



Consumers
Power
Company

James W Cook
Vice President - Projects, Engineering
and Construction

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

April 20, 1984

84-04 #1

Mr J G Keppler
US Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, IL 60137

MIDLAND ENERGY CENTER PROJECT
FINAL REPORT ON POTENTIALLY REPORTABLE CONDITIONS
SEISMIC AND STRUCTURAL DESIGN CONCERNS
FILE: 0.4.9.91 SERIAL: 28026

Because of discrepancies in the original seismic calculations, the following Safety Concerns and Reportability Evaluations (SCREs) were issued: SCRE 9 - Category I structures were analyzed with a nominal soil modulus without considering the variation of $\pm 50\%$ as required by the FSAR; SCRE 15 - for the seismic analysis of the diesel generator building, the material stiffness for soil under the building was assumed to be the same as undisturbed till material instead of fill material; and SCRE 42 - Use of Bechtel Computer Program CE-931 which overestimated the composite modal damping, which resulted in an underestimation of the building responses for the reactor and auxiliary buildings. In addition, SCRE 19 lists both seismic and structural concerns identified as a result of a CPCo review of the civil structural design calculations. The items on SCRE 19 were discussed with Messrs Landsman and Gardner of NRC Region III Inspection and Evaluation during a March 22, 1984 meeting with Bechtel and Consumers Power Company.

Attachment 1 provides a more detailed description and the circumstances under which the items were discovered. In each case, the original evaluation was that the discrepancies and concerns, respectively, were not reportable under 10CFR50.55(e), but that further evaluation would be necessary for confirmation.

In actuality, the engineering analysis supporting overall plant design and resolution of the SCREs has resulted in two basic categories in terms of making a final safety evaluation of the SCRE concerns.

1. Concerns identified in the SCREs, which in fact, have been analyzed to their original design basis and configuration and have been demonstrated to not be safety concerns, or
2. Equipment/system or structural modifications have occurred, (for various reasons) and the engineering analyses have not been performed to the original design basis and configuration. Thus the project has

not made an absolute confirmation as to nonreportability of subject SCRE concerns. This is specifically true of SCREs 9, 15, 42 and some of the items associated with SCRE 19.

Consumers Power has decided to classify these SCREs as potentially reportable. This is because conditions of the original plant design for category 2 above will remain indeterminate as to actual reportability.

These concerns are classified potentially reportable as no actual case has been identified where the original structure or components would not perform their intended function as required by the original design criteria. Changes in other loads, such as the dead loads, live loads, thermal loads, pipe break loads, etc, which are combined with the seismic loads, could have caused the increased stresses which required plant modification or equipment replacement. The effect of the specific discrepant conditions identified in SCREs 9, 15, and 42, in contributing to the need for equipment replacement or plant modification is not identifiable from the current plant design analysis. None of the SCRE 19 items have been classified as a nonconforming condition. Some of the analysis in current plant design which addresses items listed on SCRE 19 may have contributed to plant design changes. Of the 50 items originally identified in SCRE 19, only six are currently open. These will be resolved through ongoing analyses using current design criteria and thus, like the other SCRE concerns, initial evaluation of the nonreportability of the original conditions will not be verified.

To ensure all changes in seismic criteria and additional stresses are incorporated into the final plant configuration, the floor accelerations have been recalculated, and the structures have been reevaluated. Reevaluation of all piping systems, preparation of Seismic Qualification Review Team (SQRT) documentation involving review of all equipment seismic qualification, and a pump and valve operability review are tasks now in progress.

In conclusion, Consumers Power has decided to classify the subject SCREs as potentially reportable because systems have been changed and equipment has been replaced for reasons which a subject SCRE may have contributed to, and the concerns will not be analyzed to the original design. Since all required changes as documented in the SCREs have been incorporated into the latest calculations, the final plant design is assured to meet current design criteria and commitment to safety.

As can be seen from Attachment 1, each of the items was discovered through a design review process. The specific discrepancies identified are random and isolated. The review processes have provided a comprehensive look at the civil/structural design area. The review results have caused an increased awareness of design packaging and individual design detail necessary to produce acceptable design. It is felt that the past intensive overall reviews, in combination with our current Project Engineering design practices required by Engineering Department Procedures, MPQAD monitors and audits, and CPCo Engineering design overview provide an appropriate overall design review system. No additional specific corrective action is required. This is the

final report on this potentially reportable situation. If significant discrepancies are detected during the review programs, appropriate notification in accordance with 10CFR50.55(e) will be made.

James W. Cook

JWC/PWJ/lr

CC: Document Control Desk, USNRC
Washington, DC

RJCook, NRC Resident Inspector
Midland Nuclear Plant

✓DHood, USNRC Office of NRR
Bethesda, MD

INPO Records Center

OM/OL SERVICE LIST

Mr Frank J Kelley
Attorney General of the
State of Michigan
Ms Carole Steinberg
Assistant Attorney General
Environmental Protection Division
720 Law Building
Lansing, MI 48913

Mr Myron M Cherry, Esq
Suite 3700
Three First National Plaza
Chicago, IL 60602

Mr Wendell H Marshall
RFD 10
Midland, MI 48640

Mr Charles Bechhoefer, Esq
Atomic Safety & Licensing
Board Panel
U S Nuclear Regulatory Commission
East-West Towers, Room E-413
Bethesda, MD 20014

Dr Frederick P Cowan
6152 N Verde Trail
Apt B-125
Boca Raton, FL 33433

Mr Fred C Williams
Isham, Lincoln & Beale
1120 Connecticut Ave, NW, Suite 840
Washington, DC 20036

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

Atomic Safety & Licensing
Appeal Board
U S Nuclear Regulatory Commission
Washington, DC 20555

Mr C R Stephens (3)
Chief, Docketing & Services
U S Nuclear Regulatory Commission
Office of the Secretary
Washington, DC 20555

Ms Mary Sinclair
5711 Summerset Street
Midland, MI 48640

Mr William D Paton, Esq
Counsel for the NRC Staff
U S Nuclear Regulatory Commission
Washington, DC 20555

Atomic Safety & Licensing
Board Panel
U S Nuclear Regulatory Commission
Washington, DC 20555

Ms Barbara Stamaris
5795 North River Road
Rt 3
Freeland, MI 48623

Dr Jerry Harbour
Atomic Safety & Licensing
Board Panel
U S Nuclear Regulatory Commission
East-West Towers, Room E-454
Bethesda, MD 20014

Mr M I Miller, Esq
Isham, Lincoln & Beale
Three First National Plaza
52nd Floor
Chicago, IL 60602

Mr D F Judd Babcock & Wilcox
PO Box 1260
Lynchburg, VA 24505

Mr Steve Gadler, Esq
2120 Carter Avenue
St Paul, MN 55108

Mr P Robert Brown
Clark, Klein & Beaumont
1600 First Federal Bldg
Woodward Ave
Detroit, MI 48226

Mr John DeMeester, Esq
Dow Chemical Building
Michigan Division
Midland MI 48640

Ms Lynne Eernabei
Government Accountability Project
1901 Q Street, NW
Washington, DC 20009

3/14/84

ATTACHMENT 1

SUMMARY OF SCRE CONCERNS AS ORIGINALLY ISSUED

- SCRE 9 During the FSAR rereview, it was determined that there were some inconsistencies in the FSAR with regard to variations of soil modulus and effects on structural frequencies. With regard to structural adequacy, a check of seismic response forces within the major seismic Category 1 structures for a variation of soil modulus of $\pm 50\%$ from the nominal value (22×10^6 lb/ft²) as indicated by FSAR 2.5.4.7, is in process. Our opinion at this time is that the structures, in the configurations currently depicted in the FSAR, will be capable of carrying out their intended safety functions.

With regard to safety-related equipment within these structures, we have applied the option allowed in Section C.2 of Regulatory Guide 1.122, ie, to broaden the peaks associated with structural frequencies by $\pm 15\%$. In so doing, we have utilized the nominal value of soil modulus (ie, 22×10^6 lb/ft²) for both the SSE and OBE. On this basis, for the structural configurations currently depicted in the FSAR, it is believed that the systems would be able to carry out their intended safety functions.

- SCRE 15 During the course of preparing for the structural and seismic design audit, it was discovered that in the original seismic analysis of the diesel generator building, the material stiffness of the site fill had been inadvertently chosen to be the same as the undisturbed till material.

- SCRE 19 During preparation for the NRC structural audit, it was established that various engineering activities related to plant design require additional attention to document full compliance with Project licensing and/or design criteria. The Bechtel prepared list does not include items covered by previous SCREs or existing MCARs. In addition, certain issues raised by Consumers Power Company during the audit preparation need to be integrated (as appropriate) into the listing.

None of the presently identified items are deemed reportable at this time due to the lack of any indicated safety impact. In all cases, appropriate analyses will be conducted by Bechtel to determine the actual situation relative to potential impact on plant safety.

- SCRE 42 During the January 29, 1982 seismic design status review meeting in Ann Arbor, Bechtel presented a floor response spectrum curve for the reactor building comparing the original spectra with the current spectra. The comparison indicates a degree of nonconservatism in the original spectra at certain frequencies. The nonconservatism in the original spectra appears to be the result of the original use of CE-931, which resulted in a composite modal damping which was too high. BLC-11329, dated August 14, 1981, stated that the use of

CE-931 was not a safety problem due to other offsetting factors; however, the spectra comparison presented on January 29 indicates that CE-931 did, in fact, result in a spectra which was too low.

The new seismic analysis which is underway will determine the adequacy of the reactor building design. Bochtel advised during the January 29 meeting that the original design had sufficient margin relative to the nonconservative spectra; however, final determination regarding reportability cannot be made until the new analysis is complete.

SAFETY CONCERN AND
REPORTABILITY EVALUATION

4. HOW WAS CONCERN IDENTIFIED, WHEN, WHERE?

During the FSAR rereview, it was determined that there were some inconsistencies in the FSAR with regard to variations of soil modulus and effects on structural frequencies. Refer to FSAR sections 2.5.4.7, 3.7.2.4, 3.7.2.5, 3.7.2.9, and Appendix 3A (Response to Reg Guide 1.122).

