

**DAVIS-BESSE NUCLEAR POWER STATION
REQUEST FOR MODIFICATION (RFM)**

ED 8070-2

1. RFM NO.

1941-1010215

Install Service Structure Inspection Openings

3. SUS NO (6).

062-01

4. INITIATING DOCUMENT TYPE/NO.

N/A as PCAQ 96-0551

5. STATEMENT OF PROBLEM

Access is required to the top of the surface of the reactor vessel closure head and underside of the reactor vessel head insulation to provide for inspection and cleaning without removing the CRDM's. Additionally, the access openings will allow the use of HVAC (HEPA hoses/filters) during outage activities. This RFM is similar to MOD 90-0012 which was voided.

This RFM is the outcome of various meeting between Radiological Controls, Maintenance and Engineering. It is an effort to reduce total man-rem during an outage. There are several reasons behind this RFM.

First, there is an ongoing industry concern involving corrosion of the Inconel 600 CRDM reactor vessel nozzles. There is no access to the reactor vessel head or the CRDM reactor vessel nozzles without the installation of this modification. CONTINUED

6. DESCRIPTION AND SCOPE OF PROPOSED MODIFICATION (MOD)

Install 7 to 9 inspection openings around the circumference of the support skirt. These holes should be approximately equally spaced around the circumference of the support skirt, and should be located to clear existing constraints. The exact hole size and locations should be determined during the course of design. Removable cover plates should be fabricated and installed. Consideration should be given to having hinged covers to allow for easy removal and reinstallation.

CONTINUED

| | | | | |
|---|--------------------------------------|-----------------|-------------------|---|
| 7. INITIATING ENGINEER (Print Name) E. V. Chimahusky | SIGNATURE <i>E. V. Chimahusky</i> | DATE 5/27/94 | EXTENSION 8550 | 8. SPONSORING INDIVIDUAL/ ORGANIZATION Plant Engineering <i>R. C. Donnellan</i> |
| 9. INITIATING ENGINEERING SUPERVISOR E. C. Matranga | SIGNATURE <i>ECM</i> | DATE 5/27/94 | EXTENSION 8369 | |

RFM REVIEW AND APPROVALS/ CONCURRENCES

10. PROPOSED MOD CLASSIFICATION:

LIMITED MOD NORMAL MOD

| | | | |
|---|-----------------|--|-----------------|
| 11. RESP. DESIGN ENGR. SUPERVISOR <i>T. Swann</i> | DATE 7/8/94 | 12. DESIGN ENGINEERING MANAGER <i>JH. [unclear]</i> | DATE 7/12/94 |
| 13. DIRECTOR - DB ENGINEERING <i>M.A. Abbe / R [unclear]</i> | DATE 7/13/94 | 14. PLANT MANAGER <i>A. K. Wood / [unclear]</i> | DATE 7/12/94 |

15. REQUEST FOR DESIGN EFFORT TO BEGIN IMMEDIATELY N/A (NOT APPLICABLE)

| | | | | | |
|-----------------------------------|------------------------|------|-----------------------------------|---------------|------|
| <input type="checkbox"/> APPROVED | DIRECTOR - DB ENGINEER | DATE | <input type="checkbox"/> APPROVED | PLANT MANAGER | DATE |
| <input type="checkbox"/> REJECTED | | | <input type="checkbox"/> REJECTED | | |

16. APPROVAL TO PROCEED WITH:

DESIGN SCOPING STUDY (N/A FOR LIMITED MODs) CONCEPTUAL DESIGN (N/A FOR LIMITED MODs) DETAILED DESIGN

| | | | | | |
|--|------|----------------------|------|----------------------|------|
| DB REPRESENTATIVE | DATE | DBPRG REPRESENTATIVE | DATE | DBPRG REPRESENTATIVE | DATE |
| | | DBWSC REPRESENTATIVE | DATE | DBWSC REPRESENTATIVE | DATE |
| 17. <input type="checkbox"/> RFM DISAPPROVED | | DBWSC REPRESENTATIVE | DATE | DBWSC REPRESENTATIVE | DATE |

18. ACCOUNT NO.

BUDGET AUTHORIZATION BY

DATE

SUBJ: Install Service Structure Inspection Openings

5. Second, inspections of the Reactor vessel head for boric acid corrosion following an operating cycle is difficult and not always adequate. Video inspections of the head for the CRDM nozzle issue and as a follow-up to the CRDM flange inspection do not encompass a 100% inspection of the vessel head.

