COMANCHE PEAK RESPONSE TEAM

RESULTS REPORT

ISAP: I.d.3

Title: Craft Personnel Training

REVISION 1

Issue Coordinator — Date: 8/28/86

Review Team Leader — Date: 8/28/86

John W. Beck, Chairman CPRT-SRT — Date: 8/20/86

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Craft Personnel Training

1.0 DESCRIPTION OF ISSUES IDENTIFIED BY NRC

The NRC identified two specific concerns about the adequacy of craft personnel training. Those concerns, which are described below, involved the training of personnel installing conduit supports and those handling heavy loads.

1.1 Conduit Supports

It was alleged that, in general, there were problems with the adequacy of training of personnel installing conduit supports.

"The TRT interviewed personnel, craft supervisors, and training personnel to determine the availability and effectiveness of the training program, and found that there was a training program for newly hired personnel or transfers into the installation. This training program included periodic briefings on procedure changes. The interviews revealed that the training program was not effective because 7 of the 11 crew members interviewed were not cognizant of Manual 2323-S-0910, "Conduit and Junction Box Supports", which is the primary reference manual for installation of supports. Although these seven crew members indicated that they had no need to use this manual in their job assignments, the TRT could not substantiate this assertion. Hence, the lack of awareness of this procedure by craft personnel may be indicative of poor training in the area of procedural requirements." (NUREG-0797, Supplement Number 7, Page J-34)

1.2 Heavy Loads

"An NRC Region IV Resident Inspector identified a violation as a result of a discussion with a craft person who stated that he had not received instructions about how to rig and handle a large motor-operated valve."

"The TRT reviewed NRC Inspection Report 50-445/79-27, 50-446/79-26 and its corresponding Notice of Violation (NOV). The TRT also reviewed the Texas Utilities Electric Company (TUEC) response to these documents (TXX-3080, dated December 18, 1979), which stated that the subject valve was not mishandled, nor was it damaged. The engineering organization had not, however, reviewed specific vendor rigging or handling recommendations or noted the procedures for loads exceeding

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1.0 DESCRIPTION OF ISSUES IDENTIFIED BY NRC (Cont'd)

2000 pounds. An NRC follow up inspection verified that Brown & Root (B&R) Procedures CP-CPM-6.3, 35-1195-CCP-24, 35-1195-ACP-3, and QI-QAP-13.1-1 were reviewed by TUEC and revised appropriately. NRC Inspection Report 50-445/80-18, 50-446/80-18 (dated September 19, 1980) documented corrective action during the follow-up inspection." (NUREG-0797, Supplement Number 8, Page K-147)

2.0 ACTION IDENTIFIED BY NRC

Actions identified by NRC to resolve concerns about craft personnel training are provided below.

2.1 Conduit Supports

"Prior to fuel load TUEC shall accomplish the following action: Evaluate the adequacy of craft personnel training in the use of installation manuals to establish root causes and appropriate corrective actions. This action shall be integrated with other actions concerning craft personnel training addressed under QA/QC Category 8, 'As-Built'." (NUREG-0797, Supplement Number 7, Page J-35) The installation manual associated with conduit supports is Manual 2323-S-0910.

2.2 Heavy Loads

"The TRT determined that Region IV (RIV) confirmed that the craft person's stated need for better instructions was correct and confirmed follow up inspection by the RIV inspector to verify that corrective action was accomplished in accordance with TUEC letter TXX-3080 (December 18, 1979). The TRT concludes that the failure to provide proper instructions for rigging and handling heavy loads is safety-significant and has generic implications; however, corrective action was taken. No evidence of further inadequacies in this area was found; consequently the allegation requires no further action." (NUREG-0797, Supplement Number 8, Page K-147)

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3.0 BACKGROUND

The following information supplements the NRC description of issues provided in Section 1.0.

3.1 Conduit Supports

Manual 2323-S-0910 is an engineering document containing detailed drawings for installation of conduit/junction box supports. These detailed drawings are referred to as S-910/S2-910 drawings. Prior to the use of work packages, craft personnel obtained the S-910/S2-910 drawings needed to install supports from Manual 2323-S-0910. Guidance for selecting the appropriate supports was provided by engineering. After work packages were instituted, craft personnel received S-910/S2-910 drawings in those packages. Cognizant engineers designated the type of supports to be used, and package processors provided appropriate drawings from Manual 2323-S-0910. Contact of craft personnel with Manual 2323-S-0910 was through the S-910/S2-910 drawings.