(CONTINUE ON NEXT PAGE)

TO MANAGER-MPQA

1. FROM:

ORGANIZATION: Design Prod

SCRE NO: 9

FILE NO: 15.1

DATE RECEIVED: 2/4/81

2. IS CONCERN A PART 21?
☐ YES ☒ NO

WHEN?

BY WHOM?

3. IS NRC AWARE OF THIS?
☐ YES ☒ NO

WHEN?

BY WHOM?

5. BRIEF DESCRIPTION OF CONCERN - SYSTEM, COMPONENT, ACTIVITY, POSSIBLE SAFETY IMPACT - (ATTACH SUPPORTING DOCUMENTS).

The FSAR sections are now in the process of review and revision to resolve inconsistencies between sections and within sections. This will be completed in the near future.

With regard to structural adequacy, a check of seismic response forces within the major seismic Category 1 structures for a variation of soil modulus of $\pm 50\%$ from the nominal value (22×10^6 lb/ft²) as indicated by FSAR 2.5.4.7, is in process. Our opinion at this time is that the structures, in the configurations (Cont'd)

(CONTINUE ON NEXT PAGE)

6. IMMEDIATE REPORTABILITY EVALUATION:

- ☐ REPORTABLE - GO TO 13
☐ POTENTIALLY REPORTABLE - GO TO 13
☒ NOT REPORTABLE, FURTHER EVALUATION
☐ NOT REPORTABLE

7. ORGANIZATION RESPONSIBLE FOR FURTHER EVALUATION:

Bechtel Project Engineering

8. FINAL REPORTABILITY EVALUATION (IF 6.c. CHECKED):

- a. ☒ REPORTABLE b. ☐ NOT REPORTABLE

9. QA APPROVAL OF EVALUATION

BLOCKS 1 TO 7:

W R Bird

MANAGER - MPQA

DATE 2/4/81

10. JUSTIFICATION OF EVALUATION - (ATTACH SUPPORTING DOCUMENTS)

- a. Based on information in Block 5, there is confidence that the first reportability criterion is not met (ie, no adverse impact on safety).

The completion of ongoing structural (seismic) analysis is required to confirm this.

- b. The second reportability criterion that could be applicable is "a significant departure from the final design as approved and released for construction such that the design does not conform to the criteria and bases stated in the Safety Analysis Report."

(CONTINUE ON NEXT PAGE)

EVALUATOR'S SIGNATURE/DATE:

Robert Newman 2/4/81

12. FINAL QA APPROVAL - MANAGER MPQA/DATE:

W R Bird 3/22/84

NRC NOTIFICATION: HOW? Telecon

DATE: 3/15/84 TIME: 5:00 p.m.

INDIVIDUAL NOTIFIED: Ron Gardner

REFERENCE: O.C.R. Chron File No: 28053

96502713

SAFETY CONCERN A. J REPORTABILITY EVALUATION

4. CONTINUED

5. CONTINUED

currently depicted in the FSAR, will be capable of carrying out their intended safety functions.

With regard to safety-related equipment within these structures, we have applied the option allowed in Section C.2 of Regulatory Guide 1.122, ie, to broaden the peaks associated with structural frequencies by $\pm 15\%$. In so doing, we have utilized the nominal value of soil modulus (ie, 22×10^6 lb/ft²) for both the SSE and OBE. On this basis, for the structural configurations currently depicted in the FSAR, it is believed that the systems would be able to carry out their intended safety functions.

10. CONTINUED

The SAR will be revised to reflect the actual design approach being used for structures and equipment.

Final Evaluation

See oral communication record of 3/15/84 for basis to declare this item potentially reportable.

3/22/84

14. MINIMUM DISTRIBUTION:

VICE PRESIDENT - PE&C
VICE PRESIDENT - MIDLAND PROJECT
DIRECTOR - ENVIRONMENTAL SERVICES & QA
MIDLAND SITE MANAGER
SITE QA SUPERINTENDENT
MANAGER - SAFETY & LICENSING

~~MIDLAND FILE NO. 1577~~

15. ADDITIONAL DISTRIBUTION:

RCBauman, P14-312B
LHCurtis, Bechtel AA
GREagle/RLRixford, Bechtel AA
JMilandin, Bechtel AA
JARutgers, Bechtel AA
SLSobkowski, Bechtel AA
NWSwanberg, Bechtel AA

96502714



Consumers
Power
Company
QA69-0

SAFETY CONCERN AND REPORTABILITY EVALUATION

Enclosure 3
PROJECTS, ENGINEERING
AND CONSTRUCTION -
QUALITY ASSURANCE DEPARTMENT

PAGE 1 *RJC*

4. HOW WAS CONCERN IDENTIFIED, WHEN, WHERE?

During the course of preparing for the NRC's Structural and Seismic Design Audit, this concern was brought to Consumers attention in a meeting in the Bechtel Ann Arbor offices on April 3, 1981.

TO MANAGER-MPQA

1. FROM: B F Henley

ORGANIZATION: Design Prod.

SCRE NO: 15

FILE NO: *45.1.15.1*

DATE RECEIVED: 4/7/81

2. IS CONCERN A PART 21?

☐ YES ☒ NO

WHEN?

BY WHOM?

3. IS NRC AWARE OF THIS?

☐ YES ☒ NO

WHEN?

BY WHOM?

(CONTINUE ON NEXT PAGE)

5. BRIEF DESCRIPTION OF CONCERN - SYSTEM, COMPONENT, ACTIVITY, POSSIBLE SAFETY IMPACT - (ATTACH SUPPORTING DOCUMENTS).

In Bechtel's original seismic analysis of the Diesel Generator Building, it has been determined that the material stiffness of the site fill had been inadvertently chosen to be the same as the undisturbed till material. Bechtel should proceed at once to perform a safety impact evaluation for any possible effects on the Diesel Generator structure and internal equipment.

(CONTINUE ON NEXT PAGE)

6. IMMEDIATE REPORTABILITY EVALUATION:

- a. ☐ REPORTABLE - GO TO 13
b. ☐ POTENTIALLY REPORTABLE - GO TO 13
c. ☐ NOT REPORTABLE, FURTHER EVALUATION
d. ☐ NOT REPORTABLE

7. ORGANIZATION RESPONSIBLE FOR FURTHER EVALUATION:

Bechtel Engineering

8. FINAL REPORTABILITY EVALUATION (IF 6.c. CHECKED):

- a. ☒ *Potentially* REPORTABLE b. ☐ NOT REPORTABLE

9. QA APPROVAL OF EVALUATION OF BLOCKS 1 TO 7:

[Signature]
MANAGER - MPQA

[Signature]
DATE

10. JUSTIFICATION OF EVALUATION - (ATTACH SUPPORTING DOCUMENTS)

Final Evaluation

See oral communication record of 3/15/84 for basis to declare this item potentially reportable.
3/22/84

(CONTINUE ON NEXT PAGE)

11. EVALUATOR'S SIGNATURE/DATE:

12. FINAL QA APPROVAL - MANAGER MPQA/DATE:

un Bud 3/22/84

13. NRC NOTIFICATION: HOW? *Telecon*

DATE: 3/15/84 TIME: 5:00 pm

INDIVIDUAL NOTIFIED: *Ron Gardner*

96561965

REFERENCE: *O.C.R* Chron File No: 28053



Consumers
Power
Company
QA70-0

SAFETY CONCERN AND REPORTABILITY EVALUATION

PROJECTS, ENGINEERING
AND CONSTRUCTION -
QUALITY ASSURANCE DEPARTMENT
SCRE NO: 15
PAGE 2

4. CONTINUED

CONTINUED

CONTINUED

MINIMUM DISTRIBUTION:
VICE PRESIDENT - PE&C
VICE PRESIDENT - MIDLAND PROJECT
DIRECTOR - ENVIRONMENTAL SERVICES & QA
MIDLAND SITE MANAGER
SITE QA SUPERINTENDENT
MANAGER - SAFETY & LICENSING
MIDLAND FILE NO 15.1

15. ADDITIONAL DISTRIBUTION:
BCMConnell
LHCurtis
SSobkowski
MADietrich
TJohnson
JARutgers

96561966

Consumers
Power
Company
QA69-0SAFETY CONCERN AND
REPORTABILITY EVALUATIONPROJECTS, ENGINEERING
AND CONSTRUCTION -
QUALITY ASSURANCE DEPARTMENTPAGE 1 *RJC*

4. HOW WAS CONCERN IDENTIFIED, WHEN, WHERE?

During the January 29, 1982 seismic design status review meeting in Ann Arbor, Bechtel presented a floor response spectrum curve for the reactor building comparing the original spectra with the current spectra. The comparison (attached) indicates a degree of non-conservatism in the original spectra at certain frequencies.

TO MANAGER-MPQA

1. FROM: RC Bauman, P14-312B *RCB*
ORGANIZATION: Design Prod.

SCRE NO: 42

FILE NO: 15.1

DATE RECEIVED: 2/2/82

2. IS CONCERN A PART 21?

WHEN? ☐ YES ☒ NO

BY WHOM?

3. IS NRC AWARE OF THIS?

☐ YES ☒ NO

WHEN?

BY WHOM?

(CONTINUE ON NEXT PAGE)

5. BRIEF DESCRIPTION OF CONCERN - SYSTEM, COMPONENT, ACTIVITY, POSSIBLE SAFETY IMPACT - (ATTACH SUPPORTING DOCUMENTS).

The non-conservatism in the original spectra as shown on the comparison dated 1/27/82 appears to be a result of the original use of CE-931 which resulted in a composite model damping which was too high. BLC-11329 (attached), dated August 14, 1981, stated that the use of CE-931 was not a safety problem due to other off-setting factors, however the spectra comparison presented on January 29 indicates that CE-931 did in fact result in a spectra which was too low.

