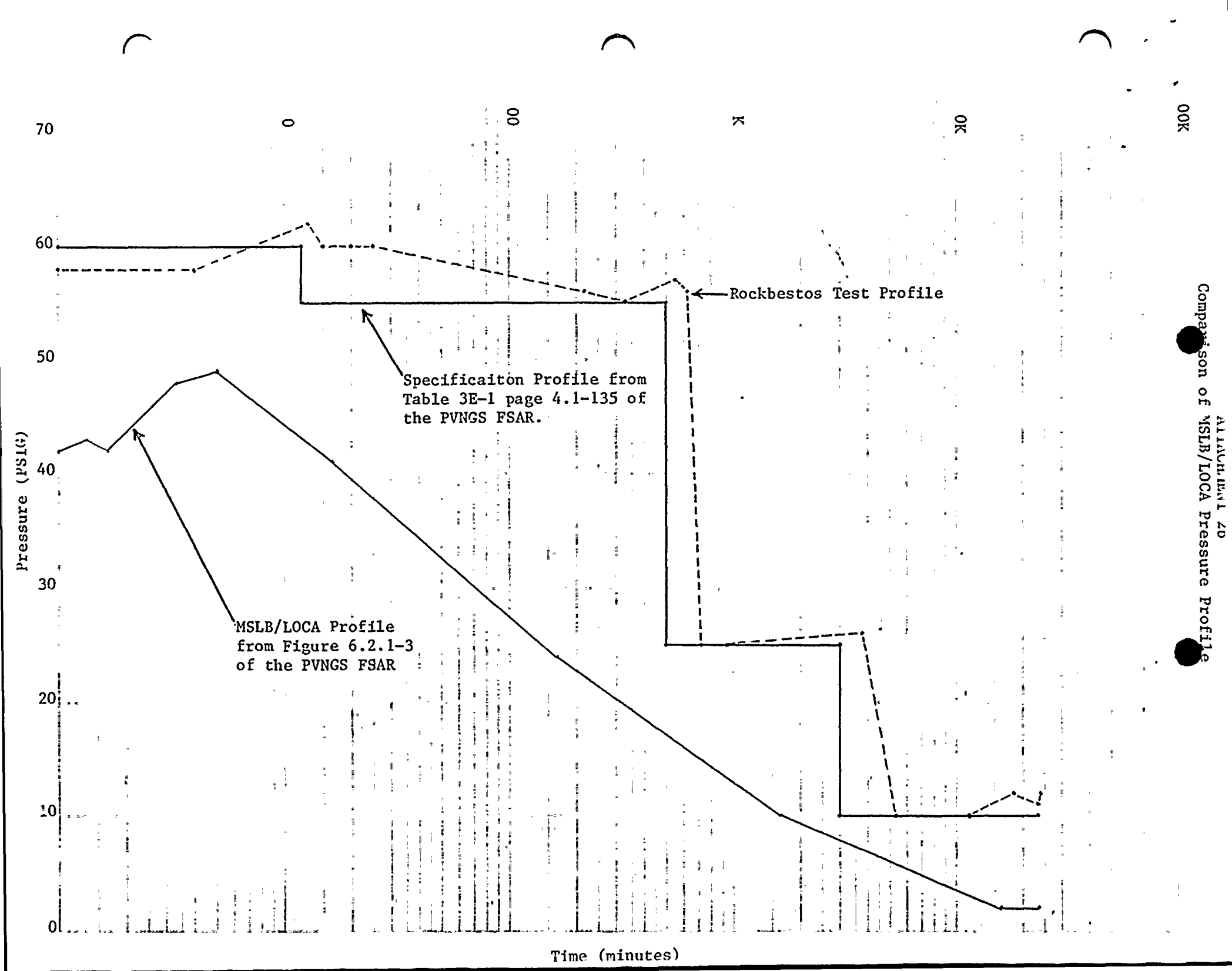
(3) This failure was encountered on only one specimen of the eight tested in the Barton program, APS therefore believes this to be a random rather than common mode failure. The aforementioned corrosion was entirely due to LOCA spray chemistry, however the lead wire failure occurred as a result of handling and not the LOCA simulation. Once the transmitters are installed at PVNGS, the leads receive no pre- or post-accident "tensile loads", therefore we do not perceive this to be a problem at PVNGS, and do not consider the stainless steel lead wire fix to be necessary at this time. Barton confirmed this in an October 20, 1983 letter to Combustion Engineering in which it is stated that "No design changes have been made to the gland seal assembly (lead wires) nor are any changes contemplated as a result of the failure".


