James W Cook
Vice President - Projects, Engineering and Construction

General Offices: 1945 West Parnall Road, Jackson, MI 49201 • (517) 788-0453

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Mr J G Keppler, Regional Director
Office of Inspection and Enforcement
US Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, IL 60137

MIDLAND PROJECT -
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Reference Letter JGKeppler to JWCook concerning the March 13, 1981 meeting in Glen Ellyn, IL, dated April 2, 1981

The referenced letter documents the meeting of March 13, 1981 at which Consumers Power made presentations concerning the Midland Project organization and the Midland Project Quality Assurance Program. In that meeting, Consumers Power made a commitment to provide additional written information on the Midland Project Quality Assurance Program. In partial fulfillment of that commitment, this letter transmits an "Executive Summary" entitled "Midland Project Quality Assurance Program Update." The appendices referenced in the Executive Summary will be transmitted under separate cover. It is anticipated that they will be transmitted by May 22, 1981.

James W. Cook

JWC/WRB/mo

Enclosure 1 Midland Project Quality Assurance Program Update, Executive Summary, dated April 1981.

CC JWGilray, NRR, Quality Assurance Branch
RJCook, USNRC Resident Inspector, Midland Nuclear Plant (1)

oc0481-0312a102

BCC JLBacon, M-1085A
WRBird, P-14-418A
JEBrunner, P-24-513
MADietrich, Midland-QA
WDGreenwell, Bechtel-QA
GSKeeley, P-14-113B
BWMarguglio, JSC-220A
DBMiller, Midland
MIMiller, IL&B
JARutgers, Bechtel
DMTurnbull, Midland-QA

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MIDLAND PROJECT

QUALITY ASSURANCE PROGRAM

UPDATE

Executive Summary

1.0 PURPOSE

During a meeting with the NRC in Glen Ellyn, Illinois on March 13, 1981, Consumers Power Company (CP Co) made a presentation in which certain improvements to the Midland Quality Assurance Program were described. This Midland Project Quality Assurance Program Update provides a summary of the aforementioned presentation and addresses topics previously identified in joint NRC/CP Co management meetings.

2.0 SCOPE

Each improvement to the Quality Assurance Program is presented with the following information: the background leading to the improvement; a description of the improvement; and future benefits expected from the implementation of the improvement.

Following is a list of the titles of specific Quality Assurance Program improvements. The improvement titles are grouped according to the most applicable criterion of Appendix B, 10 CFR 50. The list also cites the section of this Update in which a description of the improvement is given.

Applicable 10 CFR 50 Appendix B Criterion	Quality Assurance Program Improvement	Section In Which The Improvement Is Described
I. Organization	CP Co Quality Assurance Department (QAD)	3.1
	CP Co Midland Project Office	3.2
	Midland Project Quality Assurance Department (MPQAD)	3.3
	Onsite Project Engineering	3.4
II. QA Program	CP Co Interdepartmental QA Program Procedures	3.5
	CP Co QAD/MPQAD Departmental Procedures	3.6
	Quality Tracking and Statusing	3.7

Applicable 10 CFR 50 Appendix B Criterion		Quality Assurance Program Improvement	Section In Which The Improvement Is Described
		Supplier Deviation Disposition Requests	3.8
		Field Purchase Orders	3.9
		New Reg Guide Implementation	3.10
III.	Design Control	Equipment Qualification Rereview	3.11
		Specificity Reviews	3.12
VII.	Control of Purchased Material, Equipment and Services	Procurement Supplier Quality	3.13
		Quality Verification Documentation Rereview	3.14
		"Flags" Review	3.15
		CP Co Quality Assurance for New Work	3.16
IX.	Control of Special Process	Control of Cable Pulling	3.17
X.	Inspection	Inspection	3.18
XVI.	Corrective Action	Quality Trend Analysis	3.19
XVIII.	Audits	Audits	3.20

The improvements to the Program are addressed in the following sections at an executive summary level. The appendices provide a more detailed description of each improvement and sometimes also provide supporting exhibits which constitute objective evidence of the implementation of the improvement.

3.0 IMPROVEMENTS

3.1 CP CO QUALITY ASSURANCE DEPARTMENT

In 1976, CP Co management established a goal to enlarge and strengthen its Quality Assurance Department (QAD) and increase the Company's direct involvement in quality assurance for the Midland Project. Several organizational changes were implemented to achieve this goal.

