COMANCHE PEAK RESPONSE TEAM

RESULTS REPORT

ISAP: VII.b.2

Title: Valve Disassembly

REVISION 1

Issue Coordinator — Date: 3/18/86

Review Team Leader — Date: 3/18/86

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Valve Disassembly

1.0 DESCRIPTION OF ISSUE (USNRC Letter of January 8, 1985, Page. 23)

"The TRT found that installation of certain butt-welded valves in three systems required removal of the valve bonnets and internals prior to welding to protect temperature-sensitive parts. The three systems involved were the spent fuel cooling and cleaning system, the boron recycle system, and the chemical and volume control system. This installation process was poorly controlled in that disassembled parts were piled in uncontrolled areas, resulting in lost, damaged, or interchanged parts. This practice created the potential for interchanging valve bonnets and internal parts having different pressure and temperature ratings."

2.0 ACTION IDENTIFIED

Evaluate the TRT findings and consider the implications of these findings on construction quality. "...examination of the potential safety implications should include, but not be limited to the areas or activities selected by the TRT."

"Address the root cause of each finding and its generic implications..."

"Address the collective significance of these deficiencies..."

"Propose an action plan...that will ensure that such problems do not occur in the future."

3.0 BACKGROUND

The valves identified by the NRC staff are of a particular type which required disassembly for installation. Other possible reasons for valve disassembly include hydrotest, flushing, purging, and repair, and therefore many different valve types could be affected if the concern is substantiated. Accordingly, all valves which had been disassembled under the Construction QA program, regardless of valve type or reason for disassembly, were included in this action plan.

The loss of or damage to valve parts is not a concern if the parts are replaced with acceptable spare parts and properly documented. The program for valve testing provides assurance that valve damage that would hinder proper operation of the valve is detected and corrected. As the issue as stated in SER-11 did not allege any

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3.0 BACKGROUND (Cont'd)

improper handling of lost or damaged valve parts this action plan focused on the "potential for interchanging valve bonnets and internal parts having different pressure and temperature ratings".

SER-11 states in part that:

> "The TRT interviewed QC inspectors who knew of recent incidents involving lost, misplaced or interchanged valve bonnets. The QC inspectors stated that when these valves were disassembled for system flush under the direction of startup test engineers, one bonnet was lost and a mismatch between valve body and bonnet occurred. Although these incidents were documented in nonconformance reports, see e.g., NCR M-11645 (May 8, 1984), the problems associated with maintaining control of valve parts during installation, system flush, and startup indicated to the TRT that in spite of the issuance of the revised traveler and CP-CPM-9.18 in June 1983, loss, damage, and interchange of valve parts continued to occur. The TRT did not find any evidence that B&R addressed the problem on a programmatic basis, e.g., by use of a formal corrective action request (CAR)...
>
> The TRT concludes that the allegation concerning interchanged valve parts (AQ-52) was substantiated. The TRT also concludes that this condition has potential quality significance due to the generic implications. The generic implications are based on documented evidence that the interchange of valve parts did occur and effective programmatic corrective action was not implemented to identify the problem and to prevent the loss, damage, and interchange of valve parts."

An assessment of TUGCO's handling of programmatic corrective action will be included in ISAP VII.a.2, "Nonconformance and Corrective Action Systems". This action plan (Valve Disassembly) was structured to evaluate the adequacy of current procedures to control the valve disassembly/reassembly process and to evaluate the physical status of valves which are installed in the plant and have been disassembled and reassembled.

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4.0 CPRT ACTION PLAN

4.1 Scope and Methodology

The objective of this action plan was two fold: 1) to evaluate if procedures are adequate to control the valve disassembly/reassembly process; 2) to evaluate if valves that required disassembly were properly reassembled and, if not, whether an improperly reassembled valve could result in a code violation or have a safety consequence.

The following tasks were implemented to achieve these objectives:

- Identification of all valves which have been disassembled and reassembled under the Construction QA program.
- A procedure review to determine adequacy of control of valve components during disassembly and reassembly.
- A safety consequence analysis to determine if valve component parts from one valve are physically capable of fitting up to another valve of the same type but having a lower pressure/temperature rating or Code class and identification of potential risks if such reassembly occurred.
- A reinspection of valves which have been disassembled and reassembled to establish confidence that valves were properly reassembled.