The new seismic analysis which is underway will determine the adequacy of the reactor building design.

(CONTINUE ON NEXT PAGE)

6. IMMEDIATE REPORTABILITY EVALUATION:

- a. ☐ REPORTABLE - GO TO 13
b. ☐ POTENTIALLY REPORTABLE - GO TO 13
c. ☒ NOT REPORTABLE, FURTHER EVALUATION
d. ☐ NOT REPORTABLE

7. ORGANIZATION RESPONSIBLE FOR FURTHER EVALUATION:

Bechtel Engineering

8. FINAL REPORTABILITY EVALUATION (IF 6.c. CHECKED):

- a. ☒ REPORTABLE b. ☐ NOT REPORTABLE

9. QA APPROVAL OF EVALUATION OF BLOCKS 1 TO 7:

UN Bud
MANAGER - MPQA*2/3/82*
DATE

10. JUSTIFICATION OF EVALUATION - (ATTACH SUPPORTING DOCUMENTS)

Bechtel advised during the January 29 meeting that the original design had sufficient margin relative to the non-conservative spectra, however final determination regarding reportability cannot be made until the new analysis is complete.

Final Evaluation

See oral communication record of 3/15/84 for basis to declare this item potentially reportable.
3/22/84

(CONTINUE ON NEXT PAGE)

11. EVALUATOR'S SIGNATURE/DATE:

RC Bauman *2-2-82*

12. FINAL QA APPROVAL - MANAGER M. QA/DATE:

UN Bud *3/22/84*

13. NRC NOTIFICATION: HOW?

*Telecon*DATE: *3/15/84* TIME: *5:00 PM.*

INDIVIDUAL NOTIFIED:

*Ron Gardner**96700093*

REFERENCE:

Oral Communication Record - Chron File No. 28053



Consumers
Power
Company
QA70-0

SAFETY CONCERN JD REPORTABILITY EVALUATION

PROJECTS, ENGINEERING
AND CONSTRUCTION -
QUALITY ASSURANCE DEPARTMENT
SCRE NO: 42
PAGE 2

4. CONTINUED

5. CONTINUED

10. CONTINUED

14. MINIMUM DISTRIBUTION:

VICE PRESIDENT - PE&C
VICE PRESIDENT - MIDLAND PROJECT
DIRECTOR - ENVIRONMENTAL SERVICES & QA
MIDLAND SITE MANAGER
SITE QA SUPERINTENDENT
MANAGER - SAFETY & LICENSING
MIDLAND FILE NO 15.1

15. ADDITIONAL DISTRIBUTION:

RCBauman	MADietrich
LHCurtis	GSKeeley
TRThiruvengadam	JAMooney
RAWells	

96700091

121

Bechtel Associates Professional Corporation

039377

777 East Eisenhower Parkway
Ann Arbor, Michigan

Mail Address: P.O. Box 1000, Ann Arbor, Michigan 48106



August 14, 1981

BLC- 11329

Consumers Power Company
1945 West Parnall Road
Jackson, Michigan 49201

Attention: Mr. R.C. Bauman
Design Production Manager

RECEIVED

AUG 19 1981

MIDLAND PROJECT
MANAGEMENT

Subject: Midland Plant Units 1 and 2
Consumers Power Company
Bechtel Job 7220
Safety Implications -
CE931 Program

This addresses the safety implications for the Midland Project of a concern regarding the application of the CE931 program used in the seismic analysis of Seismic Category I structures. This concern is that the CE931 program may calculate composite modal damping that is too high in some cases. The CE931 program has been used in seismic analysis to calculate composite modal damping for all Seismic Category I structures on the Midland Project. However, investigations have shown that this concern is applicable only to the reactor buildings.

The concern for the reactor building is in damping for the rocking mode for both the east-west and north-south directions. The composite modal damping for this mode has been calculated in 1976 as approximately 12%. This value has been calculated in 1981 as approximately 5% for a slightly revised seismic model for the east-west direction. Using various verification techniques, we have concluded that approximately 5% is the correct damping for this application. Since the 1976 model yields lower responses than the 1981 model, the question of a potential safety concern arises for seismic qualifications performed using the 1976 seismic model.

Based upon our investigations, we believe that there is no identified safety deficiency for the following reasons;

1. The structure is partially embedded in soil. This effect will decrease response and was not considered in the 1976 analysis.
2. Credit was not taken for soil material damping and SSE concrete material damping in the 1976 analysis.
3. CE931 calculated a composite modal damping of 12%, however, a conservative limitation of 10% was used in the 1976 analysis to develop seismic response spectra and structural responses. This limitation is specified in BC-TOP-4-A and is referenced in the FSAR.

Bechtel Associates Professional Corporation

BLC-11329

Page 2

August 14, 1981

039377


The schedule impact of the resolution of this concern is shown in Schedule EPS-0119, Rev B. This impact is due to the abandonment of the CE-931 program and the substitution of the verified BSAP program in this application.

Very truly yours,

M. L. Curtis
L.H. Curtis
Project Engineer

SLS/kje(C)
7/23/7

cc: D.B. Miller
T.J. Sullivan
R.A. Wells

W. Bird


Written Response Requested: No



Consumers
Power
Company
QA69-0

SAFETY CONCERN / Enclosure 5 REPORTABILITY EVALUATION

PROJECTS, ENGINEERING
AND CONSTRUCTION -
QUALITY ASSURANCE DEPARTMENT

PAGE 1 *RJC*

4. HOW WAS CONCERN IDENTIFIED, WHEN, WHERE?

The issues covered by this SCRE were identified by Bechtel and Consumers Power during preparation for the April 20 NRC structural audit. Additional items may be identified during the audit.

(CONTINUE ON NEXT PAGE)

TO MANAGER-MPQA

1. FROM: RC Bauman
ORGANIZATION: Design Prod

SCRE NO: 19
FILE NO: 15.1
DATE RECEIVED: 4/20/81

2. IS CONCERN A PART 21?
☐ YES ☒ NO
WHEN?
BY WHOM?

3. IS NRC AWARE OF THIS?
☐ YES ☒ NO
WHEN?
BY WHOM?

5. BRIEF DESCRIPTION OF CONCERN - SYSTEM, COMPONENT, ACTIVITY, POSSIBLE SAFETY IMPACT - (ATTACH SUPPORTING DOCUMENTS).

During preparation for the NRC structural audit, it was established that various engineering activities related to plant design require additional attention to document full compliance with Project licensing and/or design criteria. These items were discussed with Bechtel on April 13 and are summarized on the attached Bechtel prepared list which does not include items covered by previous SCRE's or existing MCAR's. In addition, certain issues raised by Consumers Power Company during the audit preparation need to be integrated (as appropriate) into the listing.

(CONTINUE ON NEXT PAGE)

6. IMMEDIATE REPORTABILITY EVALUATION:

- a. ☐ REPORTABLE - GO TO 13
b. ☐ POTENTIALLY REPORTABLE - GO TO 13
c. ☒ NOT REPORTABLE, FURTHER EVALUATION
d. ☐ NOT REPORTABLE

7. ORGANIZATION RESPONSIBLE FOR FURTHER EVALUATION:
Bechtel Project Engineering

8. FINAL REPORTABILITY EVALUATION
(IF 6.c. CHECKED):

- a. ☒ *Potentially* REPORTABLE b. ☐ NOT REPORTABLE

9. QA APPROVAL OF EVALUATION OF BLOCKS 1 TO 7:

WNB
MANAGER - MPQA

4/21/81
DATE

10. JUSTIFICATION OF EVALUATION - (ATTACH SUPPORTING DOCUMENTS)

None of the presently identified items are deemed reportable at this time due to the lack of any indicated safety impact. In all cases, appropriate analyses will be conducted by Bechtel to determine the actual situation relative to potential impact on plant safety.

Final Evaluation

See oral communication record of 3/15/84 for basis to declare this item potentially reportable.
3/22/84

(CONTINUE ON NEXT PAGE)

11. EVALUATOR'S SIGNATURE/DATE:

RC Bauman 4/21/81

12. FINAL QA APPROVAL - MANAGER MPQA/DATE:

WNB 3/22/84

13. NRC NOTIFICATION: HOW? *Telecon*

INDIVIDUAL NOTIFIED: *Ron Gardner*

REFERENCE: *OCR Chron File No 28053*

DATE: *3/15/84* TIME: *16503608* *5:00pm*

SAFETY CONCERN AI REPORTABILITY EVALUATION

4. CONTINUED

5. CONTINUED

10. CONTINUED

14. MINIMUM DISTRIBUTION:

VICE PRESIDENT - PE&C
VICE PRESIDENT - MIDLAND PROJECT
DIRECTOR - ENVIRONMENTAL SERVICES & QA
MIDLAND SITE MANAGER
SITE QA SUPERINTENDENT
MANAGER - SAFETY & LICENSING
MIDLAND FILE NO 15.1

15. ADDITIONAL DISTRIBUTION:

BFHenley
JARutgers
LHCurtis
MADietrich
DMTurnbull
DMBudzik
TRThiruvengadam

96503609

CONSUMERS
POWER
COMPANY

Projects, Engineering
and Construction
Midland Project Quality
Assurance Department

ORAL COMMUNICATIONS RECORD

Chron File No: 28053

Page 1 of 2

Date of Communication: 3/15/84	MPQA Personnel Participating: W R Bird
Time of Communication: 5:00 PM	Other Party(s): Ron Gardner, NRC Region III
Prepared By: W R Bird	

Projects and/or Subjects Discussed: POTENTIAL REPORTABLE ITEM CONCERNING STRUCTURAL
DESIGN

Summary of Conversation: SCREs 9, 15, 19 and 42 represent conditions identified in the original seismic and structural design. Specifically:

- 9 - Structures were analyzed with a nominal versus the FSAR Required \pm 50% soils modulus.
- 15 - Soil stiffness under the diesel generator building was assumed to be from undisturbed till versus fill in the seismic calculation.
- 19 - Seismic and structural concerns from the Bechtel/CPCo review of civil structural design in 1981.
- 42 - For the reactor building there was too high of a modal damping in computer code ~~CD~~-931.

