NOV 8 1982

Docket Nos.: 50-329
and 50-330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF OCTOBER 25, 1982 MEETING ON INDEPENDENT DESIGN VERIFICATION PROGRAM

A meeting to discuss Midland's proposed Independent Design Verification Program (IDVP) was held October 25, 1982, between the NRC staff and representatives of Consumers Power Company (CPCo), Management Analysis Corporation (MAC), and TERA Corporation. Representatives of the Government Accountability Project (GAP), a public interest organization, also attended and provided statements. The list of attendees is provided in Enclosure 1. Viewgraph slides used during the meeting are shown in Enclosures 2 and 3.

CPCo, MAC, and TERA representatives reviewed the contents of an October 5, 1982, transmittal which proposes a three part IDVP: (1) an INPO type of construction and design evaluation by MAC, (2) a biennial audit by MAC, and (3) an IDVP of the auxiliary feedwater system by TERA. Overall integration of the program would be performed by MAC.

Following opening remarks by the applicant, the MAC representative described the proposed INPO type of Construction evaluation. This evaluation is intended only to review work in progress. It will investigate past work only as related to present deficiencies found by MAC and as time allows.

TERA representatives briefly addressed their company's participation in the performance of the Independent Design Verification or "vertical slice" of the IDVP. As proposed, TERA would be assessing the design of the Auxiliary Feedwater System (AFWS) of Unit 2 in terms of design adequacy and would review the as-built configuration on a limited basis. TERA would also be performing a sampling of design calculations and component inspections.

Questions were raised by the staff regarding the MAC-TERA interaction. The applicant explained that TERA personnel would be involved with the MAC-sponsored INPO evaluation, but each organization would report independently on its own review. MAC would then coordinate both reports into a single document and include conclusions derived from the overall integration of the two studies. This final report is presently scheduled for completion in late February of 1983.

The staff also asked how construction problems at Midland would be addressed in the IDVP. The staff noted that in its present form, the IDVP would not provide assurance of as-built construction adequacy and considers this to be a significant deficiency in the present program.

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The staff requested clarification regarding the manner in which negative findings by TERA would be resolved. TERA representatives indicated that a determination would be made as to whether or not the error was random or systematic. The root cause of the error would then be determined and then recommendations would be made accordingly.

Another question evolved around direct INPO involvement in the INPO type Construction Evaluation. INPO will overview the final report but there will be no INPO personnel involved in the actual performance of the review.

The staff questioned if the probabilistic risk assessment (PRA) results had been utilized in choosing a system for review. The applicant replied that although a PRA had been performed on the AFWS, it had been chosen from the criteria cited in the October 5, 1982, letter. The applicant indicated that the choice was not biased due to previous review of this system.

The GAP representatives summarized selected comments contained in an October 22, 1982, letter (Enclosure 4) to H. R. Denton and J. G. Keppler. They suggested holding two public meetings: one to address "single-point accountability" (Enclosure 4, pgs. 13-15) and a second to address the charters of the independent contractors (Enclosure 4, pgs. 10-12). Discussion resulting from these comments related to the independence of MAC. The GAP representatives stated that because MAC had previously done QA audits at Midland they could not be considered independent contractors. The MAC representative replied that independence is achieved since none of the MAC personnel involved in this review have had any connection with Midland and also added that the review is broader in scope than those performed by MAC in the past. MAC further stated that, while exact figures were not available at this meeting, the income derived from its involvement with CPCo is not a major portion of MAC's overall income. In a letter of September 17, 1982, CPCo described an independent assessment to be performed by Stone and Webster (S&W) regarding underpinning activities for the Midland auxiliary building. The qualifications of S&W for this task were also questioned by GAP. The GAP representatives concluded by stating that they will provide supplementary comments as a result of the October 25 meeting.

At the conclusion of the meeting, the applicant asked for policy guidance from the staff regarding its proposal. The staff indicated that additional consideration regarding the extent of the program would be necessary. The agenda for this meeting did not include review of the independent assessment of the soils remedial work to be performed by S&W. The staff noted that it would consider an additional meeting for this purpose prior to an assessment of the overall independent design verification program.

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The staff emphasized the importance of all firms engaged in this program providing copies of all written reports, including raw data, to the NRC at the same time as submitting them to the applicant. The staff discouraged the use of any verbal reports or closed meetings. The staff agreed to provide preliminary feedback to Consumers Power by October 29, 1982, and to arrange for additional meetings as deemed appropriate.

Darl S. Hood, Project Manager
Licensing Branch No. 4
Division of Licensing

Enclosures: As stated

cc: See next page

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ENCLOSURE 1

LIST OF ATTENDEES

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S. Black
M. A. Miller
D. Allison
M. Wilcove
R. Vollmer
T. Novak
D. Eisenhut
N. Wright
H. Denton*

Washington Public Power System

R. Johnson

Consumers Power Company

J. Cook
G. S. Keely
T. Sullivan
R. Huston

TERA CORP

H. Levin
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MAC

L. Kube

GAP

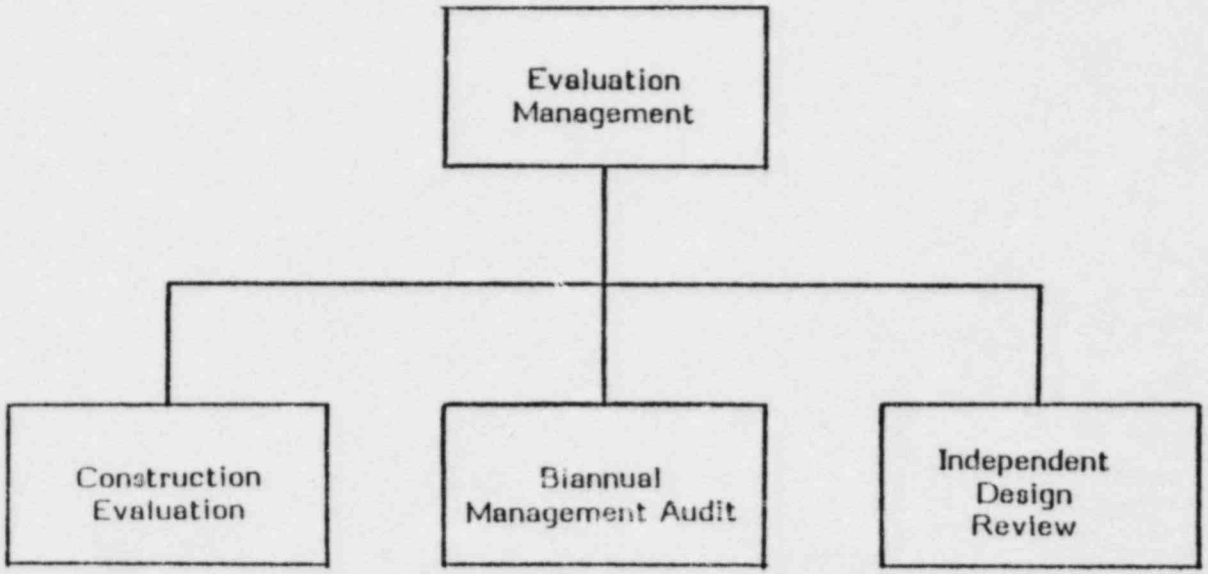
T. Devine
B. Garde

*Part time

ENCLOSURE 2

MAC VIEWGRAPHS

MIDLAND EVALUATIONS



WHAT IS A CONSTRUCTION PROJECT EVALUATION

- TEAM INVESTIGATION
  - MULTI-DISCIPLINE
  - EXPERIENCED IN NUCLEAR INDUSTRY
  - DIVERSE FIELDS AND TALENTS
- DEVELOP FACTS
  - DOCUMENTATION REVIEW
  - OBSERVE WORK IN PROGRESS
  - INTERVIEWING
- ASSESS PERFORMANCE
  - MANAGEMENT INVOLVEMENT AND COMMITTMENT TO QUALITY
  - EXECUSION OF WORK
  - QUALIFICATIONS, EXPERIENCE AND TRAINING
  - QUALITY OF PROGRAMS
- MEASURE QUALITY
  - PERFORMANCE OBJECTIVES DEVELOPED BY INPO
  - INDUSTRY PRACTICES

KEY POINTS TO REMEMBER

- HORIZONTAL SLICE
- SNAP SHOT IN TIME
- GUIDELINES ON DEPTH OF INVESTIGATION

CONSTRUCTION EVALUATION

PROGRAM HISTORY

Late 1981	Industry Problems with Plants under Construction
January 1982	Industry met with Regulatory to Propose Corrective Action Plan
Feb. - June	INPO Chartered with Establishing Performance Objectives and Supporting Criteria
July - Aug.	Pilot E..uation Conducted
Aug. - Sept.	Performance Objectives and Supporting Criteria Updated
Sept. - Dec.	Self-Initiated Evaluations Conducted

