

Robinson,  
Robinson, Peterson, Berk,  
Rudolph, Cross & Garde

Mary Lou Robinson  
Nila Jean Robinson  
John C. Peterson  
Avram D. Berk  
Michael Rudolph  
Dan Cross  
Billie Pirner Garde

Attorneys at Law  
108 East College Avenue  
Appleton, Wisconsin 54911  
(414) 781-1817  
Green Bay 494-9600  
Fax 780-8841

January 9, 1990

Christopher I. Grimes, Director  
Office of Special Projects  
Comanche Peak Project Division  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

SUBJECT: TEXAS UTILITIES ELECTRIC COMPANY, ET. AL.  
(COMANCHE PEAK STEAM ELECTRIC STATION,  
UNITS 1 AND 2)  
DOCKET NO.: 50-445/446-OL;  
ANALYTICAL EVALUATION OF STATION SERVICE  
WATER SYSTEM FOR COMANCHE PEAK, BY CASE  
CONSULTANT JACK DOYLE  
FINAL REPORT, REV. 0, DECEMBER 31, 1989

Dear Mr. Grimes,

Citizens Association for Sound Energy (CASE) has submitted to Texas Utilities Electric Company (TU Electric) a copy of a report by CASE's consultant Jack Doyle, entitled "Analytical Evaluation of Station Service Water System for Comanche Peak." A copy of that report is being sent to you under separate cover for your consideration and review. The report is being submitted to the Office of Special Projects (OSP) pursuant to Paragraph B.7 of the Joint Stipulation for the Staff's consideration as it continues to evaluate and reconsider enforcement action in regards to the events and incidents surrounding the removal of the plasite liner in the Station Service Water System (SSWS) in the Spring of 1988,<sup>1</sup> the failure to identify the precursor events to the Auxiliary Feedwater System check valve failure in

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<sup>1</sup> See, September 23, 1989 letter from Billie Pirner Garde, CASE to Christopher Grimes, NRC; Re: Service Water System Enforcement Action (EA 88-310) Docket No. 50-445/446; Permit No. CPPR-126.

May, 1989,<sup>2</sup> and ultimately the readiness of TU Electric to receive permission to load fuel and a license to operate the plant.<sup>3</sup>

#### I. BACKGROUND

As you know, Mr. Doyle has been actively involved in various aspects of evaluating the safety of the Comanche Peak facility since 1981, when he first worked in the frame analysis group at the plant, and later as a witness and technical consultant for CASE in the NRC operating license proceedings.<sup>4</sup> Since the July, 1988 settlement, Mr. Doyle has been actively engaged in continuing to monitor the safety of Comanche Peak in support of CASE President Mrs. Juanita Ellis in meeting her obligations as a regular member of the TU Electric Operations Review Committee (ORC).<sup>5</sup> Throughout this time frame, Mr. Doyle has developed in-depth knowledge of the design and construction of the Comanche Peak facility, and is in a unique position to observe and evaluate the institutional character and competence of TU Electric and its various subcontractors.

CASE has relied heavily on the opinions and work of Mr.

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<sup>2</sup> See, September 23, 1989, letter from Billie Pirner Garde, CASE to Christopher Grimes, NRC; Re: Auxiliary Feedwater System Check Valves, SDAR: CP-89-015, Docket No. 50-445/446; Permit No. CPPR-126.

<sup>3</sup> See, TU Electric letter from William Cahill to Christopher Grimes, NRC dated January 5, 1990, regarding response to NRC Inspection Report 50-445/89-200, Comanche Peak Operational Readiness Assessment Team Inspection.

<sup>4</sup> See, In the Matter of Texas Utilities Generating Company, et. al., (Comanche Peak Steam Electric Station, Units 1 and 2; Docket 50-445/50-446) MEMORANDUM AND ORDER (Quality Assurance for Design), December 28, 1983, pages 8-10, and CASE Exhibits 669, 669A, 683; see also, Exhibit C attached CASE/TU Settlement Agreement, attached to July 13, 1988, Licensing Board MEMORANDUM AND ORDER (Dismissing Proceedings) and Tr. pps 25293-25295; ASLB Judge Bloch's comments at Tr. pps 25273-25274.

<sup>5</sup> Mrs. Ellis is appointed to the Operations Review Committee pursuant to Section III of the Settlement Agreement between CASE, Mrs. Ellis, and TU Electric Company. The ORC is required by the Comanche Peak technical specifications and functions as an independent body assigned the responsibility for review of various safety related matters including nuclear power plant operations, nuclear engineering, radiological safety and quality assurance practices among others.



Doyle since his original involvement in the licensing hearings. In fact, his opinion in the Summer of 1988 that TU Electric had turned around its corporate attitude, (i.e., their approach to acknowledgement of past flaws and failures, a new corporate willingness to pursue issues and take appropriate corrective action) was a key element in CASE's decision to exchange a contested operating license challenge for an active role in monitoring the implementation of its corrective action programs and meeting its licensing requirements through the Joint Stipulation.<sup>6</sup>

Mr. Doyle has continued to be involved with evaluating and monitoring TU Electric's implementation of its settlement and regulatory commitments and reviewing various aspects of the plant's preparation for operations. It is in this capacity that he has performed this in-depth analytical evaluation of TU Electric's performance in identifying root causes and analyzing generic implications of various identified deficiencies in the SSWS.

This evaluation was prepared over a period of months using three phases of SSWS problems as a model in analyzing TU Electric's ability to accomplish and processes used to perform an analysis.<sup>7</sup> The report is a major study of the breakdown of various TU Electric and contractor programs and processes designed to evaluate problems and events such as the corrosion of the service water system. His report also studies how the inability of contract personnel to adequately evaluate the initial problems was compounded and repeated over the years by other contractors and TU Electric personnel until the discovery of a hole in the service water system piping forced reevaluation of previous assessments. Finally, the report analyzes how TU Electric still failed in a post-incident evaluation to come to grips with the system failures that contributed to the pipe's being physically damaged and the potential impact of these failures on other plant systems and components.

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<sup>6</sup> See, for example, the comments of Mr. Doyle at the July 13, 1988, pre-hearing conference on this matter at pps 25,273 to 25,280.

<sup>7</sup> CASE advised TU Electric by letter on December 4, 1989, that Mr. Doyle's draft report identified substantial programmatic deficiencies in TU's quality assurance program and other programs designed to address deficiencies. A copy of this letter was provided to the NRC staff under cover letter dated December 5, 1989. TU Electric and the NRC Staff were also made aware of Mr. Doyle's work at a November 17, 1989, public meeting on the Auxiliary Feedwater check valve failure.

## II. PURPOSE

Mr. Doyle's report concludes, in essence, that the probable root cause of the multiple failures in the SSWS resulted from a fundamental inability of TU Electric personnel (as well as its contractors) to perform a thorough and accurate analysis of the incidents, events, system or component failures, and identified deficiencies in order to prevent the SSWS problems from compounding. (This inability or unwillingness to fully grasp the generic implications of events was repeated in the Spring of 1989 with the Auxiliary Feedwater check valve failure incident.)

After consideration of Mr. Doyle's evaluation, as well as input from its other consultants, CASE has reached the conclusion that TU Electric must proceduralize a formal process for conducting root cause analysis and evaluating generic implications of incidents, events, and deficiencies at the site as part of their station Operating Procedures. This program must include training and audit requirements. Finally, this program must be given the highest management priority and be demonstrated functional and effective prior to completion of construction for Unit II, pre-operational testing, and operation of Unit I.

CASE has already engaged in several discussions with TU Electric officials in that regard, and is pleased that TU Electric has apparently reached a similar conclusion to Mr. Doyle regarding the need for a proceduralized program to analyze root cause. This apparent recognition is buttressed by the October 30, 1989, issuance of TU Electric Procedure No. STA-515, Rev. 0 "Root Cause Analysis," and the lesson plan for training on this program that Mr. Doyle recently began to evaluate. TU Electric and CASE are currently engaged in discussions in an attempt to resolve the specific matters of disagreement in the fledgling program for performing root cause analysis. Hopefully, these discussions will lead to a final program procedure that CASE, and Mr. Doyle, believe will provide TU Electric the mechanism to avoid inadequate and misdirected root cause and generic implication evaluations.

As a result of TU Electric's efforts on this issue, CASE is not providing this report to you in support of any pending dispute, and is hopeful no dispute will be necessary. Nonetheless, CASE believes that the results of Mr. Doyle's work and the conclusions he has reached on the facts reviewed are critical to the NRC's evaluation of the safe operation of the Comanche Peak facility, the competence of TU Electric personnel to operate the plant, and the integrity of the decisionmaking and evaluation process so necessary to safe plant operations. We urge you to consider it carefully as you evaluate the readiness of TU Electric management to operate the plant, and the appropriateness of enforcement action in regards to service water system failures and the auxiliary feedwater check valve



incident.<sup>8</sup>

### III. BASIS AND ISSUES FOR CONSIDERATION

CASE has submitted this report to the NRC for the purpose of its review and consideration under the rights of Paragraph B. 7 of the Joint Stipulation, and in furtherance of its various duties to inform the public of the results of its activities toward protecting public health and safety.