The first three of the above tasks were considered Phase I of this action plan. Phase II of this plan was the fourth task.

The specific methodology is described below:

4.1.1 The first step in this investigation was to identify the population of valves which have been disassembled. All valve disassembly and reassembly was accomplished under operation travelers or Item Removal Notices (IRNs). A log of all operation travelers was reviewed and those pertinent to valve disassembly were utilized to develop a list of all valves which have been disassembled. The log includes QC Checklists for valves (QCVs) which accompany IRNs applicable to valve disassembly.

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4.0 CPRT ACTION PLAN (Cont'd)

From this list another list was developed of those valves in the population identified in the TRT issue (diaphragm valves in the spent fuel cooling and cleaning system, the boron recycle system, and the chemical and volume control system).

4.1.2 Applicable procedures were reviewed, for both construction and QC, to determine if they provided adequate controls of materials during valve disassembly and reassembly. In addition to proper matching of components, the procedures were reviewed for their adequacy to identify and replace parts damaged during the disassembly, storage and reassembly process.

For procedures which changed during the course of construction, the historical file of procedures was reviewed to determine if improper reassembly was more likely to occur during a particular time frame. Units 1, 2 and Common used the same procedures.

In terms of valve installation processes, present procedures were viewed as adequate or not, based on their clarity, completeness and on the practicality of their use.

4.1.3 In parallel with the procedure review, an analysis was made to determine the safety consequences of improperly assembled valves. The analysis included potential failure modes resulting from improper reassembly of the generic valves in question. Generic valves are those which required disassembly of all valves of that type. This analysis was to be performed on a case basis for non generic valve types pending the results of reinspections. (As discussed in Section 5, this was not required.)

In addition, an evaluation was made to define potential code violations which could result from improperly assembled valves.

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4.0 CPRT ACTION PLAN (Cont'd)

4.1.4 A reinspection of valves which were disassembled was performed to provide assurance that the valves were reassembled using the correct components. A sample of valves from the population of all valves which were disassembled was reinspected, and an additional sample of valves from the population comprised of the valves identified in the TRT issue was reinspected. Both samples were in accordance with the sampling criteria guidelines of Appendix D. Sample reinspection was considered to be a reasonable approach for the following reasons:

- No programmatic deficiencies were identified in Phase I of this ISAP.
- The population of valves which have been disassembled is homogeneous. Specifically, all the valves were disassembled by the same craft under the same procedures.

4.1.5 Manufacturers drawings and disassembly procedures were reviewed and documentation packages were assembled for those valves selected in the random samples. The inspection procedure was predicated on the results of this review. If review of the documentation for a specific valve indicated probable improper reassembly, reinspection was to include a verification of internal parts. Probable improper reassembly would have been indicated by an inconsistency in internal component serial numbers from one Operation Traveler to another for a particular valve. (As discussed in Section 5, internal verification was not found to be necessary.)

4.2 Procedures

Construction and QC procedures now in effect were reviewed for use if disassembly, inspection, reassembly and test of any valves had been necessary as a result of the implementation of this ISAP.

4.3 Participants Roles and Responsibilities

The organizations and personnel that participated in this effort are described below with their respective scopes of work.

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4.0 CPRT ACTION PLAN (Cont'd)

4.3.1 TUGCO Comanche Peak Project Engineering CPPE

4.3.1.1 Scope

- Assisted the QA/QC Review Team in the identification and provision of all necessary specifications, drawings, procedures and other documentation necessary for the execution of this action plan.
- Assisted in determining the physical location of the valves selected for inspection.
- Process NCRs that were generated due to this action plan.

4.3.1.2 Personnel

Mr. C. Moehlman	TUGCO Coordinator
Mr. D. Snow	QA/QC Coordinator

4.3.2 Brown & Root Millwright Shop

4.3.2.1 Scope

Disassemble and reassemble valves, as required, for inspection. (As discussed in Section 5, this was not required.)