3.2 Heavy Loads

"The TRT interviewed TUEC's Rigging Craft Superintendent, Assistant Mechanical Superintendent, and Senior Staff Engineer. They stated that the revised procedures (specifically, CCP-2A, Revision 4, "Rigging"; CP-CPM-6.3, Revision 10, "Preparation, Approval, and Control of Operation Travelers"; and, CP-CPM-6.9, Revision 2, "General Piping Procedure") adequately controlled heavy lifts of equipment and components. Non-conformance Report (NCR) M-2128 documented the problem which was identified as a violation, and the appropriate site personnel reviewed the NRC Inspection Report and concurred with the corrective action. In addition, the TRT independently reviewed the revised procedures for the control of heavy lifts of equipment and found the control of rigging and handling to be acceptable for loads less than or exceeding 2000 pounds." (NUREG-0797, Supplement Number 8, Page K-147)

4.0 CPRT ACTION PLAN

4.1 Scope and Methodology

The objective of this action plan was to evaluate craft training programs to determine if they were adequate in the past, and also to evaluate current programs.

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4.0 CPRT ACTION PLAN (Cont'd)

To achieve this objective, the following tasks were implemented:

- Resolution of the two specific NRC concerns.
- Assessment of craft personnel training programs.

4.1.1 Specific NRC Concerns

4.1.1.1 Conduit Supports

Conduit installation procedures were reviewed, electrical craft personnel were interviewed, and the installation of a conduit support was observed to determine if craft personnel should have been cognizant of Manual 2323-S-0910.

4.1.1.2 Heavy Loads

No further action on handling heavy loads was specified by NRC. Nevertheless, procedural retraining practices were checked to ensure that corrective actions were being properly implemented by craft personnel. These checks included a review of Brown & Root procedure CP-CPM-2.2, Training of Personnel in Procedural Requirements; interviews of riggers; and an observation of a rigging activity.

4.1.2 Craft Personnel Training Programs

The assessment of craft personnel training programs was accomplished by reviewing craft training procedures, interviewing craft personnel, and observing training and field activities. The following items were considered during this assessment:

- How skill requirements for craft classification levels are established.

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4.0 CPRT ACTION PLAN (Cont'd)

- How background of education and experience of craft personnel is verified and documented.
- How craft personnel are determined to meet skill and performance requirements.
- How craft personnel classifications are established for crew loading.
- How craft personnel become aware of changes to construction requirements and how retraining occurs.
- How craft personnel become aware of QA/QC requirements/criteria and changes to those requirements/criteria.
- How management is assured that craft personnel selection, training, assignment and retraining comply with project requirements.
- How craft personnel are trained.
- How supervisory personnel are selected and trained.

4.1.2.1 Review Training Procedures

Craft training procedures (Brown & Root CP-CPM-2.2 and Bahnson QCI-CPSES-013) were reviewed to determine if they supported the activities described during interviews and field observations.

4.1.2.2 Interview Personnel

Craft personnel, from the general superintendent/building manager level to the helper level, were interviewed to determine how craft personnel were selected and trained.

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4.0 CPRT ACTION PLAN (Cont'd)

4.1.2.3 Observe Training and Field Activities

Training and field activities were observed to determine if adequate training was provided and to evaluate how well craft personnel performed in the field.

4.1.3 Use of Results

The QA/QC Review Team used results of their activities to draw conclusions about the adequacy of past and current craft personnel training practices. These conclusions may be modified if shortcomings in the training of craft personnel are determined to be the root cause of any construction deficiencies or adverse trends identified by other ISAPs. A review of the root causes of any construction deficiencies and adverse trends and, if appropriate, a reassessment of the adequacy of past training will be conducted by the Collective Evaluation Group after the results reports of other ISAPs are issued.

4.2 Participants Roles and Responsibilities

4.2.1 Special Evaluation Team (Prior to April 24, 1986)

4.2.1.1 The Special Evaluation Team interviewed personnel and observed training activities for scoping purposes.

4.2.1.2 Personnel

Mr. M. L. Curland	Consultant
Mr. J. W. Sutton	Consultant

4.2.2 Evaluation Research Corporation

4.2.2.1 The Evaluation Research Corporation was responsible for evaluating the adequacy of the craft training programs at CPSES by reviewing procedures, interviewing personnel, and observing training and field activities. On April 24, 1986, the QA/QC Review Team replaced the Special Evaluation Team.