As the Staff is well aware, without the 1988 Settlement Agreement and Joint Stipulation, CASE would have pursued these issues in front of the Atomic Safety and Licensing Board as part of its proof that TU Electric could not prevail on the merits of Contention 5.<sup>9</sup> Although it is difficult to speculate on the hearing process had no settlement been reached, it is safe to assume that the report would probably have been submitted in the form of a Motion for Summary Judgment or Preliminary Proposed Findings of Fact for the Board's consideration in reaching the ultimate determination on Contention 5 and the granting or denial of an operating license. In this regard the issues before the Board would be similar to the situation during the post-denial stage of the Byron proceedings. (In the matter of Commonwealth Edison Company (Byron Nuclear Power Station, Units 1 and 2), Docket Nos. 50-454/455, INITIAL DECISION, January 13, 1984.) In that case the Licensing Board denied Commonwealth Edison's application for a license, in part, because the Board could not conclude that the quality assurance implications raised by a discrete subcontractor failure and attendant quality assurance programmatic breakdown had been adequately resolved and

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<sup>8</sup> This report is particularly appropriate to be considered in connection with the violation identified in Inspection Report 50-445/89-23, 50-446/89-23, undated, and as yet unissued publically, but which CASE believes must be issued and resolved prior to licensing.

<sup>9</sup> The text in Contention 5 was: "The Applicants' failure to adhere to the quality assurance/quality control provisions required by the construction permits for Comanche Peak, Units 1 and 2, and the requirements of Appendix B of 10 C.F.R. Part 50, and the construction practices employed, specifically in regard to concrete work, mortar blocks, steel, fracture toughness testing, expansion joints, placement of the reactor vessel for Unit 2, welding, inspection and testing, materials used, craft labor qualifications and working conditions (as they may affect QA/QC) and training and organization of QA/QC personnel, have raised substantial questions as to the adequacy of the construction of the facility. As a result, the Commission cannot make the findings required by 10 C.F.R. 50.57(a) necessary for issuance of an operating license for Comanche Peak."

corrected. Like the substantiated worker allegations on electrical issues at the base of the denial in Byron, Mr. Doyle's report substantiates a programmatic failure in SSWS, covering years, and resulting in hardware defects in a critical safety system.

In Byron the Board refused to allow the Staff to make the ultimate decision on the identified flaws. Their refusal to delegate decisionmaking authority on contested issues to the Staff does not apply here. The Staff is both a party to the Joint Stipulation and the decisionmaker in regards to readiness to load fuel and recommend to the Commission approval for an operating license. No licensing board will conduct further evidentiary hearings on discrete issues of management's judgment and actions by TU Electric. In that capacity CASE believes it is critical that the issues raised in this report are considered thoroughly by the Staff prior to any decision on fuel load and operation.

The report contains conclusions applicable to issues of both regulatory character and competence of TU Electric to manage and operate Comanche Peak. Some of these conclusions are very negative. Unfortunately, the conclusions are not ancient history, but seem to persist in the handling of events over the past several months. These incidents have eroded CASE's confidence in various managers at TU Electric to respond to events, identified deficiencies, and programmatic breakdowns as quality-minded managers prudently operating a nuclear plant. CASE has raised these matters directly to TU Electric through the Joint Stipulation and regular management conferences, and in some cases raised the matters directly to the NRC through letters or disputes.<sup>10</sup>

CASE recognizes that the NRC Staff must reach a determination on whether TU Electric has met the regulatory requirements of 10 CFR Part 50, as well as demonstrated the competence to manage an operating plant.

The Code of Federal Regulations requires that applicants for a license establish Quality Assurance compliance during operation, as well as during design and construction. Specifically the regulations mandate the existence of

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<sup>10</sup> See, November 23, 1989 letter from Billie Pirner Garde to William G. Council and Christopher Grimes Re: Documented Request for Action (re: Thermo-Lag/50.57 dispute between CASE and TU Electric) Docket Nos. 50-445, 50-446. See, also, CASE's December 6, 1989 Documented Request for Action concerning a quality assurance and engineering breakdown in scaling calculations effort over the past five years.



ii. Managerial and administrative controls to be used to assure safe operation. Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," sets forth the requirements for such controls for nuclear power plants.

The information on the controls to be used for a nuclear power plant shall include a discussion of how the applicable requirements of Appendix B will be satisfied. 10 CFR, Part 50.34 (11)(b)(6)(ii)

and further requires that,

(3) To satisfy the following requirements, the application shall provide sufficient information to demonstrate that the requirement has been met. This information is of the type customarily required to satisfy paragraph (a)(1) of this section or to address the applicant's technical qualifications and management structure and competence.

(i) Provide administrative procedures for evaluating operating, design and construction experience and for ensuring that applicable important industry experiences will be provided in a timely manner to those designing and constructing the plant. (I.C.5)

(ii) Ensure that the quality assurance (QA) list required by Criterion II, App. B, 10 CFR Part 50 includes all structures, systems, and components important to safety. (I.F.1)

(iii) Establish a quality assurance (QA) program based on consideration of: (A) Ensuring independence of the organization performing checking functions from the organization responsible for performing the functions; (B) performing quality assurance/quality control functioning at construction sites to the maximum feasible extent; (C) including QA personnel in the documented review of and concurrence in quality related procedures associated with design, construction and installation; (D) establishing criteria for determining QA programmatic requirements; (E) establishing qualification requirements for QA and QC personnel; (F) sizing the QA staff commensurate with its duties and responsibilities; (G) establishing procedures for maintenance of "as-built" documentation; and (H) providing a QA role in design and analysis activities. 10 CFR 50.34 xxvii (3)(i)-(iii)

It is CASE's position that demonstrated failures in

fundamental regulatory programs and processes, such as the quality assurance program and a failure at accomplishing thorough root cause analyses, are predictors of whether a utility can safely operate a plant. This view is supported by NRC case law which states that "Plainly, whether the plant was properly built bears on whether it can be operated safely..." ALAB-799, citing Union Electric Co. (Calloway Plant, Unit 1), ALAB-740, 18 NRC 343, 345 (1983).

In keeping with this approach, Mr. Doyle's report and evaluation goes beyond hardware and technical issues and evaluates processes.

The report's conclusions identify probable causes of certain events and deficiencies with the SSWS that can be characterized as "Character and Competence Issues." Although neither the Atomic Energy Act nor the Commission's case law provide a complete definition of the term, several licensing boards have addressed the issue and applied it to evaluating events, patterns, and management actions in the design, construction, and operation of nuclear power plants.<sup>11</sup> In this regard, CASE submits that competence, as a separate issue of fitness to operate a nuclear plant, has been defined to be the technical abilities of an applicant to meet its regulatory requirements and protect public health and safety.<sup>12</sup> This includes "the sufficiency of staffing and resources, the quality of management, and the adequacy of a utility's organization." Id.

The Commission has determined that remedial measures are appropriate to consider in evaluating the competence of an applicant for an operating license.<sup>13</sup> Likewise, NRC case law has held that "character" which remains a subjective set of traits, cannot be evaluated without regard to evaluating remedial measures taken to correct identified weaknesses.<sup>14</sup> The Appeals Board in the South Texas case agreed with the Licensing Board that in order to evaluate "character" the Board needed to scrutinize the applicant's "...record of compliance with NRC

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<sup>11</sup> See, for example, In the Matter of Houston Lighting and Power Company, et. al. (South Texas Project, Units 1 and 2), Docket Nos. 50-498/50-499 OL, DECISION, Atomic Safety and Licensing Appeal board, February 6, 1985, ALAB-799, 19 NRC 659; In the Matter of Metropolitan Edison Co., (Three Mile Island Nuclear Station, Unit No. 1) ALAB-738, 18 NRC 177, 190 (1983); and ALAB-772, 19 NRC 1193, 1206 (1984).

<sup>12</sup> ALAB-799, at \_\_\_\_.

<sup>13</sup> Id., at \_\_\_\_.

<sup>14</sup> Id., at \_\_\_\_.



regulations, its response to non-compliances, and its candor in dealing with the Commission, the Board, the Staff and other parties." Id.

CASE submits that under the terms of the Joint Stipulation, the NRC Staff must perform the role of scrutinizing TU Electric's history of performance, compliance, and candor, and that their duty to do so in this case, without benefit of a licensing board, is even greater than usual. CASE recognizes that TU Electric has begun to undertake some remedial measures in response to quality assurance programmatic weaknesses identified by both the NRC and CASE.<sup>15</sup> We expect that the NRC will evaluate those remedial measures, the adequacy of those efforts, the information regarding SSWS disclosures and AFW events, and the commitment made by top level TU Electric management to respond to identified weaknesses in programs and personnel. However, we believe that the hour is getting very late for instituting major programmatic reforms and that such efforts must be scrutinized by the Staff to insure that they are not simply "window dressing" to be taken down after licensing.<sup>16</sup> This scrutiny may give rise to a consideration of imposing a licensing condition on TU Electric requiring continuation of certain self-initiated programs and efforts. Although CASE stops short of suggesting that action at this time, it is very close to requesting the same.

#### CONCLUSION

Since the beginning of its role under the Joint Stipulation, CASE often finds itself in the role of an independent ombudsman. It is CASE's belief that the observations and findings of its consultants and representatives provide TU Electric management factual information, analysis of facts, and insight into the power plant from a unique perspective. In most cases TU Electric responds to those observations with an open mind. Hopefully, they will respond to this report in a like manner. However, at this late date, CASE recognizes that ultimately the responsibility for determining the readiness of TU Electric to

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<sup>15</sup> As mentioned previously TU Electric has written a procedure for root cause analysis, and has undertaken some corrective measures in response to the thermo-lag incident and scaling calculation dispute.

<sup>16</sup> Id., citing United Broadcasting Co. v. FCC, 565 F.2d 699 (D.C. Cir. 1977), cert. denied 434 U.S. 1046 (1978), affirming Application of United Television Co., 55 F.C.C. 2d 416 (1975) that upholds the denial of an FCC license because of a long history of persistent violations by the Applicant. The relevant finding was that the applicant's remedial measures were mere "window dressing" and that no reliance could be placed on its promise of future compliance.

operate the Comanche Peak plant in a manner consistent with protecting the public health and safety lies exclusively with the NRC, and that the Commissioners and the general public expect the Staff to carry out that responsibility conscientiously and cognizant of all available information. In that vein CASE supplies this report for your assistance in carrying out your regulatory responsibilities.