AD HOC COMMITTEE

D. SCHNELL, CHAIRMAN, UNION ELECTRIC COMPANY

J. COOK, ASST. CHAIRMAN, CONSUMERS POWER COMPANY

W. CAHILL, GULF STATES UTILITIES

J. FERGUSON, VIRGINIA ELECTRIC & POWER COMPANY

R. GLASSCOCK, WASHINGTON PUBLIC POWER SUPPLY COMPANY

T. MARTIN, PUBLIC SERVICE ELECTRIC & GAS COMPANY

M. McDUFFIE, CAROLINA POWER & LIGHT COMPANY

D. PATTERSON, TENNESSEE VALLEY AUTHORITY

W. SHEWSKI, COMMONWEALTH EDISON

W. SHIELDS, PUBLIC SERVICE INDIANA

H. TAUBER, DETROIT EDISON COMPANY

E. VAN BRUNT, ARIZONA PUBLIC SERVICE

PILOT EVALUATIONS

GPC - VOGTLE
W - PWR
BECHTEL (LA)
SOUTHERN COMPANY SERVICES

CP&L - SHEARON HARRIS
W - PWR
EBASCO

PSE&G HOPE CREEK
GE - BWR
BECHTEL (SF)

LESSONS LEARNED

THE FOLLOWING IS A BRIEF SUMMARY OF "LESSONS LEARNED" FROM THE THREE PILOT EVALUATIONS:

A. SCHEDULE FLEXIBILITY

1. EVALUATORS MUST BE ABLE TO ADJUST THEIR SCHEDULE TO ACCOMODATE CHANGE IN PLANNED ACTIVITIES.

B. COMMUNICATIONS

1. THE EVALUATOR MUST TALK TO INDIVIDUALS AT THE WORKING LEVEL (CRAFTSMEN) WITHOUT THE PRESENCE OF SUPERVISION TO ENSURE A FREE FLOW OF INFORMATION.

2. DO MORE LISTENING THAN TALKING.

C. EVALUATION TECHNIQUES

1. UNANNOUNCED OBSERVATIONS OF ACTIVITIES IN PROGRESS ARE SUPERIOR TO THOSE SCHEDULED BY PRIOR NOTICE. THE LATTER TEND TO BE OVERSUPERVISED AND STAGED.

2. AN EFFECTIVE TOTAL EVALUATION INCLUDES OBSERVATIONS OF OTHER ACTIVITIES IN THE AREA AS WELL AS THE SUBJECT EVALUATION WHICH IS IN PROGRESS.

3. WHEN EVALUATING A WORK CONTROL SYSTEM, IT IS BEST TO TRACK A NONCONFORMING WORK ITEM SINCE IT CAN BETTER POINT OUT WEAKNESSES IN THE WORK CONTROL SYSTEM.

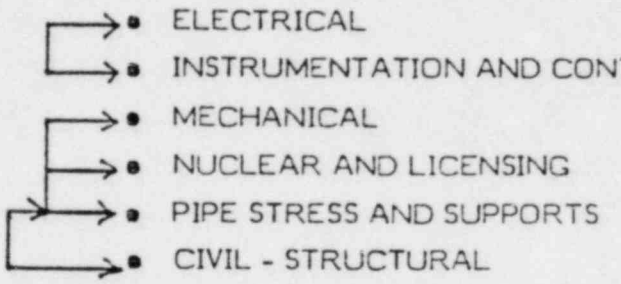
D. INTERVIEW TECHNIQUES

1. A PLANNED LINE OF QUESTIONING, WITH AN OBJECTIVE IN MIND, IS ESSENTIAL TO THE FORMULATION OF AN EFFECTIVE SCHEDULE.

E. EVALUATION TEAM COMPOSITION

1. THE MEMBERS OF THE EVALUATION TEAM SHOULD REPRESENT A CROSS SECTION OF VARIOUS DISCIPLINES AND VARIED PROFESSIONAL BACKGROUNDS. A MIXING OF ENGINEERING, CONSTRUCTION, QUALITY ASSURANCE AND QUALITY CONTROL PERSONNEL ENSURES THAT THE PERFORMANCE OBJECTIVES ARE ADEQUATELY ADDRESSED FROM VARIOUS PERSPECTIVES.

2. THE DESIGN TEAM SHOULD BE CAPABLE OF COVERING ALL DISCIPLINES (ARROWS SHOW LOGICAL OVERLAP).



3. IN ADDITION TO DISCIPLINE OVERLAP, TEAM MEMBERS SHOULD HAVE FAMILIARITY WITH QA, PROCUREMENT AND ORGANIZATION AND ADMINISTRATION FUNCTIONS.

EVALUATION CONTENT

OA ORGANIZATIONAL AND ADMINISTRATIVE

OA.1 ORGANIZATIONAL STRUCTURE

OWNER'S CORPORATE ORGANIZATION SHOULD ENSURE EFFECTIVE PROJECT MANAGEMENT CONTROL.

OA.2 MANAGEMENT INVOLVEMENT AND COMMITMENT TO QUALITY

SENIOR AND MIDDLE MANAGERS EXHIBIT INTEREST, AWARENESS AND KNOWLEDGE.

OA.3 THE ROLE OF FIRST-LINE SUPERVISORS AND MIDDLE MANAGERS

QUALIFIED BY VERIFIED BACKGROUND AND EXPERIENCE AND HAVE NECESSARY AUTHORITY.

DC DESIGN CONTROL

DC.1 DESIGN INPUTS

INPUTS SHOULD BE DEFINED AND CONTROLLED.

DC.2 DESIGN INTERFACES

EXTERNAL AND INTERNAL INTERFACES ARE IDENTIFIED AND COORDINATED.

DC.3 DESIGN PROCESS

MANAGEMENT OF THE DESIGN PROCESS IN COMPLIANCE WITH DESIGN REQUIREMENTS.

DC.4 DESIGN OUTPUT

DOCUMENTS SHOULD SPECIFY CONSTRUCTABLE DESIGNS.

DC.5 DESIGN CHANGES

CHANGES CONTROLLED TO ENSURE COMPLY WITH DESIGN REQUIREMENTS.

CC CONSTRUCTION CONTROL

CC.1 CONSTRUCTION ENGINEERING

CONTROLLED TO CONSISTENCY WITH BASIC DESIGN CRITERIA.

EVALUATION CONTENT (Continued)

CC.2 CONSTRUCTION FACILITIES AND EQUIPMENT

PLANNED, ACQUIRED, INSTALLED AND MAINTAINED.

CC.3 MATERIAL CONTROL

INSPECTED, CONTROLLED AND MAINTAINED.

CC.4 CONTROL OF CONSTRUCTION PROCESSES

MONITOR AND CONTROL PROCESSES TO ENSURE COMPLETED TO DESIGN REQUIREMENTS.

CC.5 CONSTRUCTION QUALITY INSPECTIONS

VERIFY AND DOCUMENT THAT PRODUCT MEETS DESIGNS AND QUALITY REQUIREMENTS.

CC.6 CONSTRUCTION CORRECTIVE ACTIONS

EVALUATE AUDITS, INSPECTIONS AND SURVEILLANCES AND TAKE CORRECTIVE ACTION.

CC.7 TEST EQUIPMENT CONTROL

EQUIPMENT SHOULD BE CONTROLLED.

PS PROJECT SUPPORT

PS.1 INDUSTRIAL SAFETY

PROGRAM SHOULD ACHIEVE HIGH DEGREE OF PERSONNEL SAFETY.

PS.2 PROJECT PLANNING

ENSURE IDENTIFYING, INTERRELATING AND SEQUENCING TASKS.

PS.3 PROJECT CONTROL

ENSURE OBJECTIVES OF PROJECT PLANS ARE MET THROUGH USE OF PROJECT RESOURCES.

PS.4 PROJECT PROCUREMENT PROCESS

ENSURE EQUIPMENT, MATERIALS AND SERVICES MEET PROJECT REQUIREMENTS.

EVALUATION CONTENT (Continued)

PS.5 CONTRACT ADMINISTRATION

METHODS FOR ADMINISTERING AND CONTROLLING CONTRACTORS AND MANAGING CHANGES.

PS.6 DOCUMENTATION MANAGEMENT

EFFECTIVE CONTROL AND COORDINATION OF DOCUMENTATION.