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4.0 CPRT ACTION PLAN (Cont'd)

4.2.2.2 Personnel

Mr. J. L. Hansel	QA/QC Review Team Leader
Mr. A. P. Amoruso	Issue Coordinator
Mr. W. M. Sides	Senior QA Engineer

4.3 Qualifications of Personnel

All personnel associated with the evaluation of the adequacy of craft personnel training programs were qualified in accordance with the requirements of the CPRT Program Plan.

4.4 Procedures

This action plan was conducted in accordance with the CPRT Program Plan.

4.5 Standards/Acceptance Criteria

The requirements of ANSI N45.2-1971 state that personnel performing activities affecting quality shall be trained and indoctrinated to assure that suitable proficiency is achieved and maintained.

4.6 Decision Criteria

This action plan will be closed if craft personnel training is found to meet the requirements of ANSI N45.2-1971.

5.0 IMPLEMENTATION OF ACTION PLAN AND DISCUSSION OF RESULTS

5.1 NRC Concerns

5.1.1 Conduit and Junction Box Supports

To determine if craft personnel should have been cognizant of Manual 2323-S-0910, "Conduit and Junction Box Supports", two procedures were reviewed, four people were interviewed, and a field activity was observed.

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

Brown & Root procedures, ECP-19 and ECP-19A, address the installation of safety-related conduit and associated junction box supports. These two procedures were reviewed to determine if craft personnel were required to use Manual 2323-S-0910. ECP-19 states that safety-related conduit/junction box supports are to be installed in accordance with typical S-910/S2-910 drawings. These drawings make up Manual 2323-S-0910. ECP-19A states that typical support drawings for safety-related conduit will be taken from Manual 2323-S-0910. Therefore, the crafts were required to use S-910/S2-910 drawings.

Four electricians, i.e., general superintendent, foreman, and two journeymen, were interviewed concerning their knowledge of S-910/S2-910 drawings. They were familiar with the use of S-910 and S2-910 drawings for installing conduit supports. However, three of the four could not readily associate "Manual 2323-S-0910" as the binder for S-910/S2-910 drawings. Since S-910/S2-910 drawings are the engineering documents used in the field by craft personnel to install conduit/junction box supports, the inability to readily recall the name of the manual that binds these drawings does not affect workmanship.

The installation of a conduit support in Unit 2 was observed. The work package contained an isometric drawing, a construction operation traveler and detailed conduit support drawings. Craft personnel used the detailed drawing specified on the isometric to install the support and were aware that this drawing was an S2-910 drawing.

The action identified by NRC for this concern, as stated in Section 2.0, was to evaluate the adequacy of craft personnel training in the use of installation manuals and in performing tasks addressed as examples of faulty construction under QA/QC Category 8, As-Built, in NUREG-0797, Supplement Number 11. In the case of installation manuals, engineering is responsible for assuring that pertinent construction requirements in those manuals are listed on appropriate operation travelers or provided separately for work not requiring travelers. Craft personnel must be

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

proficient in using drawings, tolerances and instructions that are provided by engineering but do not have to be thoroughly familiar with the manuals from which information is extracted. As discussed above, craft personnel could not readily recall how Manual 2323-S-0910 related to their work, but their training in the use of drawings taken from that manual was determined to be adequate based on interviews and a field observation. The adequacy of craft personnel training in the use of travelers containing instructions from other manuals is discussed and assessed under the general topic of craft personnel training programs in Section 5.2.

In the case of the faulty construction addressed under QA/QC Category 8, As-Built, the examples presented address hardware discrepancies and differences between installed hardware and as-built drawings. The causes of these problems could be shortcomings in the training of craft personnel or could be inadequate design information, procedures, management direction, or training of non-craft personnel conducting walkdowns. In the case of craft personnel, the adequacy of their training to support the installation of hardware in accordance with instructions provided by engineering is discussed and assessed under the general topic of craft personnel training programs in Section 5.2.