Third, cleaning of excessive boric acid residue from the reactor vessel head also does not encompass 100%. The size and geometry of the service structure mouse holes with scrapers and wire brushes only permits cleaning of the lower one-third of the head surface area.

Installation of these inspection openings would allow a thorough inspection and cleaning of the head. Discussions with other B&W utilities indicate that this modification was a great success and increased their access to the reactor head.

All B&W plants with the exception of Davis-Besse and ANO-1 have installed this modification. Previous discussion with ANO-1 indicate they have plans to install the access openings in their service structure.

This modification is estimated to cost \$200,000 for the design, fabrication, and installation by B&W. This is based on a November 1993 proposal by B&W. There would be additional in-house costs by Toledo Edison.

Man-rem savings are expected with this modification. Improved methods to inspect and clean the reactor vessel head can reduce the man-rem exposure for these activities. With this modification, Crystal River has been able to save 500 mR during the inspection of the reactor vessel head. Davis-Besse should be able to expect at least the same man-rem savings.



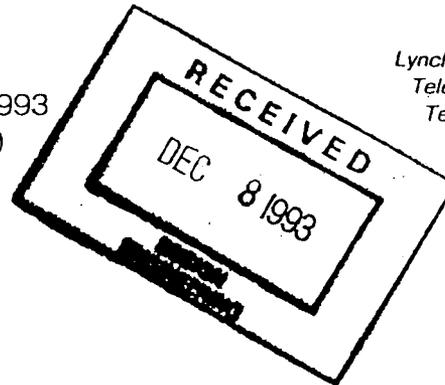
EXT- 93-04184

NUCLEAR TECHNOLOGIES

PROPOSAL FOR INFO ONLY.

November 30, 1993
TE-PS-93-150

3315 Old Forest Road
P.O. Box 10935
Lynchburg, VA 24506-0935
Telephone: 804-385-2000
Telecopy: 804-385-3663



Mr. John Holden
Toledo Edison Company
Davis Besse Nuclear Power Station
5501 North State Route 2
Oak Harbor, OH 43449

Subject: BWNS Job Number 1210598
Proposal for Service Structure Inspection Openings

Reference: TE Contract No. C605600D92

Dear Mr. Holden:

As a follow-up to your visit in Lynchburg, BWNS is pleased to provide this proposal for control rod drive service structure support skirt access openings, including the design change package, hardware, and field modifications necessary to complete the work. BWNS will utilize experience gained in performing similar work at TMI-1, Crystal River, and all three Oconee units.

DESCRIPTION OF WORK

The primary function of the control rod drive service structure support skirt access openings is to allow inspection and cleaning of the top surface of the reactor vessel closure head, lower control rod drive mechanism (CRDM) area, underside of the reactor vessel head insulation and insulation support brackets without removing the CRDM's or insulation surrounding the CRDM's. In addition, the access openings allow the use of HEPA vacuums, hoses, and filters to create down draft ventilation during outage activities such as CRDM maintenance. This helps control airborne radioactive contamination on both the local and global scales inside the reactor building. The addition of access opening cover plates prevents the disturbance of design airflow circulation paths.

This proposal addresses the BWNS engineering work required to issue field change documentation, field work to support cutting the access openings, and provision of hardware for the access opening cover plates.

The machining of holes within the service structure support skirt is a technical, moderately dose intensive task requiring specialized tooling, training and qualified personnel. BWNS provides:

- Specialized Equipment - BWNS has already designed and manufactured the special tooling and equipment required for implementation of this task. In addition, the equipment has been modified to improve its performance taking advantage of past experience.
- Experience - BWNS has not only developed the tooling necessary to perform the task, but offers the experience of personnel who have previously performed the task. This helps ensure the delivery of quality service and efficient performance, incorporating the ALARA philosophy.
- Engineering Evaluation - BWNS will prepare the necessary document package supporting this modification. Thus, Toledo Edison (TE) will have the assurance that the modification and field work meet all applicable codes.
- Specialized Procedure - BWNS already has procedures in place for this process to maintain both quality and efficiency.
- Specialized Training - BWNS conducts specialized training for this work utilizing the tooling and equipment on a mockup installation. Each crew member will be trained and qualified for the task with training certification provided.

We believe that BWNS brings proven equipment and procedures that will provide the most efficient and cost-effective performance of this work.

SCOPE OF WORK

Field Change Documentation:

BWNS proposes to prepare the documents that provide the design requirements, detail design (access opening sizes and locations), and stress analysis to support cutting access openings in the control rod drive service structure support skirt.