TN TRAINING

TN.1 TRAINING MANAGEMENT SUPPORT

EFFECTIVE PROGRAM FOR INDOCTRINATION, TRAINING AND QUALIFICATION.

TN.2 TRAINING ORGANIZATION AND ADMINISTRATION

ENSURE EFFECTIVE CONTROL AND IMPLEMENTATION.

TN.3 GENERAL TRAINING AND QUALIFICATION

EMPLOYEES RECEIVE INDOCTRINATION AND TRAINING REQUIRED TO PERFORM EFFECTIVELY.

TN.4 TRAINING FACILITIES, EQUIPMENT, AND MATERIAL

SUPPORT AND ENHANCE TRAINING ACTIVITIES

QP QUALITY PROGRAMS

QP.1 QUALITY PROGRAMS

PROGRAM APPROPRIATE, DEFINED CLEARLY AND UNDERSTOOD.

QP.2 PROGRAM IMPLEMENTATION

QUALITY ASSURANCE AND QUALITY CONTROL FUNCTIONS SUPPORT AND CONTROL PROJECT ACTIVITIES.

QP.3 INDEPENDENT ASSESSMENTS

EFFECTIVE, INDEPENDENT ASSESSMENT OF PROJECT ACTIVITIES.

QP.4 CORRECTIVE ACTIONS

CORRECTIONS OR IMPROVEMENTS RESOLVED IN EFFECTIVE AND TIMELY MANNER.

EVALUATION CONTENT (Continued)

TC TEST CONTROL

TC.1 TEST PROGRAM

VERIFY THE PLANT'S CAPABILITY TO OPERATE AS INTENDED.

TC.2 TEST GROUP ORGANIZATION AND STAFFING

ENSURE EFFECTIVE IMPLEMENTATION.

TC.3 TEST PLAN

PLAN AND SCHEDULE SUPPORT MAJOR SCHEDULE MILESTONES.

TC.4 SYSTEM TURNOVER FOR TEST

PROCESS CONTROLLED EFFECTIVELY.

TC.5 TEST PROCEDURES AND TEST DOCUMENTS

PROVIDE DIRECTION AND VERIFY OPERATIONAL AND DESIGN FEATURES.

TC.6 SYSTEM STATUS CONTROLS

METHOD TO IDENTIFY STATUS OF SYSTEM OR COMPONENT AND ORGANIZATION HOLDING CONTROL.

EVALUATION PROGRAM

PRE-PLANNING

- REVIEW PROJECT SCHEDULE
- SELECT CANDIDATE REVIEW AREAS:
  - COMPLEXITY
  - STATUS
  - INTERFACES
  - SAFETY SIGNIFICANCE
  - HISTORY OF PROBMEMS (PLANT AND INDUSTRY WIDE)
- REFINE LIST OF CANDIDATES WITH
- DEFINE REVIEW MATERIAL REQUIRED:
  - PROCEDURES
  - PSAR/FSAR COMMITMENTS
  - CRITERIA/SPECIFICATIONS
- DEVELOP TENTATIVE TEAM ASSIGNMENTS
- DEVELOP "HIT LIST" OF QUESTIONS FOR EVALUATION:
  - WHO
  - WHAT
  - WHY
  - WHEN

DETAIL PLANNING

- TOUR PLANT
- VIEW ALL CANDIDATE REVIEW AREAS
- SELECT AREAS:
  - DIVERSITY OF ACTIVITIES
  - MOST REPRESENTATIVE
- FIRM UP TEAM ASSIGNMENTS
- IDENTIFY UTILITY INTERFACE REPRESENTATIVE/S:
  - SENIOR PERSON
  - ACTIVITY INVOLVED
  - REPRESENTS UTILITY

EVALUATION PROGRAM (CONTINUED)

PERFORM EVALUATION OF AREA

- DEVELOP DAILY/HOURLY SCHEDULE
- OBSERVE ACTIVITIES
- INTERVIEW
- REQUEST BACK-UP INFORMATION
- REVIEW MATERIAL
- DISCUSS FINDINGS WITH OTHER TEAM MEMBERS
- REINVESTIGATE CONFLICTING INFORMATION
- DRAFT FINDINGS/OBSERVATIONS
- INFORMALLY REVIEW WITH UTILITY REPRESENTATIVE(S)
- CLOSE-OUT ANY OPEN ISSUES.

SUMMARIZATION

- COLLECT ALL DETAILS ONTO DATA SHEETS
- FINALIZE OBSERVATION INCORPORATING INPUT FROM OTHER TEAM MEMBER
- DRAFT DATA SHEETS
- REVIEW MATERIAL WITH UTILITY REPRESENTATIVE(S)
- CORRECT ANY ERRORS AND CLARIFY ISSUES AS REQUIRED
- FINALIZE DOCUMENTATION

REPRESENTATIVE AREAS FOR OBSERVATIONS

CIVIL

A. CONTROLLED COMPACTED FILL
B. SOIL CEMENT INSTALLATION
C. CONCRETE PLACEMENT
D. CADWELDING REBAR
E. EQUIPMENT GROUTING
F. STRUCTURAL STEEL RIGGING, BOLTING, WELDING
G. POST TENSIONING STRESSING OF A TENDON
H. MASONRY SEISMIC WALL INSTALLATION
I. APPLICATION OF COATINGS
J. WELDING OF POOL LINERS
K. INSTALLATION OF SEISMIC RESTRAINTS (SNUBBERS OR RIGID SUPPORTS)
L. PLACING OF IMBEDS
M. INSTALLATION OF DRILLED-IN ANCHORS

MECHANICAL

A. IN PLACE MAINTENANCE OF EQUIPMENT
B. PINE AND HVAC DUCT SUPPORT INSTALLATION
C. PIPE FABRICATION AND INSTALLATION
D. EQUIPMENT RIGGING
E. FIT-UP AND WELDING
F. PIPE ERECTION
G. INSTALLATION OF HVAC DUCTWORK
H. INSTRUMENTATION SYSTEM INSTALLATION
I. INSTRUMENTATION CALIBRATION
J. HYDRO TESTING
K. EQUIPMENT ALIGNMENT AND LEVELING
L. REACTOR INTERNALS INSTALLATION
M. POST WELD HEAT TREATING
N. VALVE ASSEMBLY AND/OR DISASSEMBLY
O. BOLTING OF EQUIPMENT OR PIPE FLANGES

ELECTRICAL

A. EQUIPMENT INSTALLATION AND SETTING
B. BUS DUCT INSTALLATIC
C. HANGERS AND SU[illegible]S INSTALLATION
D. CABLE PULLING
E. CABLE TERMINATION
F. IN-PLACE MAINTENANCE OF EQUIPMENT
G. CABLE TRAY INSTALLATION
H. CONDUIT INSTALLATION
I. EQUIPMENT GROUTING
J. STORAGE OF EQUIPMENT
K. GROUDNING INSTALLATION
L. MAKING STRESS CONES AT SPLICES AND TERMINATIONS
M. CABLE SPLICING
N. BOLTING OF EQUIPMENT
O. EQUIPMENT, CONDUIT AND TRAY IDENTIFICATION
P. GENERAL
Q. CALIBRATION OF TOOLS

QUALITY CONTROL

A. SOIL TESTING
B. CONCRETE TESTING
C. NDE TESTING
D. RECEIVING INSPECTION
E. IN-PROCESS INSPECTION
F. FINAL INSPECTION
G. NONCONFORMANCE PROCESSING
H. INSPECTION PERSONNEL INTERFACING WITH OTHER PERSONNEL -- CRAFT, CONSTRUCTION, ENGINEERING, ETC.
I. QC SUPERVISORS PROVIDING DIRECTION TO SUBORDINATES
J. INSPECTORS PREPARING INSPECTION REPORTS
K. TRAINING SESSIONS
L. TREND ANALYSIS MEETING
M. CERTIFICATION TESTING (NDE PRACTICAL)
N. INSPECTORS INTERFACING WITH THE AUTHORIZED NUCLEAR INSPECTOR (ANI)

GENERIC PROBLEMS

PROBLEMS WHICH OCCUR ACROSS DISCIPLINES. THE TYPE OF PROBLEMS EVALUATION IS ATTEMPTING TO IDENTIFY.