5.1.2 Rigging and Handling Heavy Loads

As discussed in Sections 1.0 and 2.0, corrective action taken by TUGCO to resolve NRC concerns about instructions for rigging and handling heavy loads included revising procedures that addressed the subject. These revisions were reviewed and found acceptable by the TRT. No further action was required.

However, to assure that craft personnel are being trained on the content of procedures that address rigging and handling of heavy loads, Brown & Root procedure CP-CPM-2.2, Training of Personnel in Procedural Requirements, was reviewed. This procedure adequately addresses (1) the requirement for craft personnel to be made aware of procedures and changes applicable to their work and (2) the process for accomplishing and documenting that training.

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

Interviews, record checks and a field observation were conducted to monitor the implementation of procedure CP-CPM-2.2. Five riggers, i.e., a general superintendent, a foreman, two journeymen and a helper, were interviewed. The interviews established that riggers read new procedures that pertain to their work and discuss changes to those procedures with their supervisors. They are knowledgeable of the following procedures as appropriate to their job classifications: CCP-24, Rigging; CPM-6.3, Preparation, Approval, and Control of Operation Travelers; CPM-7.1A, Documentation Package Preparation; CPM-14.1, Guideline for Protection of Plant Equipment; and CPM-15.1, Observation of Hold Points.

Training records for two of those interviewed, a journeyman and the helper, were checked to assure that training applicable to their work had been accomplished and recorded. No discrepancies were noted.

A rigging and lifting operation was observed to check the effectiveness of procedural training in covering revised procedures. No items on the critical equipment list that is attached to CCP-24 were scheduled for lifting because of the completion status of the plants. Therefore, the rigging and lifting of a condenser tube bundle was observed. The pre-lift briefing, inspection of handling equipment, rigging, and lifting complied with the requirements of CCP-24 for the handling of permanent plant equipment not on the critical equipment list. No discrepancies were noted.

The training checks, interviews, and rigging operation demonstrated that training related to rigging and handling operations has been effective.

5.2 Craft Personnel Training

5.2.1 Introduction

This evaluation covers the Brown & Root and Bahnson craft training programs. Those two training programs were used because Brown & Root and Bahnson were the major construction contractors involved with safety-related work remaining on site at the time of the evaluation. Craft personnel employed by Brown & Root and Bahnson comprised more than 99% of the work force involved with safety-related work.

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

The first step in the evaluation of craft training was to cover the selection and assignment process for craft personnel by interviewing management representatives and general superintendents. This established the basic entry skills of craft personnel.

Next, the evaluation covered the training provided to craft personnel as determined by interviewing craft supervisory and non-supervisory personnel and by reviewing procedural, on-the-job (OJT), classroom and mockup training. This established craft capability levels.

Finally, the evaluation covered workmanship by interviewing craft personnel, observing field activities and reviewing corrective action requests related to craft performance. Workmanship resulting from the training that was conducted provided the basis for an assessment of the adequacy of craft personnel training.

Thirty-seven interviews were conducted during this evaluation. A matrix listing those interviewed by classification and craft group is included as Attachment 1.

5.2.2 Selection and Assignment

Craft personnel are selected by a process which commences in contractor employment offices where preliminary screening actions take place. These screening actions are intended to ensure that only those individuals with applicable construction skills or capabilities are considered for employment. All hiring activity is contingent upon existing manpower needs as established by project management.

Employment forms are completed by applicants and reviewed by employment office personnel and craft management. After these reviews, applicants are interviewed by craft supervisors, usually general foremen. These interviews provide a first-hand assessment regarding an applicant's capabilities and experience through in-depth questioning of craft

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

techniques. Routine work histories are spot checked to verify the skills and knowledge professed by the applicant. These spot checks include obtaining backgrounds of applicants from associates at other work sites, information about work habits and skills from former employers and educational achievements from schools. Brown & Root uses a polygraph during pre-employment questioning.

People are assigned to grade classifications and craft groups according to skills, experience and manpower needs. Specific skill requirements for entry level positions in a craft are determined by the experience and judgment of craft supervisors. The interview process, including communications between employment personnel and craft supervisors, is used to place an individual in the appropriate craft group and grade classification.