4.3.2.2 Personnel

Mr. C. Moehlman	TUGCO Coordinator

4.3.3 CPRT-QA/QC Review Team

4.3.3.1 Personnel

All activities not identified in 4.3.1 and 4.3.2 above were the responsibility of the QA/QC Review Team.

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4.0 CPRT ACTION PLAN (Cont'd)

4.3.3.2 Personnel

Mr. M. Obert	Issue Coordinator
Mr. C. Spinks	Inspection Supervisor
Mr. J. Adam	Safety Significance Evaluation Supervisor
Mr. J. L. Hansel	QA/QC Review Team Leader

4.4 Qualifications of Personnel

Where inspections required the use of certified inspectors, qualification was to the requirements of ANSI N45.2.6 at the appropriate level. CPSES personnel were qualified in accordance with applicable project requirements. Third-party inspectors were certified to the requirements of the third-party employer's Quality Assurance Program and specifically trained to the requirements of the CPSES quality procedures.

Other participants were qualified to the requirements of the CPSES Quality Assurance Program or to the specific requirements of the CPRT Program Plan.

4.5 Sampling Plan

The sampling plan was designed in accordance with the guidelines of Appendix D, to result in reasonable assurance that programmatic deficiencies do not exist in the population. The minimum sample size according to Appendix D is 60, with a detection number of zero (i.e., the critical region is one or more deficiencies found in the sample).

4.6 Acceptance Criteria

A valve was accepted if the body markings and bonnet markings found in the field were traceable to the Manufacturer's Data Report (Form NPV-1) in the Receipt Inspection Report for that valve. Valves which have Permanent Equipment Transfers documenting replacement of valve components and for which the new component was traceable to a form NPV-1 of a valve of identical make, pressure rating, temperature rating, metallurgical type and Code class are acceptable.

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4.0 CPRT ACTION PLAN (Cont'd)

4.7 Decision Criteria

4.7.1 The action plan will be closed if the valves which were disassembled and reassembled can perform their intended safety function. Otherwise necessary corrective action will be recommended to meet the design requirements.

4.7.2 If a safety-significant deficiency is found the sample will be expanded and a root cause and generic implication analysis will be done. If deviations are found, trend analysis will be done and for any adverse trend identified a root cause and generic implication analysis will be performed. Any QA/QC Program deficiencies found will be identified to the QA/QC Programmatic Issue Supervisor for analysis.

5.0 IMPLEMENTATION OF ACTION PLAN AND DISCUSSION OF RESULTS

5.1 Summary of Action Plan Implementation

The first step of implementing this action plan was identification of the subject valves in the population. This was accomplished in two ways.

First, the generic valves (i.e., those valves which required disassembly by nature of their type) were identified by reviewing installation procedures. It was concluded that ITT-Grinnell supplied diaphragm valves were those addressed in the TRT issue which "required removal of the valve bonnets and internals prior to welding to protect temperature sensitive parts". Additionally, it was found that Borg-Warner supplied check valves were disassembled after receipt on site to perform a modification identified by the manufacturer. These two generic valve types were included in the population using a listing of valve tag numbers (unique numbers given to an installed valve) by purchase order. The listing groups the valves according to their manufacturer and type. For these valves an analysis was performed to determine if physical reinspection was required. This analysis lists the possible effects of interchanging those parts of the generic valves where parts of one rating or class valve are physically capable of fitting up with a valve of another rating or class.

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5.0 IMPLEMENTATION OF ACTION PLAN AND DISCUSSION OF RESULTS (Cont'd)

In addition to the generic valve types requiring disassembly, other specific valves were disassembled for various reasons such as repair, maintenance, or testing. To identify these valves, operation traveler logs were researched. Due to the large number of valve types/sizes in this category and the relatively small number of valves of any given type/size actually disassembled, an analysis such as was performed for the generic valves was not performed unless it was determined during the reinspection program that a deviation was found for a specific valve type. No such cases were found.