The access openings will be sized and located to permit optimum access for inspection and cleaning of the top surface of the reactor vessel closure head. Approximately nine holes, evenly spaced around the circumference of the support skirt, are proposed. Each

hole will be approximately 12 inches in diameter. The holes will be located to clear the existing physical constraints such as the RV vent line, RV insulation support brackets, and existing holes. Final hole locations will be determined during the course of the task.

Technical Requirements Document:

BWNS will prepare a Technical Requirements Document (TRD) defining controlling codes, standards, and technical requirements.

Analysis:

BWNS will prepare an analysis based on the load combinations and allowable stresses used in the original stress report for the segments attached to the reactor vessel closure head (see table below). Although leak-before-break criteria are in effect for the hot and cold legs, a detailed loading analysis for the next largest line (core flood line) has not been performed; therefore, LOCA loads will be based on results of the Asymmetric Cavity Pressure program documented in BAW-1621.

A Preliminary Safety Concern (PSC) exists regarding the stresses in the region of the flanged joint that attaches the lower end of the support skirt to the segments welded to the closure head. Resolution of the PSC will be completed by the end of 1993. The calculation package for the access openings will demonstrate that the presence of the openings has a negligible effect (~3%) on the stresses in the region that is the subject of the PSC.

| Load Combinations and Allowable Stresses | | |
|--|--|--|
| Load Case | Load Combination | Allowable Stress Limits |
| I | Design plus Operating Basis Earthquake (OBE) Loads | $P_m \leq 1.0 S_m$ $P_L + P_b \leq 1.5 S_m$ |
| II | Design plus Safe Shutdown Earthquake (SSE) Loads | $P_m \leq 1.2 S_m$ $P_L + P_b \leq 1.2(1.5)S_m$ |
| III | Design plus Pipe Rupture (LOCA) Loads | $P_m \leq 1.2 S_m$ $P_L + P_b \leq 1.2(1.5)S_m$ |
| IV | Design plus SSE plus LOCA Loads | $P_m \leq 2/3 S_u$ $P_L + P_b \leq 2/3 S_u$ |

Design Drawings:

BWNS will prepare design drawings (BWNS proprietary) of the access opening arrangement and cover plate details.

Design Package:

BWNS will prepare a MOD Detailed Design Package (DDP) in accordance with TE Procedure EN-DP-1200 Rev. 01. BWNS will be responsible for identifying the affected documents, and will request copies of the affected documents through the designated TE responsible engineer. BWNS will prepare the DDP documents on TE forms, and will provide preparer and reviewer signatures, and will submit both a 70% package for Inter Discipline Review and the final DDP.

It is proposed that normal day-to-day technical interfacing take place between the TE responsible engineer and the BWNS dedicated team lead engineer. Technical information discussed will be documented in a BWNS Record of Telecon, with copies to all involved parties. BWNS will provide minutes of any task-related meetings between TE and BWNS which are held at BWNS. TE will have two (2) weeks to review the draft MOD design report and the draft DDP.

The DDP package shall consist of the following documents (as required):

- MOD Conceptual Design form
- MOD Conceptual Design Package
- Safety Review and Evaluation Sheet
- EIT Review Sheet
- Program Impact Review Sheets
- Constructability Design Review Meeting Minutes
- ISI Review Sheet
- IWA Reconciliation
- Design Verification Control form
- Design Verification Checklist(s)
- Design Inputs Review Sheet
- Hardware Design Specification
- Bill of Materials
- IDR Documentation
- Fire Hazard Analysis Review form
- ALARA Design Review documentation
- Intra-Company Spare Parts Memorandum
- Technical Specification Interpretation Request
- MOD Detailed Design Form
- MOD Documents List

- Modification Design Report
- Limited MOD Design Summary (if applicable)
- Safety Evaluation
- Test Requirements Sheet(s)
- Interfacing Document Worksheet
- Affected Equipment Lists
- Affected Documents List
- Revised Cross-References List
- DBCES Update Form(s)
- USAR Change Notice (if required)
- License Amendment Request (if required)
- Quality Classification Update (QCU) Forms
- Document Change Notices (DCN's, SCN's, SDCN's VMCN's)
- Design Drawings
- Vendor Drawings
- Engineering Sketches
- Other Design Documents (as applicable)

Other documentation, if needed to complete the BWNS-DDP, will be added to the package as mutually agreed to by TE and BWNS.

