PROJECT QUALITY ASSURANCE PLAN FOR MIDLAND INDEPENDENT DESIGN CONSTRUCTION AND VERIFICATION PROGRAM CONSUMERS POWER COMPANY PROJECT 3201

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Midland IDCV Program
PQAP

DOCUMENT REVISION RECORD

REV	DATE	DESCRIPTION OF CHANGES
1	1/17/83	Changes made reflect omission of required graphics - no substantive changes in content. Affected pages: PQAP - pg. 19; PI Document Control Cover Sheet - pg. 3; PI - Engineering Eval. Prep. and Control - pg. 3.
2	2/15/83	Pages 12a, 13, 14a: designation of personnel who may potentially participate in the project and their functional areas of expertise.
		Appendix A, ECP-5.2, and 5.2QA, "Calculation Preparation and Control" and "Audit Checklist...", updated to include corporate revision. Includes reformatting, further detail and additional attachments.
		Appendix C, Resumes: addition of resumes for personnel who may potentially participate in the project.
3	5/2/83	General Revision: Major areas of change include Personnel Qualifications and improvements to Administrative Control Procedures. General clarification is found throughout.
4	7/15/83	Changes made reflect updated project organization, improvements to Administrative Control Procedures and the initial issuance of PI-3201-006 and PI-3201-007.

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FIGURE 1: PROJECT ORGANIZATION CHART

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C. PERSONNEL QUALIFICATION CONTROL REGISTER
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APPENDICES

A. ENGINEERING CONTROL PROCEDURES

ECP-5.2	"Calculation Preparation and Control"
ECP-5.2QA	"Audit Checklist for Calculation Preparation and Control"
ECP-5.3	"Drawing Preparation and Control"
ECP-5.3QA	"Audit Checklist for Drawing Preparation and Control"
ECP-5.5	"Project QA Plan Preparation and Control"
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ECP-5.15	"Corrective Action Procedure"

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B. PROJECT INSTRUCTIONS

PI-3201-001	"Engineering Evaluation Preparation and Control"
PI-3201-001QA	"Audit Checklist for Engineering Evaluation Preparation and Control"
PI-3201-002	"Document Control Cover Sheet"
PI-3201-002QA	"Audit Checklist for Document Control Cover Sheet"
PI-3201-005	"Documentation of Observations"
PI-3201-006	"Use of Design Verification Checklists"
PI-3201-007	"Use of Construction Verification Checklists"
PI-3201-008	"Preparation of Open, Confirmed and Resolved Item Reports, Finding Reports and Finding Resolution Reports"
PI-3201-009	"Engineering Program Plan"
PI-3201-010	"External Communications, Protocol and the Preparation of Contact Log Sheets"
PI-3201-012	"Scope Change Requests, Midland IDCV"

C. RESUMES

1. GENERAL

1.1 Purpose

The Project Quality Assurance Plan (PQAP) establishes, describes, and defines the documented, auditable, control measures to be implemented to ensure accurate engineering evaluations, correct calculational procedure and analysis, and correct data application to the Midland Independent Design and Construction Verification Program (IDCV) for Consumers Power Company (CPC).

1.2 Scope

Quality Assurance (QA) requirements shall be applied to engineering design and construction evaluations, analyses, computer analyses, calculation preparation, documentation and the development of findings and final reports. The specific activities to which the PQAP applies and the method of program application are as follows.

1.2.1 Engineering Evaluations

Engineering evaluations are the principal means of documenting the IDCV review process and the bases for its conclusions. Engineering evaluations required for project review activities associated with design and construction verification shall be controlled by Project Instruction PI-3201-001. They shall be performed by technically

qualified individuals, and will be reviewed by an individual having qualifications at least sufficient to perform the evaluation. Where calculations are required to be performed to support the engineering evaluation, these shall be controlled in accordance with Section 1.2.3.

Engineering evaluations shall be maintained in files at the Bethesda, Maryland offices of TERA for the duration of the project.

1.2.2 Document and Report Preparation

Documents such as Monthly Status Reports, Draft and Final Interim Technical Reports, Draft and Final Reports that are prepared in the course of this project shall be controlled in accordance with Project Instruction PI-3201-002 through the use of Document Control Cover Sheets. Documents such as Open, Confirmed and Resolved (OCR) Item Reports, Finding Reports and Finding Resolution Reports that are prepared in the course of the project shall be controlled in accordance with Project Instruction PI-3201-008. These documents shall be prepared by technically qualified individuals and shall be reviewed by another individual familiar with the project. This review may be performed by the Project Manager.

Documents and reports prepared during this project shall be maintained in files at the Bethesda, Maryland offices of TERA for the duration of the project.

1.2.3 Calculations, Analyses and Computer Analyses

(1) Final calculations, analyses and computer analyses that are performed for purposes of confirmatory evaluation of the Midland design or design bases shall be prepared and controlled in accordance with ECP-5.2, "Calculation Preparation and Control."

(2) Calculations shall be controlled through the use of calculation cover sheets as described in ECP-5.2.

(3) Final calculations shall be kept at the Bethesda, Maryland offices of TERA for the duration of the project.

1.2.4 Source/Reference Material

Source or reference material obtained from Consumers Power Company or other organizations used in performing the engineering evaluations, calculations, analyses, computer analyses or document preparation for this project shall be maintained in a file at the Bethesda, Maryland offices of TERA for the duration of the project. Control of this material shall be provided by use of file registers that list the information contained in that file, including date or revision. Source material for which TERA is on a revision distribution list, such as drawings and specifications, shall be controlled by use of registers which log the distribution of copies, or originals, of these documents.

1.3 Implementation

1.3.1 This Project Quality Assurance Plan is to be implemented, as applicable, by all individuals assigned responsibility for performance of technical, managerial, and administrative functions related to the quality assured activities identified previously.

1.3.2 Revisions are effective and shall be implemented within ten (10) working days of the date of issue of the revision. All activities are to be in compliance accordingly.

2. ORGANIZATION

2.1 Project Organization

Figure 1 provides the organizational chart for the project. Technical and administrative personnel (not shown) will receive assignments directly from the Project Manager (PM). The Project Manager will serve as the principal point of contact with Consumers Power Company. The Project Quality Assurance Engineers will report directly to the Executive Vice President. They will identify internal quality assurance deficiencies, work with the Project Manager in providing clarification relative to identified deficiencies and any recommendations made by them for resolution.

2.2 Authority and Responsibility

2.2.1 The Principal-in-Charge (PIC) is responsible for helping establish the general philosophy of review, setting forth guidance to the Project Manager and the Managers, Design and Construction Verification, assisting as an interface with the Senior Review Team (SRT) Chairman, NRC and Consumers Power Company and reviewing/concurring in reports issued to Consumers Power Company, NRC and other outside parties. 4

2.2.2 The Project Manager is responsible for overall planning and supervision of all in-house activities undertaken as required to fulfill the contract requirements. All documentation, correspondence, reports, calculations, etc., issued to Consumers Power Company, NRC and other outside parties are to be issued under his signature or otherwise receive his approval as required by the applicable Engineering Control Procedure or Project Instruction. The Project Manager is also responsible for overall planning and management of all outside activities performed by Associates and any subcontractors, but may delegate responsibility for supervision to other individuals within the project. Documentation may be issued to the associate or subcontractor under the signature of the designated individual.

2.2.3 The Chairman of the Senior Review Team (SRT) is responsible for the coordination and direction of SRT activities. He shall serve as an interface with the Project Manager (PM) to ensure resolution of SRT comments on Open, Confirmed and Resolved (OCR) Item Reports, Finding Reports, and Finding Resolution Reports before transmittal to the Principal-in-Charge (PIC) for approval. The SRT Chairman will document recommendations and comments arising from SRT review meetings to the PIC with copies to the PM and Lead Technical Reviewers.

2.2.4 The Senior Review Team (SRT) is responsible for the review of Open, Confirmed and Resolved (OCR) Item Reports as requested by the Principal-in-Charge (PIC), Findings and proposed Action Plans for resolution of Findings, as well as all Interim Technical Reports and Final Reports prior to issuance. They will also provide recommendations to resolve differing technical views which may arise among project team members. The SRT may at any time recommend to the PIC that the Project Manager expand the scope of review, provide clarification or reassess elements of the review. The SRT is also responsible for the review of monthly status reports, OCRs, as directed by the SRT Chairman, and any Draft Interim Technical Reports to maintain current technical awareness and assure a high level of technical quality.

2.2.5 The Lead Technical Reviewers (LTR) are responsible for implementation of all technical review activities within their discipline of review, including technical supervision of individuals on the project team and outside activities performed by Associates or subcontractors. The Independent Design Verification (IDV) LTRs report to the Managers of the Auxiliary Feedwater System (AFW) Review, the Standby Electric Power (SEP) System Review or the Control Room HVAC (CR-HVAC) Review. The Independent Construction Verification (ICV) LTRs report to either the Manager, Construction Verification or the Manager, Site Activities as shown on Figure I. The LTRs are responsible for the initial classification of OCRs and Findings, the preparation of Finding Reports and Finding Resolution Reports. 4

2.2.6 The Project Quality Assurance Engineer is responsible for verification of the implementation of the PQAP and will perform audits of applicable procedures and instructions implementation in accordance with Section 6.3 and ECP-5.6.

2.2.7 Lines of communication for identified deficiencies shall be in accordance with ECP 5.15, "Corrective Action Procedure."

2.2.8 The Managers of Design Verification and Construction Verification are responsible for overall planning, management and supervision of all activities within the IDV and ICV portions of the Midland IDCV respectively, and coordination 4

between each other to assure that IDV and ICV interfaces are adequately addressed. These individuals report directly to the Project Manager.

2.2.9 The Managers of the AFW, SEP and CR-HVAC Reviews are responsible for management and implementation of design review activities necessary to complete an integrated review of their respective systems, coordination of activities between LTRs under their supervision and coordination with the ICV program LTRs. These individuals report to the Manager, Design Verification.

2.2.10 The Manager, Site Activities is responsible for planning, management and supervision of all Midland site related activities and the Construction/Installation Documentation, Verification Activities and Verification of Physical Configuration categories of review. He reports directly to the Manager, Construction Verification.

3. PERSONNEL QUALIFICATIONS AND CONTROL

3.1 Management Personnel

3.1.1 Principal-in-Charge - John W. Beck

Mr. Beck has broad experience in operations, systems, engineering, environmental, and licensing areas of the nuclear power industry and has been selected by the Executive Vice

President to provide corporate overview of the project. He is an officer of TERA Corporation. A copy of his resume is presented in Appendix C and provides documentary evidence of his qualifications.

3.1.2 Project Manager - Howard A. Levin

Mr. Levin has broad experience in the areas of nuclear plant engineering and licensing as well as managing engineering projects. He has been selected by the Executive Vice President as Project Manager to manage and direct the implementation of the project. A copy of his resume is presented in Appendix C and provides documentary evidence of his qualifications.

3.1.3 Project Quality Assurance Engineer - Mark Polit

Mr. Polit is highly qualified in the area of nuclear power plant quality assurance and has been selected by the Executive Vice President as Project Quality Assurance Engineer for the project. A copy of his resume is presented in Appendix C and provides documentary evidence of his qualifications. 4

3.1.4 Management Personnel

The following personnel have been selected by the Project Manager based upon their unique technical and management

qualifications for the project. The following lists management personnel along with a short description of their areas of expertise. Copies of their resumes are presented in Appendix C providing documentary evidence of their qualifications.

Manager	Areas of Expertise
Frank Dougherty Manager, Design Verification	Nuclear power plant mechanical design, safety and reliability analysis, system design/criteria development
Donald Tulodieski Manager, Construction Verification	Project management/control, start-up testing, engineering analysis and design, licensing, plant reliability analysis
Martin Jones Manager, Site Activities	Nuclear power plant construction management, quality control, training, start-up, electrical engineering
Richard Snaider Manager, Auxiliary Feedwater System Review	Nuclear power plant operations, maintenance and design, systems engineering, licensing project management, mechanical engineering
Doug Witt Manager, Control Room HVAC System Review	Nuclear power plant systems and mechanical design, safety analysis, equipment design, licensing, HELBA, thermal-hydraulics
Gerald Setka Manager, Standby Electric Power System Review	Electrical engineering, nuclear power plant operations, design implementation, equipment qualification

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3.1.5 Senior Review Team

The Senior Review Team (SRT) has been selected by the Principal-in-Charge based upon their many years of experience in the nuclear industry, broad areas of personal knowledge, and specific nuclear design review expertise. The following lists the SRT members along with a short description of their areas of expertise. Copies of their resumes are presented in Appendix C providing documentary evidence of their qualifications.

SRT Member	Functional Areas of Expertise
Donald Davis	Nuclear safety and licensing, plant and reactor systems, thermal-hydraulic analysis, accident analysis
William J. Hall	Engineering analysis and design, structural engineering, structural mechanics and dynamics, soil mechanics, fracture mechanics, engineering criteria development for major projects
Robert Wilson	Nuclear power plant operations, engineering and design, licensing project management

3.1.6 Senior Review Team Chairman - Donald Davis

Mr. Davis has extensive experience in nuclear plant engineering and licensing and has been selected by the Principal-in-Charge for the project. He will coordinate and direct Senior Review Team activities.

3.1.7 The Managers, Design and Construction Verification are controlled and their performance evaluated under direct supervision of the Project Manager who provides input to the Principal-in-Charge for his review and concurrence. LTRs, the Managers of the AFW, SEP and CR-HVAC Reviews, and the Manager, Site Activities are controlled and their performance evaluated under the direct supervison of the Managers, Design or Construction Verification, respectively, who provide input to the Project Manager for his review and concurrence. 4

3.1.8 Management control is provided by the Executive Vice President, Robert W. Felton and Vice President, Larry H. Wight, through review of project reports, audit findings, and evaluations conducted in the normal course of business. Mr. Felton and Mr. Wight have extensive experience in the management of large-scale projects involving engineering, licensing and quality assurance. Their resumes are provided in Appendix C. 4

3.2 Project Personnel

3.2.1 Staff technical and administrative personnel are selected by the Project Manager or Managers, Design or Construction Verification as required, based on their qualifications and areas of expertise, to perform and/or coordinate the performance of activities undertaken in fulfillment of contract requirements. 4

3.2.2 The following lists the various TERA technical personnel that may participate in this project and the functional areas where each will provide input to the project. This listing shall in no way restrict the personnel used by TERA to complete this project. The Project Manager in consultation with the Managers, Design or Construction Verification may assign personnel in addition to those listed below; however, these other personnel must have qualifications that are adequate to the extent required for performing the specific task. 4

Technical Reviewer	Functional Areas of Expertise
Robert Cudlin	Nuclear safety and licensing, reactor safeguards, plant and containment systems, equipment qualification
Henry George	Quality assurance, training, nuclear plant systems procedures, project management

Technical Reviewer	Functional Areas of Expertise
Robert Snyder	Nuclear power plant design and construction, project management, start-up and operations
Michael Aycock	Nuclear power plant systems, operating procedures, licensing and project management
Christian Mortgat	Nuclear power plant structural/ mechanical design, engineering mechanics, earthquake engineering
Jorma Arros	Engineering mechanics
Kenneth Campbell	Soil mechanics, earthquake engineering
Norman Berube	Design and analysis of mechanical systems, thermal-hydraulics, heat transfer, engineering, analyses
Frederick Berthrong	Engineering project management, planning, scheduling and field engineering
Leonard Stout	Design, construction, start-up and operations project control, schedule and cost control systems
Susan Sly Burke	Civil/mechanical design and construction, installation and inspection

Technical Reviewer	Functional Areas of Expertise
Richard MacDonald	Engineering, construction, operation, maintenance and project management systems, nuclear plant start-up and operations
Sidney Brown	Engineering and construction management, cost and scheduling, quality control, field engineering
Douglas Witt	Nuclear power plant systems and mechanical design, safety analysis, equipment design, licensing, HELBA, thermal-hydraulics
Randy Cleland	Power plant mechanical design, piping/hanger design and construction, review and inspection of mechanical systems, construction supervision and management, results engineering
James Long	Engineering management, nuclear power plant safety and licensing
George Trigilio	Design and analysis of waste treatment systems, health physics, radiological engineering
Stephen Schreurs	Engineering analysis computational methods, ECCS evaluation, waste management, licensing

Technical Reviewer	Functional Areas of Expertise
Farzin Ramezanbeigi	Structural and mechanical engineering, usage and interpretation of structural/mechanical computer codes
Christian Nelson	Nuclear power plant operations, design, safety analysis, seismic design evaluation, inspection program development
Jim McIlvaine	Nuclear power plant design, licensing, mechanical engineering, waste management

3.2.3 Staff personnel are controlled and their performance evaluated under direct supervision of the LTRs and Manager, Site Activities who provide input to the Managers of the AFW, SEP or CR-HVAC System Reviews or the Manager, Construction Verification for their review and concurrence. 4

3.2.4 Lead Technical Reviewers

The Lead Technical Reviewers (LTR) have been selected based upon their unique technical qualifications for the project. The following lists the LTRs along with a short description of their areas of expertise. Copies of their resumes are presented in Appendix C, providing documentary evidence of their qualifications.