A crew is made up of eight to fourteen people assigned to a foreman. The classifications that make up a crew depend upon the work to be accomplished and are determined by general superintendents. Most new hires are started in a helper classification until their on-the-job performance has been observed and evaluated by their foremen and the required procedural training has been completed. The least experienced new hires are assigned to the lowest helper level. Transfers within the work force to craft groups and crews are made by general superintendents based on the performance, skills and potential of craft personnel and manpower needs of the project.

An exception to the general approach discussed above for selecting and assigning craft personnel applies to welders. Brown & Root craft supervisors requiring welders submit a requisition to the Welding Engineer. The Welding Engineer interviews and selects personnel according to requirements specified on the requisition. The welders are qualified and receive special training, as needed, before being assigned. Therefore, only qualified welders are turned over to the electrical, mechanical, and structural craft organizations. Bahnson welders are qualified as a part of the hiring process and are then assigned to hanger crews.

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

On-the-job performance is evaluated every three months by Brown & Root and annually by Bahnson using standardized forms that address knowledge, skills, productivity and leadership. These evaluations are used to counsel employees, determine compliance with project requirements and select supervisory personnel. If a craft worker's performance is determined to be inconsistent or less than expected on the basis of the original selection and assignment process, the cognizant foreman has recourse to recommending termination, transfer or retraining of the employee.

The overall craft selection and assignment process comprises a practical approach which contains responsible checks and balances.

5.2.3 Training Programs

Brown & Root and Bahnson craft personnel training programs are made up of four elements: procedural training, on-the-job training (OJT), classroom training, and mockup training. These programs are administered by project managers through craft supervisors using training coordinators.

Procedural training is governed by the following procedures:

Brown & Root, CP-CPM-2.2, Revision 4 - Training of Personnel in Procedural Requirements

Bahnson, QCI-CPSES-013, Revision 4 - Indoctrination and Training of Personnel

These Brown & Root and Bahnson training procedures were reviewed and found to contain guidance for conducting procedural training for craft personnel. Implementation of these procedures was evaluated by checking administrative controls and training records. Administrative controls were found to have provisions for assuring that craft personnel complete required procedural training as procedures are revised and personnel are assigned to new crews or grade classifications. Craft supervisors are involved in

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

authenticating procedural training requirements for crews and grade classifications and are provided the training status of assigned personnel. The training records chosen for review included those for craft personnel previously interviewed and those observed in the field performing work. The records were checked to assure that procedures pertinent to each crew and grade classification were listed as requirements and that people assigned to those crews and classifications had completed the training that was prescribed. No discrepancies were noted.

Interviews with Brown & Root and Bahnson craft personnel established that procedural training had always been a part of training programs. This training was provided by reading assignments or classroom sessions followed by discussions with foremen.

Brown & Root issued TCP-1, Project Training, on October 3, 1975. The format and means of storing training information improved when CP-CPM-2.2 was issued on December 18, 1981. Information is available prior to 1981, but retrieval is more difficult. Bahnson proceduralized their training program on July 21, 1983 with the issuance of QCI-CPSES-013. Training records exist before the issuance of QCI-CPSES-013, extending back into 1982.

On-the-job training (OJT) is an important part of Brown & Root and Bahnson training programs for both craft personnel and supervisors. During interviews, craft personnel stressed the significant role this type of training has played since the beginning of work at the site. New hires for all crafts receive OJT before being allowed to work under reduced supervision. Newly hired helpers are under close scrutiny of journeymen until they demonstrate their ability to handle supporting tasks. Newly hired journeymen work with site-experienced journeymen and are under the close supervision of foremen until they demonstrate proficiency in their crafts. This process for new journeymen takes from two weeks to several months depending on the complexity of the work and the

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

experience and learning ability of the journeyman involved. OJT is also used to prepare supervisors for higher grade levels, upgrade craft skills, correct problem areas, and clarify information obtained in procedural and classroom training. The effectiveness of OJT is monitored by craft supervisors using productivity, work reject rates, nonconformances, and personnel performance evaluations. This monitoring is part of the periodic assessment of progress made by supervisors and is not documented. Supervisors feed back areas requiring additional training into OJT or classroom training through the craft organization and the project training coordinator respectively.

Since documentation of OJT is not required by either construction contractor, interviews and field observations were used to assess this training. Interviews established that craft personnel believe that OJT has been and continues to be effective. Field observations established that foremen control work activities by assigning work, briefing personnel on the details of work, answering questions, checking procedural compliance and inspecting work. Journeymen openly discuss problems with foremen in a professional manner.