Respectfully submitted,

*Billie Pirner Garde*

Billie Pirner Garde  
Attorney for CASE

cc: William G. Council  
Vice-Chairman  
TU Electric  
2001 Bryan Tower  
Dallas, TX 75201

Dr. Ausaf Husain  
Chairman, Operations Review Committee (ORC)  
TU Electric  
400 North Olive Street, LB 81  
Dallas, TX 75201

Susan Palmer  
Stipulation Manager  
TU Electric  
Comanche Peak Steam Electric Station  
P.O. Box 1002  
Hwy. 56  
Glen Rose, TX 76043

Dennis M. Crutchfield  
Associate Director for Special Projects  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
11555 Rockville Pike  
1 White Flint North--Mail Stop 7D24  
Rockville, MD 20852

Bob Warnick  
Assistant Director for Inspection Program  
Comanche Peak Project Division  
U.S. Nuclear Regulatory Commission  
Comanche Peak Steam Electric Station  
Glen Rose, TX 76043

George Edgar  
Newman & Holtzinger, P.C.  
1615 L Street, N.W., Suite 1000  
Washington, D.C. 20036



CASE CONCERN  
No. 89-0031Page 1 of 10Date Submitted to TU Electric: September 22, 1989TU Response Due Date (as requested by CASE): October 2, 1989

Preliminary Discrepancy Category: (check all applicable)

SAFETY RELATED <u>X</u>	NON-SAFETY RELATED <u>X</u>	HOUSEKEEPING <u>  </u>
HARDWARE <u>X</u>	IMPORTANT TO SAFETY <u>X</u>	MAINTENANCE <u>X</u>
DOCUMENTATION <u>  </u>	PROCEDURAL DEVIATION <u>X</u> (CAR)	ACCESS <u>  </u>
TRAINING <u>X</u>	QUALIFICATIONS <u>  </u>	TESTING <u>X</u>
CODE DEVIATION <u>  </u>	STANDARD DEVIATION <u>  </u>	CALIBRATION <u>X</u>
10CFR50.55(e) <u>1, i &amp; iii</u>	PART 21 <u>  </u>	PROCUREMENT <u>X</u>
FSAR DEVIATION <u>  </u>	U-2 ENHANCEMENT <u>X</u>	STORAGE <u>  </u>
OSHA <u>  </u>	SECURITY <u>  </u>	TRENDING <u>X</u>
WORKER SAFETY <u>  </u>	MANAGEMENT DEFIC. <u>X</u>	OTHER <u>  </u>

QA PROGRAMATIC BREAKDOWN YES - 10CFR50, 10CFR50.55(e)

10CFR50, APPENDIX B, CRITERION Introduction, I, III, V, VI, VII, IX, X, XIII, XV, XVI, XVIIIWRONG-DOING   INTIMIDATION/HARASSMENT   POOR INDUSTRY CONSTRUCTION PRACTICE XPOOR MANAGEMENT PRACTICE XDISCIPLINE(S) INVOLVED Quality Assurance, M&TE, I&C, Testing, Quality Control, EngineeringTO: W.G. COUNCILFROM:   ON-SITE PROJECT MANAGER-CASECONSULTANT-CASE

Please provide your response to CASE with supporting references and copies of the documents/requirements that substantiate your evaluation results and conclusion. If the responding organization/person considers a meeting with CASE to be beneficial for clarity of the CASE CONCERN, please advise CASE.

### CASE PERCEIVED POTENTIAL DISCREPANCY

(Use Continuation Sheets when necessary)

1. SUBJECT: TEFLON TAPE ISSUECONCERN:   

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Teflon tape has been used extensively over long periods of time (years) at Comanche Peak Nuclear Power Station in spite of the Nuclear Regulatory Commission's recommendation that it not be used, and in spite of the fact that TU Electric issued 2 Corrective Action Reports (CAR) in 1987, a Stop Work Order in 1989, and another CAR in 1989 (which perhaps finally stopped the use of Teflon tape but the corrective action for past use has not as yet been implemented/corrected).

NOTE: Teflon Tape is an unapproved mechanical thread sealant.

\*\*Multiple NCRs issued but not referenced in this CASE Concern.

CASE CONCERN No. 89-0031REFERENCE:

- A. 10CFR50, Appendix B, Criterion: Introduction, states in part:

"...As used in this appendix, 'quality assurance' comprises all those planned and systematic actions necessary to provide adequate confidence that a... component will perform satisfactorily in service.

"...Quality assurance includes quality control, which comprises those quality assurance actions related to the physical characteristics of a material... component... which provides a means to control the quality of the material, ...component, ...to predetermined requirements."

- 10CFR50, Appendix B, Criterion: I, Organization, States in part:

"...The quality assurance functions are those of (a) assuring that an appropriate quality assurance program is established and effectively executed and (b) verifying, such as by checking, auditing, and inspection, that activities affecting the safety-related functions have been correctly performed."

- 10CFR50, Appendix B, Criterion: III, Design Control, states in part:

"...Measures shall be established to assure that applicable regulatory requirement and the design basis, ...are correctly translated into specifications, drawings, procedures, and instructions. ...Measures shall also be established for the selection and review for suitability of application of materials... that are essential to the safety-related functions of the structures..."

- 10CFR50, Appendix B, Criterion: V, Instructions, Procedures, and Drawings states in part:

"...Activities affecting quality shall be prescribed... and shall be accomplished in accordance with..."



CASE CONCERN No. 89-0031

10CFR50, Appendix B, Criterion: VII, Control of Purchased Material, Equipment, and Services states in part:

"...Measures shall be established to assure that purchased material, ...conform to the procurement documents. These measures shall include ...examination of products upon delivery."

10CFR50, Appendix B, Criterion: VIII, Identification and Control of Material, Parts, and Components states in part:

"...These identification and control measures shall be designed to prevent the use of incorrect or defective materials..."

10CFR50, Appendix B, Criterion: IX, Control of Special Processes states in part:

"...Measures shall be established to assure that special processes, ...are controlled and accomplished by qualified personnel using qualified procedures..."

10CFR50, Appendix B, Criterion: X, Inspection states in part:

"...A program for inspection ...shall be ...executed ...to verify conformance with the documented instructions, ...Examinations, ...of material ...shall be performed ...to assure quality."

10CFR50, Appendix B, Criterion: XIII, Handling, Storage and Shipping states in part:

"...Measures shall be established to control the handling, storage, ...cleaning ...of ...equipment in accordance with work and inspection instructions to prevent damage or deterioration".

CASE CONCERN No. 89-0031

10CFR50, Appendix B, Criterion: XV, Nonconforming Materials, Parts, or Components states in part:

"...Measures shall be established to control materials, ...which do not conform to requirements ...to prevent their inadvertent use or installation."

10CFR50, Appendix B, Criterion: XVI, Corrective Action states in part:

"...Measures shall be established to assure that conditions adverse to quality, ...are promptly identified and corrected. ...The measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition."

10CFR50, Appendix B, Criterion: XVIII, Audits states in part:

"...Follow up action, including re-audit of deficient areas, shall be taken where indicated."

- B. CAR-87-043  
CAR-87-007  
PDR-062, CPRT QA/QC Program Deficiency Report  
NCR M621, Revision 2, dated 6/2/77  
Stop Work Order 89-002  
CAR-89-008  
CPSES-I-1018, Revision 3, para. 1.11.5  
CPSES-M-1041G, para. 5.1.21 and Appendix A  
FVM-1C-069  
TUG-89-15  
(Multiple NCRs issued that are not referenced in this CASE Concern.)

BACKGROUND DATA:

The use of this unapproved mechanical thread sealant, Teflon Tape, at Comanche Peak Nuclear Power Station predates January 30, 1981, as documented on Non-Conformance Report (NCR) M621, Revision 2, dated 6/2/77, and as reported by CPRT Recommendation E-11 of Corrective Action Report (CAR)-87-043, Revision 1.



CASE CONCERN No. 89-0031

The Nuclear Regulatory Commission (NRC) also acknowledges that Teflon Tape is not to be used, at least in sensitive areas, in nuclear power plant construction (as verbally acknowledged to CASE and TU Auditors).

The use of an unapproved mechanical thread sealant is compounded by the fact that TU Electric has allowed (or failed to prevent) the improper application of the Teflon Tape which has a high potential to contaminate a system and even cause malfunctions, i.e., the Teflon Tape was being misapplied by wrapping the tape over the ends of the hardware which immediately cut off the tape (over the ends) when thread engagement was performed - causing the "cut-off" Teflon Tape to enter/fall into the system.

TU Electric was cognizant of the Teflon Tape being an unapproved mechanical thread sealant, as evidenced by the References under B., and should have been aware of the inherent dangers of the misapplication of the Teflon Tape.

CAR 87-043 remained open for approximately two years, during which Teflon Tape was being used and was being misapplied.

CAR 87-043 was closed on June 5, 1989 indicating corrective action was implemented and complete. However, on June 30, 1989, a CASE representative observed the continued use of Teflon Tape at Comanche Peak. At this time it was not known to CASE of the existence of CAR 87-043. The technical discussion, between the CASE Representative and the TU Auditor, that followed CASE's observation resulted initially in a "difference of opinion". The issue was subsequently taken verbally to the NRC/OSP by the TU Auditor since the CASE Representative recalled the NRC's evaluation of the use of Teflon Tape in the nuclear industry. The NRC did a limited research and verified that the use of Teflon Tape was inappropriate for most uses in nuclear plant construction.