A new Director of the CP Co QAD (Projects, Engineering and Construction) was hired in January 1977 as the result of a national search for an experienced quality assurance professional. Soon afterward, an analysis of the existing QAD organization resulted in an internal reorganization and the addition of several external personnel, the net effect having been a significant increase in the professionalism of the QAD.

The new QA Director reorganized the QAD in 1977 with two Section Heads reporting to him for Midland quality assurance activities. One Section Head was located at the site and was responsible primarily for hardware inspection, examination and test verification (IE&TV); the other Section Head was located in the General Office and was responsible primarily for quality assurance engineering (QAE). This reorganization resulted in direct contact between the QA Director and IE&TV Section Head, thus enabling the QA Director's closer involvement with the site, greater ease of escalating and resolving site quality problems and greater ease of communicating quality improvements to the site. An individual with both quality assurance and nuclear design experience was assigned as QAE Section Head and was directly involved in evaluating the adequacy of proposed resolution of quality problems and in the quality aspects of the design phase of the project.

A separate section for quality audits was established, also reporting to the QA Director.

Along with the reorganization of the QAD came a large increase in the size of the QAD's staff assigned to the Midland Project. The number of CP Co quality assurance professionals increased from 9 to 22 in 1977 and further increased to 26 by 1979. These increases enabled more concentrated and expanded CP Co overinspection of the site work and increased CP Co's involvement in preventive and corrective actions.

These improvements remained in effect when the present Midland Project Quality Assurance Department was organized in 1980. (See Section 3.3.)

3.2 CP CO MIDLAND PROJECT OFFICE

In March 1980, the CP Co Midland Project Office was developed and implemented to increase CP Co's involvement and control of the Project, to make the Project organization as self-sufficient as possible within CP Co and to provide impetus to the resolution and closure of open items and project decision-making needs in general.

The CP Co Project Office is headed by a Vice President assisted by the Project Manager. These two individuals directly supervise all phases of the conduct of the project. Reporting to the Project Office are six Department Managers who have responsibility for safety and licensing, design production, administration, quality assurance, site operations (construction and operations) and cost and schedule. These departments are staffed with personnel who have extensive nuclear project experience and proven track records.

In addition, the size of the CP Co Midland Project staff has steadily increased to help to assure the attainment of the objectives noted above. Appendix A provides a summary description of the current Midland Project organization.

Correspondingly, the Bechtel project organization has been strengthened by the addition of several key persons to support the Bechtel Project Manager and has been restructured to directly interface with the CP Co organization. Appendix B provides more information on this improvement.

Overall, the entire Midland Project team has been expanded and strengthened. There is increased CP Co and Bechtel awareness and emphasis on quality. The remaining items described in this update are examples of this emphasis that has been evolving over the past several years in both program content and in selection of personnel for the leadership roles on the project.

3.3 MIDLAND PROJECT QUALITY ASSURANCE DEPARTMENT

As part of the March 1980 CP Co reorganization, the Midland Project Quality Assurance Department (MPQAD) was also formed. The MPQAD Manager reports, in his line operating role to the CP Co Vice President in charge of the Midland Project Office. He receives QA policy direction from the Director of Environmental Services and Quality Assurance (ES&QA), who sets all the Company's quality assurance policy for projects, engineering and construction activities. Midland quality policies and procedures are approved by the Director of ES&QA prior to their implementation. MPQAD consists of all of the CP Co QA resources, formerly contained in the QAD, who were directly charged with implementing the Midland QA program. Currently, the MPQAD staff totals 46, including 15 Bechtel personnel as described in the following paragraph.

On August 15, 1980, as another step in the reorganization, the Bechtel Project Quality Assurance organization was integrated into the MPQAD. This was a positive step toward meeting the overall goal of increasing CP Co's control of the Project. This also provided single-point accountability for the implementation of the Project Quality Assurance Program and improved the utilization of all the available quality assurance resources in meeting the commitments of both the CP Co and Bechtel Topical Reports. Appropriate changes to the Project Quality Assurance Program were implemented concurrent with the integration of the Bechtel Midland Quality Assurance Organization into the MPQAD. In most cases, CP Co employees hold the supervisory positions reporting to the MPQAD Manager, who is also a CP Co employee. Direct communication between MPQAD and other departments within either CP Co or Bechtel is assured by established organizational interfaces. Appendix C provides a detailed description of the MPQAD, including the special role of the Bechtel Project Quality Assurance Engineer.