Lead Technical Reviewer	Functional Areas of Expertise
Joseph Martore AFW and CR-HVAC Structural Review	Nuclear power plant structural, mechanical design and construction, equipment qualification, operating reactor safety, licensing, project management
Richard Snaider AFW and SEP Mechanical and Systems Review	Nuclear power plant operations, maintenance and design, systems engineering, licensing project management, mechanical engineering
Lionel Bates Electrical Review	Nuclear power plant electrical, instrumentation and control systems design, equipment qualification, plant operations and maintenance
Doug Witt CR-HVAC Mechanical and Systems Review	Nuclear power plant systems and mechanical design, safety analysis, equipment design, licensing, HELBA, thermal-hydraulics
Christian Mortgat SEP Structural Review	Nuclear power plant structural/ mechanical design, engineering mechanics, earthquake engineering
Randy Cleland ICV Verification Activities	Power plant mechanical design, piping/hanger design and construction, review and inspection of mechanical systems, construction supervision and management, results engineering
Fred Pellerin ICV Construction/ Installation Documentation	Development, implementation, monitoring, supervision, and evaluation of quality assurance and quality control programs

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Lead Technical Reviewer	Functional Areas of Expertise
Martin Jones ICV Verification of Physical Configuration	Nuclear power plant construction management, quality control, training, start-up, electrical engineering
Robert Snyder ICV Storage and Maintenance Documentation	Nuclear power plant design and construction, project management, start-up and operations
Donald Tulodieski ICV Supplier Documentation	Project management/control, start-up testing, engineering analysis and design, licensing, plant reliability analysis

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3.3 Associates

3.3.1 Associates are selected by the Project Manager and Managers, Design or Construction Verification as required to perform activities requiring specific detailed, state-of-the-art knowledge of selected scientific and engineering specialties. 4

3.3.2 Associates are controlled by direct supervision of the Managers of the AFW, SEP or CR-HVAC System Reviews in consultation with the Manager, Design Verification and by the Manager, Construction Verification with assistance as required by other staff personnel. 4

3.3.3 The following lists the various TERA associate personnel that are expected to participate in this project and the functional areas where each will provide input to the project. This listing shall in no way restrict the personnel used by TERA to complete this project. The Project Manager in consultation with the Managers, Design and Construction Verification may assign personnel in addition to those listed below; however, these other personnel must have qualifications that are adequate to the extent required for performing the specific task. 4

Associate	Functional Areas
Monte Wise	Engineering and project management, preservice/inservice inspection, NDE, nuclear power plant operations and management, quality assurance
Mehmet Celebi	Nuclear power plant structural, mechanical design and construction
Stan Fabic	Thermal-hydraulic and hydo-elastic analysis, computer methods development (authored BLODWN-2, WHAM, GASRAD, MULTIFLEX), pipe rupture analysis, containment analysis
Albert Martore	Engineering, specification, construction fabrication, construction management and control, scheduling, supervision, inspection

Associate	Functional Areas
James Owens	Nuclear and fossil power plant design and construction, nuclear steam supply systems design and construction, project management, control systems, safeguards, licensing
Stanley Kaut	Design review, construction, testing, operation and licensing of electrical power, instrumentation and control systems and equipment; project management, plant procedures development, quality assurance
Edward Beck	Nondestructive testing, Level III in radiography, ultrasonics, magnetic particle, liquid penetrant, materials testing
Robert Reneau	Nondestructive testing, Level II in radiography, ultrasonics, magnetic particle, liquid penetrant, materials testing
Orin Kilgore	Corporate quality assurance, construction, startup and operations
William Pryor	Mechanical, piping, electrical and instrumentation quality inspections, startup, testing and operations
Frederick Pellerin	Development, implementation, monitoring, supervision, and evaluation of quality assurance and quality control programs

Associate	Functional Areas
Stephen Briscombe	Construction management, site construction services, construction supervision, electrical construction techniques, procedures and specification development, design review, quality control
Luis Flores	Nuclear power plant licensing, operations, systems engineering, instrumentation and control systems, failure analysis
Loren Stanley	Nuclear licensing, design review, safety-related component determinations, probabilistic risk assessment
Richard Keller	Electrical, instrumentation and control systems design, plant protection systems/engineered safety features evaluation, probabilistic risk assessment
Edward Schrull	Reactor safety systems, nuclear licensing, reliability and risk assessment, instrumentation and control, computer analyses
Peter Andersen	Nuclear power plant safety and design analysis, heat transfer, fluid dynamics, computer modeling
John Angelo	Design, operation, maintenance, installation, testing and inspection of power plant systems and components, nuclear safety and licensing

Associate	Functional Areas
Joseph Penzien	Structural engineering, earthquake engineering, reinforced concrete response
Daniele Veneziano	Engineering statistical analysis, probabilistic analysis, civil engineering
Lenny Laakso	Structural/mechanical analysis and design of nuclear power plant buildings and equipment, specifications, planning and scheduling
David Pocacha	Mechanical engineering, welding, nondestructive testing, ultrasonics
Paul J. Brunner, Jr.	Quality control, acceptance testing, construction inspection, nondestructive testing
John Smith	Ultrasonics testing, structural failure analyses, quality control
Richard Norris	Engineering materials evaluations, fracture face analyses, metallurgist

4. ADMINISTRATIVE CONTROL

4.1 Subject File

The following numbers shall be used as subject file identifiers to identify controlled documents in that file. Documents in a file shall have an I.D. number that includes the project identifier and the subject file identifier followed by a unique sequence number (001-999).

File Identifier	Subject File
3201-001	Engineering Evaluations
3201-002	Documents and Reports
3201-003	Calculations, Analyses, Computer Analyses
3201-004	PQAP
3201-005	Quality Assurance Documents
3201-006	Personnel Qualifications*
3201-007	Correspondence File
3201-008	Open, Confirmed and Resolved Item Reports, Finding Reports, Finding Resolution Reports, Observations 4
3201-009	Engineering Program Plan
3201-010	External Communications (Contact Log Sheets)
3201-011	Source Documents*
3201-012	Scope Change Requests

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* Source documents (file 3201-011) and Personnel Qualifications documents (file 3201-006) do not require ID numbers; however, these documents are logged by register in accordance with sections 4.12 and 4.7 respectively.

4.2 Engineering Evaluations

Engineering evaluations are controlled in compliance with the requirements of Project Instruction PI-3201-001, "Engineering Evaluation Preparation and Control."

4.3 Documents and Reports

Documents and reports such as Monthly Status Reports, Draft Final Reports, Draft Interim Technical Reports, Interim Technical Reports, and Final Reports are controlled in compliance with the requirements of Project Instruction PI-3201-002, "Document Control Cover Sheet."

4.4 Calculations, Analyses, Computer Analyses

Calculations, Analyses and Computer Analyses are controlled in compliance with the requirements of ECP-5.2, Calculation Preparation and Control. The Project identifier is the Project No. as listed on the cover sheet previously.

4.5 PQAP

The PQAP is controlled in compliance with ECP-5.5, Project QA Plan Preparation and Control. For this project, the PQAP Register (Attachment A), will be maintained by the Project Manager.

4.6 Quality Assurance Documents

Quality Assurance (QA) Audit Reports, responses, follow-up documents, etc., are controlled in compliance with ECP-5.6, "Quality

Assurance Audits." The Project Manager will maintain a register (Attachment B) to log control numbers assigned to QA documentation per ECP-5.6.

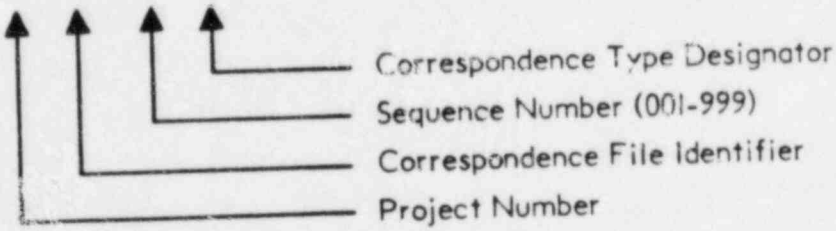
4.7 Personnel Qualifications

Documentation related to the qualifications of project personnel such as resumes and affidavits are logged (Attachment C) and filed in subject file 3201-006.

4.8 Correspondence File

Correspondence, including letters and memos, shall be routed to appropriate personnel and indexed in the subject file 3201-007. Each document will be assigned a unique identification number in the following format:

3201-007-XXX-X



4.8.1 The following correspondence type designators shall be utilized:

File Register	Correspondence Type Designator
CPC to NRC	A
NRC to CPC	B
CPC to TERA	C
NRC to TERA	D
TERA To CPC and NRC	E
CPC to Bechtel	F
Bechtel to CPC	G
NRC to Bechtel	H
Bechtel to TERA	J
CPC to B&W	K
Project Miscellaneous	L
Bechtel to/from B&W	M
Bechtel Internal	N
Miscellaneous NRC	P
TERA to Bechtel and B&W	Q
To and from Stone & Webster	R

4

4.8.2 A register (sample shown in Attachment D) will be maintained for each file. The file control stamp or equivalent (example shown on Attachment E) shall be used to record the identification number assigned to each document.

4.9 Potential Open, Open, Confirmed and Resolved Item Reports, Finding Reports, Finding Resolution Reports and Observations

4

Potential Open, Open, Confirmed and Resolved Item Reports, Finding Reports and Finding Resolution Reports are controlled in compliance with the requirements of Project Instruction PI-3201-008; Preparation of Open, Confirmed and Resolved Item Reports, Finding Reports and Finding Resolution Reports."

4.10 Engineering Program Plan

Project Instruction PI-3201-009, "Engineering Program Plan" (EPP) is issued and controlled as a separate document from the Project Quality Assurance Plan (PQAP). The EPP is included as part of Appendix B. A distribution list for controlled copies of the EPP (Attachment A) shall be maintained by the Project Manager. Preparation and control of Project Instructions are addressed in Section 5.2.

4.11 External Communications

Records of telephone conversations, meetings and exchanges of written documents between IDCV project personnel and external parties are controlled in compliance with the requirements of Project Instruction PI-3201-010, "External Communications, Protocol and the Preparation of Contact Log Sheets."

4.12 Source Documents

Source or reference material obtained from Consumers Power Company or other organizations shall be routed to appropriate personnel after logging. The Document Control Register for Drawings and Specifications (Attachment F) will be used for these two categories. Source documents files except those for externally controlled drawings and specifications, will be controlled using a Document/Report Control Register (Attachment G). A separate file

and register will be maintained for various categories of source documents at the discretion of the Project Manager or his designated representative.

4.13 Scope Change Requests

Scope Change Requests are controlled in compliance with the requirements of Project Instruction PI-3201-012, "Scope Change Requests, Midland IDCV Program." The Project Manager shall maintain a register (Attachment H) for Project File 3201-012.

5. PROCEDURES AND INSTRUCTIONS

5.1 Engineering Control Procedures

5.1.1 Engineering Control Procedures (ECP) and revisions are implemented at project level by issue of the PQAP or by revision thereof. ECPs are corporate level documents prepared under the supervision of the Quality Assurance Manager and approved by the Executive Vice President.

5.1.2 The following ECP's are hereby implemented for the subject project:

(1) ECP-5.2, "Calculation Preparation and Control", Rev. 3

(2) ECP-5.2QA, "Audit Checklist for Calculation Preparation and Control," Rev. 2

(3) ECP-5.3, "Drawing Preparation and Control," Rev. 1

(4) ECP-5.5, "Project QA Plan Preparation and Control", Rev. 3

(5) ECP-5.6, "Quality Assurance Audits", Rev. 3

(6) ECP-5.15, "Corrective Action Procedure", Rev. 0

A copy of the implemented revision for each applicable ECP is attached, Appendix A.

5.2 Project Instructions

5.2.1 Purpose

Project Instructions are prepared by the Project Manager or under his direction by a designated individual for the control of special activities not covered by any of the standard ECPs, or to clarify, expand, or otherwise supplement the standard procedures to provide more appropriate control for a specific activity.

5.2.3 Format

Project Instructions are prepared on standard header paper (Attachment 1) and shall state the purpose and general applicability of the instruction and method of implementation. The originator signs the "prepared by" block of the header on each page of the instruction.

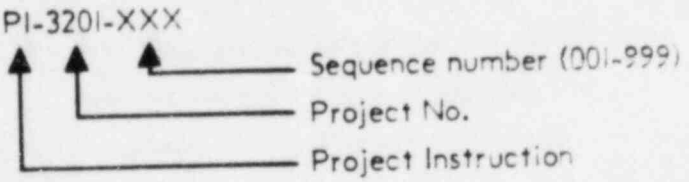
5.2.4 Verification and Approval

(1) Project Instructions not related to an implemented ECP require the review and approval of the Project Manager or Principal-in-Charge.

(2) Project Instructions related to an implemented ECP are reviewed by the PQAE prior to issue. This review is noted by the PQAE's initials in the "Approved By:" block of the form.

5.2.5 Document Control

Project Instructions are controlled by assignment of a sequence identification number in the following format:



5.2.6 Project Instructions

The following Project Instructions are hereby implemented for this project.

(1) PI-3201-001, "Engineering Evaluation Preparation and Control", Rev. 3

(2) PI-3201-001QA, "Audit Checklist for Engineering Evaluation Preparation and Control", Rev. 1

(3) PI-3201-002, "Document Control Cover Sheet", Rev. 2

(4) PI-3201-002QA, "Audit Checklist for Document Control Cover Sheet", Rev. 1

(5) PI-3201-005, "Documentation of Observations", Rev. 1

(6) PI-3201-006, "Use of Design Verification Checklists", Rev. 0

(7) PI-3201-007, "Use of Construction Verification Checklists", Rev. 0

(8) PI-3201-008, "Preparation of Open, Confirmed and Resolved Item Reports, Finding Reports, and Finding Resolution Reports", Rev. 2

(9) PI-3201-009, "Engineering Program Plan", Rev.3

(10) PI-3201-010, "External Communications: Preparation of Contact Log Sheets", Rev. 1

(11) PI-3201-012, "Scope Change Request, Midland IDCV", Rev. 1

Copies of the implemented revisions of these project instructions are attached in Appendix B with the exception of Project Instructions PI-3201-006 and PI-3201-007 which will be provided at a later date.

6. QUALITY ASSURANCE

6.1 Records

All quality assurance checklists, audit reports and records documenting activities related to the Quality Assured Activities of Section 1.2

herein are retained and controlled as specified herein and in accordance with the pertinent requirements of the applicable Engineering Control Procedure and Project Instructions.

6.2 Corrective Action

For significant conditions adverse to quality, corrective action taken is documented and resolved in accordance with Engineering Control Procedure ECP-5.15, "Corrective Action Procedure."

6.3 Audits

Quality assurance audits of project operations are conducted by the PQAE in accordance with ECP-5.6, "Quality Assurance Audits." For this project, audits shall be performed at least every 90 days of active project work.

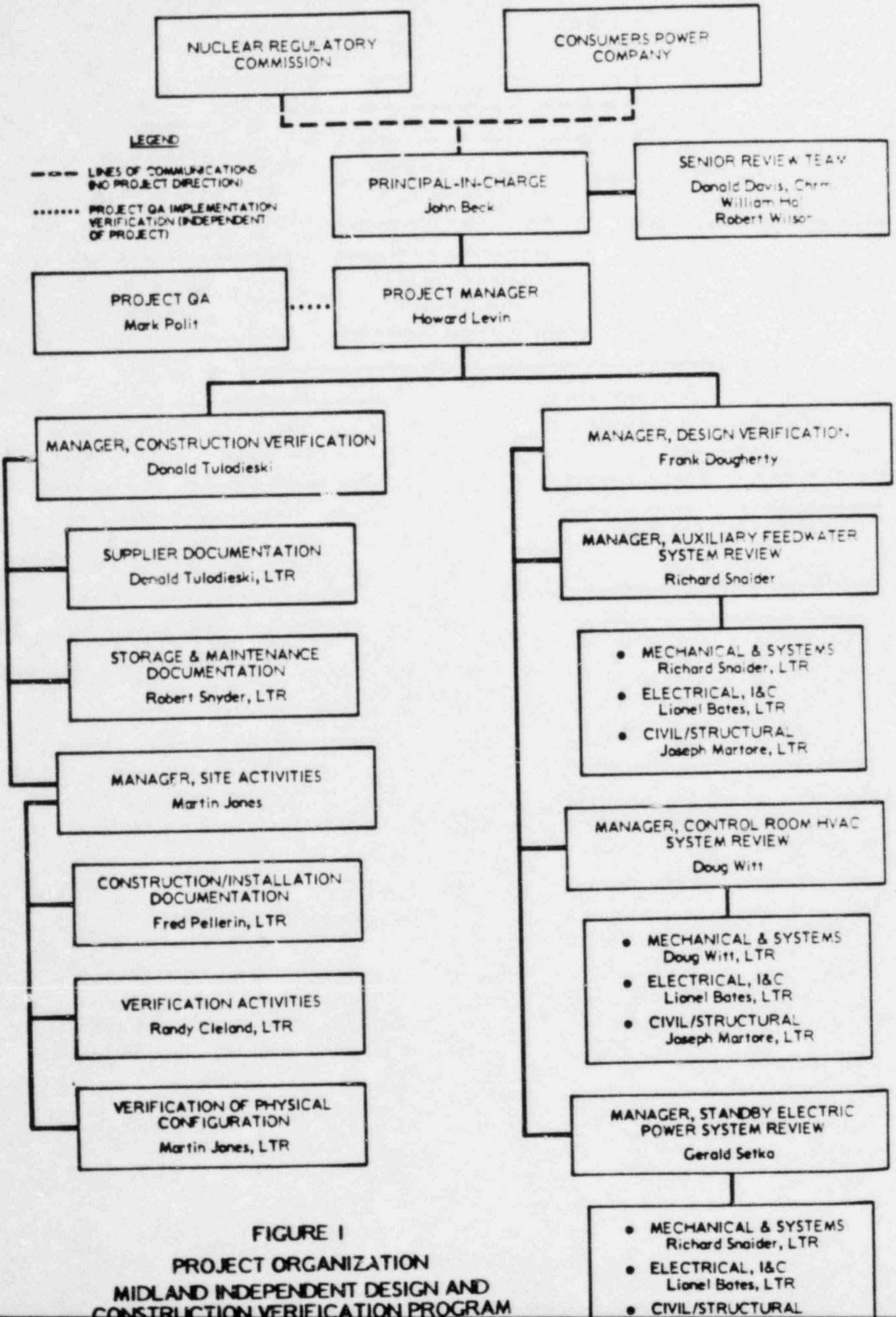


FIGURE 1

PROJECT ORGANIZATION

MIDLAND INDEPENDENT DESIGN AND CONSTRUCTION VERIFICATION PROGRAM

PROJECT INSTRUCTION			
PI- 3201 - 001		SUBJECT:	Engineering Evaluation Preparation and Control
REV.: 3	DATE: 7/15/83		
PAGE 1	of 8	PREPARED:	APPROVED BY:

1.0 GENERAL

1.1 Purpose

The purpose of this instruction is to establish the requirements for preparation and control of engineering evaluations required for the Midland Independent Design and Construction Verification (IDCV) Program.