The original conclusion as to reportability was that the conditions were not reportable but that further analysis was required to confirm. Our current design is not representative of the original design conditions. Thus, at the point in time our design analysis is supporting final hardware. Thus we are not in a position to make a clear determination that all of the items represented by the SCREs were in fact not reportable. The basis for our immediate evaluation remain valid to support the belief that the items in fact do not represent a significant safety condition. However, criteria has changed and hardware has been modified. We are taking the position to declare these items potentially reportable in order to close them. A formal written report will be submitted by April 13, 1984. Closure will be through demonstrating that our final design meets the final design criteria.

WRB/lr

CC: JWCook, P26-336B
JEBrunner, M-1079
DMBudzik, P24-517A
MADietrich, Midland
GREagle, TASK AA
RJEhardt, P14-113A
LSGibson, P24-618A
RCHollar, Bechtel
PWJacobsen, P14-414
DTPerry, Midland
EBPoser, Bechtel
DLQuamme, Midland
GLRichardson, Bechtel
JARutgers, Bechtel
RAWells, Midland
NRC Resident Inspector, Midland
RNGardner, NRC Region III



Consumers
Power
Company

James W Cook
Vice President - Projects, Engineering
and Construction

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

April 20, 1984

84-04 #1

Mr J G Keppler
US Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, IL 60137

MIDLAND ENERGY CENTER PROJECT
FINAL REPORT ON POTENTIALLY REPORTABLE CONDITIONS
SEISMIC AND STRUCTURAL DESIGN CONCERNS
FILE: 0.4.9.91 SERIAL: 28026

Because of discrepancies in the original seismic calculations, the following Safety Concerns and Reportability Evaluations (SCREs) were issued: SCRE 9 -Category I structures were analyzed with a nominal soil modulus without considering the variation of $\pm 50\%$ as required by the FSAR; SCRE 15 - for the seismic analysis of the diesel generator building, the material stiffness for soil under the building was assumed to be the same as undisturbed till material instead of fill material; and SCRE 42 - Use of Bechtel Computer Program CE-931 which overestimated the composite modal damping, which resulted in an underestimation of the building responses for the reactor and auxiliary buildings. In addition, SCRE 19 lists both seismic and structural concerns identified as a result of a CPCo review of the civil structural design calculations. The items on SCRE 19 were discussed with Messrs Landsman and Gardner of NRC Region III Inspection and Evaluation during a March 22, 1984 meeting with Bechtel and Consumers Power Company.

Attachment 1 provides a more detailed description and the circumstances under which the items were discovered. In each case, the original evaluation was that the discrepancies and concerns, respectively, were not reportable under 10CFR50.55(e), but that further evaluation would be necessary for confirmation.

In actuality, the engineering analysis supporting overall plant design and resolution of the SCREs has resulted in two basic categories in terms of making a final safety evaluation of the SCRE concerns.

1. Concerns identified in the SCREs, which in fact, have been analyzed to their original design basis and configuration and have been demonstrated to not be safety concerns, or
2. Equipment/system or structural modifications have occurred, (for various reasons) and the engineering analyses have not been performed to the original design basis and configuration. Thus the project has

DUPE

8406140036

X4

OC0284-0041A-MP01

not made an absolute confirmation as to nonreportability of subject SCRE concerns. This is specifically true of SCREs 9, 15, 42 and some of the items associated with SCRE 19.

Consumers Power has decided to classify these SCREs as potentially reportable. This is because conditions of the original plant design for category 2 above will remain indeterminate as to actual reportability.

These concerns are classified potentially reportable as no actual case has been identified where the original structure or components would not perform their intended function as required by the original design criteria. Changes in other loads, such as the dead loads, live loads, thermal loads, pipe break loads, etc, which are combined with the seismic loads, could have caused the increased stresses which required plant modification or equipment replacement. The effect of the specific discrepant conditions identified in SCREs 9, 15, and 42, in contributing to the need for equipment replacement or plant modification is not identifiable from the current plant design analysis. None of the SCRE 19 items have been classified as a nonconforming condition. Some of the analysis in current plant design which addresses items listed on SCRE 19 may have contributed to plant design changes. Of the 50 items originally identified in SCRE 19, only six are currently open. These will be resolved through ongoing analyses using current design criteria and thus, like the other SCRE concerns, initial evaluation of the nonreportability of the original conditions will not be verified.

To ensure all changes in seismic criteria and additional stresses are incorporated into the final plant configuration, the floor accelerations have been recalculated, and the structures have been reevaluated. Reevaluation of all piping systems, preparation of Seismic Qualification Review Team (SQRT) documentation involving review of all equipment seismic qualification, and a pump and valve operability review are tasks now in progress.

In conclusion, Consumers Power has decided to classify the subject SCREs as potentially reportable because systems have been changed and equipment has been replaced for reasons which a subject SCRE may have contributed to, and the concerns will not be analyzed to the original design. Since all required changes as documented in the SCREs have been incorporated into the latest calculations, the final plant design is assured to meet current design criteria and commitment to safety.

As can be seen from Attachment 1, each of the items was discovered through a design review process. The specific discrepancies identified are random and isolated. The review processes have provided a comprehensive look at the civil/structural design area. The review results have caused an increased awareness of design packaging and individual design detail necessary to produce acceptable design. It is felt that the past intensive overall reviews, in combination with our current Project Engineering design practices required by Engineering Department Procedures, MPQAD monitors and audits, and CPCo Engineering design overview provide an appropriate overall design review system. No additional specific corrective action is required. This is the

final report on this potentially reportable situation. If significant discrepancies are detected during the review programs, appropriate notification in accordance with 10CFR50.55(e) will be made.

James W. Cook

JWC/PWJ/lr

CC: Document Control Desk, USNRC
Washington, DC

DHood, USNRC Office of NRR
Bethesda, MD

RJCook, NRC Resident Inspector
Midland Nuclear Plant

INPO Records Center



Consumers
Power
Company
QA69-0

02816

SAFETY CONCERN AND REPORTABILITY EVALUATION

Attachment 6
PROJECTS, ENGINEERING
AND CONSTRUCTION -
QUALITY ASSURANCE DEPARTMENT

PAGE 1

4. HOW WAS CONCERN IDENTIFIED, WHEN, WHERE?

The issues covered by this SCRE were identified by Bechtel and Consumers Power during preparation for the April 20 NRC structural audit. Additional items may be identified during the audit.

(CONTINUE ON NEXT PAGE)

TO MANAGER-MPQA

1. FROM: RC Bauman
ORGANIZATION: Design Prod

SCRE NO: 19
FILE NO: 15.1
DATE RECEIVED: 4/20/81

2. IS CONCERN A PART 21?
☐ YES ☒ NO
WHEN?
BY WHOM?

3. IS NRC AWARE OF THIS?
☐ YES ☒ NO
WHEN?
BY WHOM?

5. BRIEF DESCRIPTION OF CONCERN - SYSTEM, COMPONENT, ACTIVITY, POSSIBLE SAFETY IMPACT - (ATTACH SUPPORTING DOCUMENTS).

During preparation for the NRC structural audit, it was established that various engineering activities related to plant design require additional attention to document full compliance with Project licensing and/or design criteria. These items were discussed with Bechtel on April 13 and are summarized on the attached Bechtel prepared list which does not include items covered by previous SCRE's or existing MCAR's. In addition, certain issues raised by Consumers Power Company during the audit preparation need to be integrated (as appropriate) into the listing.

(CONTINUE ON NEXT PAGE)

6. IMMEDIATE REPORTABILITY EVALUATION:

- a. ☐ REPORTABLE - GO TO 13
b. ☐ POTENTIALLY REPORTABLE - GO TO 13
c. ☒ NOT REPORTABLE, FURTHER EVALUATION
d. ☐ NOT REPORTABLE

7. ORGANIZATION RESPONSIBLE FOR FURTHER
EVALUATION:
Bechtel Project Engineering

8. FINAL REPORTABILITY EVALUATION (IF 6.c. CHECKED):

- a. ☐ REPORTABLE b. ☐ NOT REPORTABLE

9. QA APPROVAL OF EVALUATION OF BLOCKS 1 TO 7:

un Bud
MANAGER - MPQA

4/21/81
DATE

10. JUSTIFICATION OF EVALUATION - (ATTACH SUPPORTING DOCUMENTS)

None of the presently identified items are deemed reportable at this time due to the lack of any indicated safety impact. In all cases, appropriate analyses will be conducted by Bechtel to determine the actual situation relative to potential impact on plant safety.

