UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D. C. 20555

November 15, 1983

MEMORANDUM FOR: ACRS Subcommittee on Quality and Ouality Assurance During Design and Construction

FROM: D. Fischer, Staff Engineer D. Fischer

SUBJECT: INDEPENDENT QUALITY VERIFICATION PROGRAM

Attached is a letter from Tera Corporation that describes four conceptual options for Independent Ouality Verification Program Methodologies. The pros and cons of each option are stated. While the letter relates to Midland specifically, the methodologies are generic and therefore may be of some interest to the QA Subcommittee.

The NRC Staff believes that Option 1 is an integral part of the existing Independent Design and Construction Verification (IDCV) program at Midland. As specific design- or construction-related deficiencies are identified, process-related questions are potentially raised (as part of the evaluations associated with root cause determination). The IDCV program provides that decisions may be made at any time to initiate focused reviews as circumstances warrant. Option 1, therefore, retains this element of the existing IDCV program and would wait until later stages of the program to make decisions relative to the need for expansion of scope to systematically review process-related issues. The NRC would be a party in such decisions. Option 1 is also understood by the Staff to be compatible with existing IDCV program schedules at Midland.

After consideration of the alternatives important to the Staff's needs under the Congressional (Ford) Amendment, the Staff found Option 1 to be acceptable.

Attachment:
As stated

cc: ACRS Members
ACRS Technical Staff

TERA

August 15, 1983

Mr. James W. Cook
Vice President
Consumers Power Company
1945 West Parnall Road
Jackson, Michigan 49201

Mr. J. G. Keppler
Administrator, Region III
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

Mr. D. G. Eisenhut
Director, Division of Licensing
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Re: Docket Nos. 50-329 OM, OL and 50-033 OM, OL
Midland Nuclear Plant - Units 1 and 2
Independent Design and Construction Verification (IDCV) Program
Conceptual Options for Independent Quality Verification Program Methodologies

In accordance with direction provided during the August 5, 1983 meeting to discuss options for modification of the Midland IDCV program with respect to initiatives associated with Section 13 of Public Law 97-415 (Ford Amendment), TERA has identified several conceptual methodologies considering input provided by Consumers Power Company and NRC representatives. The attached "white paper" is intended for comment and is planned as a topic for discussion at an upcoming meeting which is tentatively set for August 26, 1983, at Bechtel's Ann Arbor offices.

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1/1 See Attached

ATTACHMENT

TERA CORPORATION
7101 WISCONSIN AVENUE BETHESDA MARYLAND 20814 301-654-8940

TERA

August 15, 1983

Mr. James W. Cook
Vice President
Consumers Power Company
1945 West Parnall Road
Jackson, Michigan 49201

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Administrator, Region III
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
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7101 WISCONSIN AVENUE TERA CORPORATION BETHESDA MARYLAND 20814 301-654-8900

It is envisioned that future discussions between CPC, NRC, and TERA will enable a definition of what reprogramming, if any, is required to make the Midland IDCV program responsive to the Ford Amendment legislation.

Sincerely,

Howard A. Levin
Project Manager
Midland IDCV Program

cc: L. Gibson, CPC
F. Buckman, CPC
D. Miller, CPC (site)
B. Palmer, CPC (site)
J. Taylor, NRC, I&E HQ
D. Hood, NRC
P. Keshishian, NRC, I&E HQ
G. Gower, NRC, I&E HQ
Midland IDCVP Service List

Attachment

HAL/djb

SERVICE LIST FOR MIDLAND INDEPENDENT DESIGN AND CONSTRUCTION VERIFICATION PROGRAM

cc: Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

James G. Keppler, Regional Administrator
U.S. Nuclear Regulatory Commission,
Region III
799 Roosevelt Road
Glen Ellyn, Illinois 60137

U.S. Nuclear Regulatory Commission
Resident Inspectors Office
Route 7
Midland, Michigan 48640

Mr. J. W. Cook
Vice President
Consumers Power Company
1945 West Parnall Road
Jackson, Michigan 49201

Michael I. Miller, Esq.
Isham, Lincoln & Beale
Three First National Plaza,
51st floor
Chicago, Illinois 60602

James E. Brunner, Esq.
Consumers Power Company
212 West Michigan Avenue
Jackson, Michigan 49201

Ms. Mary Sinclair
5711 Summerset Drive
Midland, Michigan 48640

Cherry & Flynn
Suite 3700
Three First National Plaza
Chicago, Illinois 60602

Ms. Lynne Bernabei
Government Accountability Project
1901 Q Street, NW
Washington, D.C. 20009

Ms. Barbara Stamiris
5795 N. River
Freeland, Michigan 48623

Mr. Wendell Marshall
Route 10
Midland, Michigan 48440

Mr. Steve Gadler
2120 Carter Avenue
St. Paul, Minnesota 55108

Ms. Billie Pirner Garde
Director, Citizens Clinic
for Accountable Government
Government Accountability Project
Institute for Policy Studies
1901 Que Street, N.W.
Washington, D.C. 20009

Charles Bechhoefer, Esq.
Atomic Safety & Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dr. Frederick P. Cowan
Apt. B-125
6125 N. Verde Trail
Boca Raton, Florida 33433

Jerry Harbour, Esq.
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Mr. Ron Callen
Michigan Public Service Commission
6545 Mercantile Way
P.O. Box 30221
Lansing, Michigan 48909