1.2 Scope

Engineering evaluations are the principal means of documenting the IDCV review process and the bases for conclusions. As a minimum, at least one engineering evaluation shall be required for each topic within the scope of the program. It may be necessary to have several supporting engineering evaluations serving as input to the final resolution of a particular topic. The scope of individual engineering evaluations and the combinations of engineering evaluations which form the basis of the final report depend upon the technical scope which is appropriate for the particular topic and review area and the area of expertise of the assigned individuals. As a minimum, each engineering evaluation shall clearly indicate the topics and review areas within its scope. The Project Manager and the Design and Construction Verification Managers shall be jointly responsible for assuring that all reviews are appropriately documented in engineering evaluations. 3

2.0 PREPARATION

Evaluations shall be complete and orderly and shall include sufficient sketches, notes, and explanatory information to allow any person not familiar with the work, but technically qualified, to understand it without extensive additional inquiry and research. Collectively, these documents should be sufficiently detailed so that a qualified engineer who is unassociated with the project could write the final report using only these inputs.

Engineering evaluations are the principal means not only of documenting the bases of the conclusions but of collectively providing the required history necessary to support an auditable review process. Thus, special requirements and guidance are laid forth below for their preparation and content. | 3

2.1 Engineering Evaluation Cover Sheet

An Engineering Evaluation Cover Sheet (Attachment A) shall be completed considering the following specific guidance. While the title indicates the general subject of the evaluation, the entries for "primary" and "supporting" and topic number and title will more specifically define the evaluation. The block for "purpose" should be used to describe the specific purpose of supporting evaluations. The purpose of primary evaluations is defined in this procedure. The "contents" checklist is provided for guidance to the originator and as a convenient overview of the contents. These categories are described below.

2.2 Abstract

An abstract of one page or less should summarize the evaluation and its major conclusions, as well as identify related topics and refer to related OCRs, Findings, and Finding Resolution Reports. | 3

2.3 Overview of Review Process

All engineering evaluations shall contain an overview of the review process within the scope of the evaluation. This shall include, as

applicable, an explanation of the review approach and a chronology of events such as major discussions and meetings, requests for information, and associated reporting. Supporting evaluations document the disposition of the review process and summarize the history of that process to date. Primary evaluations document an overall summary of the review process and the history of that process as applicable to final topic resolution.

2.4 Bases for Sample Selection

In view of the fact that the IDCV does not include a 100% review of the three systems within the project scope, the program must rely upon sampling. Therefore, sampling selection criteria and implementation is extremely important. It is essential that the bases for sample selection of specific plant components or elements be documented as thoroughly as possible, and include an analysis of the degree to which the selected items meet the sample selection criteria attributes documented in Sections 3.1.2 and 3.2.2 of the Engineering Program Plan. Attachment D outlines the steps in the sample selection process. This may be completed within this section of the engineering evaluation or in separate engineering evaluations that broadly address sample selection making reference to the primary and supporting evaluations when appropriate. 3

2.5 Sources of Information and References

Sources of information and references shall be listed separately using Attachment B or a similar format. References shall include, when applicable:

- o Originating organization or author
- o Document number and date or revision
- o Title
- o Type of document (specification, drawing, letter, etc.)
- o Where/how located (e.g. from records center, Bechtel engineer 'X', calculation file, etc.)

3

2.6 Background Data

Background data include inputs, assumptions, data, and related engineering evaluations, calculations, and computer analyses. Sources of this material and associated references must be identified, as applicable.

2.7 Acceptance Criteria

Acceptance criteria, upon which checklists and evaluations are based, shall be explicitly stated. These include design criteria contained in the FSAR and regulations or the guidance contained in the Standard Review Plan, Regulatory Guides, industry codes and standards.

2.8 Evaluation

Each evaluation shall be prepared by performing and documenting a point-by-point comparison of the topic being evaluated using design and construction evaluation checklists as appropriate. These checklists shall be developed by the reviewer considering the generic

checklists issued for each review scope category, the design criteria contained in the FSAR and regulations, and, as applicable, the guidance contained in the Standard Review Plan, Regulatory Guides, industry codes and standards. Each modified checklist shall be reviewed and approved by the Lead Technical Reviewer (LTR) and Manager, Design or Construction Verification before being used by the reviewer. For further discussion of the preparation and use of design and construction verification checklists see PI-3201-006 and PI-3201-007, respectively. Checklists used in the evaluation shall always be appended thereto. 3 3

2.9 Conclusions

Conclusions as well as the bases for conclusions should be summarized. Conclusions shall be written considering whether there are items which are open items, confirmed items, findings, and resolved findings.

3

- Conclusions for Engineering Evaluations for Which There Were No Findings and No Current Items Exist - The conclusions shall state that the subject matter described on the Engineering Evaluation Cover Sheet has been reviewed and been found to be consistent with the evaluation criteria. A summary statement of the bases for this statement shall be included. The conclusions shall also state that there are no potential open items or open items which remain unresolved and that no findings for the scope of review exist.

- Conclusions for Evaluations for Which There Are Findings or Currently Open Items - The conclusions shall state that the subject matter described on the Engineering Evaluation Cover Sheet has been reviewed and found to be consistent with the evaluation criteria except as documented in

referenced OCRs and Findings. The conclusion shall further state that the engineering evaluation shall be considered complete by the issuance of Resolved Item Reports or Finding Resolution Reports. The Engineering Evaluation may be revised in accordance with Section 5.0 of this Project Instruction after these reports are issued if deemed appropriate by the Project Manager. 3

3.0 VERIFICATION AND APPROVAL

3.1 Engineering evaluations shall be designated as preliminary until approved by the Managers, Design and Construction Verification, the Project Manager or his designated representative. Preliminary evaluations not upgraded to final status shall be maintained in a separate file for reference purposes. 3 3

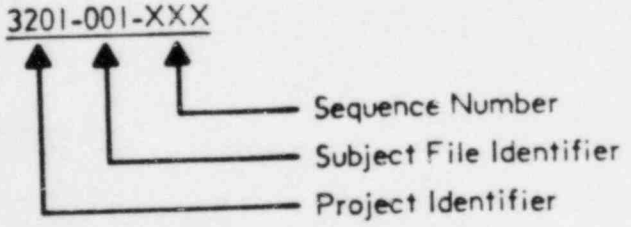
3.2 Each final engineering evaluation shall be verified by the review of an individual who has qualifications at least sufficient to originate the evaluation. The reviewer shall not be the originator but may be the Project Manager, Managers, Design and Construction Verification or an LTR. After reviewing, the reviewer shall sign and date the engineering evaluation cover sheet. To provide a basis for future traceability and approval, the extent and method of review shall be clearly described on the Engineering Evaluation Cover Sheet. Any comments shall be resolved with the originator prior to signoff. | 3

3.3 The Managers, Design and Construction Verification, the Project Manager, or his designated representative shall indicate approval by signing only the cover sheet when the evaluation and its review have been completed. | 3

4.0 DOCUMENT CONTROL

4.1 Identification

After all approvals have been obtained, the final engineering evaluation shall be assigned a control identification number by the Project Manager or his designated representative in the following format:



To facilitate reference between engineering evaluation packages, the originator may call the project Administrative Manager in Bethesda, to reserve a Control I.D. No. This number is not final or officially recognized until all approvals have been obtained and the date of revision entered on the Engineering Evaluation Register (Attachment C).

4.2 Retention

Each final engineering evaluation shall be indexed using the Engineering Evaluation Register (Attachment C) and filed in the appropriate project engineering evaluation file. Distribution of originals shall not be made unless specific written instructio are issued to the contrary. All final engineering evaluations shall be maintained by the Project Manager or his designated representative. 3

5.0 REVISIONS

5.1 Engineering evaluations may be revised to clarify misinformation (e.g., inputs). Supporting engineering evaluations will not require revision to update the latest status of the review since these documents do not generally serve as design documents nor as vehicles to document the disposition of the current review process. To simplify internal control and preserve the history of evolving reviews, new supporting engineering evaluations should be written as appropriate. These evaluations, along with the reporting process documented in PI-3201-008 will collectively provide the required history necessary to support an auditable review process. As discussed, the primary evaluation will tie all of the supporting evaluations together.

STEPS IN THE SAMPLE SELECTION PROCESS

The following steps are to be followed in determining the initial sample selection of AFW, SEP, and CR-HVAC subsystems, components, and structures.

1. Review of FSAR, P&IDs, Equipment Location and Architectural Drawings, Isometrics, and other pertinent documents to obtain an overview of the functional and physical aspects of the system(s).

2. Identify subsystems, components, and structures of particular importance to safety. The criteria for design of these items should generally be representative of the other items important to safety to facilitate later extrapolation of results. List these items on the attached table by name and I.D. in groups or categories according to major disciplines. Identify the type, function, and location in the appropriate column. Mark the column "Importance to Safety." Ensure that major design and construction interfaces are included by identifying these in the column "Interfaces" (e.g., Bechtel-vendor (Grinnell) or Bechtel-service contractor (e.g., Cygna).

3. Assess balance in number within each of these groups of items, and ensure a representative distribution (e.g., type, function, location, etc.). Modify the sample, either adding or subtracting as appropriate.

4. Review each group of items by discipline to evaluate diversity of type and function. Mark the appropriate columns on the table. Modify the sample as appropriate.

5. Obtain Design Verification, Construction Verification, and Physical Configuration/Testing Verification sample matrices and take a first cut at identifying items to be reviewed. Mark appropriate columns on the matrices. Note that the Physical Configuration/Testing matrix requires qualifying statements within the matrix to provide a more detailed specification of what is within the sample. Particular attention should be paid to maintaining a logical link or chain through the design/construction process for individual components selected. Review for balance.

6. Conduct detailed review of drawings to determine the accessibility of the items selected, noting potential physical constraints.

7. Verify physical constraints via a cursory field walkdown noting on the attached table in the column marked "Physical Constraint" any areas that are inaccessible and those that may require additional scaffolding.

8. Review the status of construction completion and any scaffolding requirements with CPC site management and internally determine where these constraints warrant a rescheduling of planned activities or resampling to enable physical verification or testing.

At this point, the sample should be approximately 75% complete.

9. Obtain input from the Project Manager relative to industry and project design/construction/operating experience to identify any additional items that should be added to complete the remaining 25% of the sample selection. Mark the appropriate column labeled "Experience-industry or project" on the attached table to indicate the bases for including the items in the sample. Particular emphasis should be placed on areas within the project that experienced repeated problems or areas which may not have received extensive prior review. Portions of steps 6 through 8 may need to be repeated; however, less sensitivity to these constraints is acceptable given the importance of this item.

BASES FOR SAMPLE SELECTION

SYSTEM: ________________

em	ID	Type	Function	Location	Importance to Safety	Interfaces	Diversity		Physical Constraints	Experience		Comments
							Type	Function		Industry	Project	

3.0 REVIEW AND APPROVAL

3.1 All documents under the scope of this Project Instruction shall be designated as preliminary until reviewed and approved within TERA. Such preliminary documents shall be maintained in separate files for reference purposes only. Each document under the scope of this Project Instruction shall be reviewed by an individual who has the qualifications to originate the document. The reviewer shall not be the originator, but may be the Project Manager or Managers, Design or Construction Verification. After reviewing, the reviewer shall sign and date the document control cover sheet. Any comments shall be resolved with the originator prior to signoff. The Project Manager (or his designated representative) shall indicate his approval by signing only the cover sheet when the document and its review have been completed. 2

4.0 DOCUMENT CONTROL

4.1 Identification

After all required approvals have been obtained, all documents under the scope of this Project Instruction shall be assigned a control identification number by the Project Manager or his designated representative in the following format:

PROJECT INSTRUCTION

PI- 3201 - 002QA	SUBJECT: Audit Checklist for Document Control Cover Sheet
REV.: 1 DATE: 4/21/83	
PAGE 1 of 3	PREPARED BY: APPROVED BY:

1. PURPOSE

This checklist shall be used by the PQAE to verify the implementation of PI-8337-002, Document Control Cover Sheet, for those documents that are to be controlled by PI-8337-002 as identified in the PQAP. It shall not be used for any other categories of documents or types of activities unless instructions to the contrary are established by the PQAP.

2. CHECKLIST

2.1 References listed on cover sheet? _____

2.2 Document control cover sheet and each page properly prepared and identified? _____

2.3 Review and approval signatures or initials included? _____

2.4 Control identification number per PQAP? _____

2.5 Document indexed and filed in controlled file? _____

2.6 Revisions processed in same manner as original? _____

2.7 Superseded documents identified on index sheet and filed in separate file? _____

PROJECT INSTRUCTION			
PI- 3201 - 0020A		SUBJECT: Audit Checklist for Document Control Cover Sheet	
REV.: 1	DATE: 4/21/83		
PAGE 2	of 3	PREPARED BY:	APPROVED BY:

3. COMMENTS

3.1 Identify document(s) used in preparing this checklist, state specific cause of any unsatisfactory ratings, and recommend corrective action, if any.

3.2 Prepared by: _____ Date: _____

4. FOLLOWUP

4.1 Recommended corrective action of item 3.1 satisfactorily implemented? _____

4.2 If not, state other action taken to resolve the deficiency, or state rationale justifying no corrective action taken, and whether this item is closed or open.

4.3 Prepared by: _____ Date: _____

a. Is the item an obvious typographical error? (An example of an obvious typographical error would be the the statement "...in accordance with paragraph 3.21 of this specification" when no such paragraph exists and where paragraph 3.12 provides the expected information.)

b. Is a user of the document containing the item likely to become aware of the deficiency as he makes use of the document or is he unlikely to apply the erroneous document in such a manner as to compound the deficiency? (For example, a piping pressure drop calculation for a normal flow condition which contains a difference of 0.2 psi in a 100 psi pressure drop is unlikely to result in a significant deficiency which could be compounded.)

c. Is the item such that when it is corrected, a change in the design, fabrication, or installation of equipment or components will probably not result?

The LTR shall consider the answers to these questions in entering a recommendation onto the OCR form (reference: Attachment A to PI-3201-008). After considering the answers to the above questions, using his own judgment, and deciding whether the item is symptomatic of a process deficiency, the LTR may recommend classification of the deficiency as an Observation in accordance with 2.2 below.

2.2 RECOMMENDATION FOR CLASSIFICATION AS AN OBSERVATION

If the LTR determines that a deficiency noted as a Potential Open Item should be classified as an Observation, he shall enter a statement to that effect in the recommendation section of the OCR form, provide a basis for that recommendation, and recommend processing of the item in accordance with this Project instruction. The project team (see Project Instruction PI-3201-008 for definition) may determine that an Open Item should be re-classified as an Observation. The

procedure documented in Section 3.0 of this Project Instruction shall be followed for preparation of OCRs as Observations.

2.3 ITEMS NOT CLASSIFIED AS OBSERVATION

When the LTR determines that a Potential Open Item is not an Observation, he shall complete the processing of the OCR in accordance with PI-3201-008.

2.4 REVIEW BY PROJECT MANAGER

All recommendations for classification as an Observation shall be reviewed by the Project Manager or his designated individual. He shall determine whether he agrees with the recommendation and shall use one of the following alternatives for disposition: 1

a. If he agrees that the item meets the criteria for an Observation, he shall apply paragraph 2.5 of this Project Instruction.

b. If he agrees that the item probably meets the criteria for an Observation, but desires additional review by the Project Team, he shall distribute the OCR in accordance with paragraph 2.6 of this Project Instruction, with or without his additional comments.

c. If he believes that the item probably does not meet the criteria for an Observation, he shall confer with the responsible LTR and they shall determine whether the recommendation should be changed. They shall agree to process the item in accordance with PI-3201-008 or paragraph 2.6 of this Project Instruction.