EXAMPLES:

- TRAINING

  MAY BE IDENTIFIED BY OBSERVING QUALITY PROBLEMS CAUSED BY LACK OF TRAINING. SUCH AS:

  - WELDING
  - RIGGING
  - PAINTING/COATING
  - INSPECTING
  - DOCUMENT REVIEWS

- MANAGEMENT

  MAY BE IDENTIFIED BY MANAGEMENT ACTIVITIES WHICH AFFECT QUALITY:

  - SCHEDULING
  - BUDGETING
  - ENFORCEMENT OF QUALITY PROGRAM
  - INVOLVEMENT IN CONSTRUCTION QUALITY

- CORRECTIVE ACTION

  MAY BE IDENTIFIED BY OBSERVING INEFFECTIVE CORRECTIVE ACTIONS, SUCH AS:

  - NONCONFORMANCE DISPOSITION
  - DEFICIENCY RESOLUTIONS
  - NONCONFORMANCE IDENTIFICATION

- ROOTS CAUSES

  MAY BE A GENERIC PROBLEM IF NOT IDENTIFIED AND CORRECTED, MAY BE IDENTIFIED BY:

  - REPETITIVE DEFICIENCIES OR NONCONFORMANCES IN AN AREA
  - REPETITIVE MATERIAL OR EQUIPMENT DEFICIENCIES
  - CONTINUOUS OR FREQUENT DESIGN CHANGES

- PROGRAM DEFICIENCIES

  GENERALLY NOT AS FREQUENT A PROGLEM AS PROGRAM IMPLEMENTATION. MAY BE IDENTIFIED BY:

  - LACK OF PROCEDURE TO DESCRIBE AN ACTIVITY
  - PROBLEMS OCCURING WITH PROGRAM HAS NOT BEEN IDENTIFIED.

- PEOPLE NON-COMPLIANCE

  MAY BE IDENTIFIED BY:

  - OBSERVATION OF PROCEDURE NOT BEING FOLLOWED
  - DOCUMENTATION INACCURATE
  - ACTIVITY NOT PERFORMED

EVALUATION METHODOLOGY

- DOCUMENT REVIEW
- PRESENTATIONS (BY PROJECT STAFF)
- PLANT WALK DOWNS
- OBSERVATIONS
- INTERVIEWS
- DETAIL FACT FINDING
- SUMMARIZATION