As a result of the integration, the MPQAD is in a "primary" rather than "overview" role. This results in MPQAD's more timely and complete involvement in both preventive and corrective activities.

The singular quality assurance entity (MPQAD) has had the effect of promoting Project interests.

3.4 ONSITE PROJECT ENGINEERING

Another organizational improvement in the quality effort not normally associated with the quality assurance program is the utilization of a large project engineering group located at the site. Onsite (resident) Engineers initially were assigned to the Midland site in 1976 to enhance the coordination between Project Engineering (Home Office) and Construction (Site). In 1979, a separate group of Onsite Engineers was assigned to the site to perform design activities.

The Onsite Project Engineers performing the coordination activity help to assure the understanding of design documents; expedite the correction of design and construction problems; expedite the processing for Field Change Requests, Field Change Notices, Design Change Notices and Nonconformance Reports; and approve construction activities, as required. Since 1976, the number of Onsite Engineers performing this activity has increased to 40. An Onsite Quality Engineer also was assigned to the group in 1979.

Currently, approximately 170 additional Onsite Engineers perform certain design activities which are best performed with a continuing knowledge of construction progress. This onsite design minimizes design interference and discipline interface problems, while simultaneously affording greater construction flexibility.

Appendix D provides a detailed description of Onsite Engineering activities.

3.5 CP CO INTERDEPARTMENTAL QA PROGRAM PROCEDURES

New CP Co interdepartmental Quality Assurance Program Procedures (Volume II Procedures) were prepared by a Management Task Force in 1979 to cover new requirements, to provide flexibility for our primary involvement, to improve technical content and to improve interface definition within CP Co. New areas covered were Definitions; Turnover to Projects, Engineering and Construction; Manufacturer's Notices; and Stop Work Orders. Later, additional Procedures were prepared to cover Turnover from Projects, Engineering and Construction to Nuclear Operations and Safety Concerns and Reportability Evaluation. Improved specificity of requirements and interfaces and improved flexibility for CP Co Quality Assurance participation on either a primary or overview basis were provided in these Procedures. The management participation in the Task Force strengthened the already strong quality assurance understanding and attitude on the Midland Project.

3.6 CP CO QAD/MPQAD DEPARTMENTAL PROCEDURES

A complete revision to the CP Co Quality Assurance Department Procedures was made during 1979 to be consistent with and to supplement the Volume II Procedures described in Section 3.5, and

tc provide technical improvements, greater procedural specificity, and added opportunity for CP Co Quality Assurance involvement in and control of site quality. Twenty-eight of the Procedures were revised from existing documents and thirteen Procedures were new. When MPQAD was formed in 1980, these Procedures formed the basis for the MPQAD Procedures. Appendix E provides a list of the subjects of these MPQAD Procedures.

3.7 QUALITY TRACKING AND STATUSING

A computerized tracking system was implemented to provide management with a tool giving visibility to and accountability for the open quality-related action items (this being necessary to assure a disciplined approach to the completion of these items). For each action item entered, the system identifies the organization responsible for the action, the schedule for completion of the action, the status of the action, and the MPQAD staff member who is responsible for follow-up to assure completion of the action and closure of the item.

The Bechtel Quality Assurance organization implemented this system in the last quarter of 1979, but the system is now being administered by the MPQAD. The system has been improved to provide more specificity regarding the types and levels of actions being tracked. Further improvement is being made to provide management with a prioritized, truncated list of actions for each responsible organization.

The tracking system enables management attention to be focused on the most significant actions and on the total number of actions for which each organization is responsible. As a result, the number of old outstanding actions has decreased markedly, while the total number of outstanding actions has increased due to the system being made more comprehensive as noted earlier.

Appendix F provides a detailed descripton of the strategy and goals of the action item tracking system, the results achieved up through November 1980, and examples of instructions and reports provided by the system.

The Project's management team is also placing continued emphasis on reducing the number of all types of open quality indicators (ie, various types of nonconformances, as distinguished from the quality action items discussed above.) To facilitate this emphasis, another system was implemented in the last quarter of 1979 to measure the level and aging of the open quality indicators. Using this system, management has reduced the average age of open indicators and significantly reduced the number of open indicators. In the period of November 1979 to January 1981, the number of open Bechtel nonconformance and deviation reports was reduced by almost two-thirds. Appendix G shows this graphically.