2.5 OBSERVATION CLASSIFICATION AND APPROVAL

The Project Manager shall sign the Potential Open Item OCR form for those items in which he agrees with the LTRs recommendation for classification as an Observation. For Open Items re-classified as Observations, the Project Manager shall sign both the OCR form which documents the Observation and a Resolved Item form, signifying completion of the project team's review. (Refer to Section 3.0 of this Project Instruction for procedures related to preparation of these documents.)

2.6 PROJECT TEAM REVIEW

If the Project Manager determines that an item classified by the LTR as an Observation (including Open Items proposed for re-classification as an Observation) should be reviewed by the project team, he shall distribute copies of the OCR and at an appropriate time organize a meeting or telecon with the project team for the purpose of an integrated review of the classification. The project team may conclude that the item is properly classified as an Observation. Otherwise the project team shall require that the OCR be processed in accordance with PI-3201-008.

3.0 PREPARATION

Observations shall be documented on OCR forms (Attachment A to PI-3201-008). The OCR recommendation section shall indicate its proposed classification as an Observation. This shall be accomplished by checking the "Resolution" space on the OCR form and the addition of a statement such as "This item is resolved by classification as an Observation." If the project team determines that an Open Item should be re-classified as an Observation, the PM or his designated representative shall prepare a Resolved Item report to document the

PROJECT INSTRUCTION		
PI- 3201 - 006	SUBJECT: Use of Design Verification Checklists	
REV.: 0 DATE: 7/5/83		
PAGE 1 of 19	PREPARED BY	APPROVED BY

1.0 GENERAL

1.1 Purpose

The purpose of this instruction is three-fold:

1.1.1 Specify and define the checklists to be used in conducting the Independent Design Verification (IDV) review as part of the Midland Independent Design and Construction Verification (IDCV) Program and thereby establish a consistent method for the acquisition and evaluation of important data and information by different technical reviewers.

1.1.2 Specify and define the data and information which will necessarily be recorded and assimilated as part of the IDV review process. The data and information specified on the checklists will constitute the minimum data base of design review-related information. These data will be subject to evaluation to discern and verify the quality of the design.

1.1.3 Provide lead technical reviewers (LTR) and other personnel participating in the IDV review portion of the Midland IDCV Program with definitive instructions and guidance for completing the checklists.

1.2 Scope

This instruction defines those formal generic checklists to be used in conducting the IDV review process and establishes the minimum amount of data and information to be acquired in executing the IDV review methodology.

1.3 Listing and Identification of Checklists

1.3.1 Design Criteria Review Checklist -- Exhibit 1

This form provides for the documentation and evaluation of the design criteria applicable to each design review area defined in PI-3201-009.

1.3.2 Implementing Document Review Checklist -- Exhibit 2

This form is used for evaluation of implementing documents against the design criteria which were identified in the identification of criteria and commitments activity.

1.3.3 Check of Calculations/Evaluations Checklist -- Exhibit 3

This checklist is used to evaluate selected calculations and evaluations for proper implementation of criteria, consistency of assumptions, and validity of results, etc.

1.3.4 Specification Review Checklist -- Exhibit 4

This form is used for evaluation of specifications. Included in the scope of the checklist are comparisons against design criteria, codes and standards, and other requirements to determine whether the purchased materials will meet design requirements.

1.3.5 Design Drawing Review Checklist -- Exhibit 5

This form is used for evaluation of design drawings. Included in the scope of the checklist are comparisons against design criteria, calculations, evaluations, and other implementing documents.

2.0 RESPONSIBILITIES

2.1 Technical reviewers shall ensure that applicable generic checklists are used when conducting their portion of IDV review and that the checklists are completed in an accurate and thorough manner.

2.2 The technical reviewers and LTRs, in collaboration with the applicable manager of each system review, will constantly monitor the adequacy of existing checklists and identify the appropriateness and need for modifications or additional checklists. Revisions to existing checklists or incorporation of new checklists for use in the IDV review will be the responsibility of the LTR, subject to the approval of the Manager, Design Verification.

2.3 LTRs are responsible for modification ("customization") of checklists, as necessary, to conduct the IDV review within the scope of their review areas. They are also responsible for training technical review personnel in the use of generic and/or modified checklists.

2.4 Should a revision to an existing checklist be made, the LTR shall be responsible for verifying that data collected and recorded on checklists completed prior to the revisions need not be supplemented or modified. The LTR will direct the acquisition of supplemental data or modification of data already collected in those instances where a revision to an existing checklist impacts the scope of review already conducted using the previous checklist. This includes checklists completed prior to the initial issuance

of this instruction. However, if completed engineering evaluations contain the requisite information, new checklists will not be required.

3.0 INSTRUCTIONS FOR COMPLETION OF CHECKLISTS

The following instructions will be used by technical reviewers participating in the IDV review. Checklists and the data required will be collected so that the source of all information is known. To the extent practical, all data required to complete a particular checklist shall be collected and accurately recorded.

Instructions for acquiring and recording data are provided in the following sections. These sections have first been categorized by the review category and then, within each review category, by the checklist(s) applicable to that review category. The four review categories applicable to the IDV review process are as follows and correspond to the numbered sections of this instruction.

- o Review of Design Criteria and Commitments
- o Review of Implementing Documents
- o Check of Calculations and Evaluations
- o Check of Design Drawings and Specifications.

3.1 Review of Design Criteria and Commitments

One generic checklist (Exhibit I) has been developed for the review of design criteria and commitments. Specific instructions for completion of this checklist are as follows:

1. Enter the system name, review topic number and review topic title for whch the checklist is being used. This information should be obtained from Figures 1.2-2, 1.2-4, and 1.2-6 of PI-3201-009 as appropriate.

2. The reviewer should next determine applicable design inputs. The reviewer should review 10 CFR 50, Appendix A, and appropriate sections of the Midland FSAR to determine appropriate entries for these categories. Applicable Regulatory Guides should also be listed, but reviewers are cautioned to review FSAR Appendix 3A to determine the Midland project's stated degree of commitment to specific Regulatory Guides.

3. The reviewer should evaluate whether the identified design inputs affect other design review areas in the system being reviewed.

   Example: General Design Criterion 17 requires consideration of the loss of offsite power. This in turn affects several design review areas including Component Functional Requirements. In preparing the Design Criteria Review Checklist for AFW Component Functional Requirements review areas this design input should be listed as affecting other areas (such as the Water Supplies and HVAC Design review areas).

   The purpose of this cross-referencing is to maintain control of the interfaces between review areas and to assure efficiency in the review process.

4. The reviewer should evaluate whether the design inputs affect systems which interface with the system being reviewed.

   Example: General Design Criterion 17, which applies to the Component Functional Requirements review area in the AFW system, also affects Class 1E power system which interfaces with AFW.

The purpose of this entry is to assure that appropriate design interfaces are being evaluated in the review scope.

5. The reviewer should determine whether the design inputs for the review area for the system being reviewed are complete. "Complete" means that the set of design inputs, taken as a whole, provides an adequate basis for performance of the design activities associated with review area being considered. If there are missing design inputs, the reviewer should note them in the space provided.

   Example: If a Regulatory Guide is clearly applicable to a specific review area, but the FSAR contains neither a reference to it in Appendix 3A nor an alternative elsewhere in the FSAR, then this Regulatory Guide should be listed as a missing design input.

6. The reviewer should consider whether the design inputs are consistent. If not, the reviewer should describe any inconsistencies.

7. The reviewer should consider whether the design inputs are sufficiently detailed to allow implementation. This question is closely related to Item 5 above. Item 5 addresses whether all relevant design inputs have been identified when those inputs are taken as a whole. Item 7 is concerned with the question of whether the design inputs, again taken as a whole, provide adequate information to assure correct implementation of design input.

   Example: Since 10 CFR 50, Appendix A, Criterion 4 is applicable to the systems being reviewed, it is necessary that components be compatible with their environments. If no design inputs for temperature, pressure, etc, are provided in the FSAR, then the design inputs should be considered as <u>not</u> being adequately defined to permit implementation.

8. The reviewer should provide a summary evaluation of the design criteria and commitments. In particular he should note whether certain design inputs deserve special consideration for implementation in conjunction with other review areas.

3.2 Review of Implementing Documents

One generic checklist (Exhibit 2) has been developed for the review of implementing documents. Specific instructions for completing this checklist are as follows:

1. Enter the system name, review topic number and review topic title for which the checklist is being used. This information should be obtained from Figures 1.2-2, 1.2-4, and 1.2-6 of PI-3201-009 as appropriate.

2. Enter the structure, subsystem, or component identification which further defines the area being reviewed for implementation.

3. Enter the document title, number, revision number and date for the implementing document being reviewed.

4. Enter the source of the document.

   Example: a. Bechtel records center
   b. CPC files
   c. Specific individual.

5. The reviewer should develop a list of items for which the implementing document is to be checked for completeness and internal consistency.

Areas of the implementing document which are found to be incomplete or inconsistent shall be identified.

6. The reviewer should determine whether there are any design interfaces which affect this implementing document or which this implementing document affects. The reviewer should determine whether these interfaces are adequately specified. Enter into the checklist conclusions regarding the specification of interface requirements and explain the significance of the missing information.

7. The reviewer should determine whether the implementing document has been checked by the originating organization. The evidence of such a check may be signatures in a title block, signatures on a document cover sheet, or a memo or other documentation indicating that the review has been performed. If the docment has not been checked, describe the circumstances associated with the missing check.

   Example: In the case of a document which has a title block with space for a "checked by" signature which is missing the signature, this fact should be noted. On the other hand, if the document has no obvious space for a signature, then this situation should be noted.

8. The reviewer should determine whether there are outstanding design or field change notices which affect the document. These changes should be listed by the appropriate control number. The reviewer shall consider these changes in performing the evaluation of the implementing document.

9. The reviewer should evaluate the design criteria applicable to the review area (see the checklist for design criteria) and determine for which of

these criteria the specific implementing document should be reviewed. Furthermore, he should consider whether it is appropriate for design criteria associated with other review areas to be reviewed for implementation as part of the review of the selected document.

Example: The P&ID for a system may reflect implementation of design criteria for several review areas. It is appropriate that a single review of the P&ID for all applicable criteria be conducted at one time.

This specific selection of criteria for which an implementing document is reviewed is to be determined by the reviewer in consultation with the LTR.

Among the factors which the reviewer should consider are whether the design criteria and commitments were correctly interpreted in the implementing document. The reviewer should list the design criteria and commitments that he evaluated and note any discrepancies such as an incorrect interpretation or a failure to incorporate an applicable criterion.

10. The reviewer should list other implementing documents for the area being reviewed that have been checked for consistency with the document being reviewed. If not applicable, the reviewer should so state. Any inconsistencies or other discrepancies between this document and others should be noted.

11. The reviewer should determine if there are assumptions or other limitations associated with the document which affect its accuracy or applicability. If such limitations exist the reviewer should determine whether they are adequately defined to accurately reflect the limitation and

whether the user is likely to be aware of the limitation. If the limitations are not adequately described, the extent of this deficiency should be noted.

12. In some cases it may be appropriate for the implementing document to contain quality assurance requirements. The reviewer should determine whether this item is applicable and whether the appropriate requirements are specified.

13. A summary of the review and its conclusions should be provided by the reviewer to document the overall results of the review.

3.3 Check of Calculations and Evaluations

One generic checklist (Exhibit 3) has been developed for the review of calculations and evaluations. Specific instructions for completing this checklist are as follows:

1. Enter the system name, review topic number and review topic title for which the checklist is being used. This information should be obtained from Figures 1.2-2, 1.2-4, and 1.2-6 of PI-3201-009 as appropriate.

2. Enter the structure, subsystem, or component identification which further defines the area to which the calculation or evaluation applies.

3. Enter the title of the calculation or evaluation.

4. Enter the calculation or evaluation number, revision number, and approval date.

5. Determine whether the calculation or evaluation has been considered a "Q" calculation or evaluation. That is, determine whether the calculation or evaluation is subject to the originating organization's QA program.

6. Determine whether the calculation or evaluation has been checked and approved by the originating organization. If not, describe missing signature levels.

   Example: A calculation may have signatures of the originator and checker, but no approval signature. The missing approval should be listed.

7. Describe the scope and purpose of the calculation or evaluation.

8. Based upon its intended scope and purpose and the review area for which it is being evaluated, the reviewer, in consultation with the LTR, should determine which design criteria will be considered in the evaluation. If there are any discrepancies between the design criteria and the calculation's (or evaluation's) input, assumptions, methods, or results, these differences should be listed.

9. Consider whether all assumptions used in the calculation or evaluation are clearly listed.

10. Determine whether the assumptions are reasonable and valid.

11. If assumptions are not reasonable and valid or if they conflict with design criteria or implementing documents, the difference should be listed.

12. The reviewer may enter any other comments concerning the assumptions as he deems appropriate.

    Example: If an assumption is valid for the specific calculation being evaluated, but may be incorrect in other situations, the reviewer may wish to note this fact if the limitation is not specified in the calculation.

13. Are the references, including data sources, listed? It is acceptable for the reference to be at the point where referenced information is used or to be cross-indexed to a separate reference list. The reviewer may add any appropriate comments on the references.

14. The reviewer should determine whether the equations and methods used are specified. The reviewer should evaluate whether the equations and methods are appropriate for the intended purposes. For cases where computer programs were used the reviewer should obtain appropriate evidence that the computer programs have been verified.

15. The reviewer should compare the calculational/evaluational objectives with the methods used. Is the use of the specified method consistent with the objective? Are there any limiting factors which influence the appropriateness of the method given the objective? The reviewer should consider these and any other appropriate questions concerning the objectives and methods and should provide a discussion of his considerations of these questions.

16. The reviewer should discuss the method used to verify the calculation or evaluation.

Example: a. Alternative calculation

b. Comparison with test data

c. Comparison with results at other plants developed by others.

17. The reviewer should determine whether the results are reasonable.

18. The reviewer should determine whether the calculation/evaluation results have been compared to the acceptance criteria to allow verification that design requirements have been met.

19. The reviewer should provide a summary of the results of the review. The summary should contain comments on the significance or deviations or discrepancies discovered in developing the review.

3.4 Check of Specifications and Drawings

Two generic checklists have been developed for this review scope:

1. Specification Review Checklist -- Exhibit 4
2. Design Drawing Review Checklist -- Exhibit 5.

3.4.1 Specification Review Checklist

1. Enter the system name, review topic number and review topic title for which the checklist is being used. This information should be obtained from Figures 1.2-2, 1.2-4, and 1.2-6 of PI-3201-009 as appropriate.

2. Enter the structure, subsystem, or component to which the specification applies.

3. Enter the title of the specification, the specification number, revision number and date.

4. Indicate the source of the specification.

Example:
a. Bechtel Records Center
b. Engineering files
c. CPC files.

5. List the design inputs (as determined from the appropriate Design Criteria and Commitments Checklists) and other items for which the specification is to be checked for completeness and internal consistency. Any inconsistencies or other deficiencies should be listed.

6. List selected related calculations or evaluations against which the specification will be compared.

Example: For a pump specification it is appropriate to select calculations which provide the basis for the pump flow and head.

Note that only selected calculations need be used. It is not necessary for the reviewer to trace every number in a specification to a calculation.

7. Determine whether the specification has been checked by the originating organization. Lack of evidence of such a check should be noted.

8. List outstanding design or field change notices applicable to the specification.

9. In consultation with the LTR, the reviewer should determine the design inputs and other information (such as data obtained from reviews or implementing documents and calculations) against which the specification will be reviewed. Discrepancies should be listed.

10. For selected components the reviewer may review the specification for inclusion of appropriate handling, cleaning or shipping requirements. If such requirements are appropriate, the lack thereof, or any inconsistency in the requirements, should be described.

11. For selected components the reviewer may review the specification for inclusion of appropriate storage, maintenance, installation, construction, repair or testing requirements. If such requirements are appropriate, the lack thereof, or any inconsistency in the requirements should be noted.

12. The reviewer should provide a summary of the review and comment on the significance of any deficiencies or inconsistencies which were identified.

3.4.2 Design Drawing Review Checklist -- Exhibit 5

1. Enter the system name, review topic number and review topic title for which the checklist is being used. This information should be obtained from Figures 1.2-2, 1.2-4, and 1.2-6 of PI-3201-009 as appropriate.

2. Enter the structure, subsystem, or component which is covered by the drawing being reviewed.

3. Enter the title of the drawing, the drawing number, revision number and date.

4. Identify the source of the drawing.

Example:
a. Bechtel Records Center
b. CPC files
c. Engineering files

5. The reviewer in consultation with the LTR should determine which design inputs are to be checked for completeness and internal consistency. Other items that may be checked include line numbers, valve numbers, specification numbers, sizes, weights, etc. Internal inconsistencies and any lack of completeness should be noted.