PERF. OBJ. NO. ___

EVALUATION/CONTACT REPORT

EVALUATOR/S _____ DATE _____

CONTACTS _____

IDENTIFICATION (AREA, COMPONENT, ACTIVITY, ETC.) _____

_____

CRITERIA/S IMPACTED _____

REFERENCES _____

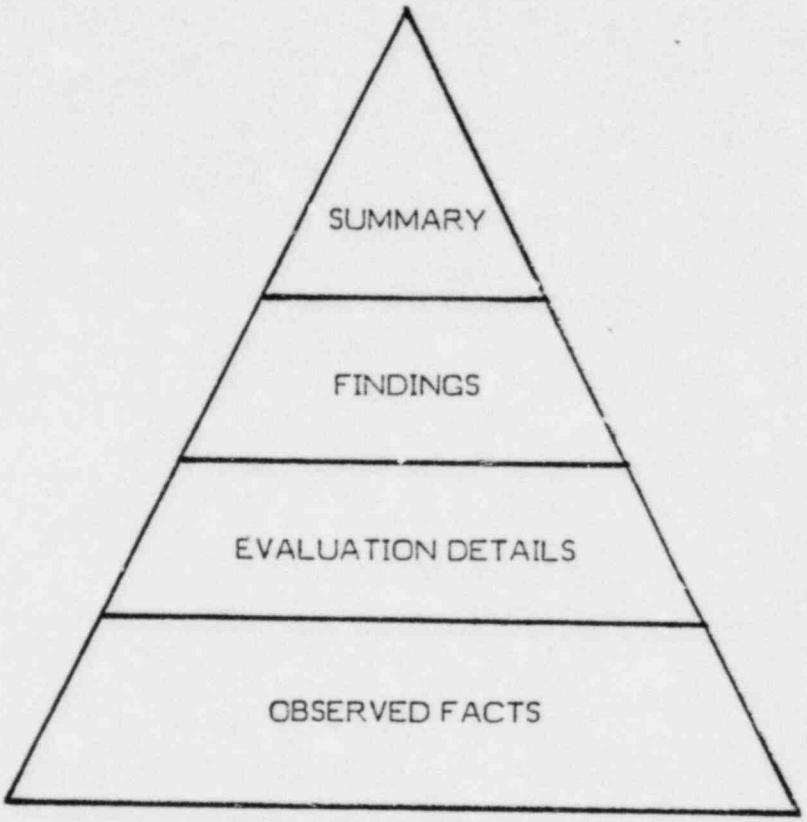
_____

_____

COMMENTS

FOLLOW-UP REQUIRED

VERIFICATION OF FOLLOW-UP _____

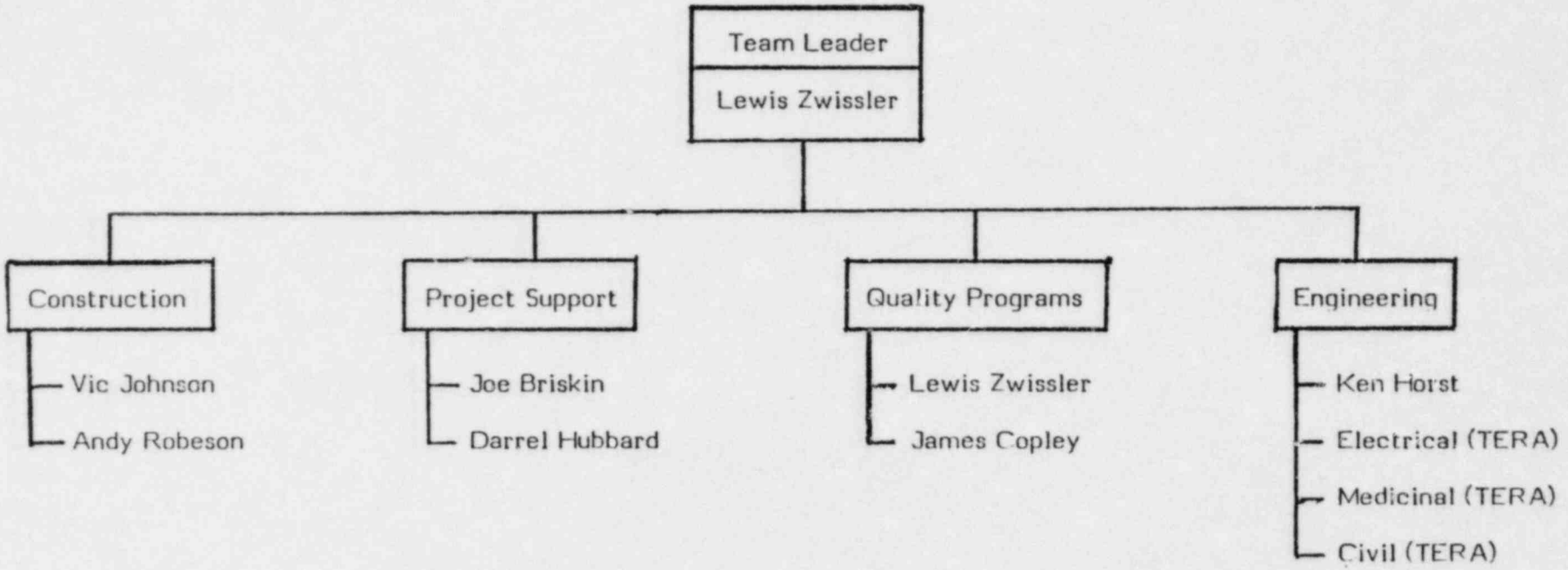


DEVELOPMENT OF AN EVALUATION

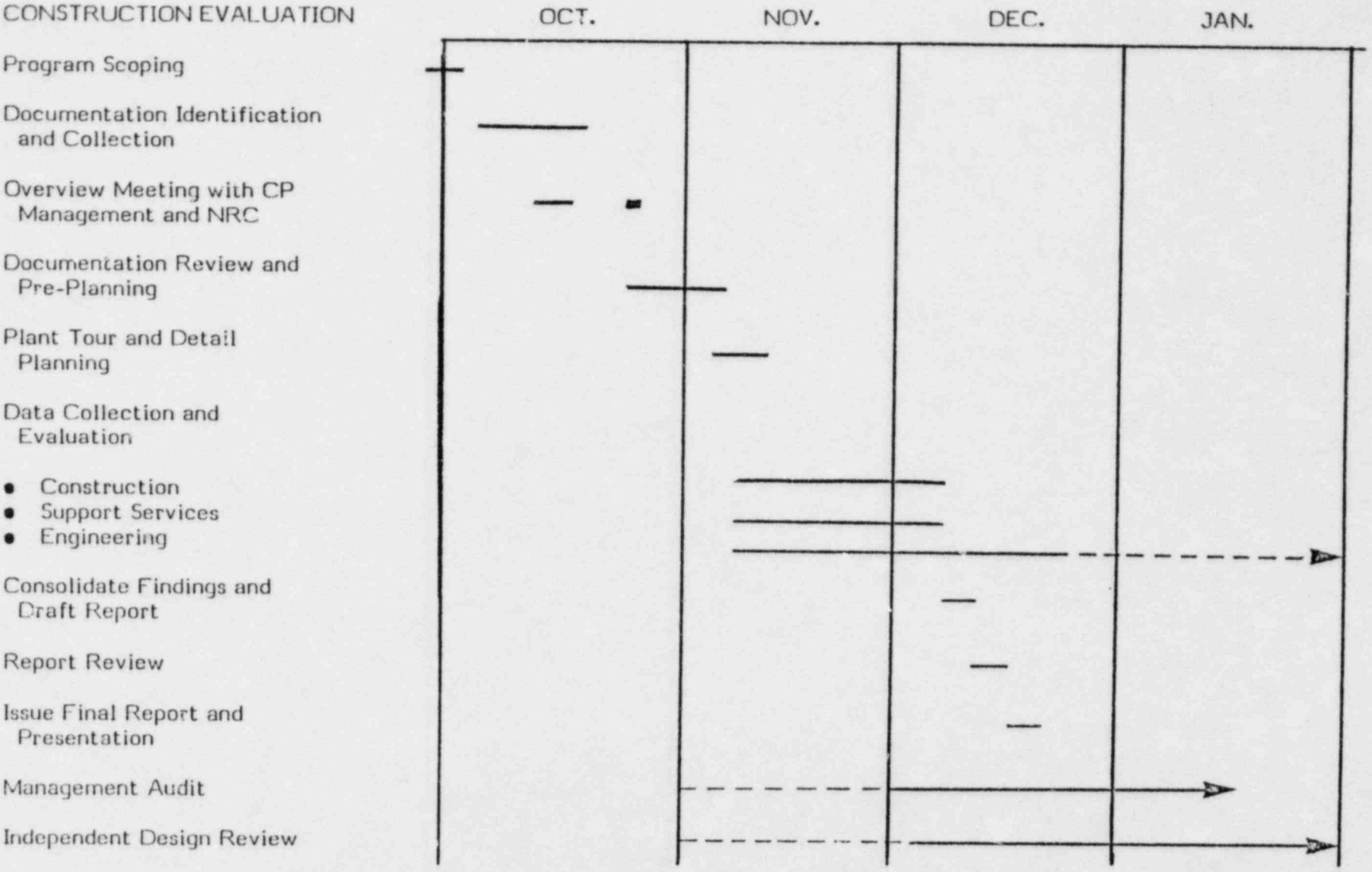
(By Performance Objective)

CONSTRUCTION EVALUATION

KEY TEAM MEMBERS



MIDLAND CONSTRUCTION EVALUATION SCHEDULE

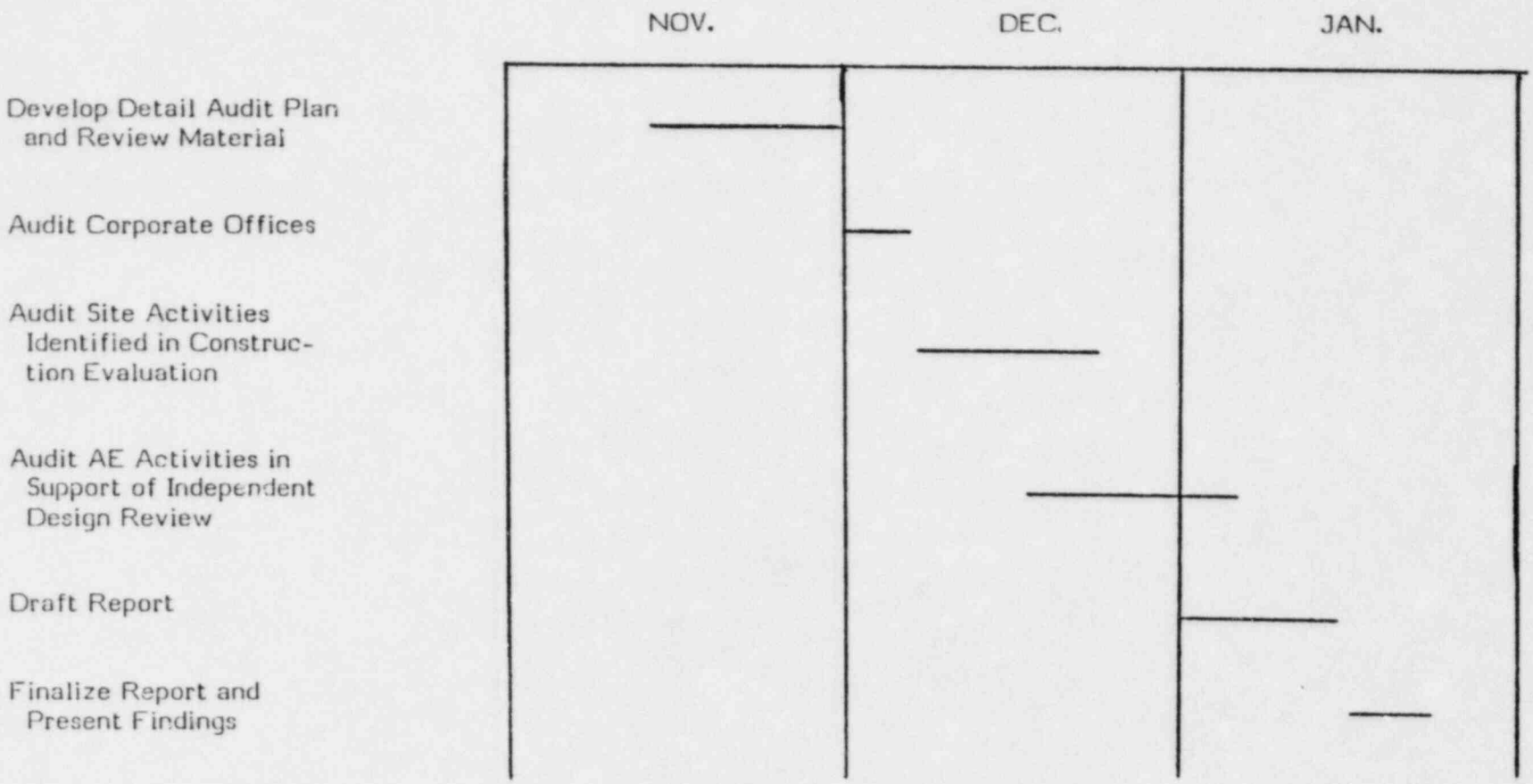


BIENNIAL QUALITY AUDIT

- EVALUATION OF QUALITY ASSURANCE PROGRAM
  - DEVELOP AN AUDIT PLAN
  - AUDIT CORPORATE OFFICES
  - AUDIT SITE ACTIVITIES
  - AUDIT AE ACTIVITIES

- COMPLIANCE WITH
  - REGULATORY GUIDE 1.144 (9/80, REV. 1)
  - REGULATORY GUIDE 1.146 (8/80, REV. 0)

MANAGEMENT AUDIT OF MIDLAND

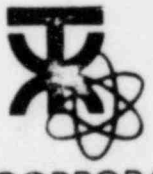


ENCLOSURE 3

TERA VIEWGRAPHS

MIDLAND INDEPENDENT DESIGN VERIFICATION PROGRAM

OCTOBER 25, 1982



TERA CORPORATION

MIDLAND INDEPENDENT DESIGN VERIFICATION PROGRAM GOALS

PRIMARY GOAL

- PROVIDE AN INDEPENDENT EVALUATION OF THE QUALITY OF THE MIDLAND PLANT DESIGN

OBJECTIVES

- EVALUATE QUALITY OF DESIGN BY EVALUATING A SAMPLE (VERTICAL SLICE) OF ENGINEERED SYSTEMS, COMPONENTS AND STRUCTURES SUCH THAT RESULTS MAY BE EXTRAPOLATED TO SIMILARLY DESIGNED FEATURES WITH A HIGH DEGREE OF CONFIDENCE

- ADDRESS DESIGN CONTROL PROGRAMMATIC AREAS (E.G. DESIGN INPUTS/OUTPUTS, INTERFACES, PROCESS, CHANGES, ETC.)