Classroom training has been an inherent part of contractor programs since work began at the site. Brown & Root has used classroom training to upgrade skill levels and improve the understanding of construction requirements that are contained in procedures. Bahnson has used classroom training to orient new hires, cover procedures with craft personnel, and discuss problem areas with cognizant groups.

Classroom training that was conducted by Brown & Root between 1975 and 1984 to upgrade skills was generally scheduled after normal working hours on a voluntary basis without monetary compensation. Craft personnel sought these courses to improve their skills and promotion potential. Their interest is shown by a cumulative enrollment in these courses of over 25,000. Courses taught included welding, concrete placement, concrete patching, conduit bending, electrical terminations, pipefitting, component supports and

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

hangers, rebar, cadwelding, instrumentation, millwright maintenance, blueprint reading, material control, and document control. Classroom training for upgrading skills has also been conducted by Brown & Root during normal working hours. The purpose of this training was to develop skills in short supply for upcoming work. These courses covered welding and pipefitting to support peak demand periods for those skills and has shifted to conduit supports, conduit bending, and electrical terminations to support peak demand periods for those skills. Supervisors select personnel for the courses conducted during normal working hours based on the performance and potential of each individual. Bahnson has used OJT and the hiring process to obtain skills needed to accomplish their scope of work.

Classroom training has been used by both Brown & Root and Bahnson to improve the understanding by craft personnel of construction requirements contained in procedures. For Brown & Root, craft supervisors decide when this type of training will be used and what procedures or changes will be covered. These decisions are based on the needs of craft personnel and the complexity of procedures. All mechanical craft personnel are being sent through classroom refresher training on procedures to reinforce their knowledge of construction requirements applicable to their work assignments. All electrical craft personnel are being recycled through classroom refresher training every six months to reinforce their knowledge of pertinent procedures. For Bahnson, classroom training is scheduled by project management and is used to review procedures with newly hired personnel during indoctrination and with all craft personnel when significant changes to procedures are promulgated.

Mockup training has been used by Brown & Root to augment OJT and classroom training. Mockup training develops hands-on skills for craft personnel using components similar to those installed in the plant. This training has been used for coatings, conduit, cable trays, pipefitting, component hangers/supports, Hilti bolts, electrical terminations, rigging and welding. Bahnson uses mockup training for welding and correcting field problems that are suited to this type of training.

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

Two classes and one mockup session conducted by Brown & Root were observed to assess classroom and mockup training. The classes covered the installation of conduit supports and the content of welding procedures. The mockup session involved high voltage cable terminations. These observations established that lesson plans are being used, instructors are well prepared, students have the opportunity to ask questions, training aids clarify concepts, and quizzes and performance tests are given to assess the effectiveness of this training and the knowledge and skills of attendees. The training sessions met the objectives of lesson plans. Also, interviews with Brown & Root and Bahnson craft personnel established that classroom and mockup training in the past has been beneficial in upgrading skills.

5.2.4 Training Effectiveness

The adequacy of current training was assessed by observing work and training activities and interviewing craft personnel. The adequacy of past training was assessed by reviewing Corrective Action Requests (CARs), considering training that was conducted as discussed in Section 5.2.3, and interviewing craft personnel . CARs were selected for use in the assessment of the adequacy of past training because any shortcomings in the training of craft personnel should have shown up as recurring hardware and documentation nonconformances, and noteworthy recurring hardware and documentation nonconformances were to be addressed by CARs. The effectiveness of CARs in addressing the causes and corrective actions for recurring hardware and documentation problems will be verified by reinspections covered by other ISAPs.

Eleven work activities, two classes, and one mockup session were observed and twenty-six interviews were conducted to assess the adequacy of current training by Brown & Root and Bahnson. The work activities covered electrical, mechanical, rigging, and HVAC (heating, ventilation, and air conditioning) areas. Observations

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

of the work activities determined that work packages containing travelers, drawings and other appropriate instructions are used; that foremen closely supervise work; that foremen and journeymen discuss procedural questions; that procedures are available at craft field stations and are used; that work is accomplished in accordance with travelers and procedures; and that hold points are honored. The working environment is professional, i.e., craft personnel are attentive to work, ask questions freely, are respectful to supervisors, and are knowledgeable of their work. Discussions with craft personnel during these field observations found them knowledgeable not only about what they were doing but also why they were doing it. They credited OJT as an important aspect of their development. Results of the observations of classroom and mockup training are summarized in Section 5.2.3. The interviews determined that craft personnel are informed about changes in construction and quality control requirements through the procedural training system and through changes on travelers, and that training programs are adequate for craft personnel to achieve proficiency in accomplishing ongoing work. Based on the work activities, classroom training and mockup session that were observed and the interviews that were conducted, current training by Brown & Root and Bahnson was assessed as adequate.