A parallel effort has reduced the number of open and outstanding Quality Control Inspection Records (QCIRs). In the 14-month period ending January 1980, such QCIRs were reduced from over 22,000 to less than 16,000, representing an improvement in the packaging of

the inspections and in the timeliness of their completion. The total number of closed QCIRs, representing completed and accepted work, is over 70,000.

3.8 SUPPLIER DEVIATION DISPOSITION REQUESTS

MPQAD performs an in-line review of Bechtel's Nonconformance Reports to assure the adequacy of the dispositioning and closure process. Consistent with this, since August 1980, MPQAD has been reviewing and approving the disposition and closure process for Supplier Deviation Disposition Requests (SDDRs) on an in-line basis. Previous to this, approval was required of only the Bechtel Engineering and Procurement organizations with "information only" copies provided to the Bechtel and CP Co Quality Assurance organizations.

The MPQAD in-line review provides a timely assessment of the discipline applied to the dispositioning process. In addition, the review provides direct feedback to MPQAD as to a given supplier's ability to achieve requirements. The final benefit is that it provides an opportunity for MPQAD to assess and enhance, as necessary, the quality requirements for future orders and to eliminate the root causes of SDDRs.

3.9 FIELD PURCHASE ORDERS

Historically, Bechtel's Quality Control organization had been reviewing and approving Field Purchase Orders (POs), primarily to assure that the design and quality criteria previously established by Project Engineering were translated accurately into the POs. In September 1980, MPQAD replaced Bechtel's Quality Control as the reviewer of field POs. (This responsibility change is consistent with MPQAD's review and approval of POs originated at Ann Arbor.) The scope and purpose of the MPQAD review is broader than the Bechtel Quality Control review. MPQAD also assures the technical adequacy of the PO quality assurance requirements, adjusting them as appropriate, to fit current conditions.

3.10 NEW REG GUIDE IMPLEMENTATION

In November 1976, Bechtel Quality Assurance Program for the Midland Project was revised to voluntarily commit the Project to the below listed ANSI Standards and Regulatory Guides (only those marked with an asterisk being a carry over from the PSAR).

ANSI Standard	Regulatory Guide-Revision Date
*N45.2-1971 "Quality Assurance Program Requirements for Nuclear Facilities"	1.28 - June 7, 1972
N45.2.4-1972 "Installation, Inspection and Testing Requirements for Instrumentation and	1.30 - August 11, 1972

Electric Equipment During the Construction of Nuclear Power Generating Stations"	
N45.2.1-1972 "Cleaning of Fluid Systems and Associated Components During the Construction Phase of Nuclear Power Plants"	1.37 - March 16, 1973
N45.2.2-1972 "Packaging, Shipping, Receiving, Storage and Handling of Items for Nuclear Power Plants During the Construction Phase	1.38 - March 16, 1973
N45.2.3-1973 "Housekeeping During the Construction Phase of Nuclear Power Plants	1.39 - March 16, 1973
N101.4-1972 "Quality Assurance for Protective Coatings Applied to Nuclear Facilities	1.54 - June 1973
N/A	1.55 - June 1973
N45.2.6-1973 "Qualifications of Inspection, Examination and Testing Personnel for Nuclear Power Plants"	1.58 - August 1973
N45.2.11-1974 "Quality Assurance Requirements for the Design of Nuclear Power Plants.	1.64 - Rev. 1, Feb. 1973
N45.2.10-1973 "Quality Assurance Terms and Definitions"	74 - February 1974
N45.2.9-1974 "Requirements for Collection, Storage and Maintenance of Quality Assurance Records for Nuclear Power Plants"	1.88 - August 1974
N45.2.5-1974 "Supplementary Quality Assurance Requirements	1.94 - April 1975

for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants"	
N45.2.8-Draft 3, Rev 4 "Supplementary Quality Assurance Requirements for Installation, Inspection and Testing of Mechanical Equipment and Systems for the Construction Phase of Nuclear Power Plants."	N/A
N45.2.12-Draft 4, Rev 1 "Requirements for Auditing of Quality Assurance Programs for Nuclear Power Plants"	N/A
N45.2.13-Draft 3, Rev 3 "Quality Assurance requirements for Control of Procurement of Items and Services for Nuclear Power Plants"	N/A

Examples of implementing procedures that were either originated or revised in response to these QA Program improvements were:

MED 2.13	"Project Engineering Team Organization Responsibilities"
EDPI 4.55.1	"Project Material Requisitions, Midland Project"
FPG-4.00	"Storage and Storage Maintenance of Equipment and Materials"
FPG-7.000	"Housekeeping and Cleanliness Control During Construction"
PSP-G-7.1	"Documentation, Records and Correspondence Control"

3.11 EQUIPMENT QUALIFICATION REREVIEW

The equipment qualification rereview was initiated to assure that equipment qualification tests are consistent with FSAR commitments. The need for the rereview was identified as a result of two initial actions that were taken concurrently - the issuance of a Problem Alert by Bechtel's San Francisco Power Division and the completion of a special review of the qualification of selected cable by CP Co's Quality Assurance Engineering Section.

All equipment requiring qualification are being rereviewed. For each equipment, the rereview encompasses a comparison of FSAR requirements, IEEE Standard requirements, and procurement specification requirements to assure their consistency and adequacy. That completed, a comparison is then made between those requirements and the actual test procedures and test reports provided by the equipment suppliers. CP Co issued a 50.55(e) Report based on the initial rereview results. This report contributed substantially to alert industry of the generic problem of qualification inconsistencies and inadequacies. The 50.55(e) Report and the Corrective Action Program preceded by three months the NRC Bulletin (79-01) which required a review of equipment qualification documentation nearly identical to what was being performed for the Midland Project.

The Bechtel Engineering Department Procedures have been improved and specific training has been provided to Engineering and Quality Engineering personnel to help preclude equipment qualification problems for new purchases. The systematic, proceduralized rereview activity is coupled with the statusing and tracking of open corrective action items. Corrective action documentation is also provided as auditable assurance of the qualification of Midland equipment. To date, Foxboro transmitters purchased under Specification 7220-J-204 have been the only hardware items judged unqualifiable.

Appendix H provides a detailed description of the equipment qualification rereview.

3.12 SPECIFICITY REVIEWS

In 1977, CP Co's Quality Assurance Engineering Section initiated a review of specifications to determine the need for their increased specificity, clarity of references to codes and standards, and clarity of wording, supportive of construction and inspection activities. Forty-nine design specifications for fabrication and installation were reviewed. The 49 specifications represented all the active field-oriented specifications; active being defined as significant remaining work to be accomplished to these specifications.

This review and the Bechtel disposition of Quality Assurance Engineering's comments resulted in the revision of 12 specifications for tolerancing and wording improvements; through the comment resolution process, an increased design personnel awareness of the need for specificity in the preparation of future design documents; and an increased confidence in the understandability of the existing design specifications for construction.

Also in 1977, the CP Co Quality Assurance Engineering Section undertook a review of the dimensional tolerances for a portion of the Reactor Building Spray System (RBSS) while Bechtel's Engineering Department conducted a parallel review. The object of the parallel reviews was to enable independent assessments and then to combine the results for resolution. The purpose of the reviews was to provide confidence that the drawings and specifications contain

the specificity necessary for successful installation and inspection. Forty design documents were reviewed, including drawings for the RBSS installation (typical of drawings for other safety-related installations) and specifications generic to the installation of all safety-related systems.

This review confirmed that dimensional toleranes were generally available to install safety-related systems. Improvements were made to seven generic design documents to clarify dimensional tolerances. Again, the review and comment resolution process increased Bechtel Engineering's awareness of the need for specificity and provided additional confidence that tolerance specificity would be incorporated in future design documents. Appendix I provides a more detailed discussion of the dimensional tolerance review.

In 1978, a review was conducted of 91 Bechtel Field Change Requests (FCRs) to assess whether Field and Design Engineering had been responsive to the need for specificity in design documents. This review verified that the specificity message was understood and was being addressed. Appendix J provides a more detailed description of the FCR review.

Specifications and drawings are subject to a continuing review through the overinspection process which from a hardware orientation viewpoint evaluates the installation and inspection processes required by the design documents. Adequacy of tolerancing and acceptance criteria is specifically addressed in the overinspection process. Revisions to specifications are subject to MPQAD review as well as the corresponding changes to the Bechtel quality control instructions.

3.13 PROCUREMENT SUPPLIER QUALITY

Over the life of the Midland Project, significant improvements have been made to the overall Bechtel Quality Assurance Program for procurement. Appendix K provides a detailed description of the Bechtel Power Corporation Procurement Supplier Quality Department organization and activities, including special activities which were implemented specifically for the Midland Project. Three of the more significant programmatic improvements are discussed below.