- EVALUATE DESIGN FEATURES BY UTILIZING A COMBINATION OF METHODS SUCH AS:

  - REVIEW OF DESIGN CRITERIA, REGULATORY AND LICENSING COMMITMENTS

  - CHECK OF ANALYSES, CALCULATIONS AND EVALUATIONS

  - CONFIRMATORY ANALYSES, CALCULATIONS AND EVALUATIONS

  - CHECK OF DRAWINGS AND SPECIFICATIONS

- COMPARE INSTALLATION AGAINST AS-BUILT DRAWINGS

SYSTEM SELECTION CRITERIA

- IMPORTANCE TO SAFETY

- INCLUSION OF DESIGN INTERFACES

  - INVOLVES MULTIPLE DESIGN INTERFACES AMONG ENGINEERING DISCIPLINES AND DESIGN ORGANIZATIONS

- ABILITY TO EXTRAPOLATE RESULTS

  - DESIGN CRITERIA, DESIGN CONTROL PROCESS ARE SIMILAR TO OTHER SAFETY SYSTEMS

- DIVERSE IN CONTENT

  - SYSTEM INCLUDES DIVERSE FEATURES, THUS REQUIRING DESIGN INPUT FROM MAJOR ENGINEERING DISCIPLINES

- SENSITIVE TO PREVIOUS EXPERIENCE

  - PREVIOUSLY EXHIBITED PROBLEMS CAN BE TESTED

- ABILITY TO TEST AS-BUILT INSTALLATION

TECHNICAL REVIEW TASKS

- IDENTIFICATION OF DESIGN CHAIN INCLUDING DESIGN ORGANIZATIONS, THEIR INTERFACES AND DESIGN PRACTICES

- REVIEW OF 50.55e REPORTS, NONCONFORMANCE REPORTS, NRC REGION III AND IV INSPECTION REPORTS, CPC DESIGN QA MONITORING REPORTS

- DEVELOPMENT OF DETAILED REVIEW PROGRAM CHECKLIST

- IDENTIFICATION AND COLLECTION OF INFORMATION (PROCEDURES, SPECIFICATIONS, DRAWINGS, CALCULATIONS, ETC.)

- REVIEW OF DESIGN CRITERIA AND COMMITMENTS

  - IDENTIFICATION OF UNIQUE FEATURES, CIRCUMSTANCES, OR DESIGN CHANGES ASSOCIATED WITH EACH DESIGN AREA

  - REFINEMENT OF SCOPE

- DESIGN REVIEW

  - REVIEW OF IMPLEMENTING DOCUMENTS
  - CHECK OF ANALYSES, CALCULATIONS, AND EVALUATIONS
  - CONFIRMATORY CALCULATIONS OR EVALUATIONS
  - CHECK OF DRAWINGS AND SPECIFICATION
  - VERIFICATION OF CONFIGURATION

- IDENTIFICATION OF POTENTIAL FINDINGS

TECHNICAL REVIEW TASKS
(CONTINUED)

- EVALUATION OF SIGNIFICANCE OF FINDINGS
- SENIOR REVIEW TEAM EVALUATION
- FORWARDING OF FINDINGS TO DESIGN ORGANIZATIONS AND EVALUATION OF THEIR RESPONSE
- DOCUMENTATION/REPORTING

SCOPE OF DESIGN REVIEW

- REVIEW OF DESIGN CRITERIA AND COMMITMENTS
  - REGULATIONS
  - LICENSING COMMITMENTS
  - DESIGN OUTPUTS WHICH SERVE AS CRITERIA INPUTS TO OTHER DESIGN AREAS
- REVIEW OF IMPLEMENTING DOCUMENTS
  - EXISTENCE OF IMPLEMENTING DOCUMENT (E.G. PROJECT INSTRUCTIONS, DISCIPLINE DESIGN INSTRUCTIONS, CALCULATIONS/EVALUATIONS ETC.)
  - DESIGN CRITERIA PROPERLY DEFINED AND INTERPRETED
  - CLOSEOUT (CALCULATIONS/EVALUATIONS SIGNED OFF IN ACCORDANCE WITH INSTRUCTIONS)
- CHECK OF ANALYSES, CALCULATIONS AND EVALUATIONS
  - SAMPLING CHECK OF ORIGINAL ANALYSES, CALCULATIONS OR EVALUATIONS; REVIEW OF
    - DESIGN INPUTS (INCORPORATION OF DESIGN CRITERIA, CONFORMANCE WITH COMMITMENTS, TRANSFER OF INFORMATION)
    - ASSUMPTIONS

SCOPE OF DESIGN REVIEW
(continued)

- METHODOLOGY (INCLUDING ANALYTICAL TECHNIQUES, EVALUATION PROCEDURES)
- VALIDATION AND USE OF COMPUTER CODES
- REVIEW OF OUTPUTS
- COMPLIANCE WITH CODES, STANDARDS, NRC GUIDANCE

- CONFIRMATORY CALCULATIONS OR EVALUATIONS
  - "BLIND" INDEPENDENT RE-ANALYSIS OR RE-EVALUATION FOR SELECTED DESIGN AREA(S)
  - INDEPENDENT RE-ANALYSIS OR RE-EVALUATION FOR DESIGN AREA THAT MAY BE SUSPECT ON BASIS OF A REVIEW OF ORIGINAL CALCULATIONS OR EVALUATIONS
  - ALTERNATIVE TECHNIQUES, SIMPLE BOUNDING EVALUATIONS OR DETAILED ANALYTICAL TECHNIQUES MAY BE EMPLOYED

- CHECK OF DRAWINGS AND SPECIFICATIONS
  - VERIFICATION THAT THE DRAWING OR SPECIFICATION REFLECTS DESIGN REQUIREMENTS SPECIFIED IN THE DESIGN CALCULATIONS OR EVALUATIONS

SCOPE OF DESIGN REVIEW
(continued)

- VERIFICATION OF CONFIGURATION
  - INSTALLATION OF SYSTEM IN ACCORDANCE WITH P&IDs
  - INSTALLATION OF COMPONENTS AND PIPING IN ACCORDANCE WITH ARRANGEMENT DRAWINGS AND ISOMETRICS (APPROXIMATE LOCATION AND ORIENTATION)
  - INSPECTION OF SELECTED FEATURES FOR COMPLIANCE WITH DESIGN DETAILS (APPROXIMATE DIMENSIONS)
  - VERIFICATION THAT EQUIPMENT PART NUMBERS AGREE WITH DRAWINGS AND SPECIFICATIONS

PRELIMINARY MIDLAND INDEPENDENT DESIGN VERIFICATION REVIEW MATRIX FOR THE AUXILIARY FEEDWATER SYSTEM

DESIGN AREA	SCOPE OF REVIEW					
	REVIEW OF DESIGN CRITERIA AND COMMITMENTS	REVIEW OF IMPLEMENTING DOCUMENTS	CHECK OF CALCULATIONS AND EVALUATIONS	CONFIRMATORY CALCULATION OR EVALUATION	CHECK OF DRAWINGS AND SPECIFICATIONS	VERIFICATION OF CONFIGURATIONS
I. AFW SYSTEM PERFORMANCE REQUIREMENTS						
SYSTEM OPERATING LIMITS	X	X	X			
ACCIDENT ANALYSIS CONSIDERATIONS	X					
SINGLE FAILURE	X	X	X			
TECHNICAL SPECIFICATIONS	X					
SYSTEM ALIGNMENT/SWITCHOVER	X	X				
REMOTE SHUTDOWN	X					
SYSTEM ISOLATION/INTERLOCKS	X	X				
OVERPRESSURE PROTECTION	X					
COMPONENT FUNCTIONAL REQUIREMENTS	X	X	X		X	
SYSTEM HYDRAULIC DESIGN	X	X	X			
SYSTEM HEAT REMOVAL CAPABILITY	X	X	X			
COOLING REQUIREMENTS	X					
WATER SUPPLIES	X	X				
PRESERVICE TESTING/CAPABILITY FOR OPERATIONAL TESTING	X					
POWER SUPPLIES	X	X				
ELECTRICAL CHARACTERISTICS	X					
PROTECTIVE DEVICES/SETTINGS	X	X			X	
INSTRUMENTATION	X	X	X		X	
CONTROL SYSTEMS	X	X	X			
ACTUATION SYSTEMS	X					
NDE	X					
MATERIALS SELECTION/TRACEABILITY	X					

PRELIMINARY MIDLAND INDEPENDENT DESIGN VERIFICATION REVIEW MATRIX FOR THE AUXILIARY FEEDWATER SYSTEM (CONTINUED)