CERTIFIED DRAWING
KEY PLAN - LEVEL A
SEE PARTIAL PLAN OF THIS AREA ON DWG 13-E-ZCC-010
TENDON GALLERY VENT DUCT AND FAN (TYP 2 PLACES)
SECTION E
STEAM GEN
MATCHLINE SEE DWG. 13-E-ZCC-008
REACTOR
CONTAINMENT
SEE REACTOR CAVITY SUMP PARTIAL PLAN-3-EL 55'6" THIS DWG.
ATTACHMENT 1
PARTIAL PLAN-3-EL 55'-6" AND REACTOR CAVITY SUMP
SCALE 3/8"=1'-0"
(SEE DWGS 13-E-ZCC-001, -007 & -008)
NOTE: ALL RACEWAY NUMBERS ON THIS PARTIAL PLAN SHALL BE PREFIXED BY EZCBA UNLESS OTHERWISE NOTED.
DETAIL 1 NTS TYPICAL
SECTION A NTS TYPICAL
SECTION B
CONCRETE BLOCKOUT
THERMOCOUPLES
CONCRETE ENCASEMENT
FLOOR EL 80'-0"
NOTES:
1 FOR GENERAL CONDUIT & TRAY NOTES ... SEE DWG-13-E-ZAC-050.
2 6" NOMINAL SCH. 80 CARBON STEEL PIPE-FOR INSTALLATION & DETAILS, SEE DWG 13-E-ZCC-027.
3 ALL RACEWAY NUMBERS ON THIS DWG ARE TO BE PREFIXED BY EZCAA UNLESS OTHERWISE NOTED.
4 RACEWAYS WITH FIRST DIGIT "A,B,C" OR "D" ARE SAFETY RELATED (CLASS 1E).
5 RACEWAYS WITH FIRST DIGIT "N" ARE NON SAFETY RELATED
6 ALL EMBEDDED CONDUITS ON THIS DWG WILL BE TERMINATED WITH A COUPLING FLUSH TO FINISHED CONCRETE AND PLUGGED UNLESS OTHERWISE NOTED
9 ALL JUNCTION BOXES SHALL BE SIZED 8"x8"x6" UNLESS OTHERWISE NOTED
10 FOR INSTRUMENTS EXACT LOCATION, SEE DWG 13 J...
APPLICABLE TO UNIT 1 ONLY
NUCLEAR SAFETY RELATED
BECHTEL
LOS ANGELES
ARIZONA NUCLEAR POWER PROJECT
PALO VERDE NUCLEAR GENERATING STATION
CONTAINMENT BLDG CONDUIT & TR. PLAN AT EL 80 FT LEVEL A
ZCAA, ZCAB
13-E-ZCC-007

ATTACHMENT 2a

Comparison of MSLB/LOCA Temperature Profile





ATTACHMENT 2D
Comparison of MSLB/LOCA Pressure Profile

ATTACHMENT 3

PURPOSE:

Demonstrate by analysis operability to 30 days in the LOCA Profile. This will be accomplished by extrapolating the excess temperature used in the first 16 days of the profile to extend the time to 30 days. The calculation will be based upon Arrhenius methods.

STEP 1 Calcuation of Activation Energy Ea

$$t_1 = t_2 \exp\left(\frac{Ea}{K_b}\left[\frac{1}{T_1} - \frac{1}{T_2}\right]\right)$$

t_1 = aging time

t_2 = service time

T_1 = aging Temperature (K)

T_2 = Service Temperature (K)

K_b = Boltzman Constant = $8.617X10^{-5}$ev/K

E_a = Activation Energy (ev)

CALCULATION

$$\left(\frac{t_1}{t_2}\right) = \exp\left(\frac{Ea}{K_b}\left[\frac{1}{T_1} - \frac{1}{T_2}\right]\right)$$

$$\ln\left(\frac{t_1}{t_2}\right) = \frac{Ea}{K_b}\left(\frac{1}{T_1} - \frac{1}{T_2}\right)$$

Referring to original Arrhenius Plot. Figure 1 Line 2

T_1 = 150°C = 423K

T_2 = 90°C = 363K

t_1 = 850 hrs.

t_2 = 40 yr = 350,400 hrs.

$$\ln\left(\frac{850}{350,400}\right) = \frac{Ea}{K_b}\left(\frac{1}{423} - \frac{1}{363}\right)$$

E_a = 1.33 ev

The equation:

$$\left(\frac{t_1}{t_2}\right) = \exp\left(\frac{Ea}{K_b}\left[\frac{1}{T_1} - \frac{1}{T_2}\right]\right)$$

may also be arranged as follows

$$\left(\frac{t_2}{t_1}\right) = \exp\left(\frac{Ea}{K_b}\left[\frac{1}{T_2} - \frac{1}{T_1}\right]\right)$$

STEP 2 In order to demonstrate that the LOCA/MSLB testing, performed by Rockbestos yields a minimum of 30 day post-accident operability, the following step by step approach will be used.

a. If aging time, aging temperature and service temperature are known, then the service time can be calculated by:

$$t_2 = t_1 \exp\left(\frac{Ea}{K_b}\left[\frac{1}{T_2} - \frac{1}{T_1}\right]\right)$$

b. The Specification Test Profile, Attachment 2a, indicates that at 3,012 minutes into the test, the specification temperature drops from 270°F to 200°F where it remains until the conclusion of the test at 23,172 minutes. This establishes a service temperature of:

$$T_2 = 200°F = 93.33°C = 366.33K$$

c. The Rockbestos Test Profile, Attachment 2a, indicates that between 3,012 minutes and 23,940 minutes, when Rockbestos concluded the test, that the minimum test temperature was maintained at or above 234°F. This establishes an aging time and temperature of:

$$t_1 = (23,940 - 3,012) \text{ minutes} = 20,928 \text{ minutes}$$
$$T_1 = 234°F = 112.22°C = 385.22K$$

d. Now that the service temprature, aging time and aging temperature have been established, they may be substituted in to the Arrhenius Equation:

$$t_2 = t_1 \exp\left(\frac{Ea}{K_b}\left[\frac{1}{T_2} - \frac{1}{T_1}\right]\right)$$

yielding:

$$t_2 = 20{,}928 \exp \left(\frac{1.33eV}{8.617 \times 10^{-5} \frac{ev}{K}} \left[\frac{1}{366.33K} - \frac{1}{385.22K}\right]\right)$$

$$t_2 = 20{,}928 \exp (2.0661)$$

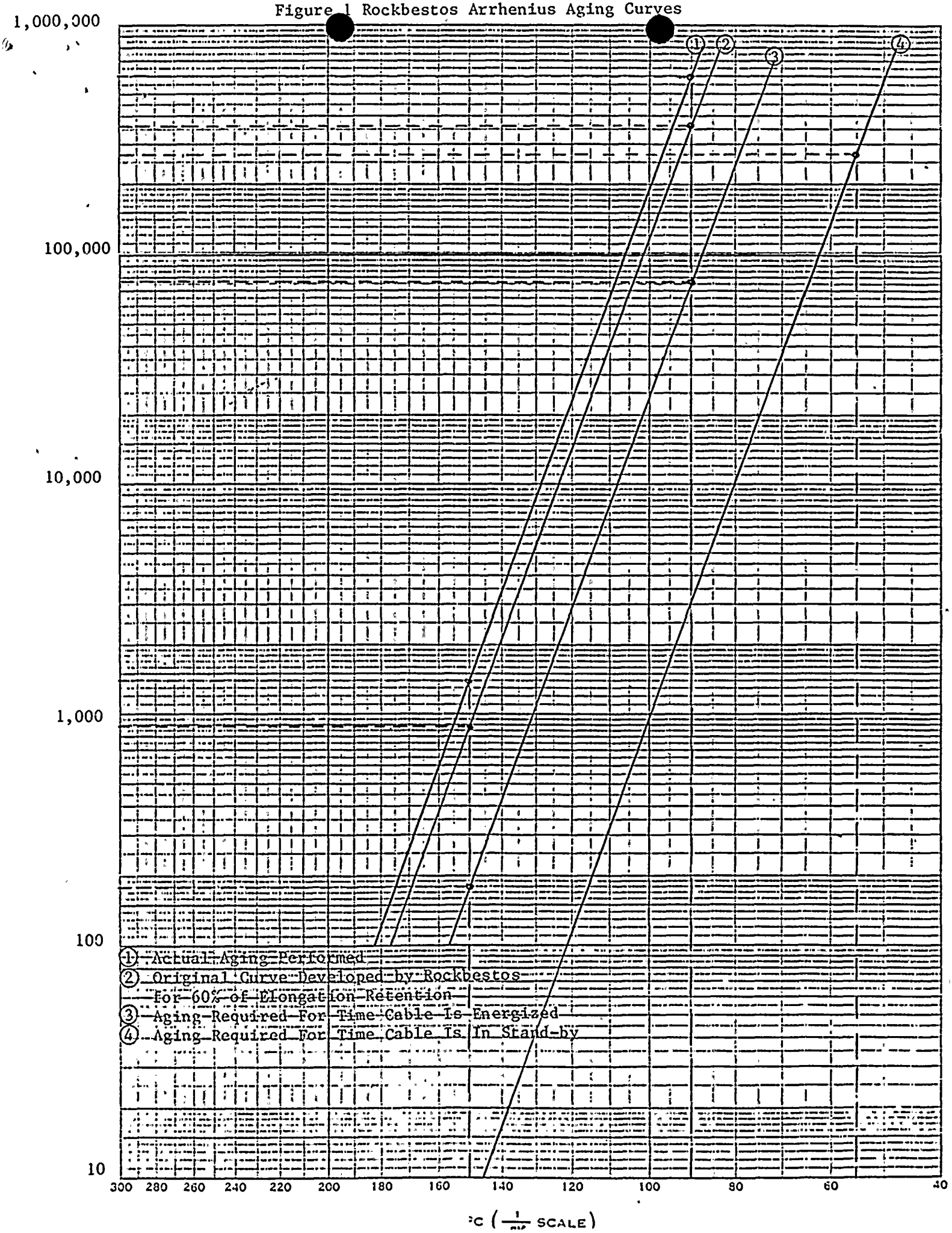
$$t_2 = 20{,}928 (7.8938)$$

$$t_2 = 165{,}201 \text{ minutes} = 114.72 \text{ days}$$

e. Therefore the testing done at 234°F, 34°F above the specification/service temperature, result in an extension of 114.72 days at the specification/service temperature of 200°F. Combining this extension with the operability demonstrated prior to 3,012 minutes (2.09 days) into the test yields a demonstrated post-accident operability of:

$$t_2 = 2.09 \text{ days} + 114.72 \text{ days} = 116.81 \text{ days}$$

Figure 1 Rockbestos Arrhenius Aging Curves



Attachment 4 to Audit Item 2(a) ASCO

Draft

TABLE OF CONTENTS

1.0 PURPOSE

2.0 SCOPE

3.0 REFERENCES

4.0 METHOD OF ANALYSIS

5.0 BASIC DATA, ASSUMPTIONS AND CALCULATION

6.0 RESULTS

1.0 PURPOSE

The purpose of this analysis is to determine the qualified life of ASCO solenoid valves installed at PVNGS that are continuously energized and that are de-energized during normal operating conditions.