A population of one thousand three hundred forty-five (1345) valves that were disassembled and reassembled was identified. Approximately seven hundred (700) of these valves were ITT-Grinnell diaphragm valves. From within this overall population a second set of three hundred thirty-four (334) valves was identified consisting of those valves addressed in the TRT issue (i.e., ITT-Grinnell diaphragm valves in the spent fuel cooling and cleaning system, the boron recycle system, and the chemical and volume control system). The populations were considered to be homogeneous for the following reasons:

1. The valves were disassembled by members of the same craft i.e., Brown & Root millwrights.

2. All valves were disassembled using the same construction and QA/QC procedures.

3. All valves in the samples could be and were reinspected to the same checklist and attributes and used the same acceptance criteria.

A random sample was chosen from both the general population and the TRT issue valves. The samples were randomly selected to obtain at least sixty (60) items from each group in order to achieve the confidence level prescribed in Appendix D of the CPRT Program Plan. During random selection of the sixty (60) valves for the general population some sample overlap occurred. Valves which satisfied the criteria of the TRT issue sample were selected in the general population sample. This required selection of only a sufficient number of additional valves in the TRT issue sample to have sixty (60) valves from each population. Thus, the total number of valves reinspected was one-hundred six (106).

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5.0 IMPLEMENTATION OF ACTION PLAN AND DISCUSSION OF RESULTS (Cont'd)

For each valve selected in the sample an inspection package was assembled containing the manufacturers drawing, piping isometric, and operational travelers associated with that valve. These documents were reviewed for any indications of incorrect valve reassembly which might require disassembly of the valve for inspection of internal components. To make this determination the travelers were checked for variances in internal component serial numbers. No such cases were found.

The valves in the sample were then physically inspected in accordance with QI-018, Reinspection of Previously Disassembled Valves. The purpose of the inspection was to verify that the body and bonnet installed in the field could be traced back to proper documentation showing that they were received from the manufacturer as part of the same valve assembly or that plant documentation showed replacement of the valve component.

Valves which had their body and/or bonnet markings obscured by insulation, paint, etc., were classified as inaccessible and were replaced by the next randomly selected valve. Forty-two (42) valves were found to be inaccessible. No bias was introduced as insulation or paint does not effect the methods used for the control of the disassembly/reassembly of the valve.

5.2 Evaluation and Categorization of Inspection Findings

No safety-significant deficiencies were found during the course of the reinspection program for this issue.

Description of Deviations

There were four (4) valid deviations. These were all on ITT-Grinnell diaphragm valves. The deviations consisted of the bonnet assemblies installed on the four (4) valves being different from the bonnet assembly that the Manufacturer's Data Report Form (NPV-1) indicated belonged on the valve.

The total of one-hundred six (106) valves reinspected consisted of seventy-nine (79) ITT-Grinnell diaphragm valves and twenty-seven (27) valves from eight (8) manufacturers.

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5.0 IMPLEMENTATION OF ACTION PLAN AND DISCUSSION OF RESULTS (Cont'd)

Review of the documents assembled for the reinspection packages revealed one case where the bonnet of a diaphragm valve had been lost and one case where the bonnet had been damaged. These were not considered deviations as they were properly identified by TUGCO using the NCR system and traceability of the installed components was maintained using Permanent Equipment Transfers.

The ITT-Grinnell diaphragm valves required disassembly for installation to protect the non-metallic diaphragm from heat damage during welding of the body into the pipe line. The disassembly of the valve is accomplished by unbolting the valve bonnet and lifting the bonnet off the body. The diaphragm and other internals remain attached to the bonnet so that the valve is essentially in two pieces, the body and the bonnet. Further disassembly of the bonnet is not required for installation.

The reason for the deviations being limited to the ITT-Grinnell diaphragm valves is judged to be due to the much greater opportunity for the switching of parts. This opportunity arose from there being a relatively large number of this type valve, all of which had to be disassembled to be installed. This resulted in many valve bonnets of the same size and type in storage awaiting reassembly at the same time. The only noticeable difference in the valves would be the marking of the valve tag number on the bag in which the bonnet was kept. Thus the opportunity existed to retrieve the wrong storage bag. No other kind of valve was disassembled in such large numbers at a given time.