Deliverables:

- A draft and final design requirements document defining controlling codes, standards, and technical requirements.
- A draft and final BWNS proprietary-2 calculation (32 Doc) reporting the stresses in the skirt at the hole location and an evaluation of the modified skirt to demonstrate that the holes do not change the structural frequency response. This would confirm that the current seismic and LOCA analysis would remain valid. An ASME Code Stress Report will be provided.
- A draft and final MOD DDP identifying the configuration changes for the service structure support skirt including design drawings that provide the details of the service structure support skirt modification and removable cover plates.
- If the transparent cover plate option (see Cover Plates & Hardware, below) is authorized, results of the material feasibility investigation will be documented in a BWNS Technical Data Record or EIR.

Field Implementation:

BWNS proposes to provide the personnel, tooling, equipment, procedures, and training required to layout and machine cut the access openings and install cover plates in the CRDM service structure support skirt at Davis-Besse. This includes the following:

1. Special tooling and equipment for hole cutting (rental basis).
2. Mockups & materials.
3. Predeployment (equipment checkout, procedure review, training preparation)
4. Training of personnel at Davis-Besse (including craft personnel).
5. Site crew: one BWNS Task Leader and two Technical Advisers, with four craft personnel.

Cover Plates & Hardware:

BWNS proposes to design and furnish cover plates (including 2 spares), HEPA vacuum adapters (2), and associated hardware for installation at Davis-Besse. The covers are designed to preclude air circulation against the head during operation, but provide the ability to connect HEPA vacuums to two cover plates for airborne contamination control, if access is being made through the openings for cleaning and observation, or if ventilation controls may be beneficial during CRDM maintenance.

OPTION: Per previous discussions with TE engineers, a transparent cover plate design would be desirable to permit visual observation to check for CRDM gasket leakage, or build-up of boron crystals on the RV closure head. As option, BWNS will perform a materials investigation to determine if Lexan or a comparable material would be feasible in the environment of the access opening cover plates.

ESTIMATED SCHEDULE

BWNS estimates that the field change documentation can be completed within approximately eleven weeks after receipt of authorization for this task from TE. Toledo Edison is requested to authorize start of this task by May 31, 1994 in order for BWNS to support the Fall 1994 refueling outage (9R) of Davis-Besse. The access opening design schedule is as follows:

ASSUMPTIONS/CLARIFICATIONS

- The design is safety-related except for the HEPA vacuum system adapters which are non-safety related. The BWNS Quality Assurance Program applies to the design and analysis while Addendum A applies to the hardware.
- The site work will be performed in accordance with Davis-Besse QA Program and procedures (with BWNS procedure input).
- The following BWNS drawings will be used as the design input.
 1. 154631E-03 Closure Head Assembly
 2. 154615E-03 Material List - Head & Vessel
 3. 154638E-02 Service Struct. Suppt. & Mtg. Flg.
 4. New drawings for cutting access openings and cover plate design.
- Radiation exposure estimate is 4-1/2 Man Rem assuming 40 mR/hour work area dose rate and the site schedule previously stated. TE will provide the necessary shielding to maintain a maximum work area dose rate of 40 mR/hour.
- The reactor vessel head will be on the RV Head Stand for the machining operations and hardware installation.
- TE will provide photographs of the service structure support skirt areas within two weeks after task authorization to verify accessibility and potential interferences outside of the support skirts.
- The service structure support skirt modification and removable cover plates will be designed to not significantly change the stiffness of the structure in order to ensure that existing seismic and LOCA loads remain valid. Also, the access hole design will not require any structural reinforcement of the service structure support skirt.
- NRC approval is not required.
- No FSAR or Technical Specification changes are needed.
- The BWNS/TE Project Management Manual (PMM), revision 2 applies to this task.
- Except for the field work to install the access openings and hardware, no site visits are required. Any design review requiring BWNS participation will be handled via telephone.

- If BWNS equipment decontamination cannot be accomplished to a level acceptable to BWNS (or is impractical), then TE will reimburse BWNS for the equipment at a price to be specified by BWNS.
- All field work pricing is based on the assumption that all badging and site in-processing to permit unescorted access can be completed in three days (eight hours per day) for both non-manual and craft personnel. This includes as a minimum the following training, qualifications, and administrative processing: GOT/RCT training, respirator physicals and training, Fitness for Duty Training for Supervisors, Background Investigations, Drug Screening, and training sessions on procedures and technical specifications directed by TE. Additional time required to complete this process will be billed to TE on a time and material (T&M) rates.
- Toledo Edison will provide the following services in support of BWNS equipment and personnel:
 - General Shop Maintenance and Services
 - Electrical or Pneumatic Power/Supplies, as required
 - Health Physics Support/Supplies
 - Decontamination/Shielding
 - Quality Assurance/QC Coverage
 - Crane Operators
 - Other support on-site as may be required
 - Suitable office space for BWNS equipment, spares, consumables, etc.
 - Equipment receipt, movement, and shipping assistance
 - General work area support
 - Miscellaneous consumables
 - Site contact person for interface between BWNS and plant service groups