Example:
a. A piping drawing may be compared against the P&ID. The reviewer would identify that the review will check that a selected valve shown on the P&ID area is properly shown on the piping drawing. Any difference between the P&ID and the piping drawing for the selected portion would be noted.

b. An FSAR commitment may require that a section of piping be Seismic Category I. In performing the review of a piping drawing the reviewer may select to verify that the section of pipe is within the Seismic Category I boundary.

6. The reviewer should select calculations or evaluations to compare the drawing against. The selection of the calculations should be made in consultation with the LTR. The calculations should generally be selected from calculations which were checked using the checklist in this Project Instruction.

Example:
a. A piping pressure drop calculation could be compared against a piping drawing for consistency of line sizes, run lengths, and number of fittings.

b. The piping stress analysis package can be compared against the piping drawing for consistency of dimensions.

c. Electric circuit schedules can be compared against maximum cable length calculations.

Any inconsistencies should be noted by the reviewer.

7. The reviewer should determine whether the drawing has been checked by the originating organization. If a drawing has not been checked, this fact should be recorded on the checklist.

8. The reviewer should determine whether there are outstanding design or field change notices applicable to the drawing being reviewed. Any such notices should be listed in the checklist. The review of the drawing should consider the change notices as well as the drawing itself.

9. The reviewer in consultation with the LTR should identify the design inputs and the related subject areas for which the drawing will be reviewed. It is not necessary that all design inputs be reviewed for

incorporation in the drawing being reviewed. The reviewer should select the design inputs considering whether other drawings will be reviewed for incorporation of that input, the project's experience in correctly using the input, and the significance of the input. The drawing is checked for incorporation of the selected inputs and any discrepancies noted.

10. Where appropriate the reviewer may check the drawing to determine whether adequate allowance has been made for inservice inspection, maintenance, repair and testing. This review item is optional. Its use is to be determined by the reviewer in conjunction with the LTR.

11. Where appropriate the reviewer may check the drawing to determine whether the drawing adequately addresses installation and construction requirements. This review item is optional. Its use is to be determined by the reviewer in conjunction with the LTR.

12. The reviewer should provide a summary of the results of the review. The summary should comment on the significance of any deficiencies or inconsistencies which were identified.

4.0 MODIFICATION OF CHECKLISTS

As stated in Sections 2.2 and 2.3, Technical Reviewers and LTRs may modify ("customize") individual generic checklists as necessary to satisfy the particular requirements of a specific review item. In each such case, the checklist section entitled "checklist modifications" shall be filled out, listing attachments (new checklist items) as applicable. Items of the generic checklist that are not required to complete the review should be marked "not applicable". Signatures of

- the LTR and Manager, Design Verification shall be required in addition to that of the Technical Reviewer, indicating their approval of the modified checklist.

PROJECT INSTRUCTION			
PI- 3201 - 007		SUBJECT: Use of Construction Verification Checklists	
REV.: 0	DATE: 7/5/83		
PAGE 1	of 32	PREPARED BY:	APPROVED BY:

1.0 GENERAL

1.1 Purpose

The purpose of this instruction is three-fold:

1.1.1 Specify and define those checklists to be utilized in conducting the Independent Construction Verification (ICV) review as part of the Midland Independent Design and Construction Verification (IDCV) Program and thereby establish a consistent method for the acquisition of important data and information by different technical reviewers.

1.1.2 Specify and define that data and information which will necessarily be recorded and assimilated as part of the ICV review process. The data and information specified on the checklists will constitute the minimum data base of construction review-related information. These data will be subject to evaluation to discern and verify the quality of construction.

1.1.3 Provide lead technical reviewers (LTR) and other personnel participating in the ICV review portion of the Midland IDCV Program with definitive instructions and guidance for completing the checklists. The instructions specified herein address not only the preferred sequence for acquisition of the data but also a preferred sequence for utilization of each checklist - i.e., proceeding through summary levels of data acquisition and data evaluation.

1.2 Scope

This instruction defines those formal generic checklists to be used in conducting the ICV review process and establishes the minimum amount of data and information to be acquired in executing the ICV review methodology.

1.3 Listing and Identification of Check-Off Lists

1.3.1 Documentation Verification - Exhibit 1

Check-off list utilized to record those requirements imposed upon suppliers and vendors which define the specific documents to be submitted to fulfill and satisfy procurement and specification requirements.

1.3.2 Documentation Availability Checklist (DAC) - Exhibit 2

The DAC is used to document the process and sources of information used to complete the Documentation Verification Checklist (Item 1.3.1) and to provide a consistent format for documenting the results of evaluating the completeness of vendor documentation submittals.

1.3.3 Supplier Documentation Functional Review (SDFR) - Exhibit 3

The SDFR provides the format and directs the recording of data relevant to the following specific categories of vendor-supplied documentation.

- o Instructions (operation, maintenance, etc.)
- o Cleaning & Coating Procedures
- o Certified Material Reports
- o Supplier Shipping Procedures

1.3.4 Verification of Supplier Documentation Adequacy - Exhibit 4

This form is used in consort with the SDFR (Item 1.3.3) to evaluate the adequacy of the vendor's documentation submittal. For each line item entry on the SDFR (Item 1.3.3) a Verification of Supplier Documentation Adequacy form will be completed.

1.3.5 Time-Base Evaluation of Vendor Documentation Submittals - Exhibit 5

This form provides the format for establishing a method to evaluate the timeliness of certain vendor documentation submittals associated with a specific component. Vendor documentation submittals are compared on a time-base against two key events in the construction process.

1. Date the component is received at the site
2. Date the component is withdrawn from storage for installation.

1.3.6 Receipt Inspection - Exhibit 6

The Receipt Inspection check-off list is used to record data necessary to characterize and identify the receipt inspection activities performed for a

specific component and to provide a consistent method for documenting the evaluation of the receipt inspection.

1.3.7 Storage and Maintenance Checklist - Exhibit 7

The Storage and Maintenance Checklist is utilized to direct the acquisition of data and information necessary to evaluate the adequacy and efficacy of storage and in-place maintenance activities as performed for a specific component.

1.3.8 Review of Selected Verification Activities Checklist - Exhibit 8

This checklist provides a guide for the collection and recording of summary information related to the review of overinspection and related site verification programs - e.g., cable overinspection, bolt hardness, PSDIV. This checklist is used in conjuntion with program-specific checklists to document the results of the ICV review of selected verification activities.

1.3.9 Overinspection of Selected Electrical Cables within Sample Boundaries - Exhibit 9

This checklist, derived in part from checklists used as part of the Midland Cable Overinspection Program, provides for the recording of information pertaining to the execution and evaluation of data collected as part of the cable overinspection program. This checklist is used in consort with checklists 1.3.10, Personnel Qualification and Training Checklist; 1.3.11, Test and Measuring Equipment Checklist; and 1.3.12, Document Control Checklist to record the minimum amount of data critical to the ICV review and evaluation of the cable overinspection program.

1.3.10 Personnel Qualification and Training Checklist - Exhibit 10

The Personnel Qualification and Training Checklist is used in consort with verification program-specific checklists (e.g. 1.3.9, Overinspection of Selected Electrical Cables Within Sample Boundaries) to record and document the review of training and qualification of personnel participating in the applicable site verification program activities.

1.3.11 Test and Measuring Equipment Checklist - Exhibit 11

Similar to the previous checklist, Item 1.3.10, this checklist is used in consort with verification program-specific checklists to record and document the review of controls and methods of use employed for mesuring and test equipment during a site verification activity.

1.3.12 Document Control Checklist - Exhibit 12

The Document Control Checklist is used in conjunction with verification program-specific checklists to record the results of the ICV review of document handling practices employed as an intergral part of the site verification program.

(Additional checklists are currently under development and/or in the approval cycle. These checklists will principally guide ICV reviewers through the Construction/Installation Documentation and Physical Verification reviews. As these checklists are approved for use, their titles and descriptions will be added to this listing and an example of the checklist itself included as an exhibit to this instruction).

2.0 RESPONSIBILITIES

2.1 Technical reviewers shall ensure that applicable generic checklists are used when conducting their portion of the ICV review and that the checklists are completed in an accurate and thorough manner.

2.2 The technical reviewers, LTRs and Manager, Site Activities, in collaboration with the Manager, Construction Verification Activities, will constantly monitor the adequacy of existing checklists and identify the appropriateness and need for additional checklists. Revisions to existing checklists or incorporating new checklists for use in the ICV review will be the responsibility of the lead technical reviewer.

2.3 LTRs are responsible for modification ("customization") of checklists, as necessary, to conduct the ICV review within the scope of their review areas. They are also responsible for training technical review personnel in the use of generic checklists and/or modified checklists.

2.4 Should a revision to an existing checklist be made, the LTR shall be responsible for verifying that data collected and recorded on checklists completed prior to the revision need not be supplemented or modified. The LTR will direct the acquisition of supplemental data or modification of data already collected in those instances where a revision to an existing checklist impacts the scope of review already conducted using the previous checklist. This includes checklists completed prior to the initial issuance of this instruction. However, if completed engineering evaluations contain the requisite information, new checklists will not be required.

3.0 INSTRUCTIONS FOR COMPLETION OF CHECKLISTS

The following instructions will be used by technical reviewers participating in the ICV review. The first and foremost instruction is, "the checklists will be used and every effort will be expended to ensure that data collected is done so from unimpeachable sources." To the extent practical, all data required to complete a particular checklist shall be collected and collected data shall be accurately recorded.

The instructions which follow range in detail from a general statement relative to a checklist's applicability and use to very specific, step-by-step directions. The level of detail provided in the following instructions is directly dependent upon the explanatory information contained on the checklist itself. Those checklists which are self-explanatory require less detailed instructions for completion than those checklists which require information and data which are more difficult to obtain or whose meaning is not readily apparent to the ICV reviewer based upon information provided on the checklist itself.

Instructions for acquiring and recording the data necessary to complete the checklists are provided in the following sections. The following sections have first been categorized by the review category and then, within each review category, by the checklist(s) applicable to that review category. The five review categories applicable to the ICV review process are as follows and correspond to the five numbered sections of this instruction.

- Review of Supplier Documentation
- Review of Storage and Maintenance Documentation

- o Review of Construction/Installation Documentation
- o Review of Selected Verification Activities
- o Verification of Physical Configuration

3.1 Review of Supplier Documentation

3.1.1 Documentation Verification Form (Exhibit I)
(Completed in consort with the Documentation Availability Checklist)

1) Enter the description of the component(s) for which the form is being initiated in the space provided after the words "Applicable To:"

Example: Valve and operator for valve number 2LV-3975A

2) Enter the applicable specification number in the space provided. A new form will be initiated for each specification applicable to the same component. A component typically will have a principal specification, which defines the design requirements of the component, in addition to other specifications of a more general nature which are incorporated as part of the procurement by the principal specification. Examples of specifications of a more general nature would be the seismic design requirements spec., cleaning and coating spec., QA program requirements spec., etc.

3) To complete the entries in the "SPEC PARA" and "DOCUMENTATION REQUIREMENT" columns proceed as follows:

a) Obtain a copy of the latest revision of the specification and material requisition applicable to the component/item being reviewed. A copy may be obtained from either site Document Control or from the Bechtel-Ann Arbor Document Control Center.

b) Review each applicable specification and material requisition. The review will consist of noting each specification paragraph which states or imposes a requirement upon the vendor to submit a form of documentation - i.e., wiring drawings, welder qual. records, CMTR's, etc. In the columns provided enter the applicable specification paragraph number and a brief statement of the documentation requirement.

(Note: A new form will be initiated for each specification applicable to the component/item under review.)

4) Having completed a review of the specifications, compare the documentation requirements annotated on the Documentation Verification form to the Bechtel-prepared G-321-D form. The G-321-D form is an integral part of each material procurement and defines, in a tabular manner, the documentation requirements imposed upon the vendor/supplier.

a) When a documentation requirement, as entered on the Documentation Verification form, is indicated as being required on the G-321-D form, enter a "YES" on the applicable line in the "NOTED ON G-321-D" column and enter the document category number in the space provided. Associated with each G-321-D form is a listing of document category descriptions which assigns a number to a specific category of documents - e.g., 4.1 = Erection/Installation Instructions; 15.0 = Cleaning and Coating Procedures & Verification Documentation.

b) Place a check on the G-321-D form next to each document category which has been entered onto the Documentation Verification form.

As a result of performing these steps the reviewer will have the following:

1. A Documentation Verification form delineating all documentation requirements imposed by a specific specification paragraph and entries indicating which documentation requirements are also indicated on the G-321-D form.

2. A G-321-D form appropriately checked to indicate which document categories have been entered onto the Document Verification form.

The next step in completing the Document Verification form is to enter onto the form those document categories indicated as a documentation requirement on the G-321-D form, but which are not indicated as a requirement on the Documentation Verification Form.

5) Using the G-321-D form, note those document categories which have not been entered onto the Documentation Verification form (or those document categories which have not been checked). For each document category not checked on the G-321-D form, make a line entry onto the Documentation Verification Form by performing the following steps:

a) Enter a "YES" in the "Noted on G-321-D" column

b) Enter the Document Category Number in the space provided

c) Enter the definition of the document category number in the Document Requirement Column.

As a result of performing these first five (5) steps the Documentation Verification Form will have the following entries.

a) Specification Number

b) Description of the component being evaluated

c) Entries indicating that a documentation requirement called for in a specification paragraph is also addressed as a requirement on the G-321-D form

d) Entries indicating that a documentation requirement called for in the specification is not indicated as a document requirement on the G-321-D form

e) Entries indicating that a documentation requirement is indicated on the G-321-D form, but not specified as a requirement in the body of the applicable specification.

The next steps relate to conducting a review of available vendor documentation and documenting the results of the review.

6) Enter a brief description and mark number of the component being reviewed at the head of a column in the area identified on the Documentation Verification form by the words "COMPONENT I.D.".

Examples: Valve 2LV-3975A; Motor 2P005A; Flow Transmitter 2FT-3975AA2, etc.

7) Obtain a copy of the most recent Supplier Document Register from Bechtel-Ann Arbor Document Control. The Supplier Document Register may be requested by providing the number of the principal procurement specification.

8) Obtain all aperture cards and microfiche which contain images of vendor-supplied documents applicable to the component/item under review. Similar to acquiring the Supplier Document Register, the applicable aperture cards and microfiche may be obtained from Bechtel-Ann Arbor, Document Control by providing the principal specification number.

9) Review the vendor-supplied documentation using the aperture cards/microfiche and Supplier Document register. When a vendor-supplied document satisfies a document requirement as annotated on the Documentation Verification form, enter the sequence number of the document on the appropriate line under the Component ID column. The sequence number is obtained from the Supplier Document Register.

Not all of the vendor-supplied documentation is retained in Bechtel-Ann Arbor Document Control. Certain quality-related documentation such as Code forms, CMTR's, and welding qualification documentation is retained in the QA vault located at the site. Access to this documentation is obtained as follows:

10) Provide the Bechtel site Receiving QC organization with a description of the component being reviewed and the applicable purchase order item number and principal specification number and request the corresponding Ann Arbor Engineering Order (AEO) number.

11) Provide site QC vault custodians with the specification and AEO number and request to see the AEO packages.

12) Review the vendor-supplied documentation contained within the "AEO" packages. When a vendor-supplied document satisfies a document requirement as annotated on the Document Verification Form, enter the AEO number on the appropriate line under the Component ID column.

3.1.2 Documentation Availability Checklist (DAC) - Exhibit 2

The data and information required to complete the DAC will be obtained at the same time that the Documentation Verification Form (Article 3.1.1) is being completed.

1) Obtain a number for the DAC form from the LTR and insert the assigned number in the space provided.

2) Complete the first page of the DAC by noting the required information as information is collected in preparing the Documentation Verification form (Article 3.1.1). Of special note are the required entries as follows:

   a) Item # 5.0 System, and 5.1 Startup System Designator, may be obtained from cross-reference indexes as retained at the site Document Control Center

   b) Item # 6.6, Material Receiving Report No(s)., and 6.7, Quality Control Inspection Report No(s). are typically included as part of the AEO package as obtained from the Site QC Vault custodian. (See Article 3.1.1, Step numbers 10 and 11, for the actions necessary to obtain the AEO data packages.)

3) Using as a reference the completed Documentation Verification Form, complete Item # 7.0 as follows:

   Note those lines on the Documentation Verification form which do not have an entry in the "Noted on G-321-D" column and transfer the required information from the Documentation Verification form onto the DAC.

4) Using as a reference the completed Documentation Verification Form, complete Item # 8.0 as follows:

   Note those lines on the Documentation Verification form which have an entry in the "Noted on G-321-D" column, but do not have an entry in the "Spec. Para" column and transfer the required information from the Documentation Verification form onto the DAC.

5) Using as a reference the completed Documentation Verification Form, complete Item # 9.0 as follows:

   Note those lines on the Documentation Verification form which do not have an entry in the "Component ID" column and transfer the required information from the Documentation Verification form onto the DAC.

6) Item # 10.0, Comments of IDCV Reviewer, shall contain the results of the reviewers evaluation of the entries in Item # 9.0. It is important to note that the reviewers comments will address the significance of not receiving the documentation as entered in Item # 9.0 and will not address the adequacy of the documentation which has been submitted.

If in the opinion of the reviewer the significance of the missing documentation warrants an OCR Report, the applicable OCR Report Number shall be entered in Item # 10.1.