(CONTINUE ON NEXT PAGE)

11. EVALUATOR'S SIGNATURE/DATE:

RC Bauman 4/21/81

12. FINAL QA APPROVAL - MANAGER MPQA/DATE:

13. NRC NOTIFICATION: HOW?

DATE:

TIME:

INDIVIDUAL NOTIFIED:

REFERENCE:



Consumer
Power
Company
QA70-0

028161

SAFETY CONCERN AND REPORTABILITY EVALUATION

PROJECTS, ENGINEERING
AND CONSTRUCTION -
QUALITY ASSURANCE DEPARTMENT
SCRE NO: 19
PAGE 2

4. CONTINUED

5. CONTINUED

10. CONTINUED

14. MINIMUM DISTRIBUTION:

VICE PRESIDENT - PE&C
VICE PRESIDENT - MIDLAND PROJECT
DIRECTOR - ENVIRONMENTAL SERVICES & QA
MIDLAND SITE MANAGER
SITE QA SUPERINTENDENT
MANAGER - SAFETY & LICENSING
MIDLAND FILE NO 15.1

15. ADDITIONAL DISTRIBUTION:

BFHenley
JARutgers
LHCurtis
MADietrich
DMTurnbull
DMBudzik
TRThiruvengadam

TODAY'S DATE 04/20/81 0457 03 April 1981 215-020

CUSTOMER #2150 OPERATOR C20 07220 0L1 PAR 215-C20

SA LI 015 07220-001/Audit Ltrgs/8-20-81/rar~~~~~

DATE STORED 04/20/01 0457

WIDTH 124 DEPTH 60

284

PRINT POSITION 01 LINE 03

Current

028167

```

SHIP TO: *****
**
** *****215
** Wechtel Power Corporation
** 777 E. Eisenhower Pkwy
** Ann Arbor, MI 48104
** ATTN: S. Strohl
** 215 COURIER PT 1200
**
*****

```

NOTES:

- 1) THIS MARKED COPY IS AN ATTACHMENT TO SCRF NO. 19.
- 2) CIRCLED ITEMS ARE COVERED BY THE SCRF DATED 4-20-81
- 3) OTHER ITEMS MAY BE ADDED TO SCRF NO. 19 COVERAGE FOLLOWING ADDITIONAL CMC/BECHTEL REVIEW AND COMPLETION OF THE NRC STRUCTURAL ANALYSIS. Retman 4/22/81

STRUCTURAL AUDIT LIST OF ITEMS
AUXILIARY BUILDING

Auxiliary Building	NRC Page	Inappropriate or Omitted Calculations	Compliance with FSAR Comments	General Condi- tion of Calcu- lations	Signif- icance or Disposition	Cognizant Engineer	Origina- tor/ Checker Group Leader	Status	
Part I -									2
General Analysis									3
I. Basic Design	1								5
Criteria									6
									7
									8
									10
									17
									18
									20
									21
A. Seismic criteria	1	T.H. response spec- tra comparison to site spectra. (typical for all buildings)	BC-TGP-4 to 71 frequencies. Frequencies used may not be con- sistent.		Not significant	J.Chien	W.Tseng	Being generated (shows dip not in FSAR)	25
									26
									27
									30
B. Design loads	2			Fair					33
									34
II. Analysis Method	4						S.Foelber/ W.Tseng		36
									37
									38
									39
									40
									41
									42
									43
A. Seismic analysis		Model is being re- vised to consider the tornado missile shield and the con- nection of the con- trol tower to the main auxiliary building.	NCAR 47	Good	Change spectra	W.Tseng	S.Foelber/ W.Tseng K.C.Hsu	Revision in	47
									48
									49
									50
									51
									52
									53
									54
									55
									56
									57
									58
1. Material properties	4	1. Basis for the fill parameters		Fair	Unknown	W.Tseng	K.C.Hsu	1. Search in progress	47
		2. As-built concrete modulus						2. No action planned	51
									54
									55
									56
									57
									58
2. Time history, response spectrum, etc (general)	6	The integration time interval used was .01 second instead of .005 second. (Typical for all buildings)		Fair	Not significant	W.Tseng	K.C.Hsu	.005 will be used in future.	54
									55
									56
									57
									58
									61
									62
3. Selection of number of masses	6			Good		W.Tseng	K.C.Hsu		61
									62

028161

STRUCTURAL AUDIT LIST OF ITEMS
AUXILIARY BUILDING

Auxiliary Building	NPC Page No.	Inappropriate or (omitted Calculations	Compliance with ISAR Commitments	General Condi- tion of Calcu- lations	Signif- icance or Disposition	Cognizant Engineer	Orig- inator/ Checker Group Leader	Status	
4. Modal responses	7		The combination of motions for the components was not consistent with the ISAR. (typical for all buildings)	Good	Not significant	H.Tseng	K.C.Hsu	SCM approved	66 67 68 69 70 71 72 02816
5. Soil-structure interaction	9	The $\pm 50\%$ variation in soil properties is also identified by CPCo and is addressed in SCRE 9. SCRE 9 also addresses modifications of building response spectra. (typical for all buildings)	The effect of $\pm 50\%$ variation in the the soil properties was not considered	Fair	Significant if SAR change not (implemented)	H.Tseng	K.C.Hsu	SCM approved; calculations in progress	7 77 78 79 80 81 82 83 84 85 86
6. Hydrodynamic effect of spent fuel pool	10	Not considered in seismic analysis.		Poor	Not significant	V.Lakshmi/ D.Magnuson		Calculations in progress	8 90 91
6a. Fuel pool walls and floors	10	Seismic effects not completely accounted for in design. Slosh height not calculated walls and slab appear to be designed for temperature effects only. Other loads not considered in combination.	Loads not combined in accordance with Section 3.8.6.3.	Poor	Calculations need to be redone	V.Lakshmi/ D.Magnuson	S.Puri/ H.Tsao/ Y.Lan	Calculations in progress	9 95 96 97 98 99 100 101 102 103 104 105
7. Response spectra (specific)	11			Good					108 109

STRUCTURAL AUDIT LIST OF ITEMS
AUXILIARY BUILDING

Auxiliary Building	NBC Page No.	Inappropriate or Omitted Calculations	Compliance with FSAP Commitments	General Condi- tion of Calcu- lations	Signif- icance or Disposition	Cognizant Engineer	Oriei- nator/ Checker Group Leader	Status	
B. Vertical analysis	15	Floor flexibility was not included in the calculations. (typical for all buildings)	FSAP does not address floor flexibility.	Fair	Study in progress	W. Tseng	None	Waiting for piping response	11 113 114 115 116
B. Stress analysis	12	A superseded seis- mic analysis was used for design.		Fair	Not signi- ficant			Calculations in progress	1 12 129
1. Shear walls and floors	12	The loading com- bination including tornado wind was not checked.		Fair	Not signi- ficant	J. Ross/ Lakshmi	P. Regu- pathy/ V. Verma/ K. Lan	Justification being pre- pared.	125 126 127
2. Foundation mat		1. The dead load in- creased after the analysis was com- pleted. 2. The loading combination including tor- nado wind was not checked.	All the load com- binations specified in the FSAR have not been checked.	Fair	Not signi- ficant	V. Verma/ Lakshmi	P. Regu- pathy/ K. Lan	Calculations scheduled	1 131 132 133 134 135 136 137 138 139
C. Joint filler between buildings	14	NA	NA			J. Ross			142 143
D. Computer verifi-	16	Verification has not been completed for several programs. (typical for all buildings)	No FSAR commit- ment.		Not signi- ficant			Verification being devel- oped.	1 1 144 145 150
E. Overall stability	18			Good		D. Magnuson	Lakshmi	Calculation approved.	15 154

STRUCTURAL AUDIT LIST OF ITEMS
AUXILIARY BUILDING

028161

	NPC Page No.	Inappropriate or Omitted Calculations	Compliance with FSAR Comments	General Condi- tion of Calcu- lations	Signif- icance or Disposition	Cognizant Engineer	Origina- tor/ Checker Group Leader	Status	
Auxiliary Building									
F. Interaction with non-Category I structures	20	Auxiliary building calculations do not include interaction with turbine building during tornado and seismic events. Turbine building seismic analysis and tornado calculations to be finalized.	See as calculations column	Not available	Calculations necessary to show that turbine building will not damage auxiliary building.	J. Ross	Lakshmi	Turbine building calculations to be finalized.	157 158 1 161 162 163 164 165 166 167
G. Tornado missiles	21					D. Magnuson	Lakshmi	Calculations complete	171 174 175 176 179 180
III. Conformance to Staff's Criteria (Deviations)	23								
Part II - Key Designs									
A. Exterior shear walls	24	1. Walls were not designed for plate bending for seismic and tornado loads. 2. Consider thermal gradient in design		Fair	This will probably not be critical to design but calculations need to be made to check this.	J. Ross	P. Raghupathy/ V. Verma/ K. Lam	Calculations in progress.	184 185 186 187 188 189 190
B. Interior shear walls	25	Flexural design considers only compartment pressurization. Seismic load was not included.	Missing load combination pressure plus seismic	Poor Difficult to follow	Calculations need to be made including seismic effects on walls. (transverse bending)	J. Ross	H. Tsao/ H. Kelley/ K. Lam	Calculations in progress	191 195 196 197 198 199
C. Main floors and roofs	26	Roof not checked for uplift during tornado		Fair	Not significant	D. Magnuson	K. Lam/ J. Arora	Calculations in progress	200 201 204

STRUCTURAL AUDIT LIST OF ITEMS
AUXILIARY BUILDING

028161

Auxiliary Building	NPC Page No.	Inappropriate or Omitted Calculations	Compliance with FSAR Comments	General Condi- tion of Calcu- lations	Signif- icance or Disposition	Cognizant Engineer	Origina- tor/ Checker Group Leader	Status	
D. Structural steel bracing	28	Generally designed for dead load and live loads only.	All the load combinations given in the FSAR have not been considered.	Fair	Probably not significant	D. Magnuson	K. Lam/ J. Arora	Justification being pre- pared.	208 209 210 211
E. Foundation mat	29			Fair		V. Verma	V. Verma/ P. Regu- pathy/ K. Lam		214 215 216 217
F. Main frame concrete column design			NA	NA					220 221
G. Secondary floors	31	Same as main floors.							224 225
H. Floor-wall junction details	32					J. Ross			228 229
I. Dynamic effects of machinery	33				Not signifi- cant (speeds higher than 30 Hz)				232 233 234 235
Added items not covered in audit		1. Probable maximum flood elevation of 632', instead of 635.5'	Probable maximum flood elevation of 632' instead of elevation 635.5' was used in the analysis and design.	Fair	Not signifi- cant 635.5 is wave runup	D. Magnuson	D. Magnuson/ V. Lakshai		237 238 239 240 241 242 243