Quality Assurance organizations are participating as part of the team to assess and qualify suppliers for the Midland Project. Supplier Quality Representatives are utilized as part of the team to qualify suppliers via the commodity audit at the time of the initial purchase and to perform subsequent supplier audits. (See Section 3.20.) The Bechtel Supplier Quality Group for the Midland Project utilizes the new Supplier Information System and Evaluated Supplier Listing, published by the San Francisco Power Division, as inputs to the establishment of specific procurement quality requirements. CP Co Quality Assurance personnel have performed supplier audits, or in conjunction with Bechtel Supplier Quality, have participated in supplier audits. It is a CP Co Quality Assurance Program commitment to do a minimum of 10 supplier audits each year for the Midland Project.

These improvements in supplier evaluations have provided increased confidence in a supplier's capability to understand and meet procurement requirements and have resulted in improved technical capability of the audit teams.

As a means of facilitating the identification of significant characteristics for inspecting, the Supplier Quality Department has been participating, along with Quality Engineering and Quality Assurance (now MPQAD), in reviewing procurement specifications and in preparing Procurement Inspection Plans. An MPQAD contractual clause was originated and implemented and a Bechtel procedure was revised to require that applicable inspection witness and hold points be specified in suppliers' inspection planning documents. These improvements have resulted in increased assurance that the requirements are understood by the suppliers and inspection agencies.

Quality program verification, which is a form of a mini-audit, has been implemented on the Midland Project to provide a more timely assurance that a supplier's quality assurance program is being effectively implemented. (Again, see Section 3.20.) Project Engineering, in conjunction with Quality Assurance (now MPQAD), provide the direction for the specific program implementation verifications which are made by Bechtel Supplier Quality Representatives. The net result is improved timeliness of verification (progressive) to supplement annual audits. Another benefit is that the Supplier Quality Representatives' capabilities have been improved through their training and participation in program evaluation (as contrasted to their being limited to performing only inspection).

3.14 QUALITY VERIFICATION DOCUMENTATION

In February 1978, CP Co Quality Assurance engaged Science Applications Incorporated to perform an audit of the B&W (NSSS supplier) quality verification documentation. The results of this audit indicated that a complete rereview of this documentation was necessary, and in conjunction with B&W, CP Co Quality Assurance established the requirements by which to accomplish the rereview. This rereview has been completed, the discrepancies have been dispositioned and corrected, as necessary, and the effectiveness of the process has been verified through additional audits and summary reviews by MPQAD of all quality verification documentation. Confidence has been established that the documentation supports hardware quality and is ready for turnover to CP Co.

In 1979, a rereview was started of supplier-originated, quality verification documents for Bechtel-procured items. The purpose of the rereview was to provide additional assurance of hardware quality by assuring the adequacy of the supplier quality verification documentation - adequacy with respect to documentation availability, traceability, legibility, and technical content. Supplier quality verification documenation received since July 1978 is subject to a 100% review for adequacy, but documentation received prior to that time is subject to the rereview on a systematic sampling basis. When the adequacy of a supplier's

quality verification documentation is judged to be "indeterminant" from the sampling, 100% of that supplier's quality verification documentation is subjected to the rereview. All discrepancies are dispositioned and corrected, as necessary. At the end of February 1981, the rereview was approximately 64% complete with 2,050 purchase order packages dispositioned by the Material Review Board. Appendix L provides a more detailed discussion of this documentation rereview.

3.15 "FLAGS" REVIEW

The purpose of the "flags" review is to identify "flags" which may indicate possible product quality concerns in the procurement packages and associated documentation. A "flag" is an adverse condition for which the available documentation does not provide evidence of adequate disposition and/or resolution of the condition. The "flags" review was developed in response to the problems encountered with the Unit 1 reactor vessel anchor bolts.

Procedures require the "flags" review to be accomplished on a disciplined basis by experienced Quality personnel who have been trained specifically for this task. The scope of the review includes Field POs for which the procurement was made without source inspection and Field and Ann Arbor POs which, on a judgmental basis, were considered to have higher probability of containing a "flag."

At the end of February 1981, the review is just starting to complete a significant fraction of the planned investigation. Twenty "flags" had been identified which require further resolution and disposition although no serious hardware concern has been positively identified. The resolution of the "flags" provides greater confidence in the quality of the procured materials and items.