2.0 SCOPE

This analysis considers ASCO solenoid valves continuously energized and those de-energized during normal operating conditions. ASCO solenoid valves on Valve Tag Nos. CH-505 and CH-523 outside containment and CH-506, CH-507, CH-515, CH-516 and CH-240 inside containment are continuously energized while all other ASCO solenoid valves are de-energized during normal operating conditions.

3.0 REFERENCES

3.1 14273-9452-Q165, Rev 1, Aging Analysis of ASCO Solenoid Operated Pneumatic Pilot Valves.

3.2 AQR-67368, Rev 0, Report on Qualification of Automatic Switch Co. (ASCO) Catalog NP-1 Solenoid Valves for Safety-Related Applications in Nuclear Power Generating Stations.

3.3 Bechtel letter B/CE-E-38247 dated 1/26/82, Location and Environmental Conditions for NSSS Equipment Installed at Palo Verde Units.

3.4 V-PAK-408, Measurement of ASCO Solenoid Valve Housing Temperature.

3.5 ANPP-19310 dated 10/29/81, Basis for Pump and Valve Operation Parameters.

3.6 ANPP-27815 dated 9/16/83, NUREG 0588 Qualification Program - ASCO Solenoid Valves

3.7 E-14273-310-130, Rev 04, Safety Injection System Piping and Instrumentation Diagram.

3.8 E-14273-310-131, Rev 04, Safety Injection System Piping and Instrumentation Diagram.

3.9 E-14273-310-120, Rev 05, Chemical and Volume Control System Piping and Instrumentation Diagram.

3.10 E-14273-310-121, Rev 05, Chemical and Volume Control System Piping and Instrumentation Diagram.

3.11 E-14273-310-122, Rev 06, Chemical and Volume Control System Piping and Instrumentation Diagram.

4.0 METHOD OF ANALYSIS

Substitute into the Arrhenius Equation given in Appendix B of Reference 3.1 the test time and temperature used for thermal aging given in Reference 3.2, the activation energies given in Table 1 of Reference 3.1, the environmental conditions given in Reference 3.3, the temperature rise data given in References 3.4 and 3.6 and operability requirements given in Reference 3.5.

5.0 BASIC DATA, ASSUMPTIONS AND CALCULATION

5.1 Basic Data

5.1.1 Arrhenius Equation given in Appendix B of Reference 3.1

$$\frac{t_1}{t_2} = \exp\left[\frac{\phi}{k}\left(\frac{1}{T_1} - \frac{1}{T_2}\right)\right]$$

where: t_1 = qualified life (hours)
t_2 = aging time (hours)
ϕ = activation energy (eV)
k = Boltzmans Constant = 8.617×10^{-5} eV/°K
T_1 = total environmental temperature (°K)
T_2 = aging temperature (°K)

5.1.2 Aging Data

Thermal Aging data given in Reference 3.2

$t_2 = 360$ hours
$T_2 = 322°F = 161.1°C = 434.1°K$

Activation energies given in Table 1 of Reference 3.1

$\phi_C = 1.0$ ev (coil)
$\phi_E = 0.94$ev (elastomers)

5.1.3 Environmental Data

Ambient temperature given in Reference 3.3

Inside Containment Temperature = 120°F
Outside Containment Temperature = 104°F

5.1.4 Temperature Rise Data

Temperature rise of solenoid coil and elastomers per References 3.4 and 3.6

Temperature rise of coil = 59.5 °F
Temperature rise of elastomers = 35 °F

5.1.5 Total Temperature

total temperature of solenoid valve per section's 5.1.3 and 5.1.4 to be used in section 5.1.1

(a) De-energized

Inside Containment = 120°F = 48.9 °C = 321.9 °K
Outside Containment = 104°F = 40 °C = 313 °K

(b) Energized

Inside Containment
Coil = 120°F + 59.5°F = 179.5°F = 81.9°C = 354.9 °K
Elastomers = 120°F + 35°F = 155°F = 68.3°C = 341.3°K

Outside Containment

Coil = 104°F + 59.5°F = 163.5°F = 73.1°C = 346.1°K
Elastomers = 104°F + 35°F = 139°F = 59.4°C = 332.4°K

5.1.6 Operating Hours

operating hours energized are 308 days/year per Reference 3.5

5.2 Assumptions

5.2.1 The only solenoid valves energized are those valves which must remain open during normal operation. The valves listed in Section 2.0 as being energized were taken from References 3.7, 3.8, 3.9, 3.10 and 3.11 which are verified approved reference designs.

5.2.2 The operation of solenoid valves will be considered as follows:

(a) normally de-energized

365 days/yr = 8760 hrs/yr at ambient temperature

(b) normally energized

308 days/yr = 7392 hrs/yr at total temperature
57 days/yr = 1368 hrs/yr at ambient temperature

5.2.3 The temperature rise of solenoid valves were determined by measurement per References 3.4 and 3.6

	Temperature (°F)				Temperature Rise (°F)		
	A	B	C	D	B'	C'	D'
Ref. 3.6	80.7	134.8	128.0	112.5	54.1	47.3	31.8
	81.8	141.3	131.4	116.8	59.5	49.6	35.0
	82.4	140.5	129.0	115.8	58.1	46.6	33.4
	83.3	136.2	126.3	113.3	52.9	43.0	30.0
	81.4	135.2	128.3	—	53.8	46.9	—
AVG	81.9	137.6	128.6	114.6	55.7	46.7	32.7
Ref. 3.4	98	—	141	—	—	43	—

where: A = ambient temperature
B = surface temperature on top of solenoid enclosure
C = surface temperature on side of solenoid enclosure
D = surface temperature on solenoid valve body

Comparison of C' for References 3.4 and 3.6 indicates that the temperature rise remains essentially constant for various ambient temperatures. It is assumed that the temperature rise in the ambient temperature region is represented by the measurements taken.