Two types of ITT-Grinnell diaphragm valves were supplied. The first type is a standard Class 150 valve per ANSI B16.5. This class is commonly referred to as the 150 lb. class valves but in fact are good for pressures higher than 150 psi depending upon the temperature. The design pressure and temperature of the ITT-Grinnell standard Class 150 valve is 255 psi at 150° F.

For some applications valves rated for 300 psi at 150° F were specified. The valves provided for these applications are slightly modified versions of the standard Class 150 valve. These modifications are only made to valve sizes 2", 3", and 4". Other valve sizes are identical irrespective of pressure/temperature rating.

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5.0 IMPLEMENTATION OF ACTION PLAN AND DISCUSSION OF RESULTS (Cont'd)

There are two modifications. The most significant modification is the addition of a support sheet behind the diaphragm to increase diaphragm life by reducing abrasion to the back of the diaphragm operating at the higher pressure. The support sheet is not required for safe operation of the valve. Additionally, the manually operated valves rated at a design pressure of 300 psi have a brass spindle instead of stainless steel. This is to reduce galling at higher operating pressures. Valves with air operators have stainless steel spindles for both pressure/temperature ratings. The change in spindle material does not affect safe operation of the valve. Both modifications described are made only to improve valve lifetime and do not affect the safety performance of the valve. The valves with design pressure of 255 psi and the valves with design pressure of 300 psi have bonnets and bodies of identical material type and metal thickness and identical diaphragms.

Both of the valve types (255 psi and 300 psi design pressure) were supplied to CPSES in ASME Code class 2 and 3. The ASME valves of a given pressure rating are manufactured the same regardless of desired Code class. After manufacturing they are certified to the desired Code class through different post manufacturing testing, with the more stringent testing being performed on Code class 2. The difference in testing involves only the body of the valve. There is no difference in the certification of the bonnets of class 2 and class 3 valves. Therefore, there is no substantive effect of interchanging class 2 and class 3 bonnets on ITT-Grinnell diaphragm valves.

Additionally, some non-ASME class diaphragm valves were supplied. The difference in non-ASME and ASME manufacturing processes for the bonnets and these valves are all in the level of QA requirements and documentation. The chemical and physical properties identified in the material specifications of the non-ASME and ASME Code class valve bonnets are the same. Also the post manufacturing testing performed on the non-ASME valve bonnets is the same as that for the ASME bonnets, and therefore, the likelihood of an undetected valve bonnet defect is the same for both ASME and non-ASME valves. It is concluded that there is no substantive effect of interchanging a non-ASME bonnet with an ASME bonnet on ITT-Grinnell diaphragm valves.

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5.0 IMPLEMENTATION OF ACTION PLAN AND DISCUSSION OF RESULTS (Cont'd)

The valve bonnet of a given ITT-Grinnell diaphragm valve size will physically fit up with any valve body of the same size, regardless of their respective pressure/temperature rating or Code class. Any undocumented interchange of one valve bonnet for another discovered during the reinspection was considered a deviation.

For two of the bonnets found to be deviations (valve tag no. 2-8422 and 2-7131B), documentation was found in the TUGCO vault substantiating that the valve bonnets installed are identical in pressure/temperature rating and Code class to those which were supposed to be installed.

Of the remaining two deviations, one of the valves (valve tag no. XSF-179) is a standard (255 psi at 150°F) rated valve, ASME Code class 3. Documentation was not found to identify the pressure/ temperature rating and Code class of the installed bonnet. However, the bonnet was verified through markings stamped on the bonnet to be an ASME Code class component so it must be equal to or better than Code class 3. Likewise since only two valve types were supplied to CPSES the installed bonnet must be equal to or better in pressure/temperature rating.