CASE CONCERN No. 89-0031

After the observation by CASE on June 30, 1989, that Teflon Tape was being used and was being misapplied, TU Electric issued Stop Work Order (SWO) 89-002 and subsequent CAR 89-008 (as required by the SWO). TU Electric Quality Assurance verbally notified appropriate personnel of the SWO pertaining to the use of Teflon Tape to be immediately stopped.

It was further observed by the CASE Representative that even after the SWO had been issued, TU Electric and its contractors continued to use Teflon Tape and continued to misapply the tape. Upon investigation it was determined that not only were operations, test, and construction personnel unaware of the SWO, but also the QA Surveillance Group, and other persons internal to Quality Assurance Audit Group, were unaware of the SWO, and verbal notification of the SWO.

#### CONCLUSION:

CASE's conclusion, based upon personal involvement with this issue/concern, and after research into the historical facts and circumstances involving this issue/concern, is:

- 1) Teflon Tape, an unapproved mechanical thread sealant, has been used extensively in the construction of Comanche Peak Nuclear Power Station for an indeterminate number of years, but up to 1989,
- 2) The integrity of the hardware where Teflon Tape has been applied is indeterminate; and, if considered in some areas to be "acceptable" for use, the misapplication of the Teflon Tape causes the integrity of the hardware to be indeterminate.
- 3) There is evidence of a QA Programmatic breakdown in that, three CARs, one SWO, one Program Deficiency Report, and one NCR had to be generated before the unapproved use of Teflon Tape could be (as purportedly is the case) stopped, (Reference CASE Concern 89-0015).



CASE CONCERN No. 89-0031

- 4) TU Electric has an inadequate and ineffective Stop Work Order Program (Reference CASE Concern 89-0005.1).
- 5) TU Electric does not meet the intent of 10CFR50, Appendix B, Criterion XVI, by promptly identifying and correcting nonconforming conditions: in fact, the non-conformance continued over two years while waiting for (and after) the closure of CAR 87-043 (Reference CASE Concern 89-0024 and 89-0037).

Additionally CASE concludes, based upon our evaluation/analysis of the current and historical conditions, and based upon our interpretation of 10CFR50, Appendix B (Reference), the following assessments:

A quality assurance program apparently was not effective in assuring that Teflon Tape could not be introduced into a safety-related system(s), thereby preventing satisfactory performance once the system(s) were in service and subjected to the conditions which would introduce failures in stainless steel applications. Measures were not apparently in effect to identify that the physical material characteristics of Teflon Tape were detrimental to stainless steel under certain circumstances (radiation, heat, stress), and that the use of Teflon Tape in plant systems must be controlled.

The quality assurance functions apparently were not effectively executed in preventing (once identified) through its checking, auditing, and inspection programs, the continued use of Teflon Tape in permanent plant safety-related systems.

Once the use of Teflon Tape was identified by TU Electric Engineering to be detrimental to stainless steel applications in permanent plant safety-related equipment, appropriate design measures were not apparently correctly translated into procedures and instructions (training) to prevent misapplication of the material.

CASE CONCERN No. 89-0031

Once it was determined by TU Electric project personnel that the use of Teflon Tape was restricted, the applicable documents apparently were not issued to prevent unauthorized use of the tape in permanent plant safety-related systems.

The restricted use of Teflon Tape was not apparently adequately relayed to the suppliers of safety-related components, nor were those restrictions verified during receipt of those components (which continued to use Teflon Tape) to prevent introduction of Teflon Tape into permanent plant safety-related equipment.

Teflon Tape containers and/or dispensers were not identified to prevent its use in permanent plant safety-related equipment.

CASE perceives the installation of Teflon Tape to fall into the category of a special process. The correct installation of Teflon Tape (i.e., initial wrap starting back from threaded end to prevent cutting off of wrapover tape and dropping into tubing/device; minimizing excess application; and, being wrapped in the direction of tightening) cannot be verified after installation; therefore, special process controls must be in place to assure proper application of the tape.

The Project's QC inspection activities did not verify conformance to certain documents (i.e., CPSES-I-1018 Rev. 3, para. 1.11.5; CPSES-M-1041G, para. 5.1.21 and Appendix A; CAR's 87-007 and 87-043), and allowed potentially dangerous conditions to exist after inspection acceptance, i.e. FVM-IC-069, did not inspect for all areas where the use of Teflon Tape could result in fluoride concentrations collecting in stainless steel joint crevices that could cause cracking.



CASE CONCERN No. 89-0031

Teflon Tape was not removed from the threads of M&TE after calibration so that it would not be installed in permanent plant equipment.

Teflon Tape, a nonconforming material, was not controlled to prevent its inadvertent use or installation into plant equipment.

CAR-87-043 was closed two years after initiation and did not identify all the areas of Teflon Tape usage nor did it prevent the continued and unapproved use of the tape. Stop Work Order 89-002 was issued following closeout of CAR-87-043 but was not effective in preventing the continued and unauthorized use of Teflon Tape.

The project Audit programs conducted by TU Electric and its contractors, were not effective in preventing and identifying the continued use of Teflon Tape in temporary and permanent plant equipment.

RECOMMENDATION:

Based on the data contained within this CASE Concern, CASE recommends the following:

- 1) Prompt and correct closure of CAR 89-008, by
  - a) Revising procedures to prevent the unapproved use of Teflon Tape,
  - b) Revising procedures to control the issuance of Teflon Tape for "approved" uses,
  - c) Developing an inspection plan to identify and evaluate all uses of Teflon Tape at Comanche Peak Nuclear Power Station.

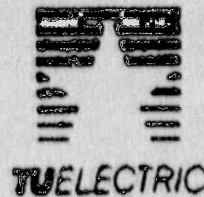
CASE CONCERN No. 89-0031

- 2) Evaluate other procured items for similar generic implications in other areas, i.e. uncontrolled use of chlorides.
- 3) Perform a Vendor/Supplier Audit and/or Surveillance to ascertain the inappropriate use of Teflon Tape; to include how the manufacturer applied the Teflon Tape if its use was evaluated as being acceptable to use.
- 4) Label (strictly control) Teflon Tape containers and dispensers to prevent the tape from being used in permanent plant safety related equipment.
- 5) Train personnel on the proper application of Teflon Tape where its use is acceptable, and develop, or revise, applicable procedures
- 6) Develop (or revise) Quality Control Receiving Inspection Procedures and/or Checklists to include criteria for the inspection for the unacceptable use of Teflon Tape on components/equipment supplied by Vendors.
- 7) Train Quality Control Inspectors on the criteria applied to the acceptable and unacceptable use of Teflon Tape.

The CAR and SWO remain unclosed at this time; therefore, the above conclusion and recommendations are not representative of CASE's final conclusion and recommendation pending the closure of the CAR and SWO.

NOTE: TU Electric may upon their final evaluation and closure of subject documents, arrive at the same or similar conclusion and recommendation as CASE.





LOGO LPT-89/635  
FILES 10086

William G. Council  
Vice Chairman

November 21, 1989

Mrs. Juanita Ellis  
President, CASE  
1426 South Polk Street  
Dallas, TX 75224

Subject: Teflon Tape Issue  
CASE Concern No. 89-0031

Dear Mrs. Ellis:

On September 22, 1989 TU Electric received from CASE the subject concern, regarding the use of Teflon tape at Comanche Peak Steam Electric Station. Enclosed is a restatement of CASE Concern No. 89-0031 followed by the TU Electric response.

Very truly yours,

*W. G. Council*  
W. G. Council

Enclosure  
cc: B. P. Garde

#### CASE Concern:

Teflon tape has been used extensively over long periods of time (years) at Comanche Peak Steam Electric Station in spite of the Nuclear Regulatory Commission's recommendation that it not be used, and in spite of the fact that TU Electric issued 2 Corrective Action Reports (CARs) in 1987, a Stop Work Order in 1989, and another CAR in 1989 (which perhaps finally stopped the use of Teflon tape but the corrective action for past use has not yet been implemented/corrected).

NOTE: Teflon tape is an unapproved mechanical thread sealant.

#### TU Electric Response:

##### Background:

The following is a listing of specifications addressing Teflon tape and changes dealing with Teflon tape use at CPSES:

##### o MS-100 - "Piping Erection Specification"

MS-100 Rev. 0, March 1, 1976 stated, "the use of Teflon tape is prohibited in the Containment and in Class 1 systems. The contractor shall not use Teflon tape in other areas or systems except when its use has been approved by the Owner".

- MS-100 was revised July 9, 1976 (Rev. 2) to state, "the use of Teflon tape is prohibited in the plant".
- DCA 3950 Rev. 0, was issued March 6, 1979 to MS-100 Rev. 3 to allow use of Teflon tape for temporary installations, including temporary connections to permanent piping or equipment for testing purposes. It further required that all Teflon tape must be removed from permanent piping or equipment after its use.
- DCA 9564 was issued January 30, 1981 to MS-100 to allow the use of Teflon tape for oxygen manifolds at the catalytic hydrogen recombiners. This DCA allowed a one time deviation and no other changes were made.
- MS-100 was revised July 9, 1987 (Rev. 9) to state, "The use of Teflon tape is prohibited for all installations whether permanent or temporary. Exceptions to this are as follows:
  - a. Reactor Coolant Pump Lubrication Oil System
  - b. Reactor Head Stud tensioners



o MS-101 - "Mechanical Erection Specification"

MS-101 Rev. 0, December 5, 1975 stated, "Installation of all piping, valves and piping accessories furnished with equipment shall comply with the applicable provisions of Piping Erection Specification 2323-MS-100 for the system of which the equipment is a part. In the case where two or more systems are involved, the more restrictive specification shall apply".