STRUCTURAL AUDIT LIST OF ITEMS
SERVICE WATER PUMP STRUCTURE

028161
287
248
250
251
252
253
255

Service Water PUMP STRUCTURE	NPC Page No.	Inappropriate or Omitted Calculations	Compliance with FEAR Comments	General Condi- tion of Calcu- lations	Signif- icance or Disposition	Cognizant Engineer	Origina- tor/ Checker Group Leader	Status	
Part I - General Analysis									258 259
I. Basic Design Criteria	1								261 262
A. Seismic criteria	1			Fair		J.Chien/ P.Fujawa	S.Sobkow- ski/ G.Tuvenon		264 265 266
B. Design loads	2	Tornado wind speed of 300 mph used to check missile local effects.	300 mph tornado wind used instead of 360 mph wind.	Fair	Redo tor- nado analy- sis	D.Griffith/ L.Ho	N.Nakim/ P.Coffey/ P.Shea	Tornado re- analysis complete	26 270 271 272 273
II. Analysis Method	4								276
A. Seismic analysis	4		Refer to aux	Fair					278
1. Material prop- erties	4	1. Concrete modulus (E) based on f'c = 3,000 psi instead of speci- fied concrete strength of f'c = 4,000 psi.			Not signi- ficant	J.Chien		Consider in current efforts	28 283 284 285 286 287
		2. Analysis did not consider fill.							288 290
2. Time history, response spectrum, etc (general)	6	Refer to aux							293 294 295
3. Selection of number of masses	6			Good					298 299
4. Modal responses	7	Refer to aux		Fair					302

STRUCTURAL AUDIT LIST OF ITEMS
SERVICE WATER PUMP STRUCTURE

02816

Service Water Pump Structure	PRC Page No.	Inappropriate or Omitted Calculations	Compliance with FSAR Commitments	General Condition of Calculations	Significant or Disposition	Cognizant Engineer	Originator/Checker Group Leader	Status	
5. Hydrodynamic forces	8	1. Hydrodynamic effects are not considered. 2. Torsional effect of combinations of bays filled or empty should be considered.		Good	Probably not significant			Consider in current efforts	305 306 307 309 310 311 312 313
6. Response spectra (specific)	9			Good			F.Hsin/ K.Hsu/ G.Tuvenon	New analysis not begun.	316 317 318
7. Vertical seismic	10	Refer to above							321
8. Intake conditions (discharge)	11								320 325
9. Screen conditions	12								328
10. Intake structure (hydrodynamic force)	13	Reference should be made to the design of the intake structure. The design of the intake structure is not in accordance with the design of the intake structure. The design of the intake structure is not in accordance with the design of the intake structure.	Will be put of late when design conditions are included in the calculations. But all loading conditions are checked.	Incomplete	Probably not significant	D.Griffith/ L.Ho	Y.Kim/ P.Parikh/ M.Kumra (P.Shen)	Consider in current efforts	330 331 332 333 334 335 336 337 338
11. Intake conditions (discharge)	14								341 342
12. Foundation	15	Refer to above		Good		D.Griffith/ L.Ho M.Kumra/ (P.Shen)	Y.Kim/ P.Parikh/ (P.Shen)		345 346 347 348
13. Computer verification	16			Good		B.Mozafari			351 352
14. Overall stability	17	Refer to above		Incomplete, fair		D.Griffith/ L.Ho	Y.Kim/ P.Parikh/ (P.Shen)		353 356 357

STRUCTURAL AUDIT LIST OF ITEMS
SERVICE WATER PUMP STRUCTURE

028161

247
248

Service Water PUMP STRUCTURE	NFC Page No.	Inappropriate or Omitted Calculations	Compliance with FSAP Comments	General Condi- tion of Calcu- lations	Signif- icance or Disposition	Cognizant Engineer	Orig- inator/ Checker Group Leader	Station
---------------------------------	--------------------	---	-------------------------------------	---	--	-----------------------	--	---------

E. Interaction with
non-Category I
structures

19	Calculations have not been located for the completed interaction of the circulating water intake structure with SWPS.	FSAP work not completed	No calcu- lation showing the in- teraction	Preliminary study shows no problem.	P. Shen/ D. Griffith	Perform seismic analysis on circulating water struc- ture and check of structure	36 36 364 365 366
----	---	-------------------------	--	---	-------------------------	--	-------------------------------

Part II - Key Designs

A. Exterior shear walls

21	1. Loads from Method I seismic analysis not considered in design.	The required load combinations in the FSAR have not all been checked.	Probably not significant	D. Griffith/ J. Gobster/ L. Ho	M. Harl/ P. Parikh/ M. Kurra (P. Shen)	Consider in current efforts	37 373 374
	2. North and south walls not checked for tornado loads.						376 377 378
	3. Temperature gradient across walls						380 381

B. Interior shear walls 22 Refer to A

C. Main floors and 23 Refer to A

D. Foundation mat 24 Refer to A

E. Floor-wall joint details 25 Refer to A

F. Seismic restraint of pumps 26

1. Tanks	Section 3.8	Good	Rao/Desai	Diesel oil tanks: Rao/ A. Bando- podhyaya Pressuri- zation tanks: V. Patankar/ C. Dirnbauer	Complete	400 401 402 403 404 405 406 407 408
----------	-------------	------	-----------	--	----------	---

STRUCTURAL AUDIT LIST OF ITEMS
SERVICE WATER PUMP STRUCTURE

Service Water Pump Structure	HRC Page No.	Inappropriate or Omitted Calculations	Compliance with FSAR Commitments	General Condi- tion of Calcu- lations	Signif- icance or Disposition	Cognizant Engineer	Origina- tor/ Checker Group Leader	Status	
2. Piping			Section 3.8	Vendor calcu- lation for pipes Good		Rao/Desai			247 248 250 251 252 253 255
8. Seismic Analysis								028161	
1. Tanks		The stress summary for the diesel oil tanks is incomplete. Pressures not corrected are given in Table 3.9- 5.1, Sheet 5. Vertical earth- quake not con- sidered for diesel oil storage tank design.		Vendor/ Good		C.Otal	Go back to vendor.		411 412 413 414 415 416 419
2. Piping (concrete)		Flexibility of pipe heads was not con- sidered in the analysis. Para- meters in analy- sis need to be re- vised: F for pipe and shear wave velocity.		Fair free field only.		D.Reeves	W.Tseng/ C.Tuveson	Revise calcu- lations.	420 421 422 423 424 425 426 427 428 429 430 431 432 436 437 438 439 440 441 442 443
C. Structural Analysis									444
1. Tanks				Good			Vendor calcu- lations		445 446 450
2. Piping (conc)		Missile impact was considered for the steel pipe and not concrete pipe.		Good	Not signi- cant	Rao/Desai	Vendor calcu- lations/Rao	Update for concrete pipe.	451 452 453 454 455 456

STRUCTURAL AUDIT LIST OF ITEMS
SERVICE WATER PUMP STRUCTURE

128161

Service Water Pump Structure	NPC Page No.	Inappropriate or Omitted Calculations	Compliance with FEAR Comments	General Condi- tion of Calcu- lations	Signif- icance or Disposition	Cognizant Engineer	Origina- tor/ Checker Group Leader	Status	
									247 248 250 251 252 253 255
D. Soil Settlement Pipes									459 460
1. Differential support movement		Not considered.						Revise design.	463
2. Seismic settle- ment		Not considered.							466 467
3. Connections to structures		Not considered.							471
4. Effects of non- Category I piping		Not considered.							474 475 476
E. Damage to piping due to differential settlement		NA for concrete Seismic Category I pipe. Con- crete pipes are 40' away from the structure and buried in natural soil.							479 480 481 482 483
Part IV - Items Not Covered in Questions Which Should be Ident- ified									486 487 488 489
Electrical Duct banks and conduit design					In review				491 492

03161

3717

STRUCTURAL AUDIT LIST OF ITEMS
DIESEL GENERATOR BUILDING

Diesel Generator Building	BPC Page No.	Inappropriate or Omitted Calculations	Compliance with ISIR Requirements	General Condi- tion of Calcu- lations	Signif- icance and Disposition	Cognizant Engineer	Orig- inator/ Checker Group Leader	Status	
6. Response spectra (specific)	1	Diesel potential spectra do not envelop horizontal building base spec- tra.		Fair				Vendor requalify	580 581 582 583 584
7. Vertical seismic	15								587
B. Stress analysis									578
1. Shear walls and floors	Complete			Good	NA		T.Huang/ A.Bandyo- padhyaya/ P.Shen	BSA	572 573 574 575
2. Foundation	13 Complete			Good	NA		T.Huang/ A.Bandyo- padhyaya/ P.Shen	NA	577 578 579 588
C. Joint filler be- tween structures	14 NA				NA	NA		NA NA	583 584
D. Computer verifica- tion	16 Complete	Good		NA	D.Houshori	NA	NA		587 588
E. Overall stability	18			Good	Uplift	J.Cobator	T.Huang/ A.Bandyo- padhyaya/ P.Shen	NA	59 592 593 594
F. Interaction with non-Category 1 structures	20								597 598 599
G. Tornado studies	21 Refer to auxiliary building			Good		J.Cobator	T.Huang/ A.Bandyo- padhyaya/ P.Shen		602 603 604 605
III. Conformance to Staff's Criteria (Deviations)									606 609 610

070161

3708

STRUCTURAL AUDIT LIST OF ITEMS
FIFTH GENERATION BUILDING

191820

Model	Spec	Insufficient or Failure	Compliance with Code	General Condition of Calculations	Stiffness and Displacements	Comments	Original Motor/Checker Group	Initial
General Building	Part 1 - General							
A. Exterior shear walls	Complete			Good		J. Gobster A. Bandyo- pachyona/ P. Shen	T. Huang/ Complete	813 815 816 817 818
B. Interior shear walls	Complete			Good	BA	BA	T. Huang/ A. Bandyo- pachyona/ P. Shen	821 822 823 824
C. Main floors and roofs	Complete			Good	Good	Reanalyse	J. Gobster	T. Huang/ Complete 827 828 829
D. Steel structural bracing	No structural steel bracing has been used.			BA	BA	BA	BA	832 833 834
E. Foundation	Complete			Good		J. Gobster A. Bandyo- pachyona/ P. Shen	T. Huang/ Complete	837 838 839 840
F. Main frame concrete columns	No concrete column columns has been used.			BA	BA	BA	BA	842 843 844
G. Secondary floors	No secondary floor has been used.			BA	BA	BA	BA	847 848
H. Floor-wall joint details	Complete			Good	BA		T. Huang/ A. Bandyo- pachyona/ P. Shen	850 851 852 853
I. Dynamic effects of machinery	Complete			Good	BA	BA	A. Bandyo- pachyona/ B. Solenhi/ P. Shen	856 857 858 859