PRICING

| | |
|---|-----------|
| Field Change Documentation: | \$ 74,000 |
| Field Work, Training, and Predeployment: | \$112,700 |
| Cover Plates & Hardware: | |
| Fixed Cover Plate Option (See Figure 1): | \$ 13,000 |
| Hinged Cover Plate Option (See Figure 2): | \$ 21,700 |

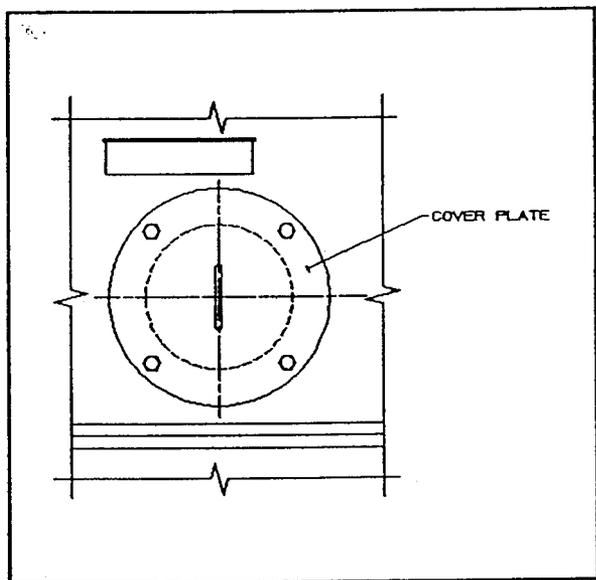


FIGURE 1

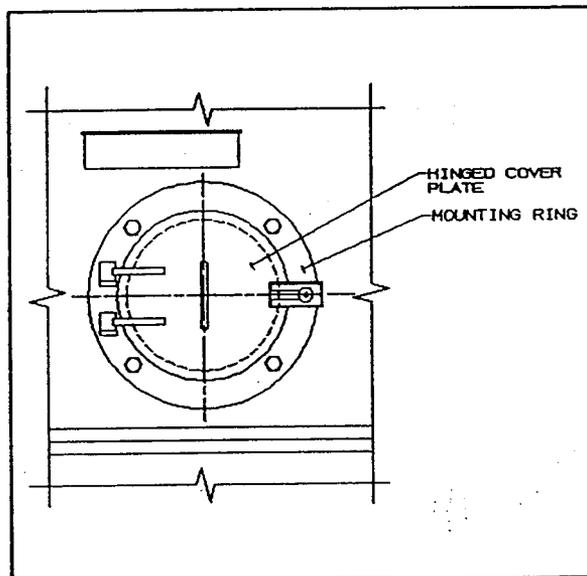


FIGURE 2

TOTAL FIRM, FIXED PRICE for field change documentation, field work, training, predeployment, cover plates, and hardware (Fixed cover plate option): \$199,700

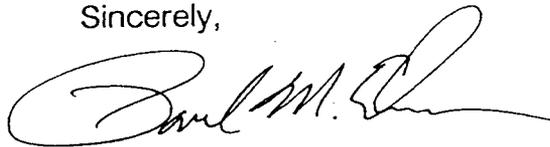
TOTAL FIRM, FIXED PRICE for field change documentation, field work, training, predeployment, cover plates, and hardware (Hinged Cover Plate Option): \$208,400

OPTIONAL PRICING for evaluation of transparent cover plate material: \$ 6,000

This proposal is made under the terms and conditions of the referenced TE contract, including escalation provisions. This proposal is valid until December 31, 1993, except that BWNS reserves the right to withdraw or amend it at any time prior to approval in writing by TE and subsequent written acceptance by an authorized representative of BWNS.

If you have any questions or would like additional information, please call Brian Elliott at (804) 385-2336 or me at (804) 385-2311.

Sincerely,



P.M. Ulmer
Senior Product Manager
Plant Services Projects

BCE/lab

cc: B.C. Elliott
R.L. Pittman
R. Greer
A. Wilson