The remaining valve deviation (valve tag no. 1-7046) was on a Code class 3 valve rated at 300 psi and 150°F. No documentation was found identifying the installed bonnet but it was verified through markings stamped on the bonnet as an ASME Code class component so it must be equal to or better than required. The reasoning used to classify the deviation as non-safety significant is as follows. Making a worst case assumption, the installed bonnet is assumed to be a standard bonnet. This is a three inch valve. The required bonnet would, at most, have the modification of adding the plastic support sheet. This valve is air operated, so the spindle is stainless steel regardless of the bonnet type. Per ITT-Grinnell, use of a standard valve in a 300 psi system is not recommended; however, lack of the support sheet would reduce diaphragm life but would not prevent proper valve operation. This, coupled with the fact that the valve pressure containing boundary (body and bonnet walls) for both valve types are identical, led to the conclusion of non-safety significance of the deviation. No credit was taken for this valve's expected operating pressure and temperature being substantially lower than even the standard valve's capabilities.

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5.0 IMPLEMENTATION OF ACTION PLAN AND DISCUSSION OF RESULTS (Cont'd)

The valves found to have deviations were installed between early 1979 and late 1981. This was a period of high activity for diaphragm valve installation. It should be noted that the installation travelers for two of the valves, Tag No. 1-7046 disassembled in December, 1980 and Tag No. 2-8422 disassembled in January, 1981, included requirements to record the markings on the bonnets and to verify the numbers at reassembly. This was done and indicates that the valves as originally issued for installation and as currently installed in the plant are the same. This means that the switching of the bonnets occurred prior to their issue for installation. No documentation has been found indicating disassembly prior to installation issue, nor any reason found for disassembly prior to issue.

The travelers for the other two valves with deviations were written prior to the practice of recording bonnet markings so it is unknown when the switching of the bonnets occurred.

Procedure Review

Procedures pertaining to valve disassembly/reassembly are designed to:

1. Provide instructions to craft for proper process completion.

2. Provide control for tracking of components (valve bonnets) to ensure removed parts are returned to proper locations or to ensure interchanged parts are properly recorded (on PETs).

3. Provide control for identification and proper replacement of lost or damaged parts.

The valve installation process was performed under Construction Procedure CP-CPM-6.9, General Piping Procedure including Appendix E, Pipe Fabrication and Installation initially issued in October 1978.

From the initial issue of this procedure in October, 1978, through the present time the requirement has existed to perform valve disassembly/reassembly using Construction Operation Traveler's prepared using Construction Procedure CP-CPM-6.3, "Preparation, Approval, and Control of Operation

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5.0 IMPLEMENTATION OF ACTION PLAN AND DISCUSSION OF RESULTS (Cont'd)

Travelers". The operation traveler "serves as a fabrication/installation/inspection checklist of operations necessary to achieve a quality end product". Both CP-CPM-6.9 and CP-CPM-6.3 provide for Quality Assurance participation in both the preparation of the traveler, to ensure proper inspection hold points were included, and during the actual disassembly/reassembly. Procedure CP-CPM-6.9 has also always contained a provision that the parts from disassembled valves be placed in a bag or box which was marked with the valve number. The bag/box was required to be stored in the valve vicinity for large valves or in a secure storage area for smaller valves (ITT-Grinnell diaphragm valves can all be considered small).

The early procedures in use did not specifically call for recording on the travelers the marking stamped on the valve pieces stored nor for QC verification that the same components were being reassembled as were removed. They were adequate, however, if properly followed, to accomplish the disassembly/reassembly of valves with correct components. This conclusion follows from the requirements to mark the bag containing the disassembled components and to store them in specified areas.

The valve storage area at the millwright shop was inspected and it was found that valves are currently being marked and stored correctly. The millwright shop personnel are knowledgeable in requirements for equipment component traceability and have implemented an effective program to meet these requirements. These personnel have been in charge since early 1983. Sufficient information for evaluating valve storage prior to this time is not available.

The issue related to documentation of interchanging bonnets on the diaphragm valves was recognized by TUGCO and as early as 1980 travelers began to be written requiring that the body and bonnet identification numbers (numbers that are marked on the individual component and are different from the valve assembly serial number) be recorded at the time of valve disassembly.