STRUCTURAL AUDIT LIST OF ITEMS
CONTAINMENT BUILDING

028161

Containment Building	BPC Page No.	Inappropriate or Omitted Calculations	Compliance with FSAR Comments	General Condi- tion of Calcu- lations	Signif- icance and Disposition	Cognizant Engineer	Origina- tor/ Checker Group	4/17/81A	662 663 665 666 667 668 670
Part I - General Analysis	1								674 675
I. Basic Design									677
A. Seismic criteria Criteria	1	Refer to aux							680 681
B. Design loads	2	1. Wind and tornado loads are not addressed.		Fair	Not signi- ficant. Add cal- culation	Ader	T.Salya- naranay/ ana/ C.Yen	Calculations in progress.	6 685 686
		2. The 1974 FINEL model has com- ments requiring resolution and program must be verified.			Wind and tornado are not gover- ning loads.	Vel/Yuan	H.Tuhol- ski/B.Dhar	Calculations to be per- formed.	6 690 691 692 693 694
				Fair	Not signi- ficant		H.Tuhol- ski/B.Dhar	Analysis to be reviewed.	69 6
II. Analysis Method									702
A. Seismic analysis	4								704
1. Material proper- ties	4	1. Cracked section properties not used.		Good	Probably not sig- nificant	Hu/ G.Luh		No action planned	707 708 709
		2. Tested concrete modulus not used							711 712
2. Method of analy- sis (time history, response spectrum, etc)	6	Refer to aux		Fair					715 716 717 718
3. Selection of num- ber of masses	6	1. Backup required for reducing num- ber of NFSS masses is re- quired.		Fair	Not signi- ficant. Com- pare frequen- cies.			Not reduced in in new cal- culations. Calculations in progress	72 723 7 72

STRUCTURAL AUDIT LIST OF ITEMS
CONTAINMENT BUILDING

Containment Building	NRC Page No.	Inappropriate or Omitted Calculations	Compliance with FSAR Comments	General Condi- tion of Calcu- lations	Signif- icance and Disposition	Cognizant Engineer	Origina- tor/ Checker Group Leader	4/17/81A Status	662 663 665 666 667 668 670 728 729 730 731 732 735 738 742 743 744 745 748 749 752 756 757 758 760 762 766 768 771 772 777 778 779 780
		2. Applicability of specifying only translational and base rotational DDOF.							
4. Modal responses	8	Refer to aux							
5. Soil structure	9	1. Refer to aux 2. Hydrodynamic effects of a flooded re-fueling canal not considered.		Good	Could be significant for equipment			Calculations scheduled	7
6. Response spectra (specific)	11								
7. Vertical analysis	16	Refer to aux							
8. Polar crane	17	1. Multi-model response horizontal response change. program must be		Fair	Probably not significant			discuss with CPCo	7
9. Buried piping	18	Refer to buried piping							
B. Containment general analysis	19								
1. Containment shell	19	1. Seismic separation of base may not be considered.	FSAR Tables 3.8-1 through 3.8-17 contain typographical errors.	Good (s)		Vel/ D.Yuan	K.Huang/ B.Dhar	Calculations in progress	7
					Verified by 11/6/81				
					Review design calculations.				

STRUCTURAL AUDIT LIST OF ITEMS
CONTAINMENT BUILDING

Containment Building	NPC Page No.	Inappropriate or Omitted Calculations	Compliance with FSAR Commitments	General Condi- tion of Calcu- lations	Signif- icance and Disposition	Cognizant Engineer	Origina- tor/ Checker Group Leader	#/17/81A Status	
		2. Sizing calcu- lation has not been checked.			Not signi- ficant	G. Kwong		In progress	783 784 785
		3. FINEL analysis of shell does not include stiff- nesses of inter- nal structures			Not signi- ficant known.	D. Yuan	NA	Justification in progress	786 787 788 789 790 791 792
		4. Primary load alone was not checked	Not required	NA	Probably not significant	D. Yuan	NA	Calculations scheduled	793 794 795 796
		5. Deviations from design criteria a) membrane comp. stress b) radial tension in dome c) allow. reinf. stress d) allow. effec- tive tendon stress			Probably not significant	D. Yuan	H. Tulhonski	Calculations scheduled	797 798 799 800 801 802 803 804 805 806 807 808 809
		6. Section resultant at Section 3 of ring girder (C56) has to be checked.			Calcu- lation to be checked			Check scheduled	810 811 812 813
2. Containment internals	20			Bad					814 815 816 817
		1. Loads from RV were not included in FINEL analy- sis of primary shield wall.			Calculation is being revised.	D. Chow		Being per- formed	818 819 820 821 822
		2. Seismic load not checked for lay- down area and surge wall.		Fair	Not signifi- cant	W. Hagedorn		To be addressed	823 824 825 826 827

STRUCTURAL AUDIT LIST OF ITEMS
CONTAINMENT BUILDING

Containment Building	NRC Page No.	Inappropriate or Omitted Calculations	Compliance with FSAR Comments	General Condi- tion of Calcu- lations	Signif- icance and Disposition	Cognizant Engineer	Origina- tor/ Checker Group Leader	4/17/81	Status	
		3. Primary shield wall loads in the FSAR have not been veri- fied.			Additional calculation might be required.	C. Boyak			New calcu- lations com- pleted	838 8 840 841 842
		4. Pinned boundary condition is			Modify model	D. Chow			Future work	844 846
3. Foundation mat		8. Soil property (F) variation not evaluated.		(*)	Probably not significant				Calculation scheduled	851
C. Computer program verification	23	A number of computer programs have not been verified.	FSAR Subsection 3.8.1.4.8 and Ap- pendix 3C do not list all of the programs used for analysis of the containment.		Verified by 11/81.	D. Yuan/ I. Tsang	NA			854 855 856 857 858 859 860
D. Overall stability	24	Seismic separation of basement not con- sidered.	Calculations sup- porting FSAR Table 2.5-14, bearing pressure, cannot be located.	(*)	Not signi- ficant	D. Yuan	K. Huang/ B. Dhar		Calc in progress	863 86 865 866 867
E. Interaction with non-Category I structures	26	1. Interaction be- tween tendon ac- cess shaft and containment.	See NRC Page 2		Not signi- ficant (no interaction)				New calcu- lations com- plete	871 872 873

STRUCTURAL AUDIT LIST OF ITEMS
CONTAINMENT BUILDING

028161

Containment Building	NPC Page No.	Inappropriate or Omitted Calculations	Compliance with FCAR Commitments	General Condi- tion of Calcu- lations	Signif- icance and Disposition	Cognizant Engineer	Origina- tor/ Checker Group Leader	8/17/81A Status	662 663 665 666 667 668 670 876 877 879 882 883 884 885 888 889 890 898 895 896 897 898 901 902 903 907 908 91 917 920 921
III. Conformance to Deviations	27								
Part II - Key Designs									
A. Liner design	28	1. A full calculation for liner plate has not been loca- ted (Compare to FC-TOP-11)		Fair	Add calcu- lation.	D.Yuan	C.Yen	Calculations scheduled	882 883 884 885
		2. No calculations located for some pene- trations in liner.			Provide calculations			Calculations scheduled	888 889 890
		3. Calculations are required for the bulge under the liner plate.			Provide cal- culation cover sheet and reference staff report.	T.Brozo		Calculations scheduled	898 895 896 897 898
F. Hatch design	31	1. Liner plate effect not con- sidered.		Fair	Not signi- ficant.	Vel	J.Shi/ B.Yoshiki/ C.Yen	Covered by by NCAR 51	901 902 903
		2. Tangential shear has not been checked.			Not signi- ficant			Calculations scheduled	907 908
		3. Shear reinforcing appears low			May be sig- nificant			Calculations in progress	91
C. Base slab	34	1. There is no bearing calcula- tion located.		Poor/ Average	Vel			Calculations in progress	917
D. Wall-base slab junction	37	See shell response		Poor/ Average		Vel	J.Shi/ J.Wink		920 921

STRUCTURAL AUDIT LIST OF ITEMS
CONTAINMENT BUILDING

Containment Building	ERC Page No.	Inappropriate or Omitted Calculations	Compliance with FSAR Commitments	General Condi- tion of Calcu- lations	Signif- icance and Disposition	Cognizant Engineer	Origina- tor/ Checker Group Leader	4/17/81A Status	652 663 665 666 667 668 670
E. Membrane shear	40	The equipment hatch area has not been evaluated for membrane shear.	The equipment hatch area has not been evaluated for membrane shear. (FSAR Subsection 3.8.1.5.1.4)		May be significant			Calculations in progress	9 92 926 927 928 929 930
F. Dose-to-cylinder junction	42	See shell response		Fair	Not significant	Vel	J.Shi/		933 934
G. Primary shield wall base mat junction	44	1. No verification of rebar adequacy at junction.		Poor	Calculation is being developed.	D.Chow	C.Yen/ J.Hink		937 938 939
H. Operating floors	47	1. Seismic load was not considered.		Fair (20)	Vertical-not governing; Horizontal-may be significant.	W.Hagedorn/ R.Lightcap	H.Elgealy/ G.Tuveson	Calculations in progress	9 94 946 945
I. Polar crane supports	48	1. Consideration of seismic loads is not clear. 2. Global effect on shell is not clear. 3. Containment movement due to pressure and temperature has not been considered.		Fair (21)	Probably not significant	W.Hagedorn/ D.Yuan	H.Elgealy/ G.Tuveson	Calculations in progress	9 94 950
					Not significant			Calculations in progress	953 954 955
					To be reviewed in future.			Calculations scheduled	9 959 960 961 964
J. Reactor vessel	51								
K. Steam generator support	53	1. The calculation for the 24"-concrete slab is not available.	Revise FSAR to state that bolts do not take shear		Not significant.	D.Chow/ D.Yuan	H.Elgealy/ J.Hink	Calculations scheduled	9 968 969 970
L. Coolant pump support	55	1. NCAR 45 - anchor bolt		(25)	Case by case evaluation.	W.Hagedorn	K.Handaki/		973 974 975