It is also assumed that the surface temperatures are equal to interior temperatures at steady state conditions. This is based on the measurements being taken at times that allowed steady state conditions to be established.

5.2.4 For conservatism, the following is assumed:

(a) Temperature Rise - the temperature rise will be considered the highest temperature rise measured, i.e, 59.5°F for the coil (surface temperature on top of solenoid enclosure) and 35°F for elastomers (surface temperature on solenoid valve body)

(b) Aging Temperature - the temperature rise will not be considered in the aging temperature even though the solenoid valves were energized throughout thermal aging. Only the ambient temperature will be used.

5.3 calculation

5.3.1 Qualified service life using data from sections 5.1 and 5.2

(a) de-energized condition

Inside Containment

Coil $t_1 = 360 \exp\left[\frac{1.0}{8.617\times10^{-5}}\left(\frac{1}{321.9} - \frac{1}{434.1}\right)\right] = 4{,}009{,}490$ hrs

elastomers $t_1 = 360 \exp\left[\frac{.94}{8.617\times10^{-5}}\left(\frac{1}{321.9} - \frac{1}{434.1}\right)\right] = 2{,}292{,}355$ hrs

Outside Containment

Coil $t_1 = 360 \exp\left[\frac{1.0}{8.617\times10^{-5}}\left(\frac{1}{313}-\frac{1}{434.1}\right)\right] = 11,176,012$ hrs

elastomers $t_1 = 360 \exp\left[\frac{.94}{8.617\times10^{-5}}\left(\frac{1}{313}-\frac{1}{434.1}\right)\right] = 6,008,524$ hrs

(b) energized condition

Inside Containment

Coil $t_1 = 360 \exp\left[\frac{1.0}{8.617\times10^{-5}}\left(\frac{1}{354.9}-\frac{1}{434.1}\right)\right] = 140,360$ hrs

elastomers $t_1 = 360 \exp\left[\frac{.94}{8.617\times10^{-5}}\left(\frac{1}{343}-\frac{1}{434.1}\right)\right] = 333,976$ hrs

Outside Containment

Coil $t_1 = 360 \exp\left[\frac{1.0}{8.617\times10^{-5}}\left(\frac{1}{346.1}-\frac{1}{434.1}\right)\right] = 322,347$ hrs

elastomers $t_1 = 360 \exp\left[\frac{.94}{8.617\times10^{-5}}\left(\frac{1}{332.4}-\frac{1}{434.1}\right)\right] = 785,919$ hrs

5.3.2 Qualified Installed Life

The qualified installed life must be greater than or equal to the qualified service life or replacement is necessary.

$$\text{qualified installed life} \geq \text{qualified service life}$$

or

$$\frac{\text{qualified installed life}}{\text{qualified service life}} \geq 1.0$$

Since the qualified installed life is dependent on operation, it can be expressed in terms of hours of operation per year and years as given in Section 5.2.2.

de-energized condition

$$\frac{8760 \times \text{YRS}}{\text{qual. svc. life de-energized}} \geq 1.0$$

energized condition

$$\frac{7392 \times \text{YRS}}{\text{qual. svc. life energized}} + \frac{1368 \times \text{YRS}}{\text{qual. svc. life de-energized}} \geq 1.0$$

Solving for yrs:

de-energized condition

$$yrs \geq \frac{\text{qual. svc. life de-energized}}{8760}$$

energized condition

$$yrs \geq \frac{1}{\frac{7392}{\text{qual. svc. life - energized}} + \frac{1368}{\text{qual. svc. life de-energized}}}$$

substituting values calculated in section 5.3.1

(b) de-energized condition.

Inside Containment

$$\text{coil yrs} \geq \frac{4,009,490}{8760} = 457.7$$

$$\text{elastomer yrs} \geq \frac{2,292,355}{8760} = 261.6$$

Outside Containment

$$\text{Coil yrs} = \frac{11,176,012}{8760} = 1275.8$$

$$\text{elastomer yrs} = \frac{6,008,524}{8760} = 685.9$$

(b) energized condition

Inside Containment

$$\text{Coil yrs} = \frac{1}{\frac{7392}{140,360} + \frac{1368}{4,009,490}} = 18.8$$

$$\text{elastomer yrs} = \frac{1}{\frac{7392}{333,976} + \frac{1368}{2,292,355}} = 43.9$$

Outside Containment

$$\text{Coil yrs} = \frac{1}{\frac{7392}{322,347} + \frac{1368}{11,176,012}} = 43.3$$

$$\text{elastomer yrs} = \frac{1}{\frac{7392}{785,919} + \frac{1368}{6,008,524}} = 103.8$$

6.0 RESULTS

The results of this analysis indicates the following qualified installed service life of coils and elastomers as follows:

	Inside Containment	Outside Containment
(a) de-energized condition		
Coil	457.7 yrs	1275.8 yrs
Elastomer	261.6 yrs	685.9 yrs
(b) energized condition		
Coil	18.8 yrs	43.3 yrs
Elastomer	43.9 yrs	103.8 yrs

(1) All coils and elastomers of ASCO solenoid valves are qualified for a minimum of 40 years located outside containment that are normally energized or de-energized

(2) All elastomers of ASCO solenoid valves are qualified for a minimum of 40 years located inside containment that are normally energized or de-energized.