Appendix M provides a more complete description of the "flags" review, including the procedures and examples of the results of the review process.

3.16 CP CO QUALITY ASSURANCE FOR NEW WORK

Selected major procurements were processed through the CP Co Quality Assurance Program rather than the Bechtel Quality Assurance Program in order to provide CP Co with direct control of new work.

For the NSSS erection and preservice examination procurements, the CP Co Quality Assurance Department was established as the "primary" Quality Assurance organization rather than an "overview" organization. These jobs are each more than 50% complete. For these jobs, both the execution of the Quality Assurance Program and the suppliers' performance are considered above average based on the low number and lack of significance of the noncompliances. It is anticipated that additional future site work will also be executed wholly utilizing the CP Co Quality Assurance Program.

3.17 CONTROL OF CABLE PULLING

To avoid damage to electrical cables during installation (pulling), a computer program for cable pulling force calculations was used as a control mechanism. Based on Field Engineering and Quality Control inputs, among others, this program computes the anticipated pull forces based on field conditions before the actual pulling occurs. The program considers the frictional forces imparted where one or more bends are involved. Appendix N provides the methodology and equations necessary to develop this computation. Appendix N also provides an actual computer printout and schematic drawing for an actual cable run.

Construction and quality utilizes the output from this program. The results are used in an assessment of quality attributes by Quality Control personnel prior to every Class 1E pull.

Success has been achieved in adhering to allowable pulling tensions. This is evidenced by the absence of CP Co Nonconformance Reports and NRC concerns relative to this activity.

3.18 INSPECTION

Improvements in this area were made by refining the requirements for both CP Co and Bechtel inspector qualification, instituting and increasing the CP Co overinspection activity and refining the Bechtel Project Quality Control Instructions (PQCIs).

MPQAD personnel who perform inspection and Bechtel Quality Control inspection personnel are certified to requirements which exceed the ANSI N45.2.6 requirements. ANSI N45.2.6 requires only that inspectors be certified on a discipline-by-discipline basis (eg, civil, electrical) whereas MPQAD Level II personnel are certified to each specific Inspection Plan that is used on a repetitive basis and Bechtel Level I and II personnel are certified to individual PQCIs. The Ann Arbor Power Division uses discipline-certified Level III personnel for training and certification. These improvements in assuring the qualifications of inspection personnel have increased inspection effectiveness. Appendices O and P provide further details of these improvements.

Requirements for the certification of MPQAD nondestructive examination (NDE) personnel meet or exceed SNT-TC-1A criteria as well as ASME Section III and XI criteria for training, experience and visual acuity.

The CP Co overinspection activity was implemented to provide a measure of the supplier's "primary" inspection effectiveness and to provide increased confidence in the quality of the hardware.

Reinforcing steel and embed overinspection commenced in 1976 and 1977. The overinspection activity was expanded in 1979 to cover all discipline activities at the site. The overinspection activity is performed such as to place frontend emphasis on new work and potential problem areas. Appendix P provides the details of the overinspection activities.

A special plan was implemented for overinspecting Bechtel on-site radiography (RT) on a sampling basis and for overinspecting the NSSS erection RT on a 100% basis. A review program for vendor radiography is also being utilized. Appendix Q provides the details of the RT overinspection.

In 1980, 223 mechanical, 102 civil, 151 electrical and 116 welding/NDE (excluding RT) overinspections were conducted. Each of these overinspections corresponds to a work package involving numerous characteristics and may cover several Bechtel Quality Control Inspection Records (QCIRs). When there is a sample size of a thousand or more and the lot size is at least ten times the sample size, then the percentage of defects found in the sample closely approaches the percentage of defects that exists in the lot as a whole. The number of overinspections being conducted along with the many individual characteristics each looks at when compared to the number of primary inspections and the corresponding multitude of characteristics fit the large sample/lot criteria. The number of individual deficient characteristics found compared to the total number of characteristics looked at during overinspection substantitiates a general conclusion that the completed construction which has been accepted by the primary inspection agency is in conformance to the design documents.

The overinspection activity provides a timely identification of nonconforming conditions and corrective action in both the construction and inspection processes. Overinspections are scheduled to provide a close review of new activities and any areas where problems have been experienced. This additional inspection layer provides an increase in hardware quality through the identification and correction of specific nonconformances and process corrective action and through the verification of the overall inspection effectiveness of the primary inspection agencies.