In June, 1983 the procedures were revised and a new procedure, CP-CPM-9.18, Valve Disassembly/Reassembly was issued. This procedure covers valve types including the ITT-Grinnell diaphragm valves. At the same time Quality Assurance issued

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5.0 IMPLEMENTATION OF ACTION PLAN AND DISCUSSION OF RESULTS (Cont'd)

procedure QI-QAP-11.1-39A Valve Disassembly/Reassembly corresponding to CP-CPM-9.18. This QA procedure specified use of a "QCV" checklist which requires the recording of body and bonnet identification numbers upon disassembly and a verification of the proper numbers at the time of reassembly. This ensures that the proper bonnet is returned to the valve. The requirements of Procedure QI-QAP-11.1-39A have now been incorporated into QI-QAP-11.1-26, ASME Pipe Fabrication and Installation Inspections.

CP-CPM-9.18 allows valve disassembly to be initiated through use of an operations traveler (CP-CPM-6.3) or an IRN (CP-CPM-6.10). The IRN is used if valves are only disassembled/reassembled without addition of spare parts and disassembly/reassembly procedures are included in CP-CPM-9.18. Otherwise the operations traveler is used. In both cases QC is involved as specified in QI-QAP-11.1-26. The QC checklist used with both the operations traveler and the IRN requires recording of the bonnet identification numbers.

Administrative actions were taken in mid-1985 to ensure the above requirements were fully implemented in the startup test program.

The current program provides the controls necessary to ensure:

1. Proper installation of valve components and

2. That non-conformances (lost or damaged parts or interchanges affecting performance characteristics) will be identified and corrected.

The example of a lost valve cited by TRT in SSER-11 is not unexpected in a large project. The procedures are structured to detect such problems. The particular instance mentioned was detected by the project and documented on a Nonconformance Report, thereby demonstrating that the procedure system is working as designed to identify and correct any lost or damaged parts.

5.3 Trend Analysis

A trend analysis was performed for the four (4) valid deviations found.

All deviations were found in ITT-Grinnell diaphragm valves. It is significantly less likely that similar deviations exist in valves other than ITT-Grinnell valves for the following reasons:

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5.0 IMPLEMENTATION OF ACTION PLAN AND DISCUSSION OF RESULTS (Cont'd)

1. These valves (non-diaphragm) were not disassembled such that large numbers of compatible valve parts were available for interchange as was the case with the ITT-Grinnell diaphragm valves. Even though all the valves were disassembled by the same craft and under the same procedural control, the valves other than ITT-Grinnell diaphragm valves were less likely to be interchanged as there was less potential.

2. Of the valves other than ITT-Grinnell diaphragm valves reinspected, no valid deviations were found.

For the ITT-Grinnell diaphragm valves, it was determined that the effect of using a valve bonnet rated at 255 psi on a valve body rated for 300 psi would not cause a safety-significant deviation in any instance. This comes from the fact that the pressure boundaries of the valve and the diaphragm are identical for both ratings. The only differences (diaphragm support sheet and brass spindle in higher rated bonnet) are for increased life/reduced maintenance and are not required for the safe operation of the valve.

No deviations in code class were found so no trend for code class violations exists.

The non-ASME and ASME Code class valve bonnets are manufactured by the same physical process and use the same materials. Additionally, the post manufacturing testing of the non-ASME bonnets is the same as for the ASME bonnets. While the potential for switching non-ASME and ASME Code class bonnets did exist, there is no implication that switching of non-ASME and ASME valve bonnets could be safety-significant.

Therefore, the four deviations were not judged to be an adverse trend.

5.4 Root Cause and Generic Implication Evaluation

The reinspection program found no construction deficiencies. No adverse trend exists. Therefore, no root cause or generic implication analyses were required.

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5.0 IMPLEMENTATION OF ACTION PLAN AND DISCUSSION OF RESULTS (Cont'd)

The NRC hypothesized root cause that the process for valve disassembly/reassembly was not controlled was partially substantiated. The lack of adequate control was limited to ITT-Grinnell valves that were disassembled in large numbers at the same time. Although the procedures at that time appeared adequate to accomplish the disassembly/reassembly of valves correctly, they did not contain requirements to record and verify valve bonnet identification numbers, and undocumented interchanges occurred as large numbers of assembly/disassembly operations were performed with similar valves. The procedures were strengthened in June, 1983.