(3) All coils of ASCO solenoid valves are qualified for a minimum of 40 years located inside containment that are normally de-energized

(4) All coils of ASCO solenoid valves are qualified for a 18.8 year period located inside containment that are normally energized. These coils require periodic replacement.

ARIZONA NUCLEAR POWER PROJECT
Post Office Box 21666 Phoenix, Arizona 85036

attachment 5 to Audit item 2(a) Asco Cover Letter

September 16, 1983
ANPP 27815-JTB/EJG

Mr. Charles Ferguson
Project Manager
Combustion Engineering, Inc.
1000 Prospect Hill Road
Windsor, Connecticut 06095

Subject: NUREG 0588 Qualification Program -
ASCO Solenoid Valves
File: N001, N1.01, 83-001-419.1

References: (A) NRC Letter of 8/8/83 "Summary of Site Audit for Environmental Qualification of Equipment" Item B(2)(a).
(B) ASCO Solenoid Valve Program 14273-PE-5734

Dear Chuck:

This is to formally convey the APS Test Report #13-EC-SI-A01, Rev. 0 which addresses IN-SITU temperature rise testing performed on NP series ASCO solenoid valves.

If you have any questions on this document or require further information, please contact E. Gouvier directly.

Very truly yours,

E. E. Van Brunt

E. E. Van Brunt, Jr.
APS Vice President,
Nuclear Projects
ANPP Project Director

EEVBJr/EJG/dh

cc: A. C. Rogers
J. T. Barrow
M. L. Raines
C. C. Miller
B. L. Aley
R. Cyboron
E. Fitzsimmons (w/a) (CE)
R. Haller (w/a) (CE)

APS

DOCUMENT TITLE SHEET

NUCLEAR PROJECTS — RECORDS MANAGEMENT

F-AP-14

DOCUMENT NUMBER 13-EC-SI-A01

ASCO SOLENOID VALVE
[MODEL # NP8320A187V]
IN-SITU TEMPERATURE RISE
TEST REPORT

REV. NO.	REV. DATE	REVISION DESCRIPTION	ORIG. / DATE	CHECKER / DATE	DS/SE/DR / DATE	QA / DATE	NEM / DATE
△							
△							
△							
△							
△							
Ø	9/9/83	1ST ISSUE	[signature] 25 AUG	[signature] 8/25/83	[signature] 8/25/83	[signature] 9-7-83	[signature] 9-9-83

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- ☐ NOS Manager
- ☐ Nuclear Ops Mgr.
- ☐ PVNGS Engr. Mgr.

PV214-09C 9/82 (REV 1)

aps.
WE CARE HOW YOU LIVE

BY	DATE	SUBJECT	SHEET NO.
EJ Gouvier GOUVIER	24 AUG 83	ASCO SOLENOID VALVE MODEL # NP8320A187V	1 (RΦ) of 5
CHECKED BY JJ Bassoney	DATE 8/24/83	IN-SITU TEMPERATURE RISE TEST	JOB NO. 13-EC-SI-A01

REPORT

PURPOSE: to establish the temperature rise over ambient due to coil heating of continuously energized ASCO solenoid valves

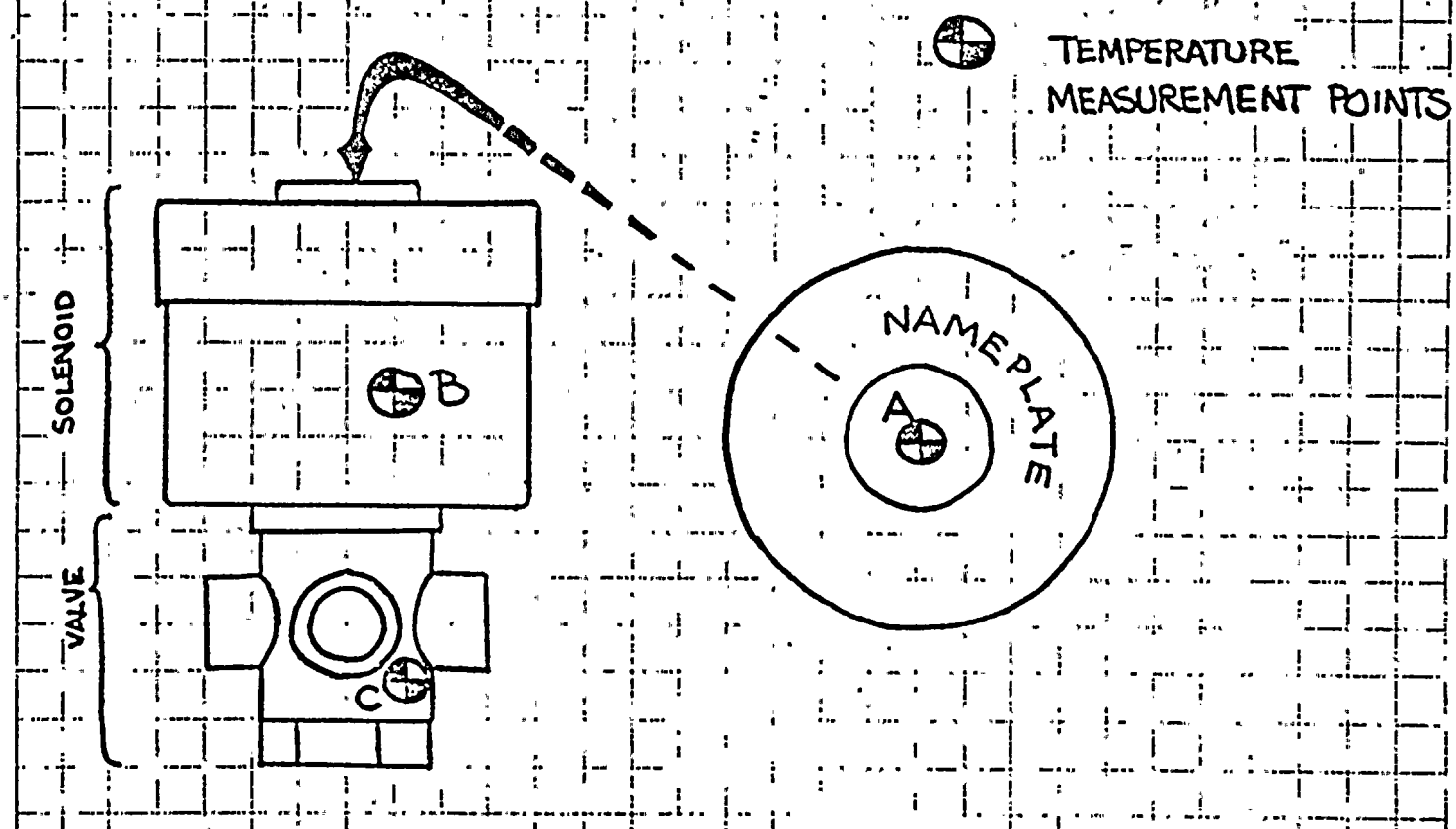
SUMMARY: (RESULTS) In continuous operation, the case (hot spot) temperature rise above ambient, was found to be on the order of 55°F to 60°F