Mr. Paul Rau
Midland Daily News
124 McDonald Street
Midland, Michigan 48640

CONCEPTUAL OPTIONS FOR
INDEPENDENT QUALITY VERIFICATION PROGRAM METHODOLOGIES

The Independent Design and Construction Verification (IDV, ICV) components of the Midland IDCV program focus on an engineering evaluation of the quality of end products of the design and construction processes. Due to the focus on end products, process reviews were not intended to be a part of the IDV and ICV programs. The NRC has expressed a desire to modify the Midland IDCV program to include a review of these processes. Several conceptual options have been identified for the potential addition of an Independent Quality Verification (IQV) program as an integral part of the Midland IDCV program to selectively evaluate the implementation of the design control, construction control and QA/QC processes. The melding of the IQV and IDV/ICV components potentially provides enhanced capability to evaluate overall quality through the combination of a limited "horizontal slice" process review with a "vertical slice" three-system test of these processes. The relative benefits of such an approach versus the existing approach is subject to a degree of speculation in view of the fact that the nature of the Midland IDCV program Findings and the depth of penetration into process reviews is indeterminate at this time. Added assurance may be gained in extrapolating the conclusions (i.e., to other safety systems provided that these other systems were designed and constructed by similar processes) reached through a combined horizontal and vertical review; however, such benefit has not as yet been quantified through industry experience.

Design and Construction control processes and the parallel QA/QC verification are important in producing a quality constructed facility. For the evaluation of a facility in later stages of construction, a review of process issues is of lesser significance in reaching conclusions. A more direct approach is an engineering evaluation of completed products (e.g., the existing Midland IDCV program "vertical slice") provided the quality is readily measurable by physical or other means. Process reviews become potentially more useful when evaluating inaccessible items or items where quality is otherwise difficult to measure.

As specific design or construction related deficiencies are identified within either the IDV or ICV programs, process related questions are potentially raised as part of the evaluations associated with root cause determination. Decisions may be made at any time to initiate focused reviews as circumstances warrant. In view of the substance of such matters, these decisions are generally by consensus of CPC, NRC, and TERA. Clearly, option I may be to retain this element of the existing IDCV program and wait until later stages of the program to make decisions relative to the need for expansion of scope to systematically review process related issues.

Option 2 may be not to initiate process reviews within the specific scope of the IDCV program; however, utilize the program as a mechanism to assimilate the outputs of various other ongoing programs that address process related issues to provide a broader perspective.

A third optional approach for an IQV program may be a focused review of process issues biased towards items that evolve from:

- IDV and ICV program Findings;
- An evaluation of project experience and noted process related deficiencies;
- Process related issues known to have presented problems within the nuclear industry.

The implementation of all design/construction control and QA/QC processes relative to criteria of 10 CFR 50, Appendix B will not be evaluated under this option for an IQV program. The selection of specific issues within scope would be based upon the judgement of senior reviewers on the IDCV and IQV project teams. The objective would be to devote resources on a priority basis in areas that warrant greater attention, recognizing that certain process issues are more significant and have a greater potential to compromise quality. An attempt would be made to identify potential areas where identified root causes may also have manifested in problems (however, as yet unidentified) in the same or similar form. This approach is supported by the fact that industry experience dictates that undetected problem areas (which are of greatest concern) are likely to be the result of similar root causes as detected problems.

The identification of the portion of the IQV scope that is derived from the IDV and ICV program Findings would be ongoing and subject to change as the IDCV program progresses. This subset would be supplemented, as necessary, by additional areas determined through an evaluation of project experience. Sources of information such as NRC inspection reports, SCREs, MCARs, 50.55e reports, quality assurance and inspection reports, etc. would be reviewed for this purpose.

It is contemplated that the following issues would be reviewed on an a priori basis in view of their importance to complex projects and general impact within the industry.

- NSSS/BOP interface control (i.e., B&W and Bechtel);
- Interface control between disciplines (e.g., civil/structural and mechanical groups within Bechtel);
- Vendor interface control (e.g., between Terry Turbine and Bechtel for the AFW turbine);
- Control of design changes;
- Document control (i.e., at site and design office);
- Control of field changes;
- Translation and interpretation of design requirements into procedures;
- Development of QA/QC inspection procedures and implementation.

This listing would constitute the initial scope of the IQV for option 3. As discussed, a potential exists that these areas of review may have to be supplemented subject to the project experience evaluation and IDCV Findings.

As with option 2, an important element of the option 3 IQV program would be the review and evaluation of the overall adequacy of the implementation of the Construction Completion Program (CCP) and its effectiveness in identifying and correcting potential undetected problems associated with past activities and for completion of the remainder of work. The IQV objective would be to determine

whether the CCP remedial measures adequately attend to the issues for which the CCP was created. The review would verify that the CCP process which is now the primary construction process, as supplemented with additional verification activities, adequately addresses potential quality concerns. Outputs from the Construction Implementation Overview (CIO) of the CCP would be assimulated into this assessment. Accordingly, TERA's review would *not* duplicate the CIO efforts, but complement it through integrating its outputs into the IDCV evaluation process. Selected areas outside the CCP scope could also be selected such as Babcock and Wilcox and Zack HVAC activities; however, the specific organizations or programs to be evaluated should be determined based upon the involvement in the design or construction of the three systems within the IDCV program scope.

Option 4 may be consideration of a program that is similar to a common quality assurance audit. The quality assurance manuals, procedures and records would be reviewed against applicable requirements of 10 CFR 50, Appendix B and other industry standards. The audit would include a review of objective evidence that the QA program was adequately implemented and documented. Given the status of the Midland project and various other considerations, this option may not be technically viable and is most costly.

Options 1 through 3 are all technically feasible. There may be cost-benefit trade-offs associated with the selection of any of these options, including the more obvious schedular considerations. Option 2 would appear to be the least resource intensive effort. Options 1 and 3 may very well be equivalently cost-effective. If the IDCV program identifies few process related Findings, then option 1 may be most effective; otherwise, option 3 may provide for a more systematic and efficient review process.