Ninety-seven CARs issued since 1977 were reviewed, training conducted since 1975 was considered, and seventeen interviews of craft personnel with more than two years of on site experience were conducted to assess the adequacy of past training by Brown & Root and Bahnson. Twenty-seven of the ninety-seven CARs that were reviewed related to craft performance. Twelve of the twenty-seven were issued by TUGCO, fourteen were issued by Brown & Root, and one was issued by Bahnson. Fifteen of the twenty-seven CARs were recurring. Of those fifteen, three dealt with errors on weld data cards and weld material requisitions, eight dealt with failures to notify QC and/or the Authorized Nuclear Inspector (ANI) at predetermined hold points, and four dealt with failures

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

to generate Inspected Item Removal Notices (IRNs). These issues were administrative in nature and were resolved by clarifying procedures followed by additional training. After these issues were fed back into training programs and corrective measures were implemented, no additional CARs on these subjects were issued.

Training conducted since 1975 that was considered in the assessment of past training is summarized in Section 5.2.3. Seventeen craft personnel with more than two years of on site experience were interviewed to determine how training was conducted. Information obtained from these interviews supported the conclusion that past training by Brown & Root and Bahnson was adequate to achieve proficiency in accomplishing assigned work. Based on CARs, training conducted, and interviews, past training by Brown & Root and Bahnson was assessed as adequate.

This assessment of past training does not include results of hardware and documentation reinspections conducted by the Comanche Peak Response Team. These reinspections are covered by other ISAPs. Therefore, the adequacy of past training will be reassessed if the results of other ISAPs identify shortcomings in the training of craft personnel as the root cause of any construction deficiencies or adverse trends. Such a reassessment will be conducted, if appropriate, by the Collective Evaluation Group after the results reports of other ISAPs are issued.

5.3 Root Cause and Generic Implication Evaluation

Since no program deviations or deficiencies were identified, root cause and generic implication analyses are not applicable.

6.0 CONCLUSIONS

Craft personnel were cognizant of detailed drawings for conduit and junction box supports contained in Manual 2323-S-0910. Craft personnel could not readily recall the name of the manual from which the drawings were extracted but that information does not affect workmanship because craft personnel use the drawings, and not the manual, to accomplish their work.

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6.0 CONCLUSIONS (Cont'd)

Brown & Root procedure CP-CPM-2.2 provides for the retraining of craft personnel on revised procedures. Craft personnel are knowledgeable of the procedural requirements for rigging. Training conducted on rigging has been effective.

Past and current practices used for craft selection and training were found to be in compliance with ANSI N45.2-1971 and, therefore, were determined to be adequate. The craft selection and assignment process is a practical approach with responsible checks and balances. Procedural, on-the-job, classroom and mockup training programs have been effective.

No program deviations or deficiencies were identified.

7.0 ONGOING ACTIVITIES

No ongoing activities have resulted from implementation of this action plan.

8.0 ACTION TO PRECLUDE OCCURRENCE IN THE FUTURE

Since no program deviations or deficiencies were identified, action to preclude occurrence in the future is not applicable.

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(Cont'd)

Attachment 1

Interview Matrix

CLASSIFICATION	GROUP								
	Elect.	Mech.	HVAC	Protective Coatings	Rigging	Personnel	Maint.	Training	Total
GENERAL SUPERINTENDENT	1	1			1				3
SUPERINTENDENT	1			1		2			4
COORDINATOR								2	2
MANAGER			1					1	2
SUPERVISOR		1		1		1		1	4
GENERAL FOREMAN	1								1
FOREMAN	1	1	1		1		1		5
JOURNEYMAN	4	1	4		2		1		12
HELPER	1	1	1		1				4
TOTAL	9	5	7	2	5	3	2	4	37