NOTE: THE RESULTS OF THIS REPORT ARE TO BE USED TO VERIFY THE VALIDITY OF THERMAL AGE PRECONDITIONING PERFORMED TO DEMONSTRATE ASCO VALVE QUALIFIED LIFE, AS PART OF ITS HARSH ENVIRONMENT QUALIFICATION PROGRAM.

REF: 14273-PE-5734

aps.
WE CARE HOW YOU LIVE

BY	DATE	SUBJECT	SHEET NO.
E.J. Bonnier GOUVIER	24 AUG 83	ASCO SOLENOID VALVE [redacted] T° RISE (IN-SITU) TEST	2 (Rφ) of 5
CHECKED BY	DATE		JOB NO.
J.J. Hanson Jr.	8/24/83		13-EC-SI-A01



EQUIPMENT DESCRIPTION (TEST SPECIMENS):

ASCO SOLENOID PILOT VALVES
CAT # NP8320A187V
S/N 96607E
125 VDC AIR 60
17.4 WATT

[PVNGS UNIT 1 TAG NOS:]
SIB-UY-611
" 621
" 631
" 641

TEST INSTRUMENTS: @ WAHL PLATINUM 392MX DIGITAL THERMOMETER
SERIAL NO 2444 ID 4232
CALIBRATED 8-9-83
DUE 2-11-84
measured accuracy ±1°F

BY	DATE	SUBJECT	SHEET NO.
J.P. Gouvier	24 Aug 83	ASCO SOLENOID VALVE T° RISE (IN-SITU) TEST	3 (RØ) of 5
CHECKED BY	DATE		JOB NO.
J. Barrow, Jr.	8/24/83		13-EC-SI-A01

TEST INSTRUMENTS (CONTINUED)

ⓑ PLATINUM SURFACE TEMP PROBE
NO SERIAL NUMBER ID 4224
CAL: 8·11·83
DUE: 2·12·84

ⓒ WRISTWATCH

TEST PROCEEDURE: AFTER OBTAINING THE NECESSARY CLEARANCES, ENERGIZE THE TEST SPECIMENS REMOTELY FROM THE CONTROL ROOM. ALLOW SUFFICIENT TIME FOR TEMPERATURES OF THE COIL AND HOUSING TO STABILIZE* THEN MEASURE THE SURFACE TEMPS. AS INDICATED IN THE DIAGRAM OF PAGE 2/5 AND THE AREA AMBIENT FOR EACH OF THE SUBJECT PILOT VALVES. RECORD MEASURED TEMPS. AND THE TIME AT WHICH THEY WERE TAKEN.