028161

STRUCTURAL AUDIT LIST OF ITEMS
CONTAINMENT BUILDING

462
663

Containment Building	WPC Page No.	Inappropriate or Omitted Calculations	Compliance with FSAR Comments	General Condi- tion of Calcula- tions	Signif- icance and Disposition	Cognizant Engineer	Origin- ator/ Checker Group Leader	4/17/81A Status	665 666 667 668 670
		2. Snubber spring rates do not consider cold condition or as- built pin to pin lengths.			Probably not significant				978 979 980 981 982
H. Secondary shield walls	57	Computer run needs addi- tional checking.		Poor	B.Yuan	B.Hagedorn/ B.Dhar	C.Chung/ Check calcu- lation		985 986 987
H. Other steel struc- tures	59	Seismic loads were not considered on all platforms.	NA	Fair (2?)	Not control- ling load.	B.Hagedorn/ D.Yuan	J.Wink/ C.Tovegon/ H.Elgaaly/ B.Dhar/ D.Yuan	Redo calcu- lations	991 992 993 994
O. Post-tensioning system	61	Neither Bechtel nor vendor calcs include pressurization effects.	1. Preliminary calculations indicate that the allowables in FSAR Subsections 3.8.1.5.1 and 3.8.1.5.2 for pre- stressing tendons and concrete are exceeded under pressure conditions. 2. Pretensioning tendons stress level exceeds 0.7 fu (allow- able in accor- dance with FSAR Subsections 3.8.1.5.1.8 and 3.8.1.5.2.7) at transfer.	Good	Signifi- cance un- known Calculation is being checked.	Vel/ T.Bronze	H.Duchon/ H.Benoit/ G.Unknown	Rerun 028161	997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009
					Not signi- ficant		Revise FSAR		1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021

STRUCTURAL AUDIT LIST OF ITEMS
POPATED WATER STORAGE TANK

Borated Water Storage Tank		NPC Page No.	Inappropriate or Omitted Calculations	Compliance with PSAR Comments	General Condi- tion of Calcu- lations	Signif- icance and Disposition	Cognizant Engineer	Origina- tor/ Checker Group Leader	Status	
Part I - General Analysis			Yes		Good		Rao/Desai	Rao/ A. Bando- padhyaya/ C. Udogi	Complete	1025 1026 1028 1029 1030 1031 103
I. Basic Design Criteria		1								1037 1038 1039 1040
A. Seismic design criteria		1	None				McConnell/ Mozafari/	Banby/ Dunnelly/		1042 1043 1046 1049 1050 1051
B. Design loads TBL 3-17		2			Good		Rao/Desai	Rao/Bando/ Udogi	Complete	1054 1055 1056
II. Analysis Method		4								1059
A. Seismic analysis		4	Dynamic analysis was performed using TID-7024 techniques.		Tank fair Foundation good		Otal Pierce	Banby/Don- nelly/Huang		1061 1062 1063
1. Material properties		4	1. soil struc- ture interac- tion 2. Shear modulus, subgrade reac- tions and bearing capabilities of soil were taken from unchecked and unapproved calculations.		Not signi- ficant				Calcs in progress	1066 1067 1068 1069 1070 1074 1075 1076
2. Time history, re- sponse spectrum, etc (general)		6	Not performed	N/A	N/A		N/A	N/A		1079 1080 1081
3. Selection of num- ber of masses		6	Based on TID-7024	-	Tank - no		Otal Pierce	N/A N/A		1084 1085
4. Modal response		7	N/A	N/A	N/A		N/A	N/A		1088

STRUCTURAL AUDIT LIST OF ITEMS
BORATED WATER STORAGE TANK

1025
1026

Borated Water Storage Tank	WPC Page No.	Inappropriate or Omitted Calculations	Compliance with FSAP Commitments	General Condi- tion of Calcu- lations	Signif- icance and Disposition	Cognizant Engineer	Origi- nator/ Checker Group Leader	Status	
5. Soil structure	9	Refer to aux		N/A		N/A	N/A		1091
6. Response spectra (specific)	11						Bandy/Hc- Connel	Complete	1094 1095
7. Vertical seismic	15			Tank - sparse		Otal	Bandy/Hc- Connel	Complete	1098 1099
				Foundation - good		Pierce	Bandy/Hc- Connel	Complete	1100 1101
B. Stress analysis									
1. Steel tank	12	Vendor design	Yes	Good		Rao/Desai	Vendor	Complete	1106
2. Foundation	13			Good		Rao/Desai	Bandy/ Udogi/Rao	Complete	1109 1110
C. Joint filler be- tween structures	14		N/A						1113 1114
D. Computer verifica- tion	16								1117 1118
E. Overall stability	18			Good		Rao/Desai	Bandy/ Udogi/Rao	Complete	1121 1122
F. Interaction with non-Category I structures	20								1125 1126 1127
G. Tornado missiles	21								1130
III. Conformance to Staff's Criteria (De- viations)	23								1131 1132 1135
Part II - Rev. Designs									
A. Steel tank				Good		Rao/Desai	Vendor/ Rao	Complete	1140 1141
B. Foundation				Good		Rao/Desai	Bandy/ Udogi/Rao	Complete	1143 1144

STRUCTURAL AUDIT LIST OF ITEMS
POPATED WATER STORAGE TANK

Popated Water Storage Tank	NPC Page No.	Inappropriate or Omitted Calculations	Compliance with FSAR Comments	General Condi- tion of Calcu- lations	Signif- icance and Disposition	Cognizant Engineer	Origi- nator/ Checker Group Leader	Status	
Part III - Justifica- tion of Proposed Re- pair									1025 1026 1028 1029 1030 1031 103
A. Effects of thru cracks	26								1147 1148 1149 1152 1153
B. Test Procedure to Evaluate Settlement Effects	26								1156 1157 1158 1161 1162 1163 1164
Part IV - Items Not Covered in Questions that Should be Identi- fied									

028161

STRUCTURAL AUDIT LIST OF ITEMS
FORATED WATER STORAGE TANK

1025
1026

Forated Water Storage Tank	NRC Page No.	Inappropriate or Omitted Calculations	Compliance with FSAR Comments	General Condi- tion of Calcu- lations	Signif- icance and Disposition	Cognizant Engineer	Origina- tor/ Checker Group Leader	Status	
									1028
									1029
									1030
									1031
									103
									1167
NOTES:									
(1)		Calculation Q23 overturning and sliding S.F. check.							1169
(2)		Calculation Q24A buttress access shaft							1170
(3)		Calculation Q25 feedwater isolation valve chamber							1171
(4)		Calculation Q26 containment shell and base slab analysis (FINEL)							1172
(5)		Calculation Q27 containment analysis for seismic loading (ASHSD)							1173
(6)		Calculation Q56 combination of Q26 and Q27 to develop FSAR Tables 2.8-1 and 3.8-17 (for additional relevant calculations see NRC page 2)							11
1083									1175
(7)		(For primary shield wall calculations Q14A see NRC page 44)(for secondary shield wall calculations Q33, Q34A, and Q35A see NRC page 57)							1176
(8)		Calculation Q4, Q4a foundation mat reinforcement design (for additional relevant calculations see NRC page 19 calculation Q26 and Q27)							11
(9)		(for Q24A see NRC page 2)							1180
(10)		Calculation Q46, Q50, and Q55							1181
(11)		Question 5A, Q5B, and 5C							1182
(12)		Calculation Q9 - equipment hatch reinforcement design							1183
(13)		Booley calculations for steel equipment hatch 7220-50B-17, 7220-50B-18							1184
(14)		Calculation Q4 and Q4a foundation mat reinforcement design							1185
(15)		Calculation Q10 wall reinforcement (see NRC pages 19 and 21 for calculations Q4, Q4A, Q26, Q27, and Q5b)							1186
(16)		(for other relevant calculations Q10, Q26, Q27, and Q.6 see NRC pages 2, 19, 24, 21, 34, and 37)							1187
(17)		Calculation Q141							1188
(18)		Calculation Q14A							1189
(19)		Calculation Q17D, Q17E-1, Q18C, Q18C-1 structural steel, concrete, steel plate and grating							1190
(20)		Calculations Q56, Q5-C4 concrete, reinforcement (recent) girders, brackets, concrete, and reinf. at bracket locations							1191
(21)		Calculation Q12 (old) Q144-f (new) Q23P-10 Q14C							1192
(22)		Lower support Calculation Q12							1193
(23)		Calculation Q12A upper lateral support							1194
(24)		Calculations Q13-a(CPDC) Q33, Q34A, Q55A-good condition. Calculations Q42 stress summary-good condition (components of snubbers, support anchor bolts, rear brackets, tubing, res.)							1195
(25)		Calculations Q33, Q34A, and Q35A wall reinforcement and details-poor condition							1196
(26)		Calculations Q12C, Q61, Q65, Q18R-1 Q13B-5 through Q13F-23, Q13F-24, Q37, Q64, Q20C-2 press-structural steel, fan supports etc, core flood support, pipe restraint, jet barriers, missile shields-fair							1197
(27)		Calculation Q6, Q6a post tensioning design and input-poor. Inryco calculations 7220-C2-49, 7220-C2-50, and 7220-C2-56-good.							1198
(28)		Calculation Q7, Q7a buttress reinforcement design							1
									1200
									1202

028161