DESIGN AREA	SCOPE OF REVIEW					
	REVIEW OF DESIGN CRITERIA AND COMMITMENTS	REVIEW OF IMPLEMENTING DOCUMENTS	CHECK OF CALCULATIONS AND EVALUATIONS	CONFIRMATORY CALCULATION OR EVALUATION	CHECK OF DRAWINGS AND SPECIFICATIONS	VERIFICATION OF CONFIGURATIONS
II. AFW SYSTEM PROTECTION FEATURES						
SEISMIC DESIGN	X					
• PRESSURE BOUNDARY	X	X	X	X	X	
• PIPE/EQUIPMENT SUPPORT	X	X	X	X	X	X
• EQUIPMENT QUALIFICATION	X	X	X		X	X
HIGH ENERGY LINE BREAKS	X					
• PIPE WHIP	X	X				
• JET IMPINGEMENT	X					
ENVIRONMENTAL PROTECTION	X					
• ENVIRONMENTAL ENVELOPES	X	X	X	X	X	
• EQUIPMENT QUALIFICATION	X	X	X		X	X
• HVAC DESIGN	X					
FIRE PROTECTION	X	X	X			
MISSILE PROTECTION	X					
SYSTEMS INTERACTION	X					
III. STRUCTURES THAT HOUSE THE AFW SYSTEM						
SEISMIC DESIGN/INPUT TO EQUIPMENT	X	X	X		X	
WIND & TORNADO DESIGN/MISSILE PROTECTION	X					
FLOOR PROTECTION	X					
HELB LOADS	X					
CIVIL/STRUCTURAL DESIGN CONSIDERATIONS	X					
• FOUNDATIONS	X	X	X			
• CONCRETE/STEEL DESIGN	X	X	X			
• TANKS	X	X	X			

CONFIRMATORY ANALYSES, CALCULATIONS OR EVALUATIONS

PIPE STRESS EVALUATION

- SCOPE
  - PIPING PROBLEM FROM AFW PUMP 6" Ø DISCHARGE LINE
  - MODEL DEVELOPED FROM FIELD VERIFIED DRAWINGS
  - DEADWEIGHT, PRESSURE AND SEISMIC LOADS CONSIDERED
  - HIGHER STRESSED POINTS COMPARED TO DESIGN ANALYSIS

PIPE SUPPORT

- SCOPE
  - SEVERAL SUPPORTS ASSOCIATED WITH PIPING VERIFICATION TO BE SAMPLED (E.G. SNUBBER, RIGID RESTRAINT, SPRING HANGER)
  - FIELD VERIFICATION TO BE PERFORMED
  - STRESS CALCULATION FOR SAMPLED SUPPORTS BASED UPON PIPING VERIFICATION LOADS
  - LOAD COMPARISON TO DESIGN LOADS FOR REMAINDER OF SUPPORTS ASSOCIATED WITH PIPING VERIFICATION

CONFIRMATORY ANALYSES CALCULATIONS OR EVALUATIONS

(continued)

ENVIRONMENTAL ENVELOPE EVALUATION

- SCOPE
  - TEMPERATURE/PRESSURE/HUMIDITY ENVIRONMENT FOR A SELECTED COMPARTMENT OUTSIDE CONTAINMENT
  - MODEL DEVELOPMENT TO INCLUDE INDEPENDENT VERIFICATION OF INPUT PARAMETERS (E.G. VENT AREAS, COMPARTMENT VOLUMES, ETC.)
  - ENVELOPE COMPARED TO DESIGN ENVELOPE USED FOR THE QUALIFICATION OF EQUIPMENT AND STRUCTURE

CRITERIA FOR ISSUING A FINDING

- LICENSING CRITERIA OR COMMITMENTS ARE NOT MET
- DESIGN METHODOLOGY DEFICIENCY (E.G. FAILURE TO USE ACCEPTED ANALYTICAL APPROACH, USE OF INCORRECT INPUTS, ETC.)
- QUALITY ASSURANCE PROGRAM AND DESIGN CONTROL IMPLEMENTATION NONCONFORMANCE
- INDEPENDENT CALCULATION RESULTS DIFFER FROM DESIGN ANALYSIS
- DIFFERENCE BETWEEN DESIGN OUTPUT AND THAT WHICH IS CALLED FOR IN A PROCUREMENT SPEC
- DIFFERENCE IN FIELD CONFIGURATION VERSES AS-BUILT DRAWINGS

TREATMENT OF FINDINGS

- CLASSIFICATION OF FINDINGS BY LEAD REVIEWER
  - OPEN - POTENTIAL FOR BECOMING CONFIRMED FINDING
  - CONFIRMED - JUDGED TO BE AN APPARENT ERROR NECESSITATING ADDITIONAL INVESTIGATION (E.G. FURTHER DOCUMENTATION, ANALYSES, DESIGN/CONSTRUCTION CHANGES)
  - RESOLVED - ONGOING REVIEW OF ADDITIONAL INFORMATION LEADS TO CLOSEOUT OF FINDINGS (ROOT CAUSE IDENTIFIED AND IMPACT ASSESSED)
- INTEGRATED REVIEW BY PROJECT TEAM UNDER DIRECTION OF PROJECT MANAGER
  - FURTHER TECHNICAL REVIEW TO CLARIFY, EXPAND OR REASSESS
  - REVIEW OF CLASSIFICATION
- PREPARATION OF ERROR REPORTS
- SENIOR REVIEW TEAM REVIEW
  - POSSIBLE IDENTIFICATION OF NEED FOR CLARIFICATION, EXPANSION OF REVIEW OR REASSESSMENT
  - EVALUATION OF SAFETY SIGNIFICANCE
- FORWARDING OF FINDINGS AND ERRORS TO CPC AND ORIGINAL DESIGN ORGANIZATIONS FOR THEIR REVIEW AND RESPONSE
- REVIEW OF DESIGN ORGANIZATION RESPONSE TO ERROR REPORTS

ADDITIONAL VERIFICATION AND SAMPLING

- UNDERTAKEN FOR FINDINGS CLASSED "OPEN" FOR RECLASSIFICATION TO "CONFIRMED" OR "RESOLVED"