* TO PROVIDE AN ADDED DEGREE OF ASSURANCE THAT STABILIZATION HAD INDEED BEEN ACHIEVED, THE THERMAL MEASUREMENTS PERFORMED ON THE FIRST SPECIMEN WERE REPEATED AT THE CONCLUSION OF THE TEST AND COMPARED TO THE INITIAL READINGS.

aps

BY	DATE	SUBJECT	SHEET NO.
E.J. Gouvier	24 Aug 83	ASCO SOLENOID VALVE T° RISE (IN-SITU) TEST	4 (Rev) 5
CHECKED BY	DATE		JOB NO.
J. Bassow, Jr.	8/29/83		13-EC-SI-A01

DETAILED TEST RESULTS:

THE FOLLOWING TABLE PROVIDES A LIST OF MEASURED TEMPERATURES OF THE SUBJECT ENERGIZED ASCO SOLENOID VALVES

DATE OF TEST: 23 Aug 83
LOCATION: PVNGS UNIT 1
100' ELEV. CONTAINMENT
CONDUCTED BY: E.J. GOUVIER

◆ TEST SPECIMENS ENERGIZED t_E = 1200 hrs. (12:00 NOON)

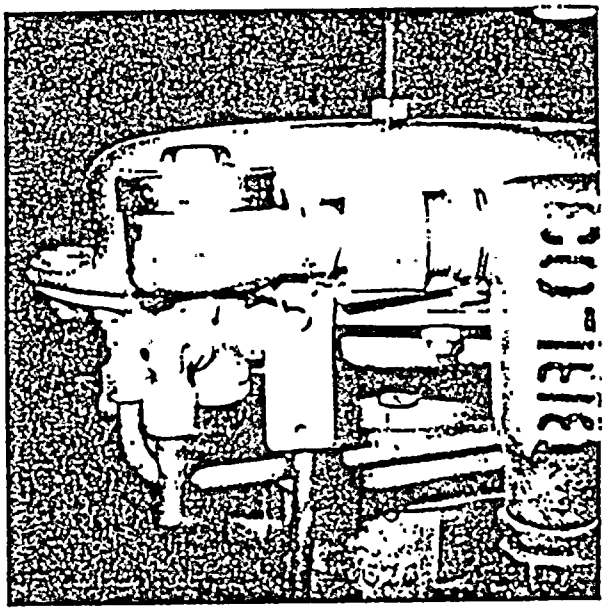
VERIFICATION TEST

VALVE TAG # / MODEL NO. / time of measurement (t_m)	TEMPERATURES MEASURED POINT A	B	C	AMBIENT
SIB-UY 621 # NP8320A187V t_m = 1316 hrs	134.8°F	128.0°F	112.5°F	80.7°F
SIB-UY-611 # NP8320A187V t_m = 1330 hrs.	141.3°F	131.4°F	116.8°F	81.8°F
SIB-UY-641 # NP8320A187V t_m = 1346 hrs.	140.5°F	129.0°F	115.8°F	82.4°F
SIB-UY-631 NO NAMEPLATE t_m = 1358 hrs.	136.2°F	126.3°F	113.3°F	83.3°F
SIB-UY-621 # NP8320A187V t_m = 1415 hrs.	135.2°F	128.3°F	NOT TAKEN	81.4°F

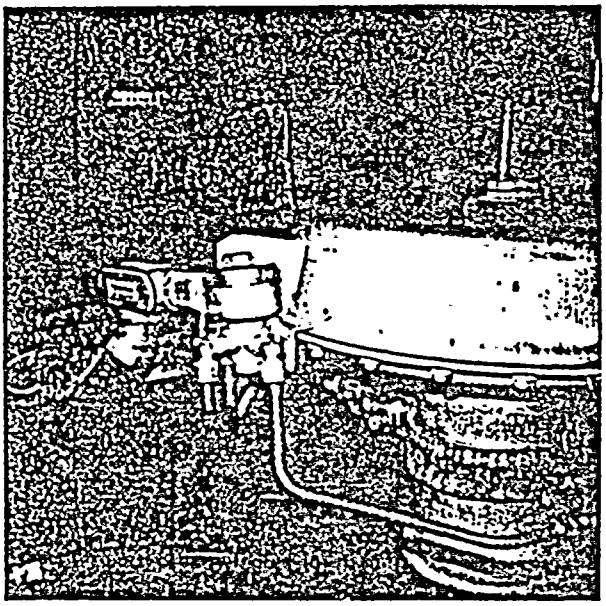
END OF TEST t = 1440 hrs.

cps

BY	DATE	SUBJECT	SHEET NO.
E.D. Bourne Gouvier	24 Aug. 83	ASCO T° RISE (IN-SITU) TEST	5 (R0) of 5
CHECKED BY	DATE	PHOTOGRAPHS	JOB NO.
J.S. Barnes Jr.	8/24/83		13-EC-SI-A01



SIB-UY-621



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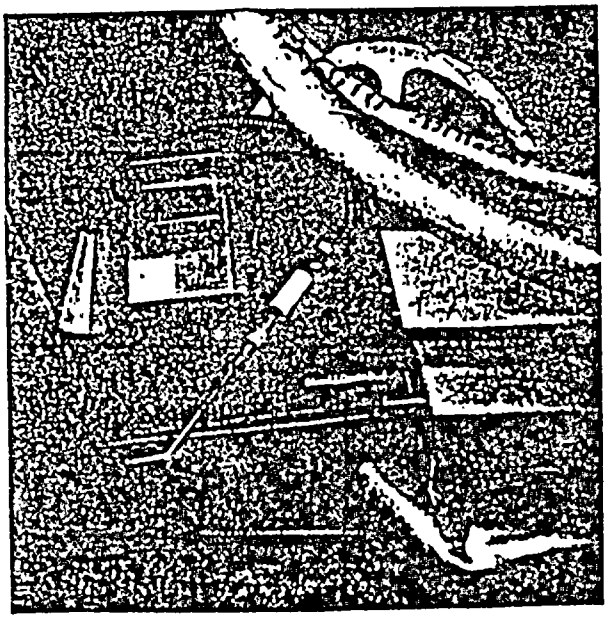

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