3.1.3 Supplier Documentation Functional Review (SDFR) Form - Exhibit 3

The SDFR will be completed subsequent to completing the Documentation Verification Form (Article 3.1.1) and the Documentation Availability Checklist (Article 3.1.2). For each line entry on the SDFR a Verification of Supplier Documentation Adequacy Form (Article 3.1.4) will be completed.

1) Obtain a number for the SDFR form from the LTR and insert the assigned number in the space provided.

2) Enter the requested data as contained in the header information. The requested data may be copied from the applicable Documentation Availability Checklist (Article 3.1.2). The entry for "Bechtel Specification" will be the number of the principle Bechtel Specification for the component under review.

3) Using as a reference the completed Documentation Verification Form (Article 3.1.1), enter in the column entitled "Bechtel Doc. No." the Supplier Document Register Sequence No. or AEO Number corresponding to the applicable document category.

4) For entries in the "Bechtel Doc. No." column, which are Supplier Document Register Sequence Numbers, note the Spec and Sequence Number and request the corresponding aperture card/microfiche from Bechtel-Ann Arbor Document Control. Review the document which corresponds to the assigned sequence number and note and enter the following data onto the SDFR.

   a) "Date Reviewed for Use" will be the date written in the Stamped Review Block which appears on the first page of each vendor document submittal.

b) Vendor Document Number, Revision, Date and Vendor Document Title.

c) In those instances when the document category was not identified on the Documentation Verification Form as being a required document submittal, enter the words "Not specified as a required document" on the applicable document category line.

d) In those instances when the document category was specified as a required document on the Document Verification Form but was not supplied by the vendor, enter the words "Specified but not supplied" on the applicable document category line.

e) In those instances when the document category is obviously not applicable to the component being reviewed (e.g., Impact Test Data for a Motor) enter the words "Not Applicable" on the appropriate document category line.

5) For entries in the "Bechtel Doc. No." column, which are AEO Numbers, note the Specification and AEO Number and request the corresponding AEO data package from the Site QC Vault custodian. Review the document which corresponds to the applicable AEO and document category and enter the following data onto the SDFR.

a) "Date Reviewed for Use" will be the date that the entire AEO data package was reviewed and deemed acceptable

b) Vendor Document Number, Revision, Date and Vendor Document Title

c) Refer to Step 4 of this procedure, Items 4c, 4d and 4e, for exception entries.

3.1.4 Verification of Supplier Documentation Adequacy Form - Exhibit 4

This form will be completed in consort with the SDFR (Article 3.1.3). A Verification of Supplier Documentation Adequacy form will be completed for each unique entry which appears on the SDFR under the column entitled "Bechtel Doc. No."

To complete the form, reference will be made to the Document Verification Form (Article 3.1.1), and the SDFR.

1) Complete the form's header information by transferring the applicable data from the corresponding SDFR. Of special note is the entry to be made in the "Applicable Doc. Category" field. A vendor-supplied document, such as an instruction book, may be applicable to more than one document category. In such instances, insert the document categories to which the vendor's document is applicable. Thus one Verification of Supplier Documentation Adequacy Form will be completed for each unique entry which appears on the SDFR under the column "Bechtel Doc. No."

2) Acquire a copy of the applicable Bechtel Specification from either the site or Bechtel-Ann Arbor Document Control Centers.

3) Acquire the aperture card/microfiche which contains the images of the document, when the applicable document is identified by an entry in the Bechtel Doc. No. field. The aperture card/microfiche is obtained through Bechtel-Ann Arbor Document Control by providing the Spec. and Sequence Number.

When the desired document is identified by an entry in the "AEO" field, obtain the AEO data package from the site

QC Vault custodian by providing the AEO # and Specification #.

4) Complete entries in item(s) 1.0 by referring to the Documentation Verification Form and noting the applicable document category and Document Number (Bechtel Doc. No. or AEO).

5) As a result of conducting a review of the applicable specification, enter the requested data into Item 2. Entries in Item 2 shall be those requirements contained within the body of the specification which stipulate the form or format of the required documentation or which stipulate the minimum amount of information content of the vendor submittal.

6) Complete Item(s) 3.0 by first entering requirements, as contained in Items 1.0 and 2.0 of the form, in the column entitled "Bechtel Specification Requirement". Review the vendor's documentation submittal and provide a brief description as to how the information contained within the vendor's documentation submittal satisfies, or does not satisfy, the Bechtel Specification Requirement. Entries are made in the column entitled "Vendor Submittal In Response To Requirements".

7) Complete Item 4.0. Entries in Item 4.0 can be of a subjective nature wherein the reviewer applies his sound engineering judgment to evaluating whether or not the vendor has provided adequate and substantive detail. The evaluation and the results of the evaluation documented in this section will address not only the adequacy of the vendor's submittal in response to specification requirements, but also the usability of the vendor's submittal in maintaining, installing, storing, and operating the subject equipment.

3.1.5 Time-Base Evaluation of Vendor Documentation Submittals - Exhibit 5

The information to be represented on this form enables a quick interpretation of the timeliness of vendor documentation submittals. The required information will be extracted from the Supplier Documentation Functional Review Form (Article 3.1.3) and the Storage and Maintenance Checklist (Article 3.2.2).

1) In the upper left-hand corner of the "Event Description" block enter the component name and tag number - e.g., AFW Pump Motor 2P005A; Flow Transmitter 2FT3975AA2; etc.

2) From the applicable Storage and Maintenance Checklist, Item # 18, note the date the material/component was receipted for at the Midland site. On the line provided corresponding to 1), Component Received at Site, place a triangle indicating the year and month. From the base of the triangle draw a vertical line downward to the line corresponding to Item 4, Storage and Handling Instructions Reviewed for Use.

3) From the applicable Storage and Maintenance Checklist, Item # 19, note the date the material/component was issued from storage. On the line provided corresponding to 5), Component Withdrawn From Warehouse for Installation, place a triangle indicating the year and month.

   From the base of the triangle draw a vertical line downward to the line corresponding to Item 7, Long Term Storage Requirements Reviewed for Use.

4) Using information collected and entered onto the Supplier Documentation Functional Review Form (Article 3.1.3), place a triangle indicating the month and year on the lines corresponding to the following:

2), Cleaning/Coating Procedures Reviewed for Use

3), Shipping Procedures Reviewed for Use

4), Storage and Handling Instructions Reviewed for Use

6), Erection/Installation Instructions Reviewed for Use

7), Long Term Storage Requirements Reviewed for Use.

3.2 Review of Storage and Maintenance Documentation

3.2.1 Receipt Inspection Form - Exhibit 6

1) Enter the description of the item/component under review. The description will consist of a definition of the component plus the component/item tag number - e.g., AFW Pump Motor 2P005A; Flow Transmitter 2FT3975AA2; etc.

2) From the Documentation Availability Checklist (Article 3.1.2) obtain the information necessary for completing entries in Items 1 - 5.1.

3) Complete the entries for Item 6.0, Principal/Major Appurtenances. The entries in this item will be dictated by the method the item/component, described in the header information, has been shipped by the vendor. As an example, a motor-operated valve will be comprised of the valve and the motor operator. Even though the ICV documentation review considers the

valve and operator as two distinct and separate components, the operator and valve are customarily shipped as one, assembled component. In this instance, the motor operator would be considered as a principal/major appurtenance to the valve and the data and information applicable to the operator would be entered here, in item 6.0.

4) The information necessary to complete the entries in Items 7.0 and 8.0 are typically included in the AEO package as obtained from the Site QC Vault Custodian. (See Article 3.1.1, Step numbers 10 and 11, for the actions necessary to obtain the AEO data packages.)

Of special note are the entries made in Item 8.2, Documents Noted on QCIR as Controlling the Receipt Inspection. The entries made in Item 8.2 must be compared against the revision levels of the applicable documentation used as source information for completing the Review of Supplier Documentation. Compare the revision levels of documentation noted in Item 8.2 with the applicable documents and information noted on the appropriate Documentation Availability Checklist (Article 3.1.2) and reconcile the differences. Reconciliation of different revision levels of the same document will be performed by noting the Record-of-Revisions page of the effected document to discern whether or not more recent revisions affect the requirements imposed upon the component/item subject to ICV review.

5) Information required to complete entries in Item 9,0, Description and Disposition of NCR's, Item 10.0, Applicable Supplier Design Deviation of NCR's and Item 10.0, Applicable Supplier Design Deviation Requests

(SDDR's) is obtained from the site Midland Plant Quality Assurance Department (MPQAD). Automated tracking systems utilized to status the dispostion of NCR's and other matters affecting quality are managed and maintained by MPQAD.

6) Associated with each AEO package is typically a G-321-D Form utilized by the receipt inspector/quality inspector to annotate the documentation received from the vendor. Obtain the applicable AEO package (Step 4 above) and complete entries in Items 11.1 and 11.2.

Entries in Item 11.3 are to be made by the ICV reviewer to indicate his evaluation of the completed G-321-D form. Special note should be taken by the ICV reviewer of those instances where documentation required by the vendor, as noted on the G-321-D, was not received or was not considered by the person completing the G-321-D form.

7) Entries in Item 12.0 shall be made by the ICV reviewer to document his findings relevant to the receipt inspection conducted for the component/item under review. As a minimum, comments must address:

- NCR Status
- SDDR Status
- G-321-D Review Status
- Reconciliation of the revision levels of documentation controlling the receipt inspection to most current revision levels of the applicable documentation.

3.2.2 Storage and Maintenance Checklist - Exhibit 7

1) Complete the header information (Items 1-8) by noting the identical entries made on the Documentation Availability Checklist (Article 3.1.2).

2) Entries for Item 9.0, Quality Classification, is obtained from the Material Requisition and/or Purchase Order. Item 9.1, Storage Level, is obtained from the applicable F-1 form (See Step 4).

3) In Item 10, Reference Documents, enter the vendor-supplied documentation which provide guidance for the recommended storage and maintenance of the component/item under review. Entries wil be comprised of information extracted from the Supplier Documentation Functional Review (SDFR) form, Item 4.3, Maintenance Instructions; Item 4.4, Site Storage and Handling Instructions and, where applicable, Long Term Storage Requirements. Information to be entered in Item 10 will be the following:

- Bechtel Document No.
- Vendor Document No.
- Revision
- Date
- Title

Bechtel documents controlling equipment storage are as follows:

FPG-4.000: Storage-Maintenance/Inspection of Equipment and Materials

FPG-5.000: Maintenance/Inspection of Material and Equipment Released for Construction

The ICV reviewer must ensure his familiarity with the above instructions prior to proceeding with the completion of this checklist.

4) For each classification of material and equipment "In Storage" (prior to issue from the warehouse for construction) an F-1 form is prepared in accordance with the requirements of FPG-4.000. The F-1 form delineates the specific storage conditions, storage level, periodic maintenance requirements and inspection intervals. For the component/item under review obtain the applicable F-1 form from the Bechtel site Receiving QC Section. Note the F-1 number and revision level and enter the noted information on the Storage and Maintenance Checklist, Item 11.

5) F-2 forms are defined in Bechtel Procedure FPG-4.000 as F-1 forms which have been used to document the requirements as delineated on the F-1 form. F-2 form numbers are assigned sequentially as an inspection requirement comes due for performance. Deficiencies found during inspections, in addition to actual performance of the inspection, are recorded on the F-2 form. The applicable F-2 form numbers are obtained from the Bechtel site Receiving QC Section and are physically retained in

the Bechtel QC Vault or, if the component has been turned over to CPC, in the CPC vault. Note the beginning F-2 form number and date, and enter the noted information in Item 12 of the Storage and Maintenance Checklist.

6) From the file of completed F-2 forms enter the most recent storage inspection report number in Item #13 and the corresponding date of performance.

7) From the F-1/F-2 form, extract the storage inspection intervals and enter the information in Item #14.

8) From the reference documents entered in Item #10 and the applicable Specification (Item #7), extract and summarize those storage requirements recommended by the vendor(s) and stipulated by the applicable Specification. The vendor's instructions may be obtained from the site vendor document control center or from the Bechtel-Ann Arbor document control center.

9) Compare the vendor recommended storage instructions to those instructions delineated on the applicable F-1 form. Note the results of this comparison in Item #16.

10) Upon a review of the applicable F-2 forms, enter the required information in Item #17.

11) Obtain the dates required by Item #18, Date Material Received and Item #19, Date Material Issued from Storage from the Bechtel site Receiving QC Section.

Items 20 through 27 require information relevant to programs and procedures used to inspect and maintain the item/component once the item/component has been withdrawn from the warehouse and installed in the field.

12) For each item/component installed in the field an F-10 form is prepared in accordance with the requirements of FPG-5.000 as follows. "Information for maintenance/inspection of material and equipment released for construction is provided by preparing the dual purpose maintenance/inspection form (F10/F20). The maintenance/inspection information is outlined in the main body of the form and is issued with a unique F-10 number for implementation." Obtain the F-10 form applicable to the component/item under review and enter the F-10 number in Item #20, Maintenance Procedure Number. The F-10 may be obtained from the responsible Bechtel Field Engineer.

13) Each time the requirements of the implemented F-10 Form are to be reported, compliance or non-compliance and corrective action is reported on a copy of the F-10 Form. This marked-up F-10 Form is issued a unique F-20 number. Obtain the file, file numbers, of the applicable F-20 forms from the responsible Bechtel Field Engineer and/or from the Bechtel QC Vault Custodian. From the file of F-20 forms, enter the information required by Items 21, 22 & 23 on the Storage and Maintenance Checklist.

14) From the reference documents entered in Item #10 and the applicable Specification (Item #7), extract and summarize those in-place maintenance and storage requirements recommended by the vendor(s) and stipulated by the applicable Specification. Enter these recommendations and requirements in Item #24.

15) Compare the vendor-recommended storage instructions to those instructions delineated on the applicable F-10 Form. Note the results of this comparison in Item #25.

16) Upon a review of the applicable F-20 forms, enter the required information in Item #'s 26 & 27.

17) Items 28, 29 & 30 of the Storage and Maintenance Checklist are to be completed based upon the reviewer's evaluation of both the storage and in-place maintenance documentation and programs for the component/item under review. Access to information maintained by both the responsible Bechtel Field Engineer and the Midland Plant Quality Assurance Department (MPQAD) may be required.

18) As part of the verification of storage and maintenance review, a visual inspection of the component/item under review will be conducted. The intent of the inspection is to verify installation status, accurate marking and identification and any obvious damage or lack of maintenance (e.g., protective coverings not installed, space heaters de-energized, etc.). Summarize the results of the visual inspection in Item #31.

19) Upon the evaluation of all information collected during the Storage and Maintenance Review, record the results of the evaluation in Item #32. The findings documented in Item #32, as a minimum. should address themselves to those storage and maintenance activities which have, or have not, been performed and as a result could have a deleterious effect on the component under review.

3.3 Review of Construction/Installation Documentation

(Checklists currently being prepared and/or reviewed for acceptability).

3.4 Review of Selected Verification Activities

3.4.1 Review of Selected Verification Activities Checklist - Exhibit 8

This checklist will be completed in its entirety for each overinspection/site-initiated verification program subjected to ICV review.

1) ICV reviewer will record and document information required by Items 1 through 7 ensuring that sources of information and statusing of activities are confirmed with cognizant and designated CPCo personnel.

2) Careful attention will be given to ensuring that the revision level and source of information for data entered into items 8 and 9 is provided. These data are necessary

to ensure that a "benchmark" is established against which to gauge the status of the verification program at the time the ICV review was conducted.

3) Complete Section 3.3.3 of this instruction, Personnel Qualification Checklist, and summarize inconsistencies, noted deviations, and other attributes of the training/qualification of personnel conducting the overinspection activities in item 10 of this checklist.

4) Complete the checklist corresponding to the overinspection/site- verification program being reviewed (e.g., Section 3.3.2 of this instruction, Overinspection of Selected Electrical Cables within Sample Boundaries). Enter the information requested by items 11 and 12 of this checklist.

5) Complete Section 3.3.5 of this instruction, Document Control Checklist, and summarize inconsistencies, noted discrepancies and other attributes of the document control systems used to manage and control the dissemination, retention, and acquisition of documented information generated by the program being reviewed. Enter the required information in Item 13 of this checklist.

6) Complete Section 3.3.4 of this instruction, Test and Measuring Equipment Checklist, and summarize inconsistencies, noted discrepancies and other attributes of the utilization and control of test and measuring equipment in item 14 of this checklist.

7) Having completed the checklist corresponding to the overinspection/site-verification program being reviewed (Step 4 above), enter the information required to complete item 15 of this checklist and summarize your findings in item 16, Summary.

3.4.2 Overinspection of Selected Electrical Cables within Sample Boundaries - Exhibit 9

This checklist will be used and completed by the ICV reviewer when conducting a review of the Cable Overinspection Program. A checklist will be completed for each cable inspected and the results summarized on this checklist, item 25, and on the Review of Selected Verification Activities Checklist, Section 3.3.1 of this instruction.

3.4.3 Personnel Qualification and Training - Exhibit 10

This checklist will be completed for each overinspection and verification program subjected to ICV review and the results of completing this checklist summarized on the Review of

Selected Verification Activities Checklist, Section 3.3.1 of this instruction.

1) The information required by Section I of the checklist will be completed for each overinspection and verification program subjected to ICV review.