- ROOT-CAUSE IDENTIFICATION

  - RANDOM ERROR

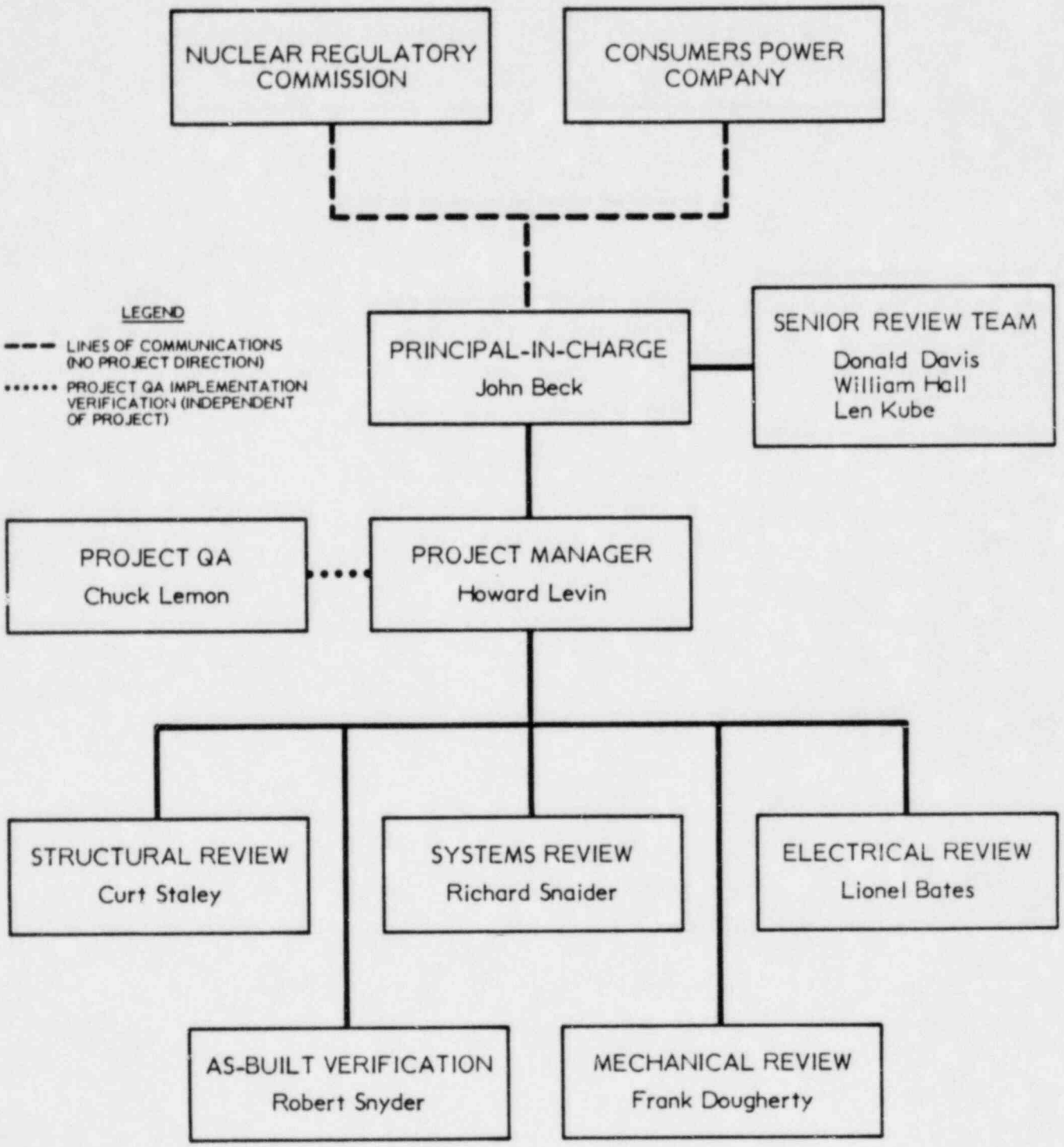
  - SYSTEMATIC ERROR

- DETERMINATION OF EXTENT

- IMPROVEMENT OF LEVEL OF CONFIDENCE

- BOTH INPO AND IDV FINDINGS WILL BE CONSIDERED

PROJECT ORGANIZATION
MIDLAND INDEPENDENT DESIGN VERIFICATION



KEY PERSONNEL
MIDLAND INDEPENDENT DESIGN VERIFICATION PROGRAM

- PROJECT DIRECTION

JOHN BECK, PRINCIPAL-IN-CHARGE

NUCLEAR POWER PLANT OPERATIONS AND CORPORATE MANAGEMENT, LICENSING, ENGINEERING AND PROJECT MANAGEMENT

HOWARD LEVIN, PROJECT MANAGER

NUCLEAR POWER PLANT STRUCTURAL, MECHANICAL DESIGN AND CONSTRUCTION, EQUIPMENT QUALIFICATION, OPERATING REACTOR SAFETY, LICENSING, PROJECT MANAGEMENT

- SENIOR REVIEW TEAM

DONALD DAVIS, TERA

NUCLEAR SAFETY AND LICENSING, PLANT AND REACTOR SYSTEMS, THERMAL-HYDRAULIC ANALYSIS, ACCIDENT ANALYSIS

WILLIAM J. HALL, UNIVERSITY OF ILLINOIS

ENGINEERING ANALYSIS AND DESIGN, STRUCTURAL ENGINEERING, STRUCTURAL MECHANICS AND DYNAMICS, SOIL MECHANICS, FRACTURE MECHANICS, ENGINEERING CRITERIA DEVELOPMENT FOR MAJOR PROJECTS

LEONARD KUBE, MAC

NUCLEAR SAFETY AND LICENSING, QUALITY PROGRAMS, PROJECT MANAGEMENT

KEY PERSONNEL
(continued)

- DESIGN REVIEW TEAM

CURT STALEY, LEAD STRUCTURAL REVIEWER

NUCLEAR POWER PLANT STRUCTURAL, MECHANICAL DESIGN, CONSTRUCTION PROJECT MANAGEMENT AND CONTROL

FRANK DOUGHERTY, LEAD MECHANICAL REVIEWER

NUCLEAR POWER PLANT MECHANICAL DESIGN, QUALITY ASSURANCE, SAFETY AND RELIABILITY ANALYSIS, SYSTEM DESIGN/CRITERIA DEVELOPMENT

RICHARD SNAIDER, LEAD SYSTEMS REVIEWER

NUCLEAR POWER PLANT OPERATIONS, MAINTENANCE AND DESIGN, SYSTEMS ENGINEERING, LICENSING PROJECT MANAGEMENT, MECHANICAL ENGINEERING

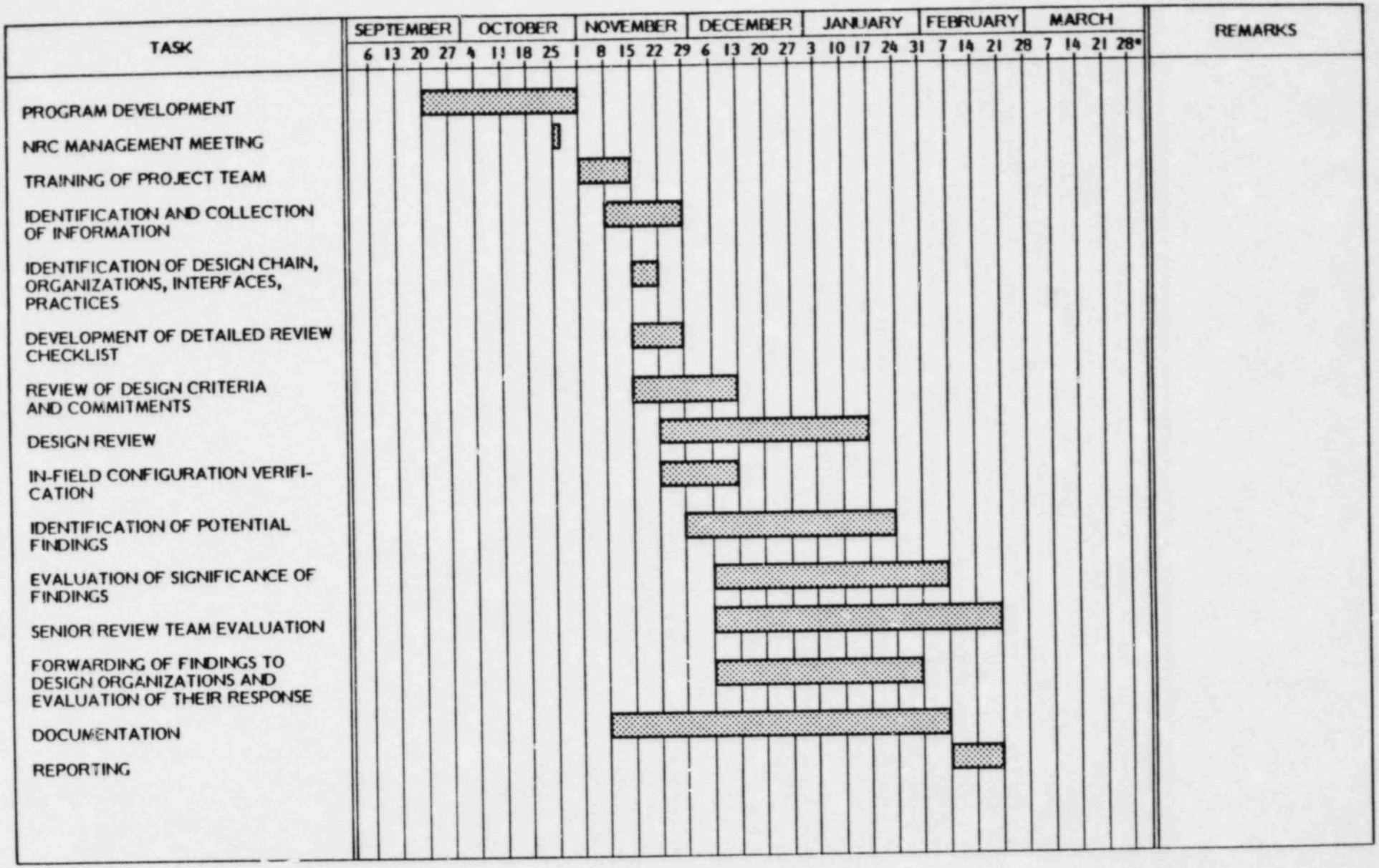
ROBERT SNYDER, LEAD FIELD VERIFICATION

NUCLEAR POWER PLANT DESIGN AND CONSTRUCTION, PROJECT MANAGEMENT, START-UP AND OPERATIONS

LIONEL BATES, LEAD ELECTRICAL REVIEWER

NUCLEAR POWER PLANT ELECTRICAL, INSTRUMENTATION AND CONTROL SYSTEMS DESIGN, EQUIPMENT QUALFICATION, PLANT OPERATIONS AND MAINTENANCE

SCHEDULE FOR MIDLAND INDEPENDENT DESIGN VERIFICATION



* DATES BEGIN ON MONDAY

ENCLOSURE 4

GAP LETTER TO NRC