- DCA 3951 Rev. 0 was issued March 6, 1979 against MS-101 to allow the use of Teflon tape for temporary installations, including temporary connections to permanent piping or equipment for testing purposes. All Teflon tape was to be removed from permanent piping or equipment after its use. The use of Teflon tape was prohibited for permanent installation.
- DCA 3951 Rev. 1 was issued May 24, 1982 against MS-101 to incorporate allowance for use of Teflon tape on stud tensioners for hydraulic and air fittings per Westinghouse memorandum TBX-M-739.
- MS-101 was revised May 15, 1987 (Rev. 5) to prohibit Teflon tape for permanent installations. However, it could still be used on stud tensioners and the revision also allowed its use on the reactor coolant pump motor flywheel labyrinth seal vent pipes per Westinghouse memorandum TBX-M-589.

o MS-625, "Instrument Tubing and Fittings (Nuclear Safety Related)"

This specification as issued in 1975 prohibited the use of Teflon tape.

- DCA 13839 was issued in July 1984 to allow the use of Teflon tape in the Turbine Building and Circulating Water Intake Structure.

o MS-626, "Procurement of Non-Nuclear Safety Related Tubing Fittings and Valves"

This specification as issued in 1976 prohibited the use of Teflon tape.

o CPES-I-1018, "Installation of Piping/Tubing and Instrumentation"

This specification compiled all installation criteria from MS-625 and MS-626 into a common document. It was issued July 7, 1987. MS-625 and MS-626 are now procurement specifications. This specification prohibits the use of Teflon tape in all plant areas with the exception of Teflon tape installed in the Turbine Building and Circulating Water Intake Structure prior to July 1987.

- DCA 72528 revised Specification CPES-I-1018 on September 29, 1988 to prohibit the use of Teflon tape in all piping/instrumentation systems associated with the Turbine Generator.

o CPSES-M-1041G, "Chemical/Consumable Products"

This specification was issued on July 7, 1988 to control the use of Teflon tape on stainless steel applications. However, it allowed Teflon tape on the exceptions described in DCA 3950, Rev. 0 and DCA 3951, Rev. 0 and Rev. 1.

Controlled Material Approval Requests (CMARs) TUE-143-89 and TUE-201-89 issued August 2, 1989 and August 16, 1989, respectively were issued to expand specific uses provided Teflon tape does not come into direct contact with permanent plant equipment.

To TU Electric's knowledge the NRC has not issued any written recommendation or prohibition regarding the use of Teflon tape.

Discussion:

In 1977, during receiving inspection activities certain vendor supplied equipment was identified that had Teflon tape on flex line fittings. Nonconformance Report NCR-M-621 was issued on May 12, 1977, for this condition.

Discovery of Teflon tape use in the Safeguard and Auxiliary buildings during a QA surveillance resulted in the issuance of DR-86-109 on July 16, 1986. The disposition of DR-86-109 required each Operations System Engineer to walkdown his assigned instrumentation system. The scope of this walkdown was to identify the presence of Teflon tape in the assigned system, with emphasis on vendor supplied skid mounted equipment. DR-86-109 identified 8 instances where Teflon tape was applied to safety related instruments. The Teflon tape was removed from 5 instruments, with the remaining 3 instruments being dispositioned "use-as-is." None of the instances was determined to be safety significant.

On October 31, 1986, the Comanche Peak Response Team (CPRT) during its documentation review issued Recommendation E-11, "Unidentified Sealant", which resulted in the issuance of Corrective Action Request (CAR) 87-007, "Unidentified Thread Sealant". During the CPRT reinspection efforts governed by Issue Specific Action Plan (ISAP) VII.a.9, "Adequacy of Purchased and Safety-Related Material and Equipment," an out-of-scope deviation was noted for the use of Teflon tape on a vendor supplied instrument. CPRT issued Program Deviation Report (PDR)-62 for this deviation on February 5, 1987. TU Electric issued CAR 87-043 to evaluate the use of the unapproved thread sealant. No other similar deviations were identified during ISAP VII.a.9 implementation. Additionally, no deviations related to the use of Teflon tape were identified during ISAP VII.c, "Construction Reinspection/Documentation Review", reinspection activities.

CPRT Recommendation E-11 was revised on March 20, 1987, by the CPRT to incorporate PDR-62. This revision of E-11 indicated that Teflon tape was an unapproved sealant which was found on a vendor-supplied instrument. CPRT stated that the use of unapproved sealant has limited generic implications



since it only applies to instrument installations with threaded tubing connections (i.e., threaded connections are not utilized in any other safety related fluid-carrying systems). It was recommended by CPRT that TU Electric Engineering make an evaluation of the sealant application in instrumentation systems to determine if prior use of the improper sealant was a problem.

Because CARs 87-007 and 87-043 both addressed the thread sealant issue, CAR 87-007 was incorporated into CAR 87-043 to provide a common disposition of the generic concerns for the use of all thread sealants.

As part of the corrective action for CAR 87-043, Engineering performed a walkdown of the Reactor Coolant and Residual Heat Removal Systems. A total of 342 joints were verified for visible signs of Teflon tape. No Teflon tape was observed in any of the joints. Furthermore, as additional corrective action for CAR 87-043, Engineering personnel performed a walkdown controlled by Field Verification Method (FVM)-069, "Safety/Non Safety Related Instrumentation and Tubing Connected to ASME III Fluid Systems and ANSI Safety Class Installations", of all instrument installations (over 400) connected to ASME III piping or ANSI Safety Class 1, 2, or 3 installations in Unit 1 and Common. Each of the installations has an average of 2.5 fittings which were disassembled and verified for the presence of Teflon tape. As indicated by NCR trend data, eleven apparent instances of the use of Teflon tape were identified and documented on NCRs during the performance of FVM-069. Review of the dispositions of these NCRs revealed that 6 were dispositioned "Use-As-Is" stating that they were not nonconforming conditions because the sealant identified by the walkdown personnel was Grafoil tape which is an acceptable sealant under the criteria of Specification CPES-I-1018. The remaining 5 NCRs were reworked by removing the Teflon tape, even though they were determined not to be safety significant.

Instrumentation attached to non-safety related installations was excluded from the walkdown because it was determined by Engineering that even if Teflon tape was used in these installations it would pose no threat to the safe operation of the plant.

Additionally, radiation monitoring and safety related plant sample lines which have threaded pipe connections were excluded from the FVM-069 walkdown because they have been reworked since 1987 in accordance with various Design Modification Request Construction (DMRCs). The work performed under the DMRCs included QC verification and was in accordance with Specification CPES-I-1018, "Installation of Piping/Tubing and Instrumentation", which controlled Teflon tape use. Therefore, reasonable assurance exists that Teflon tape was not applied to these installations.

The use of Teflon tape during the two year period between issuance and closure of CAR 87-043 was controlled by Specifications MS-100, MS-101, CPES-I-1018 and CPES-M-1041G. The two years between issuance and closure were required for completion of FVM-069 to determine the extent of the use of Teflon tape and were consistent with the Post Construction Hardware Validation Program (PCHVP) schedule. The corrective actions discussed above were implemented and verified for proper closure of CAR 87-043 for Unit 1 and common only (closure date June 1, 1989). CAR 87-043 remains open for Unit 2.

During performance of audit TUG-89-15 (June 19, 1989 through June 28, 1989) the use of Teflon tape was identified in the following areas:

1. Primary Chemistry Sample Line (PI-4240) for Hydrogen Analyzer drain - elevation 810'.
2. Auxiliary Feed Water Electric Pump Room for the pressure indicator on LAF059.
3. Secondary Sample Room 115 - Auxiliary Building - elevation 773'.
4. Condensate Polishing Demineralizer - Turbine Building - elevation 810'.

As a result of these findings, Stop Work Order (SWO) 89-002 was issued, and as required by NEO 3.25, "Stop Work Order", and NEO 3.01, "Corrective Action", CAR 89-008, "Use of Teflon tape", was issued.

None of the foregoing uses were in a safety related application. The proposed corrective action plans issued to resolve the conditions were provided by Nuclear Operations on October 5, 1989. The corrective actions for the deficiencies are as follows:

- o The Teflon tape associated with the Hydrogen Analyzer in the Primary Chemistry Sample line drain was removed. Teflon tape should not have been used in this application as this is not a threaded connection.
- o The pressure indicator on LAF059 was a temporary gauge installed by Startup for testing. The Teflon tape was removed.
- o Teflon tape use in the Secondary Sample Room and at the Condensate Polishers was approved via CMARs.

The applications identified above where Teflon tape has been used were reviewed by Engineering and determined not to affect the safety of plant operations since the Teflon tape was not used in a safety related application and the areas of use involved low temperature and lack of radiation fields. These environmental effects on Teflon tape can be briefly summarized as follows.

The thermal stability of Teflon has been studied extensively including physical property effects as well as the release of products of decomposition. Teflon tape suffers essentially no chemical degradation below 400 degrees Fahrenheit and is typically assigned a maximum service temperature of 500 degrees Fahrenheit by its manufacturers. Above 400 degrees Fahrenheit, decomposition may become increasingly more significant from an outgassing standpoint but it still has a small effect below 750 degrees Fahrenheit. Release of decomposition products which may liberate fluorine was not reported to occur, even under extended exposure up to 750 degrees Fahrenheit. TU Electric reviewed the Industry Operating Experience Reports and concluded that there have been no cases documented which lead to fluoride stress corrosion as a result of Teflon tape intrusions.