2) Section 2 of the checklist, which contains individual-specific data and information, will be completed for each individual interviewed and reviewed. Thus the Personnel Qualification and Training Checklist will be comprised on one Section I, and as many Section 2's as necessary to correspond to the number of individuals reviewed for qualification and training.

3.4.4 Test and Measuring Equipment Checklist

3.4.5 Document Control Checklist

The above checklists will be completed for each overinspection and verification program subjected to ICV review and the results of completing these checklists summarized on the Review of Selected Verification Activities Checklist, Section 3.3.1 of this instruction.

3.5 Verification of Physical Configuration)

(Checklists currently being prepared and/or reviewed for acceptability).

4.0 MODIFICATION OF CHECKLISTS

As stated in Sections 2.2 and 2.3, ICV Reviewers and LTRs may modify ("customize") individual generic checklists as necessary to satisfy the particular requirements of a specific review item. In each such case, the checklist section entitled "checklist modifications" shall be filled out, listing attachments (new checklist items) as applicable. Items of the generic checklist that are not required to complete the review should be marked "not applicable". Signatures of the LTR and Manager, Construction Verification shall be required in addition to that of the ICV Reviewer, indicating their approval of the modified checklist.

tion procedures, thus requiring additional investigation or confirmatory analysis in areas such as: quality assurance or design control implementation, licensing criteria or commitments compliance, analytical or mathematical technical approach, design analysis evaluation, specifications review, field configuation and constructed product verification, etc. Potential Open Items that are verified by the project team become Open Items, unless they are classified as observations in accordance with Project Instruction PI-3201-005. |2

1.3.2 Open Item

The item has the potential for becoming a Confirmed Item, but additional investigation or confirmatory analysis is necessary to make a final judgement.

1.3.3 Confirmed Item

The item is judged to be an apparent Finding by the review team and will require action, such as additional documentation not utilized by the team that documents the resolution of the item or additional analysis, design or construction changes or procedural changes that may be necessary to resolve the item. Confirmed Items that are later verified become Findings.

1.3.7 OCRs

Reports written to summarize the status of disposition of items under review within the IDCV program prior to any definitive conclusion being made. Definitive conclusions are made at the Finding or Finding resolution stage in the reporting process. The term OCR may generally be interpreted as including Potential Open Items.

2

1.3.8 Project Team

The Project Manager, Manager, Design Verification and Manager, Construction Verification are permanent members of the project team. The Managers, AFW, SEP and CR-HVAC System Reviews and the Manager, Site Activities are part-time members of the project team when issues under their direct responsibility are under consideration. Specific LTRs also participate on the team as required when technical issues within their discipline of review are being discussed.

2.0 RESPONSIBILITIES

2.1 The technical reviewers are responsible for preparing OCR Item Reports, recommending the classification of OCR Items and forwarding these to their Lead Technical Reviewer (LTR). Note that items initially identified by technical reviewers are Potential Open Items until such a time that these items are reviewed and approved by the project team as Open Items.

2.2 The Lead Technical Reviewers are responsible for the review of and concurrence in all Potential Open Items and OCRs forwarded by their technical reviewers, the classification of OCRs, the preparation of Finding Reports and Finding Resolution Reports, and the forwarding of all of these reports to the Project Manager (PM). The LTRs shall consider input provided to them by the technical reviewers. An LTR may perform the duties of the technical reviewer.

2.3 The Project Manager is responsible for periodically organizing meetings or telecons of the project team for the purpose of conducting an integrated review of the classification and significance of OCRs and Findings, and the resolution of Findings.

2.4 The Project Manager is responsible for forwarding OCR Item Reports, Finding Reports, and Finding Resolution Reports to the Principal-in-Charge and Senior Review Team (SRT); and forwarding Confirmed Item Reports, Finding Reports and Finding Resolution Reports to outside parties. The Project Manager may perform the duties of the LTR.

2.5 The project team shall review all Potential Open Items forwarded by the LTRs, review the classification of and attempt to resolve Open or Confirmed Items, conduct further technical review or call for further technical review to clarify, expand or reassess Open or Confirmed Items. The project team is responsible for verification of a Confirmed Item leading to the declaration of a Finding, resolution of a Finding or the re-classification of a Finding as "resolved" by issuance of a Finding Resolution Report. 2

2.6 The Principal-in-Charge (PIC) is responsible for concurring with the classification of OCRs, Findings, Findings Resolution Reports, making a determination if a review of OCRs is required by the Senior Review Team, and directing the Project Manager to forward Con-

firmed Item Reports, Finding Reports, and Finding Resolution Reports to outside parties.

2.7 The Senior Review Team is responsible for reviewing OCR Item Reports as requested by the PIC or the Chairman of the SRT. The SRT shall review all Finding Reports and Finding Resolution Reports, identifying the need for clarification, expansion of review or reassessment by iDCV project personnel. The SRT shall review the safety significance of forwarded OCR Reports and Finding Reports and may recommend a course of action to the PIC and PM for identification of root cause and extent. The SRT shall review the Finding Resolution Reports to assess the acceptability of any remedial actions taken by CPC and the original design or construction organization. 2

2.8 The Chairman of the SRT is responsible for reviewing all OCRs to determine whether a review by the SRT is necessary, independent of the PIC's request for a review of specific OCRs. He is also responsible for coordinating the SRT's review efforts associated with Findings and Finding Resolution Reports and reporting results and recommendations to the PIC and PM.

3.0 PREPARATION

3.1 The preparation of reports under the scope of this Project Instruction shall follow the report generation process shown on the diagram, "Report Flow Chart" (Figure 1).

5.1.1 The following report type identifiers shall be utilized:

P - Potential Open Item Report
O - Open Item Report
C - Confirmed Item Report
R - Resolve Item Report
F - Finding Report
Z - Finding Resolution Report
B - Observations

2

5.1.2 Related OCR and Finding Reports or Finding Resolution Reports shall be assigned the same sequence number, starting from 000 to 999. Note that aii sequence numbers rnay not be used for all report types.

5.2 Retention

The Potential Open Item, OCR, Finding, and Finding Resolution Reports shall be indexed using the appropriate Document Control Register (Attachment D-1 (Potential Open Item Reports), D-2 (Open Item Reports), D-3 (Confirmed Item Reports), D-4 (Resolved Item Reports), D-5 (Finding Reports), and D-6 (Finding Resolution Reports), and filed in the appropriate project controlled documents file. Distribution of originals shall not be made unless specific written instructions are issued to the contrary. All such final documents shall be maintained by the Project Manager or his designated representative.

5.3 Tracking

Potential Open Items, Open Items, Confirmed Items, Resolved Items, Finding Reports and Finding Resolution Reports shall be tracked as to their current status of disposition utilizing the format shown on Attachment E. This tracking system shall be attached to each monthly IDCV program status report.

6.0 DISTRIBUTION AND INTERCHANGE OF INFORMATION

6.1 Confirmed Item Reports (and any associated Resolved Item reports), Finding Reports and Finding Resolution Reports shall be distributed by the Project Manager to CPC (with a carbon copy to the original design or construction organization), NRC and other outside parties on the IDCV program service list upon receiving direction from the Principal-in-Charge. 2

6.2 It shall be the responsibility of the Project Manager to determine when there is a need to have a meeting of the project team with CPC and the original design or construction organization to discuss Confirmed Items, Findings or the resolution of Findings. These meetings shall be controlled in accordance with the provisions of Project Instruction PI-3201-010. 2

7.0 REVISIONS

7.1 Revisions to final documents shall be made, verified, and approved in the same manner as the original document.

7.2 Superseded final documents shall be so identified and transferred to a superseded document binder. The document control register shall note this action by referencing the new revision of the document. Revisions shall be entered into the Document Control Register.

2.0 RESPONSIBILITIES AND APPROVAL

2.1 The technical reviewers are responsible for promptly notifying the appropriate lead technical reviewer should they discover an area of program scope requiring modification.

2.2 The lead technical reviewers in consultation with the Managers, AFW, SEP and CR-HVAC System Reviews and Manager, Site Activities shall continually monitor the technical activities under their direction and compare the activities necessary to achieve project objectives against those activities which have been previously planned. Upon determination that additional activities are needed to achieve project objectives, the lead technical reviewer shall document the additional activities on a Scope Change Request (SCR) form (Attachment 1) and associated data on a Cost and Schedule Considerations (CSC) form (Attachment 2) sign the form and obtain concurrence from his manager.

2.3 The Managers, Design and Construction Verification shall review all SCR and CSC forms and determine whether the proposed scope change is appropriate and if adequate justification has been provided.

They may send the SCRs and CSCs back to the lead technical reviewers and their managers for clarification or additional detail. If satisfied that the scope change is appropriate and that justification has been documented in accordance with this instruction, they shall sign the SCRs and CSCs signifying their approval and forward these to the Project Manager. Upon his review and approval, the Project Manager shall forward the SCRs and CSCs to the Principal-in-Charge.

3.1.3.4 Description of Increase in Scope

The technical activities which will be performed if the scope change is approved shall be listed. The description shall be sufficiently complete to allow project management personnel, the Project Manager and the Principal-in-Charge to evaluate the need for the described activities. 1

3.1.3.5 Basis or Cause of Increase

The lead technical reviewer shall explain why the scope increase is necessary. This explanation shall relate the additional activities to the engineering program plan.

3.1.4 Upon reviewing the completed SCRs and CSCs and obtaining clarification, the Project Manager may add his comments and recommendations for disposition in the space provided for "Comments by PM" on each form. The Principal-in-Charge shall also add his comments as appropriate in the space provided for "Comments by PIC".

3.2 Documentation of Cost and Schedule Considerations

3.2.1 For each Scope Change Request, a Cost and Schedule Considerations form (Attachment 2) shall be completed by the lead technical reviewer.

4.0 ADMINISTRATIVE CONTROL

4.1 Upon completion of the Scope Change Request form and its associated Cost and Schedule Considerations form, the lead technical reviewer shall sign the Scope Change Request and forward it through the concurrence and approval chain defined in section 2.0. 1

4.2 Each Scope Change Request form and its associated Cost and Schedule Considerations form shall have a unique identif cation number consisting of the subject file number (3201-012) followed by a sequential three digit number (001 thru 999). For example: 3201-012-001. The Project Administrator is responsible for assigning the sequential number upon approval of the Project Manager. 1

4.3 The Project Manager or his designee shall maintain an appropriate log of Scope Change Requests which he has received and their status. The dates of budget approval and receipt of contract change notice shall be entered onto the Cost and Schedule Considerations form by the Project Manager when received from Consumers Power Company.

5.0 INITIATION OF ADDITIONAL ACTIVITIES

5.1 Additional scope items described in Scope Change Requests shall not be initiated without the approval of the Project Manager and Principal-in-Charge. Where a lead technical reviewer believes that there are compelling reasons for initiating such new scope items prior to budget approval by CPC, he shall request authorization to proceed from the Project Manager and Principal-in-Charge, through his manager. Reasons for requesting such authorization may include inefficiencies which would result from waiting 1

ATTACHMENT I
MIDLAND IDCV
SCOPE CHANGE REQUEST

Number _____

System/IDCV Topic _____

Review Activity _____

Description of Increase in Scope _____

_____

_____

_____

Basis or Cause of Increase _____

_____

_____

_____

Comments By PM _____

_____

_____

Comments By PIC _____

_____

_____

Initiating LTR _____ Date _____

Manager, AFW, SEP, CR-HVAC or Site Activities _____ Date _____

Manager, ICV or IDV _____ Date _____

Project Manager Approval _____ Date _____

Principal-in-Charge Approval _____ Date _____

STANISLAV FABIC
Associate Principal Scientist

EDUCATION

Ph.D.	Nuclear Engineering, University of California, Berkeley
M.S.	Nuclear Engineering, University of California, Berkeley
M.E.	Mechanical Engineering, University of Melbourne, Australia
B.E.	Mechanical Engineering, University of Melbourne, Australia Naval Architecture, University of Zagreb, Yugoslavia

SUMMARY OF EXPERIENCE

Present Principal Scientist, TERA Corporation.

1982-Present President, Dynatrek, Inc.

1973 - 1981 Chief, Analysis Development Branch, Nuclear Regulatory Commission. Supervised professionals (all GS-15 grade) engaged in managing various research programs, conducted at five National Laboratories and various universities in the area of analysis development and verification, for applictaion to nuclear safety. Yearly budget over $10 M. As a Branch Chief, responsible for identification of goals, plans, work programs, selection of contractors, review of work progress, and reporting of accomplishments to NRC higher level management, Commissioners, Advisory Committee for Reactor Safeguards, and Congressional Committees. From July 1979 was a member of the Senior Executive Service.

Chairman of the NRC/RES Containment Review Group. Member of the following: (a) NRC/RES Advanced Code Review Group, (b) NRC/RES Code Assessment Review Group, (c) CSNI/NEA Working Group on ECCS (Paris, France), (d) CSNI/NEA Working Group on Containments, (e) NORHAV (Nordic Countries) Review Group, and (f) Marviken IV Project Board (Sweden).

1967 - 1973 Advisory Engineer, Westinghouse Nuclear Energy Systems. At Westinghouse, Pittsburgh, involved in the methods development for analyses of the following: (a) blowdown-induced forces on piping, reactor, and steam generator internals; (b) blowdown-induced thermal and hydraulic transients in the primary coolant system before and after injection of the emergency coolant; (c) pipe rupture (break opening time); (d) choked two-phsae flow during blowdown; and (e) steam generator feed-line break (hydro-elastic analysis).

Participated in drafting Westinghouse position statements on matters pertaining to ECCS hearings.

1963 - 1967	Project Engineer, Kaiser Engineers. At Kaiser Engineers, Oakland, worked on the following projects: (a) Hallogen and noble gas removal; (b) blowdown analyses for the preliminary design of LOFT test facility; and (c) thermal radiation from the nuclear rocket exhaust plume at NERVA test facility.
1958 - 1963	Research Engineer, Institute of Engineering. At the Institute of Engineering Research, Berkeley, participated in a research project on transient boiling and boiling incipience.

PROFESSIONAL AFFILIATION

American Nuclear Society
Sigma-Xi

PUBLICATIONS AND LECTURES

Books

S. Fabic, "Review of Existing Codes for Loss-of-Coolant Accident Analysis", pp. 365-404 in ADVANCES IN NUCLEAR SCIENCE AND TECHNOLOGY, Vol. 10 Edited by E. Y. Henley, Y. Lewins, M. Becker, (Plenum Publishing Corp., 1977).

S. Fabic, "Accident Analysis", Chapter 6.6 in HANDBOOK OF MULTIPHASE SYSTEM, Editor G. Hetsroni, (Hemisphere Publishing Corp., 1981).

Technical Paper (Sole Author)

"BLODWN-2: Westinghouse APD Computer Program for Calculation of Fluid Pressure, Flow, and Density Transients During a Loss-of-Coolant Accident", ANS Transactions Vol. 12, No. 1, p. 358 (1969).

"Investigation of Methods for Coupled Structural Hydrodynamic Analysis of Reactor Internals" Proceedings, Conference on Flow Induced Vibrations in Reactor System Components, ANL-7685 (1970).

"BLODWN-2 Code Prediction of Pressure Undershoot During Transition from Subcooled to Saturated Blowdown" ANS Transactions Vol. 13, No. 1, p. 386 (1970).

"Two- and Three-Dimensional Fluid Transients" ANS Transactions Vol. 14, No. 1, p. 360 (1971).

"Comparisons Between Results of the Westinghouse Loss-of-Coolant Analyses and Semiscale (ECC) Test Data Part II: BLODWN-2A Code Results," CONF-730304, p. 702 (1973).

"Data Sources for LOCA Code Verification," Nuclear Safety Journal, Vol. 17, No. 6, (Nov.-Dec., 1976).

"Computer Codes in Water Reactor Safety: Problems in Modeling of Loss-of-Coolant Accident," Conf. Heat-Fluid Flow in Water Reactor Safety, Manchester, U.K., paper C201/77 in Proceedings, Institute of Mechnical Engineers, London, England (Sept. 1977).

"Analytical Modeling of Transient Two-Phase Flow," ANS Transactions 1979 Summer Annual Meeting in Atlanta, Georgia, (June 1979).

"Code Assessment for Nuclear Reactor Accident Analysis Programs," 1980 International Conf. on World Nuclear Energy, Washington, D.C., pp. 254-255, ANS Transactions Vol. 35, (1980).

Reports

1. Company Reports (All Sole Author)

   a. Kaiser Engineers Division of Kaiser Industries Corp.

      1. "Early Blowdown (WATER-HAMMER) Analysis for Loss-of-Fluid Test Facility," 65-28-RA (1965).

      2. "Digital Computer Blowdown Analysis for Loss-of-Fluid Test Facility, Part I: Engineering," 65-29-R (1965).

      3. "MERCURY: Digital Computer Program for Heat Transfer Analysis," 66-26-R (1966).

      4. "GASRAD: Digital Computer Program for Calculation of Thermal Radiation from Plumes," 67-11-R (1967).

      5. "Computer program WHAM for Calculation of Pressure, Velocity, and Force Transients in Liquid Filled Piping Networks," 67-49-R (1967).

   b. Westinghouse, Nuclear Energy Systems, PWR Systems Division

      1. "BLODWN-2: Digital Computer Program for Calculation of Hydraulic Transients During a Loss-of-Coolant Accident," WCAP-7235 (1968).