Bechtel PQCIs were also improved to assure that characteristics important to safety are inspected and to provide increased accountability for the required inspections.

Fifty-four PQCIs active in 1977 were reviewed for specificity by the CP Co Quality Assurance Department. The resulting improvements involved providing clarification of the inspection code callout (Visual, Measure and V&M) - ie, the method of inspection to be used; providing additional detail and clarified instructions by including the "inspection method" in the Instruction document (ie, the PQCI) rather than in the record document; assuring that important characteristics were covered; providing greater specificity as to the meaning of the "surveillance" (S) and "review" (R) inspection techniques; and revising the PQCIs to eliminate the use of "surveillance" in any final inspection activity. Currently "surveillance" is being replaced with witness or hold points as the Bechtel in-process inspection technique.

3.19 QUALITY TREND ANALYSIS

Trend analysis gives visibility to nonconformances in a given area which are increasing in number or which are remaining at an undersirable high level. It also provides an impetus to the timely correction of the root causes of these nonconformances. Appendix R provides a history of the improvements in trend analysis since its initial implementation in 1974.

Currently quality indicators are categorized by 15 performance areas and by 4 nonconformance or deficiency codes. There are separate performance areas for site subcontractors (eg, Zack and B&W). For each performance area, Nonconformance Reports, Quality Audit Findings, Deficiency Reports, Quality Action Requests and NRC Items of Noncompliance are entered into one of the four deficiency codes. Totals are obtained by area and by code and reviewed by MPQAD with special emphasis on detecting indications of any specific process being out of control, and with special emphasis, as well, on detecting gross patterns across all areas and codes. Both a micro and macro approach are utilized for the analysis of the data.

The MPQAD Manager is required to make and document a specific review of each Monthly Trend Report. If the trend data for a given month exceeds the 4-month trailing average for a specific area, an assessment is required of the need to stop work in that area. The Monthly Trend Report is distributed to the Project's management team.

The present improved trend program is responsive to the need to have a management system which identifies adverse quality trends.

3.20 AUDITS

The Midland Project audit activities cover five areas: Bechtel's audits of its suppliers; Bechtel's monitoring of its own activities; Bechtel's management audits; MPQAD's audits and CP Co's "corporate" audits. There have been improvements in all of these areas. The improvements in Bechtel's audits of its suppliers were described earlier in Section 3.13. The improvements in the other four areas are described below.

Bechtel's Quality Assurance monitoring activities began in August 1977 to provide more timely and less formal assessment of procedural adequacy and implementation of repetitive design, construction, and inspection activities. The monitoring activities utilize basic audit elements such as planning, checklists, auditor qualification, reported results, and a closed-loop system for obtaining corrective action. The monitoring activities complement the formal audit and overinspection activities. Since there are more monitoring activities than formal audit activities accomplished in a given period, monitoring supplements the confidence gained through audit in the activities affecting quality. Appendix S provides a detailed description of the monitoring activities.

The need to increase the frequency of Bechtel's management audits was recognized. The frequency of these audits for the Midland

Project has been increased from once to twice a year. The scope of the management audits is shifting to include auditing for technical compliance as well as for programmatic compliance. To achieve this, the programmatic requirements checklists have been supplemented with checklists for technical requirements relating to calculations, design documents and hardware. In addition, technical specialists are included on the audit teams. Appendix T provides additional details pertaining to the management audit activities.

Both the MPQAD and CP Co "corporate" audit activities were improved by formal qualification and certification of auditors and lead auditors to ANSI N45.2.23 requirements (with the one exception of not requiring a fixed number of audits per year). These audit activities provide an assessment of the adequacy of the Quality Assurance Program, as well as its implementation and cover all phases of the Project from design through preoperational testing and final turnover to Operations.

4.0 CONCLUSION

The Quality Assurance Program improvements summarized above demonstrate the high level of effort in the Midland Project to comply with the requirements of 10 CFR 50, Appendix B; national nuclear quality assurance standards; and corresponding NRC Regulatory Guides. These improvements also demonstrate CP Co management's willingness to make large up-front investments for quality assurance; willingness to accept changes in the Quality Assurance Program; willingnesss to be kept informed about quality assurance; to make timely decisions on quality assurance matters; to promote quality assurance throughout the organization and, very importantly, willingness to interact responsibly with the NRC - all excellent indicators of CP Co management's positive attitude about quality assurance for the Midland Project.

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