High energy radiation has been demonstrated to affect the properties of Teflon by breaking the large polymer molecule into smaller parts, thus reducing the molecular weight (scissioning). This results in a reduction in such properties as elongation and tensile strength, beginning at approximately  $2-7 \times 10^4$  rads when irradiated in air. However, Teflon is reported to retain as much as fifty percent of its original elongation and tensile strength after radiation exposure of  $10^5$  and  $10^6$  rads, respectively. As addressed previously, a deterioration in certain properties after application should have little or no impact on maintaining a thread seal.

Subsequent to the issuance of SWO 89-002, it was observed that Startup and M&TE personnel were not fully aware of the Stop Work Order boundaries. Startup immediately suspended any further use of Teflon tape and M&TE suspended use until Revision 1 of SWO 89-002 was issued, allowing controlled use of Teflon tape in M&TE applications. To provide assurance that the use of Teflon tape by Startup had not compromised FVM-069 and as part of CAR 89-008, a sample walkdown of 60 randomly selected instruments was performed by Quality Control Inspectors. This sample was taken from the population of instruments which were previously inspected during the implementation of FVM-069. The results of the walkdown did not reveal any evidence to indicate that instrument fittings had been reworked with Teflon tape as a thread sealant before or after the issuance of SWO 89-002.

SWO-89-002 was lifted on November 3, 1989. Corrective and preventive actions are documented in CAR 89-008, which was closed on November 11, 1989.

### Conclusion

Teflon tape is a controlled mechanical thread sealant at CPSES. Walkdowns by Engineering under CAR 87-043 and FVM-069 and by Operation System Engineers under DR-86-109 identified a low number of uses of Teflon tape, which were determined not to be safety significant. The Teflon tape identified during TUG-89-15 was not installed in permanent safety related applications and, therefore, had no effect on plant safety. The additional Quality Control walkdowns did not identify any evidence of Teflon tape in field-installed safety related joints. Therefore, control of Teflon tape use is considered acceptable. The issuance of SWO-89-002 and additional corrective and preventive actions taken pursuant to CAR-89-008, including additional training, have led to enhanced controls of Teflon tape at CPSES. No further actions are deemed necessary.

The following CASE conclusions are presented in pages 6 through 9 of Concern 89-0031. Each CASE conclusion is followed by a TU Electric response.

#### 1. CASE Conclusion

Teflon Tape, an unapproved mechanical thread sealant, has been used extensively in the construction of Comanche Peak Nuclear Power Station for an indeterminate number of years, but up to 1989.

Summary Response

Teflon tape is an approved mechanical thread sealant; however, the use of Teflon tape is restricted/controlled by Specifications MS-100, MS-101, CPES-1-1018, and CPES-M-1041G.

Teflon Tape has not been used extensively at CPSES as documented by the results of the Engineering walkdowns per CAR 87-043 and FVM-069, Operations Systems Engineer Walkdowns under DR-86-109, QCI sample walkdown per CAR 89-008, and also as documented in the CPRT Results Reports for ISAP VII.c and VII.a.9.

2. CASE Conclusion

The integrity of the hardware where Teflon Tape has been applied is indeterminate; and, if considered in some areas to be "acceptable" for use, the misapplication of the Teflon Tape causes the integrity of the hardware to be indeterminate.

Summary Response

The areas identified which contained Teflon tape where it was prohibited were recorded on deficiency documents per FVM-069 and DR-86-109. The integrity of the hardware was not affected by the use of Teflon tape. The NCR dispositions were implemented prior to testing of the systems. The acceptable testing of the safety related systems demonstrated that if the tape was misapplied, it did not affect the performance of the safety related instruments or systems. The Teflon tape identified during TUC-89-15 was not installed in safety related applications and has been evaluated to show that it has no effect on safe plant operation.

3. CASE Conclusion

There is evidence of a QA Programmatic breakdown in that, three CARs, one SWO, one Program Deficiency Report, and one NCR had to be generated before the unapproved use of Teflon Tape could be (as purportedly is the case) stopped, (Reference CASE Concern 89-0015).

Summary Response

The following describes the relationship of these documents:

CAR 87-007 was issued to address the use of unapproved thread sealant as identified by the third party (CPRT). TU Electric combined CAR 87-007 and CAR 87-043 to provide a disposition of the generic concerns of the use of all thread sealants and consumables and the controls of such consumables. The SWO was issued due to isolated non-safety related occurrences, and, as demonstrated above, none of these documents resulted in identification of conditions indicative of less than adequate controls for the use of Teflon tape.



In summary, one NCR was issued in 1977 for Teflon tape use on a vendor supplied item, one CAR was issued to evaluate the use of Teflon tape which per the corrective action identified 5 nonconforming conditions, and DR-86-109 identified 8 additional non-conforming conditions, 3 of which were dispositioned "use as-is." TU Electric has controlled the use of Teflon tape, although some violations occurred in implementation of specifications. They were isolated and their impact was not significant from either a safety, quality of construction, or programmatic standpoint. The non-conformance documents collectively identified 11 safety related conditions over a period of 12 years where Teflon tape was removed and do not provide evidence of a QA programmatic breakdown.

4. CASE Conclusion

TU Electric has an inadequate and ineffective Stop Work Order Program (Reference CASE Concern 89-0015.1).

Summary Response

TU Electric is aware that some groups were not fully cognizant of the issuance of SWO 89-002. TU Electric initiated enhancements to the notification process to assure that all affected organizations and personnel receive timely notification of the issuance of SWOs. TU Electric will also assure that the affected organizations and personnel remain cognizant of the status of SWOs affecting them.

5. CASE Conclusion

TU Electric does not meet the intent of 10CFR50, Appendix B, Criterion XVI, by promptly identifying and correcting nonconforming conditions; in fact, the non-conformance continued over two years while waiting for (and after) the closure of CAR 87-043 (Reference CASE Concern 89-0024 and 89-0037).

Summary Response

CAR 87-007 was issued to address CPRT QA/QC Recommendation E-11 dated October 31, 1986. Upon issuance of CAR 87-007, TU Engineering commenced an evaluation of the sealant application in instrumentation systems to determine if prior use of the improper sealant was a problem. However, prior to the issuance of Recommendation E-11 TU Electric evaluated the sealant problem when verbally notified by the CPRT. SWEC performed a physical verification of the instrument in question and stated that the MERCOLD level/pressure switches in the Containment Spray System (CSS) do not perform any safety function. Additionally, releasing the pressure on the instrument side will not cause failure of the diaphragm, and the integrity of the process pressure boundary will be maintained. The evaluation was made on September 24, 1986, and stated that the reported condition will not result in the inability of the affected item to perform its intended safety related function.

The above discussion indicates that the condition was promptly identified and evaluated. Use of Teflon tape during the two year period was controlled by Specifications MS-100, MS-101, CPES-1-1018, and CPES-M-1041C. CAR 87-043 remained open pending completion of FVM-069 in accordance with the project schedule. The results of FVM-069 walkdowns did not identify a significant use of Teflon tape nor indicate any QA program breakdown. Rather they provided a positive indication that Teflon tape use was controlled.

6. CASE Conclusion

A quality assurance program apparently was not effective in assuring that Teflon tape could not be introduced into a safety-related system(s), thereby preventing satisfactory performance once the system(s) were in service and subjected to the conditions which would introduce failures in stainless steel applications. Measures were not apparently in effect to identify that the physical material characteristics of Teflon Tape were detrimental to stainless steel under certain circumstances (radiation, heat, stress), and that the use of Teflon Tape in plant systems must be controlled.

Summary Response

TU Electric was aware of the Westinghouse Report WCAP-7628, "Stress Corrosion Testing", dated December 1970 and of the importance of avoiding misuse of Teflon tape as evidenced by Specifications MS-100, MS-101, MS-625, CPES-1-1018 and CPES-M-1041C which have controlled the use of Teflon tape in safety related applications as stated in the response to CASE Conclusion #5 above. Teflon tape has been adequately controlled at CPSES.

7. CASE Conclusion

The quality assurance functions apparently were not effectively executed in preventing (once identified) through its checking, auditing and inspection programs, the continued use of Teflon Tape in permanent plant safety-related systems.

Summary Response

TU Electric's review collectively identified only 11 conditions over a period of 12 years, where the use of Teflon tape in safety related application was determined to be unacceptable. The occurrences of Teflon tape used as the basis for issuing the SWO were not in safety related applications. Therefore, TU Electric has not found evidence of ineffective QA program control of Teflon tape in safety related applications.



8. CASE Conclusion

Once the use of Teflon tape was identified by TU Electric Engineering to be detrimental to stainless steel applications in permanent plant safety-related equipment appropriate design measures were not apparently correctly translated into procedures and instructions (training) to prevent misapplication of the material.

Summary Response

As discussed in the response to CASE Conclusion #6 above, the use of Teflon tape was controlled by applicable project specifications. A misapplication of Teflon tape has not been identified that could prevent safety-related instruments from performing their intended functions. This is evidenced by successful completion of extensive pre-operational startup testing and extensive hot functional testing. Application techniques for the use of Teflon tape have been incorporated as an attachment to CHARS. The isolated occurrence cited by CASE of misapplication in the M&TE Calibration Lab was on M&TE and was not directly connected to permanent plant equipment. Additionally, training was provided to I&C personnel as corrective action for CAR 89-008.

9. CASE Conclusion

Once it was determined by TU Electric project personnel that the use of Teflon tape was restricted, the applicable documents apparently were not issued to prevent unauthorized use of the tape in permanent plant safety-related systems.

Summary Response

Use of Teflon tape at CPSES has been controlled since 1976. Refer to Background section of the response to this Concern.

10. CASE Conclusion

The restricted use of Teflon Tape was not apparently adequately relayed to the suppliers of safety-related components, nor were those restrictions verified during receipt of those components (which continued to use Teflon tape) to prevent introduction of Teflon Tape into permanent plant safety-related equipment.