The problem does not extend to the general population because large numbers of other types of valves were not disassembled at the same time. The results of our investigation support this.

5.5 Evaluation of Results Against Action Plan Decision Criteria

No construction deficiencies were found. The valves found with deviations were determined to be able to perform their intended functions under the design conditions. Therefore, the action plan is to be considered closed.

This action plan required expansion of the sample upon finding one or more construction deficiencies. Since none was found, the sample was not expanded.

5.6 Identification and Discussion of Corrective Action

The programmatic requirements to preclude switching valve bonnets at the time of reassembly have already been addressed by TUGCO. The change of personnel and revamp of the millwright valve storage area in February, 1983, should act to minimize loss, damage or inadvertent interchange of valve bonnets. The procedures in place since mid-1983 requiring the verification during reassembly that the body and bonnet identification numbers match those when the valve was disassembled preclude an inadvertent and undetected switching of the valve bonnets.

The specific valves found with deviations have been identified to TUGCO and have been entered into the TUGCO Non-conformance Report (NCR) system.

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5.0 IMPLEMENTATION OF ACTION PLAN AND DISCUSSION OF RESULTS (Cont'd)

5.7 Out of Scope Observations

During the course of reinspection, thirteen (13) valves were found to have the required code data tag missing. This tag lists the manufacturer's name and serial number, Code class, pressure/temperature rating, and year built. These valves were identified to TUGCO and NCRs written covering this observation. TUGCO had already identified a problem with missing code data tags and has in place acceptable procedures for handling missing data tags. The absence of these tags has no effect on the performance or safety of the valves.

No other out-of-scope observations were noted during implementation of this action plan.

6.0 CONCLUSIONS

Two valid deviations were found in the sample from the general population of valves disassembled and reassembled, one of which was also part of the TRT issue population. Two more valid deviations were found in the additional samples selected just from the TRT population. No construction deficiencies and no code-class deviations were found in the samples.

A safety significance evaluation has shown that no construction deficiencies can occur on the ITT-Grinnell valves due to interchanged parts occurring during reassembly of disassembled valves.

Based on the results of the reinspection program the following conclusions are drawn:

- There is a 95 percent confidence that at least 95 percent of the general population of valves that were disassembled were reassembled in a functionally correct manner and have no code class deviations (i.e., zero construction deficiencies or code class deviations found in a sample of sixty).

- There is a 95 percent confidence that at least 95 percent of the TRT issue valves (i.e., ITT-Grinnell valves in the spent fuel cooling and cleaning system, the boron recycle system, and the chemical and volume control system) that were

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(Cont'd)

7.0 ONGOING ACTIVITIES (Cont'd)

disassembled were reassembled in a functionally correct manner and have no code class deviation (i.e., zero construction deficiencies or code class deviations found in a sample of sixty).

The procedures for valve disassembly/reassembly were reviewed and determined to provide adequate control requirements except in cases where large numbers of similar valves were simultaneously disassembled. Furthermore, no instances were found that the control process broke down except in the case of the ITT-Grinnell valves. The improvements made to the control process since 1983 provide reasonable assurance that an adequate control process is in place.

The four deviations occurred on ITT-Grinnell diaphragm valves in a time frame when relatively large numbers of valves were disassembled at the same time. This fact, along with confidence in the process for the control of valve disassembly/reassembly, indicates that uncontrolled switching of valve bonnets does not extend to the general population.

7.0 ONGOING ACTIVITIES

The SRT considers the implementation of VII.b.2 to be complete.

The disposition of the NCRs for the four deviations will correct the "as installed" documentation for the valves.

The assessment of TUGCO's handling of programmatic corrective action regarding control of valve disassembly/reassembly will be addressed in ISAP VII.a.2.

8.0 ACTION TO PRECLUDE OCCURRENCE IN THE FUTURE

As previously discussed the control process currently in effect is adequate to ensure proper valve disassembly/reassembly.

Additionally, discussions with millwright supervision and the supervisor of the valve storage area in the millwright shop revealed an appreciation for the need to maintain proper material traceability.