      2. "Tornado Induced Water Removal from Spent Fuel Storage Pool," WCAP 7313-L (1969).

      3. "Topical Report, Loss-of-Coolant Analysis: Comparison Between BLODWN-2 Code Results and Test Data," WCAP-7401 (1969).

      4. "Calculation of Loss-of-Coolant Through a Propagating Longitudinal Crack, Using the Modified BLODWN-2 Code," WCAP-7405 (1969).

      5. "Preliminary Report on Synthesis of Equivalent Piping Networks for Blowdown Analysis of the Reactor Primary Coolant System, with BLODWN-2 Code," WCAP-7421-L (1969).

      6. "Description of the BLODWN-2 Computer Code," WCAP-7593 (1970).

      7. "Application of BLODWN-2 Code to PWR Loss-of-Coolant Analysis," WCAP-7489 (1970).

      8. "Feed-Line Break Analysis for Model-D Steam Generator," WCAP-8158 (1973).

II. Government Sponsored Reports: Reactor Technology TID-4500

Issued by Institute of Engineering Research, University of California, Berkeley, under AEC Contract AT(11-1)-34, Project 42: "Reactor Heat Transients Project".

1. "Reactor Heat Transients Research, Annual Summary Report," SAN-1002, TID-4500, 16th Edition (Nov. 1961) (co-author).

2. "Reactor Heat Transients Research, 1962 Annual Report," SAN-1007, TID-4500, 18th Edition (March 1963) (co-author).

3. "Vapor Nucleation on Surfaces Subjected to Transient Heating: Ph.D. Thesis," SAN-1008, TID-4500 (August 1964) (sole author).

4. "A High Pressure Test Facility for Transient Boiling Studies," SAN-1010, TID-4500 (June 1963) (principal author).

III. Reports Issued by Nuclear Regulatory Commission

S. Fabic and P.S. Andersen, "Plans for Assessment of Best Estimate LWR Systems Codes," NUREG-0676 (July 1981).

Lectures (All Invited)

"Design Basis Accidents and Containment Criteria for LWR's"

Presented at IAEA Interregional Training Course on Nuclear Power Plant Construction and Operations Management, at Argonne National Laboratory. (Courses sponsored by the International Atomic Energy Agency).

Lectures presented during:

1. Fall Session (Sept.-Dec., 1976),

2. Spring Session (Jan.-April, 1977),

3. Fall Session (Oct.-Nov., 1977).

4. "Emergency Core Cooling System Performance," Two lectures presented at the IAEA Training Course in Nuclear Power Safety Analyses Review, at Argonne National Laboratory (Sept. 1978).

5. "Nuclear Reactor Safety Applications," Lecture presented at the course, "Two-Phase Flow" at Drexel University (Continuing Professional Education), Philadelphia (Dec. 18, 1978).

6. "Survey of LOCA Computer Codes," (Lecture #LWRS/80/7) and "LOCA Computer Code Assessment," (Lecture #LWRS/80/11), Two lectures presented at the ISPRA Course (1980) titled "Thermal-hydraulic Problems Related to LWR Safety", sponsored by Commission of the European Communities Joint Research Center, Ispra, Italy (May 19-23, 1980).

7. "Application of Computer Codes to Resolution of LWR Safety Issues," Lecture presented at a Seminar on Two-Phase Flow, Massachusetts Institute of Technology (April 30, 1981).

Panels

1. As a member of the panel on "Loss of Coolant Accidents in Nuclear Reactors," Eighth National Heat Transfer Conference (ASME-AICHE), in Los Angeles, presented a discussion of methods of blowdown analysis (August 8, 1965).

2. "Summary Review of Meeting Highlights - Understanding NSSS Response to Design Basis Events," presented at ANS Thermal Reactor Safety Meeting at Sun Valley, Idaho (August 1977).

3. "Problems in Simulation of Nuclear Reactor Plant Thermal Hydraulics for Postulated Small and Intermediate Break Accidents," presented at the Simulation and Analysis Panel, Working Conference on Advanced Electro Technology Applications to Nuclear Power Plants, sponsored by NRC and IEEE, Washington, D.C. (Jan. 15-17, 1980).

4. "How Good the Codes Have To Be," Third CSNI Specialist Meeting on Transient Two-Phase Flow, California Institute of Technology (March 1981).

DAVID S. POCACHA
Associate Welding Engineer

EDUCATION

M.S.	Welding Engineer, Ohio State University
B.S.	Mechanical Engineering, Drexel University

SUMMARY OF EXPERIENCE

Mr. Pocacha has experience in the area of nondestructive testing. He has been responsible for the direction and supervision of engineering and welding technicians engaged in nondestructive testing and steel and metal inspection services for several major industry projects.

Present	Associate Welding Engineer, TERA Corporation.
1980 - Present	Law Engineering Testing Company, Metals Department Manager/Projects Metal Engineer at Lake Buena Vista, Florida. Consulting engineer specializing in welding engineering, metallurgy and manufaturing processes. As Project Engineer for construction of EPCOT Center at Walt Disney World in Florida, responsibilities included coordination of all metals inspection services for shop fabrication and field erection. Metal consultant services were provided to project engineers to solve construction and QA problems.
1979 - 1980	Senior Manufacturing Engineer, Martin Marietta Serospace, Orlando, Florida. Responsibilities included providing welding engineering design and weld process development for manufacturing of aerospace components.
1975 - 1977	Welding Engineer, Perry Oceanographics, Inc., Riviera Beach, Florida. Duties involved total responsibility for qualifying welding procedures and welders, training and development, and fabrication methods and design.

CERTIFICATION/REIGSTRATIONS

Professional Engineer, Florida Certified Welding Inspector - American Welding Society

PROFESSIONAL Associations

American Welding Society
American Society for Metals
American Society for Non-Destructive Testing - Central Florida Chapter Treasurer

PAUL J. BRUNER, JR.
Associate Construction Engineer

EDUCATION

B.C.E. Auburn University
Associate in Architectural Engineering Technology, Southern Technical Institute

SUMMARY OF EXPERIENCE

Mr. Bruner has held a wide variety of responsibilities associated with both technical and managerial services. Having spent some years performing the duties of an engineering technician and considerable time in coordinating the activities of engineering technicians under his supervision, he is well acquainted with construction practices and techniques and quality control, assurance and reliability of construction materials. Supervisory duties have included review of test results, preparation of proposals for prospective projects, direction of engineering technicians involved in subsurface soil sampling, construction of observation wells, soil, concrete, reinforcing steel, structural steel, and asphaltic concrete inspection and a thorough understanding of professional liability. Performance of his work, including submittal of technical reports, has required extensive communication with external contacts to develop projects and relate findings, conclusions and recommendations. Special studies conducted or participated in by Mr. Bruner include soil investigations, hydrological studies, steel structure integrity surveys, radiography training, and asphalt mix designs.

Present Associate Construction Engineer, TERA Corporation.

Manager, Construction Services, Law Engineering Testing Company. Mr. Bruner has worked with all the local power companies including Potomac Electric Power Company, Virginia Electric Power Company, and Baltimore Gas and Electric. Services provided included materials quality control and acceptance testing, construction inspection and testing, and NDT work. These services were provided at both fossil fuel and nuclear power plants including Calvert Cliffs Nuclear Power Plant and North Anna Nuclear Power Plant.

REGISTRATION

Professional Engineer - Virginia, Maryland and District of Columbia

PROFESSIONAL ASSOCIATIONS

American Society of Civil Engineers

JOHN R. SMITH
Associate Construction Engineer

EDUCATION

Civil Engineering/Electronics - Army, Navy and Marine Schools

SUMMARY OF EXPERIENCE

Mr. Smith is nationally known for his work and consultation on quality assurance and reliability on a diverse range of construction projects under a considerable variety of climatic conditions. His ability to investigate special and unusual problems is exemplified by his work pertaining to technical evaluation of problems related to all types and phases of construction and of causes of structural failure, research and recommendations for corrective action, and disposition of nonconforming materials.

Mr. Smith's continuing research and continuing active participation in American Concrete Institute Committees and ASTM has resulted in numerous publications. Among the topics addressed are statistics, cost factors in concrete construction, concrete compaction by internal vibration, summer concreting, use of calcium chloride, testing hardened concrete, and load tests of full scale construction (part of an ASTM symposium). Mr. Smith has appeared numerous times as a successful expert witness on ultrasonics, concrete, coatings and construction. His broad knowledge of construction, his familiarity with related disciplines, and numerous studies of construction problems and failures has given him a vast comprehension of construction techniques, materials testing techniques and the ability to choose, evaluate and correlate findings provided by different testing methods.

Present Associate Construction Engineer, TERA Corporation.

Project Engineer/Consultant, Law Engineering Testing Company. In his position as technical head of inspection departments, he has developed expertise in defining the scope of problems, establishing and operating reporting systems, planning and executing projects requiring coordination of field and lab work and review of the work of outside and internal professional associates and technicians. Independent decision making and judgment are constantly required. His duties have included communication with external contacts to develop projects and relate findings, conclusions, and recommendations.

REGISTRATION

Professional Engineer - California and Wisconsin

PROFESSIONAL ASSOCIATIONS

American Concrete Institute (Member committees 303 and 309)
American Society for Testing and Materials (Member committees C12, C13 and E30)
National Society of Professional Engineers (National)
American Society for Quality Control
Professional Engineers in Private Practice

RICHARD H. NORRIS
Associate Metallurgical Engineer

EDUCATION

B.S. Materials Engineering, North Carolina State University

Continuing Education Courses in Welding Design and Process Selection, Metallurgical Factors in Weldment Design, and Management Principles, North Carolina State University

SUMMARY OF EXPERIENCE

Mr. Norris has extensive experience in engineering failure analyses and accident reconstruction associated with engineering materials systems. He has conducted studies into failures in boats, engines, boiler systems, cooling systems, tools, machinery, equipment and sub-assemblies. He has conducted fracture face analyses and composition analyses of many materials. Mr. Norris also has considerable experience in engineering materials evaluation in determining compliance of materials such as ferrous and non-ferrous metals and their alloys, lubricants, cooling mediums, etc. and related quality of the work in compliance with ASTM, AWS, ASME, ASNT and AISI standards, specifications and/or codes. He has extensive experience in use of destructive and non-destructive testing techniques. Mr. Norris has participated in programs for the engineering evaluation and testing of engineering metallic materials to develop engineering data for special purposes or to characterize the material as to suitability, weldability, electrochemical compatibility, etc. Other areas of expertise include corrosion of metals, joining processes of metals, heat treating and metallic materials manufacturing processes.

Present Associate Metallurgical Engineer, TERA Corporation.

Staff Metallurgist, Law Engineering Testing Company. Responsible for all of the metallurgy-related duties in the Charlotte, North Carolina Branch, where he is an expert on the application of metallic materials such as aluminum, copper and other non-ferrous metal, as well as carbon steels, stainless steels and other ferrous metals.

REGISTRATION

Engineer-in-Training, North Carolina

PROFESSIONAL ASSOCIATIONS

American Society for Metals
American Welding Society
American Institute for Metallurgical Engineers

JAMES B. McILVAINE, P.E.
Senior Mechanical Engineer

Education

M.S.	Nuclear Engineering, Purdue University
B.S.	Applied Science, U.S. Naval Academy
1974	Radioactive Waste Management for Nuclear Power Reactors Short Course, Georgia Institute of Technology

Summary of Experience

Mr. McIlvaine has experience in all phases of nuclear power plant design and licensing, with extensive experience in radioactive waste management. He has been responsible for studies of waste generation, for conceptual and detailed engineering of processing systems, handling and storage facilities, and transportation casks, for evaluating processing system and interim on-site storage alternatives and performance, and for developing estimates of the cost of waste disposal.

Present — Senior Mechanical Engineer, TERA Corporation.

1982 - Supervising Engineer, EDS Nuclear, Inc. Performed a Radioactive Liquid Waste Management Study for Georgia Power Company's Plant E. I. Hatch, Units 1 and 2. Worked on the project on radioactive waste classification for the Atomic Industrial Forum's National Environmental Studies Projects.

1978-1982 Engineering Supervisor, Bechtel Power Corporation. In Operating Services group, worked on projects to upgrade control room habitability, the preliminary engineering of a dry cask spent fuel storage facility, and a review of the solidification system and interfaces at the South Texas Project.

As assistant mechanical group supervisor on PWR project, provided direction and assisted in the evaluation of proposals for a radwaste volume reduction and solidification system. Directed a program to assure acceptable nozzle loads on all safety related components and assisted in the licensing activities necessary to obtain an operating license.

Member of the initial Containment Recovery Engineering team sent to Middletown, Pennsylvania, soon after TMI accident and was a contributor to the Phase I Containment Reentry and Decontamination Study. Coordinated and contributed to the Phase II Study. Directed work and was principal author of the Radwaste Management Study and contributed the technical analysis section of the Solidification Planning Study prepared for Three Mile Island.

As engineering staff specialist, was responsible for coordinating staff review and comment of all design documents requiring chief nuclear engineer's review and approval. Also responsible for licensing and state-of-the-art awareness of plant security systems, pipe break hazards, seismic II/I hazards, safe shutdown requirements, Q-criteria requirements, experience feedback, load combinations, and radwaste systems.

Mr. McIlvaine was a member of a corporate task force which developed a manual addressing Inservice Inspection requirements for use on Bechtel projects. He was also a member of a corporate-wide Radwaste Design Committee.

1975-1977 Engineering Manager, Hittman Nuclear and Development. Served as engineering manager in charge of engineering design of radioactive waste solidification systems, handling equipment, and casks and liners for transportction and disposal.

1972-1975 Engineer, Bechtel Power Corporation. Radwaste group leader responsible for staff review and evaluation of radwaste systems for nuclear power plants, generic radwaste systems, and Bechtel standard documents. Assigned to twin 850 MWe PWR project, resolved licensing questions regarding systems design commitments, issued and revised equipment specifications, balanced system flows and other startup problems, determined shield requirements of field run pipe, and coordinated client requested changes.

Professional Memberships

American Society of Mechanical Engineers
Sigma Pi Sigma (National Physics Honor Society)

Registration

Registered Professional Engineer in Maryland

Publications

"Changes Are Needed For Radwaste Systems Design Criteria," presented at American Power Conference, April 1980.

"Radioactive Wastes - After It Leaves the Plant," presented at 8th Biennial Topical Conference on Reactor Operating Experience, August 1977 (co-author).

"Design Considerations for Piping Systems for Bead Resins," HNDC Report No. HN-R1114.

"Hittman Nuclear and Development Corporation Topical Report Radwaste Solidification System (Cement)" (primary author).

"A Study of the Feasibility of Applying the Neutron - Capture Gamma-Ray Spectroscopy Technique to Small Sample Analysis," Masters Thesis.

GERALD E. SETKA
Principal Electrical and Systems Engineer

EDUCATION

B.S. Electrical Engineering, Illinois Institute of Technology

B.S. Mechanic, Mechanical and Aerospace Engineering, Illinois Institute of Technology

Introduction to Power Plant Operations, Westinghouse PWR Simulator Training

SUMMARY OF EXPERIENCE

Mr. Setka has been involved with the electric power industry since 1971, with extensive experience in the areas of nuclear and fossil power plant system operations, system design and modification, and design implementation. He has served as Engineering Manager of a Systems Design Group and has had lead technical responsibility for multi-disciplined work, such as the design and modification of new and existing power plant systems, systems studies and evaluations, and operating plant problem-solving. Engineering disciplines involved in systems work include electrical, mechanical, instrumentation and control, nuclear, and human factors engineering. Mr. Setka has acquired an extensive background in power plant systems through major backfitting work for Commonwealth Edison Company's nuclear and fossil plants. He has had electrical design responsibility for a high pressure coolant injection system, an essential service diesel generator system, and an off-gas processing system for the Dresden Nuclear Power Station. For fossil plants, he has retrofitted induced draft fan, precipitator, fly ash handling, flue gas conditioning, and waste treatment systems. Mr. Setka has also authored or assisted in the preparation of several licensing reports, including an ECCS design report and a safe shutdown report, in addition to providing formal responses to questions from the NRC on backfit system design.

Present Principal Electrical and Systems Engineer, TERA Corporation.

1980 - 1983 Engineering Manager, Systems Design Group, NUTECH. Responsible for supervising equipment qualification activities for Detroit Edison Company's Fermi 2 plant. This required safety-related equipment list preparation, qualification documentation review and evaluation, action plan develoment, and central file preparation, which culminated in a successful NRC audit at the site. For Northern States Power Company's Monticello plant, Mr. Setka was involved with fire protection modifications, and the additions of a containment atmosphere monitoring system and a post-LOCA sampling system. He also had managerial responsibility for the SRV position indication and blowdown control system, combustible gas control system, and suppression pool temperature monitoring system.

1972 - 1980 Electrical Project Engineer, Sargent and Lundy Engineers.

1971 Construction Supervisor, Commonwealth Edison Company.

REGISTRATION

Professional Engineer - Illinois

PROFESSIONAL ASSOCIATIONS

Institute of Electrical and Electronics Engineers
American Society of Mechanical Engineers