Summary Response

Teflon tape was a generic characteristic inspection attribute for receipt inspection of vendor supplied safety-related equipment as evidenced by the initiation of NCR-M-621 in 1977. Suppliers of safety related equipment are cognizant of the CPSES specification requirements that prohibit the introduction of Teflon tape on safety related equipment. Additionally, DR 86-109 resulted in the Operations System Engineers performing a walkdown that emphasized vendor supplied skid mounted equipment and removed Teflon tape where it was not acceptable.

11. CASE Conclusion

Teflon Tape containers and/or dispensers were not identified to prevent its use in permanent plant safety-related equipment.

Summary Response

In response to SWO 89-002, yellow labels are now affixed in a conspicuous place on the Teflon tape product to designate it as a "Controlled Chemical/Consumable Category III/Restrictive Use - Refer to CPES-M-1041G", effective September 26, 1989.

12. CASE Conclusion

CASE perceives the installation of Teflon Tape to fall into the category of a special process. The correct installation of Teflon tape (i.e., initial wrap starting back from threaded end to prevent cutting off of wrapover tape and dropping into tubing/device; minimizing excess application; and, being wrapped in the direction of tightening) cannot be verified after installation; therefore, special process controls must be in place to assure proper application of the tape.

Summary Response

A special process is typically a procedure which cannot be repeated (e.g., welding, heat treatment, etc.) and changes the physical characteristics of a given element. Application of Teflon tape does not alter the physical or chemical properties of the elements under normal operating conditions and is not considered by TU Electric to be a special process. The application of Teflon tape can be reverified visually after fitting disassembly.

13. CASE Conclusion

The Project's QC inspection activities did not verify conformance to certain documents (i.e., CPSES-I-1018 Rev. 3, para. 1.11.5; CPSES-M-1041G, para. 5.1.21 and Appendix A; CAR's 87-007 and 87-043), and allowed potentially dangerous conditions to exist after inspection acceptance, i.e. FVM-IC-069, did not inspect for all areas where the use of Teflon Tape could result in fluoride concentrations collecting in stainless steel joint crevices that could cause cracking.

Summary Response

As stated in the summary response to CASE Conclusion #3, TU Electric controlled the use of Teflon tape. Although the results of FVM-IC-069 identified some procedural violations in implementation of safety related Specifications MS-100, MS-101, MS-625, CPES-I-1018 and CPES-M-1041G, they are isolated and their impact was not significant from either a safety, quality of construction, or programmatic standpoint. As described above in the Discussion section, FVM-IC-069 inspected the appropriate areas and determined that the use of Teflon tape was controlled and plant safety was not affected.



14. CASE Conclusion

Teflon tape was not removed from the threads of M&TE after calibration so that it would not be installed in permanent plant equipment.

Summary Response

In addition to the summary response to CASE Conclusion #6, STA-608, "Control of Measuring and Test Equipment", section 6.1.9, was added August 8, 1989 to state, "Teflon tape may be used on M&TE and Reference Standards; however, it shall be properly applied and shall not come in direct contact with plant hardware surfaces (e.g., a pressure gauge may not be connected to a plant test connection using Teflon tape). In addition, all M&TE/Reference Standard surfaces which have had Teflon tape applied and subsequently removed shall be cleaned".

15. CASE Conclusion

Teflon tape, a nonconforming material, was not controlled to prevent its inadvertent use or installation into plant equipment.

Summary Response

Teflon tape has been controlled to prevent its inadvertent use or installation into plant equipment. Refer to Background, Discussion, and Conclusion section in this response.

16. CASE Conclusion

CAR-87-043 was closed two years after initiation and did not identify all the areas of Teflon Tape usage nor did it prevent the continued and unapproved use of the tape. Stop Work Order 89-002 was issued following closeout of CAR-87-043 but was not effective in preventing the continued and unauthorized use of Teflon Tape.

Summary Response

The programs were in-place and verified per the response of CAR 87-043. The conditions in Stop Work Order 89-002 as described in the Discussion section of this response, were isolated occurrences and the conditions are not adverse to safety. Stop Work Order enhancements have been initiated as stated in the summary response to CASE Conclusion #4.

17. CASE Conclusion

The project Audit programs conducted by TU Electric and its contractors, were not effective in preventing and identifying the continued use of Teflon tape in temporary and permanent plant equipment.

Summary Response

Refer to summary responses to CASE Conclusions #3, #10 and #13.

The following is TU Electric's response to CASE recommendations on pages 9 through 10 of Concern 89-0031.

1. CASE Recommendation

Prompt and correct closure of CAR 89-008, by

- a) Revising procedures to prevent the unapproved use of Teflon tape,
- b) Revising procedures to control the issuance of Teflon tape for "approved" uses,
- c) Developing an inspection plan to identify and evaluate all uses of Teflon tape at Comanche Peak Nuclear Power Station.

Summary Response

Procedures and specifications have been in place to control use of Teflon tape at CPSES since prior to 1977. Further enhancements have been made and are documented in CAR 89-008 which was closed on November 11, 1989. Uses of Teflon in safety-related applications have been evaluated by CAR 87-043 and CAR 89-008 as described in the Discussion section of this response. No additional actions are required.

2. CASE Recommendation

Evaluate other procured items for similar generic implications in other areas, i.e., uncontrolled use of chlorides.

Summary Response

TU Electric's evaluation of the use of Teflon tape at CPSES, as described in this entire response, indicates that there are no generic implications. Additionally, Site Specifications MS-100, MS-101, MS-525, CPES-I-1018 and CPES-M-1041G have controlled the procurement and use of halogenated compounds to prevent stress corrosion cracking of stainless steel as a result of contact with these compounds.

3. CASE Recommendation

Perform a Vendor/Supplier Audit and/or Surveillance to ascertain the inappropriate use of Teflon tape; to include how the manufacturer applied the Teflon tape if its use was evaluated as being acceptable to use.

Summary Response

Technical and Quality Requirements require vendors to adhere to CPSES specifications and include Teflon tape restriction. The summary response to CASE Conclusion #10 discusses receipt inspection for Teflon tape on vendor supplied safety-related equipment. Also, the successful results of system testings did not provide any evidence of blockage or incorrect readings in the instruments. This provides additional assurance that misapplication by vendors did not occur.



4. CASE Recommendation

Label (strictly control) Teflon tape containers and dispensers to prevent the tape from being used in permanent plant safety related equipment.

Summary Response

Teflon tape containers have been labeled as part of the corrective and preventive actions taken as a result of SWO-89-002.

5. CASE Recommendation

Train personnel on the proper application of Teflon tape where its use is acceptable, and develop, or revise, applicable procedures.

Summary Response

Actions taken as a result of CAR 89-008 include training of appropriate personnel in the application and use of Teflon tape.

6. CASE Recommendation

Develop (or revise) Quality Control Receiving Inspection Procedures and/or Checklists to include criteria for the inspection for the unacceptable use of Teflon tape on components/equipment supplied by Vendors.

Summary Response

QA Verification Plans contain the attribute to verify presence of Teflon tape on vendor supplied safety related piping/instrumentation items. This is documented in CAR 89-008.

7. CASE Recommendation

Train Quality Control Inspectors on the criteria applied to the acceptable and unacceptable use of Teflon tape.

Summary Response

Quality Control Inspectors (QCI) are trained to the specifications and/or the corresponding Quality Control procedures which together define acceptable and unacceptable use of Teflon tape at CPSES. No additional training is required.



**Brown & Root, Inc.**  
QUALITY ASSURANCE DEPARTMENT  
NONCONFORMANCE REPORT (NCR)

Attachment # 5C

IN...

CPS1	CBHXXX	SUPORT
PLANT CODE	SYSTEM CODE	COMPONENT CODE
14	510	11-16

TBX-RCESHS						PA-14856REVE																	
TAG/SPIN/IDENT NO.						DRAWING/SPECIFICATION NO.						SERIAL NO.											
A	B	C	D	E	F	G (Units)						H (Units)						J (Units)					

236051	W120
PURCHASE ORDER NUMBER	VEND CODE
56-69	70-73

CASE EXHIBIT 562 ONLY

CP0603	03345	X	20 EA	29748	M621R2	R N	060277
MRR NUMBER	RIR NUMBER	VENDOR'S HEAT/LOT/BATCH NO.	COUNT	UNITS	PURCH'S OR NO.	RLS/HOLD NO. CODE	INPUT DATE
74-79	80-85	86-95	96-105	106-111	112-121	122-127	

(2) NONCONFORMING CONDITION:

- A - Westinghouse equipment spec. G952835, Pg. 16 of 26, Para. 6.2.  
B - N/A  
C - Teflon tape used on fittings on all 20 units. Hold Tag #621 attached and units stored in warehouse C.

NOTE: Rev. 1 issued to re-open this NCR.  
Rev. 2 issued to change disposition.

CA RECORD I

REV. 1 REVIEW
<i>L</i> <i>PN 3-13-79</i>
FILE NO. 15.1
SUBMIT NO. 17-621R2

(3) PREPARED BY: A. W. McCreary	(5) DATE: 5/12/77	(3) REPORTED BY: A. W. McCreary	(4) DATE: 6-2-77
		(7) REVIEW/APPROVAL: <i>[Signature]</i>	(8) DATE: 3/12/79

(9) DISPOSITION ASSIGNED TO: C. H. Gatchell	(10) DUE DATE: 5/20/77	(11) CORRECTIVE ACTION REQUEST: <input type="checkbox"/> Required <input checked="" type="checkbox"/> Not Required	CAR#	(12) REPORTABLE DEFICIENCY: <input type="checkbox"/> POSSIBLE <input checked="" type="checkbox"/> NO
--	---------------------------	---	------	---

(13) DISPOSITION: REWORK \_\_\_\_\_ REPAIR \_\_\_\_\_ USE AS IS X SCRAP \_\_\_\_\_  
See TBX-004 from Westinghouse PWR Div. attached.  
See DCA 3950 attached.

(16) QA REVIEW/APPROVAL: <i>[Signature]</i>	(17) DATE: 3/12/79	(14) CONSTR. REVIEW/APPROVAL: <i>[Signature]</i>	(15) DATE: 3/12/79
(20) ENG. REVIEW/APPROVAL: <i>[Signature]</i>	(21) DATE: 3/12/79	(18) CLIENT REVIEW/APPROVAL: N/A <i>[Signature]</i>	(19) DATE: 1/1
		(22) ANI REVIEW/APPROVAL: N/A <i>[Signature]</i>	(23) DATE: 1/1

(24) VERIFICATION: <input checked="" type="checkbox"/> Satisfactory <input type="checkbox"/> Unsatisfactory <input type="checkbox"/> Not Req'd.	(25) QA/ QC ENGR /INSP. VERIFICATION: <i>[Signature]</i>	(26) DATE: 3/12/79
(27) ANI VERIFICATION: N/A <i>[Signature]</i>		(28) DATE: 1/1

(29) QA REVIEW/CLOSURE: <i>[Signature]</i>	(30) DATE: 3/12/79
---	-----------------------

(31) REMARKS:  
*HOLD TAGS Removed*  
*3-12-79*  
*DWK*



QUALITY ASSURANCE DEPARTMENT  
RECEIVING INSPECTION REPORT

ANT CODE	SYSTEM CODE	COMPONENT CODE
14	5-10	11-16

TAG/SPIN/IDENT. NO.										DRAWING/SPECIFICATION NO.									
A	B	C	D	E	F	G	(Units)	H	(Units)	I	(Units)	J	(Units)	K	(Units)	L	(Units)	M	(Units)
							17.55												

PURCHASE ORDER NUMBER	VEND CODE
55-69	70-73

NCR M-621R2  
Pg 2 of 5

MRR NUMBER	RIR NUMBER	VENDOR'S HEAT/LOT/BATCH NO.	COUNT QUANTITY	UNITS	PURCH'S OR NO.	RLS/HOLD NO.	CODE	INPUT DATE
74-79	80-85	86-95	96-106		106-111	112-121		122-127

\*OFF-LOADING INSPECTION:

RECEIVING INSPECTION:

\*NDE/NDE REVIEW:

CP - NDEP - \_\_\_\_\_  
CP - NDEP - \_\_\_\_\_  
CP - NDEP - \_\_\_\_\_SAT. ☒ UNSAT. \_\_\_\_\_ N/A \_\_\_\_\_N/A ☒SAT. \_\_\_\_\_ UNSAT. \_\_\_\_\_  
SAT. \_\_\_\_\_ UNSAT. \_\_\_\_\_  
SAT. \_\_\_\_\_ UNSAT. \_\_\_\_\_

\*CHARACTERISTIC INSPECTION:

CP - OCI - 1.1 - 8

SAT. \_\_\_\_\_ UNSAT. ☒

N/A \_\_\_\_\_

\*ACCEPTANCE TESTS:

CP - OCI - \_\_\_\_\_ - \_\_\_\_\_

SAT. \_\_\_\_\_ UNSAT. \_\_\_\_\_

N/A ☒

\*CORROSION/ENVIRONMENT PROTECTION:

CP - OCI - \_\_\_\_\_ - \_\_\_\_\_

SAT. \_\_\_\_\_ UNSAT. \_\_\_\_\_

N/A ☒

\*CLEANLINESS:

SAT. \_\_\_\_\_ UNSAT. \_\_\_\_\_

N/A ☒

\*SUPPORTING DOCUMENTATION ATTACHED

ADDITIONAL INFORMATION/REMARKS: Class "B" Storage - Stored in Warehouse "C",  
Snubber Serial Numbers - PD 14836-11 Thru 30

① Teflon Tape used of Flex line Fittings.

AUTHORIZED NUCLEAR INSPECTION

NOTIFICATION: DATE \_\_\_\_\_ TIME: \_\_\_\_\_ MEDIA \_\_\_\_\_ N/A \_\_\_\_\_ PROJECT QA MGR  
/QC ENGR. \_\_\_\_\_ANI WITNESS: SAT. \_\_\_\_\_ \*\* UNSAT. \_\_\_\_\_ \*\* WAIVED \_\_\_\_\_ DATE: \_\_\_\_\_  
\*\*ANI'S INITIALS REQUIREDQC ENGR./INSP. *Ann-C*

ED TO:

B &amp; R

G &amp; H

F &amp; N

W

TUSI

OTHER

MR NO.

0503

P.O. NO.

CP-0001

236051

REQ. NO.

VENDOR:

Westinghouse Electric Corp.  
Pittsburgh, Pennsylvania**FOR INFORMATION ONLY-77**

DATE

SHIPPER:

Remco Hydraulics  
Willits, California

FOR

Partial

XXX

127 Complete

☐

QUANTITY	UNIT	ITEM	MATERIAL DESCRIPTION	LOCATION
20	ea.		1000 KIP Hydraulic Cylinder (Snubbers) Spin #TBX-RCESH5	Whse C QA Rec.
1	box		Consisting of: 20 ea. Remco P/N C-670205-1 Pivot Pin 20 ea. Remco P/N C-670205-3 Pivot Pin 80 ea. Remco P/N Z-700814 Cotter Pin	
1	box		Consisting of: (Field Equipment) 4 ea. PD16650 Reservoir Assy. 80 ea. PD 16662-03 Pipe Clamp 3/4" 80 ea. PD 16662-04 Channel 40 ea. PD 16662-06 Hose Clamp 20 ea. PD 16662-07 Hose 3/4 ID, 4'0" long 20 gal PD 16662-08 Fluid SF 1154 16 ea. PD 16662-10 Tee 4 ea. PD 16662-11 Straight 8 ea. PD 16662-12 Union 4 ea. PD 16662-13 Elbow 80 ea. PB 14542-04 Spacer	
1	box		Consisting of: (Tubing) 140' 3/4 OD x .049 PD 16662-05 XXXXXXXXXXXXXXXXXXXX	
1	set		Certification Papers Tkt. #27315	
NOTE: THE SHIPMENT IS IN GOOD CONDITION AND THERE IS NO EVIDENCE LOAD SHIFT, HUMPING, OR OTHER VISIBLE DAMAGE.				

Gaylon Hargrove  
RECEIVED BY:

Q.C. CHECK BY

05-11-77

XXXX *Aum*

EXP.	IP	TEX PAK	UPS	PREPAID	COLLECT

Remco Truck (wt. 29,025 lbs)

DELIVERING CARRIER

F.R. NO.

CAR NO.

32779

jd(5-10-77)

ACCTS. PAYABLE



MEMORANDUM  
WESTINGHOUSE SITE

NOR M-621R2  
Rg40T45  
TBX-004

TO: CPSES	BROWN & ROOT (QA)	R. OSBORNE	MAY 16, 1977
Location	Dept.	Name	Date


SUBJECT: Monroe Hydraulic Shock Suppressors

The subject equipment on QR 29748 per P.O. 236051 arrived on site with "Teflon" tape used as a thread sealant on the hydraulic lines. This is an apparent violation of the applicable Equipment Specification G-952835 Rev. 0 paragraph 6.2.

During installation of the shock suppressors the hydraulic lines and individual accumulators for each unit will be removed and discarded to permit installation of the permanent common accumulator system. During this removal the "Teflon" tape will also be removed and discarded, therefore the Equipment Specification which is written for equipment in its in-service condition has not been violated as long as the final installation to the common accumulator system does not include "Teflon" tape.

FOR INFORMATION ONLY

cc; D. Ferg, PWR-SB  
R. Stayer, NSD

FROM Comanche Peak Site	NSD-ISD	 P.S. VAN TESLAAR
Location	Dept.	Name

COMANCHE PEAK STEAM ELECTRIC STATION  
DESIGN CHANGE AUTHORIZATION

NCR M-621R  
Pg 5 of 5

(WILL) (WILL NOT) BE INCORPORATED  
IN DESIGN DOCUMENTS

FOR INFORMATION ONLY

AUTHORIZATION NO. 3950

SAFETY RELATED DOCUMENT X YES NO

1. DESCRIPTION: DESIGN CHANGE X YES NO

A. APPLICABLE SPEC/DWG/DOCUMENT 2323-MS-100

3  
REV.

B. DETAILS PROBLEM: The wording of paragraph 2.17.7 prevents use of Teflon tape for temporary systems, testing, etc.

CHANGE: Revise paragraph 2.17.7 to read as follows: "The use of Teflon tape is prohibited for permanent installations. However, it may be used for temporary installations, including temporary connections to permanent piping or equipment for testing purposes. All Teflon tape must be removed from permanent piping or equipment after its use."

2. SUPPORTING DOCUMENTATION

3. SIGNATURES: MWS:eh 3-6-79

A. APPROVED BY: [Signature]  
G&H Representative

B. APPROVED BY: [Signature]  
Responsible Engineer

INDEXED		
	RE	
	DO	
	FILE	
	DATE	
	FILE	
	DATE	
	FILE	
	DATE	

FILE 3/6/79  
Date

4. STANDARD DISTRIBUTION:

B&R Field (Original) (1)  
G&H-New York (1)  
TUGCO Site QA (1)  
B&R Site QA (1)  
FSDG Site (1)  
G&H-Dallas (1)

FOR ENGINEERING  
AND  
OFFICE USE ONLY