

10/19/81
Wf 2
J. Kune

Based on Ellen Brown's brief

Stamiris Contention No. (See pg. 23 - 25)

NRC recommendations of ASLB position (per Ellen's brief)

- | | |
|---|--|
| 2(a) Early submittal of FEAR | ASLB finds no support for contention 2(a) pg. 29 |
| 2(b) Expediency of remedial measures | ASLB finds no support for contention 2(b) pg. 30 |
| 2(c) Substituting concrete for any soil Expediency | ASLB finds no support for contention 2(c) pg. 32 |
| 2(d) Option for removal & replacement fractured | ASLB finds no support for contention 2(d) pg. 37 |
| 2(e) - CFC's refusal to comply with NRC testing requests | No ruling necessary as contention 2(e) was withdrawn |
| Item 1 - Supplement to contention 2. Example of financial & time pressures
"Proceed w/ preload as rapidly as possible" | ASLB finds root causes were not fully identified & remedied prior to starting surcharge
ASLB denies claim that failure was due to financial & time pressures (pg. 40) |
| Item 2 - Decision to fill and affected piezometer measurements during preload | ASLB finds raising penul affected piezometers may have adversely affected timely resolution of issues not due to time & financial pressures |
| Item 3 5 month period being available for surcharge | ASLB finds the decision to remove the surcharge was not influenced by scheduling concerns. Also final surcharge was removed before NRC was satisfied secondary consolidation had been achieved. Issue whether it adversely affected resolution of soil issues will be addressed by testimony on varying soil data (pg. 41) |
| Item 4 Failure to cut gROUT gaps prior to cutting duct banks | ASLB finds no evidence that failure to gROUT the gaps, cut the condensate lines or breakup mudmat were the result of time or financial pressures. No evidence that demonstrated these failures adversely affected resolution of the soil settlement issues (pg. 53) |

6/19/81
2 of 2
J. Kane

Based on Ellen Brown's findings (Continued)

Stamiris Contentions No. (See pgs 23-25)

NRC recommendations of ASLB position (per E. Brown)

Item 5 Continuing construction of DGB eliminated removal & replacement option

ASLB (similar to finding on Contention 2(d)) finds no support for this contention that removal & replacement option was precluded (pg. 54)

Item 6 Early PSAR submission precluded detection of inconsistencies

ASLB finds no support for item 6 (pg. 55)

Items 7, 9 & 11 Relates to adequacy & conservatism of the DGB surcharge program

ASLB finds no evidentiary support for items 7, 9 & 11. These concerns did not adversely affect resolution of the soil settlement issue (pg. 59)

Item 8 Failed to excavate loose sands as committed to in PSAR

ASLB finds no support for item 8 (pg. 62)

Item 10 WCo appeals to NRC to consider financial plight of Seismic Deferral Motion

ASLB finds "Seismic Deferral Motion did not represent time & financial pressures which adversely affected resolution of soil settlement issues. (62)

Item 12 Changes to DGB design, material or specs without proper approval

ASLB finds no support for item 12 (pg. 64)

ROUTING AND TRANSMITTAL SLIP

Date 10/19/81

TO: (Name, office symbol, room number, building, Agency/Post)	Initials	Date
1. Ellen Brown		
2.		
3.		
4.		
5.		

Action	File	Note and Return
Approval	For Clearance	Per Conversation
As Requested	For Correction	Prepare Reply
Circulate	For Your Information	See Me
Comment	Investigate	Signature
Coordination	Justify	

REMARKS

Ellen,
I have returned your draft and have made some minor comments. Your summary is very good and should prove helpful in preparing future testimony.

If you wish to discuss my comments please call 2-8153. I have a different office now @ P-218.

Joe

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FROM: (Name, org. symbol, Agency/Post) J. Kone	Room No.—Bldg.
	Phone No. 2-8153

5041-102

OPTIONAL FORM 41 (Rev. 7-76)
Prescribed by GSA
FPMR (41 CFR) 101-11.205

DRAFT
ASLB Findings on
Stamiris Contention No. 2
(Prepared by E. Brown)

Subject: Comments on Draft ASLB findings prepared by Ellen Brown

<u>Page No.</u>	<u>Br. No.</u>	<u>Comments</u>
29	64	3rd line from bottom - Change "approached" to "approved"
36	80	No correction is necessary but I have difficulty with Dr. Peck's statement about inferior foundation. What is the best way to proceed with statements in testimony & findings that are not accurate but which were not pursued when these statements were made? What are OELD's recommendations?
43	96	I have added a sentence which I think is pertinent to the discussions in par. 96. Pursue in future testimony. See pgs 43 & 44
44	97	No correction of testimony is necessary but this concluding statement is inaccurate. How should it be pursued?
46	105	Add words "one of"
48	109	No correction necessary but statement is inaccurate. How to pursue?
58	138	Check testimony - pg 3463 Judge Decker wants answer if there are means to give adequate warning in car settlement if there are means to give adequate warning in car settlement 4th line - Change cross-examination to cross-examined

ROUTING AND TRANSMITTAL SLIP

Date 9-22

	Initials	Date
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REMARKS

Joe - Attached is the first installment of proposed findings on Contention 2. Would you please review those portions you provided testimony on + return them with your comments. Thanks.

Ellen

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OPTIONAL FORM 41 (Rev. 7-76) Prescribed by GSA FPMR (41 CFR) 101-11.206

5041-102

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Date 9-30

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REMARKS

Joe - Attached is the last installment on Contention 2. Please review + provide me your comments. Thanks

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FROM: (Name, org. symbol, Agency/Post)

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Phone No.

Ellen

OPTIONAL FORM 41 (Rev. 7-76) Prescribed by GSA FPMR (41 CFR) 101-11.206

5041-102

U.S. GOVERNMENT PRINTING OFFICE: 1979-840-194/10

55. We note that Intervenor Stamiris' position is that all the examples stated in Contention 1, taken together, form a pattern which represents poor managerial attitude. We do not agree. Although we have found support for some of her examples, we do not conclude that these examples reflect on poor managerial attitude in general. Therefore, CPC's managerial attitude does not necessitate stricter than usual regulatory supervision.

56. Stamiris' Contention 2, as accepted by this Licensing Board in our October 24, 1980 Prehearing Conference Order Ruling on Contention and as supplemented by Intervenor Stamiris on April 26, 1981, states the following:

Consumers Power Company's financial and time schedule pressures have directly and adversely affected resolution of soil settlement issues, which constitutes a compromise of applicable health and safety regulations as demonstrated by:

- (a) the admission (in response to § 50.54(f) question #1 requesting identification of deficiencies which contributed to soil settlement problems) that the FSAR was submitted early due to forecasted OL intervention, before some of the material required to be included was available;
- (b) the choice of remedial actions being based in part on expediency, as noted in Consumers Power Company consultant R.B. Peck's statement of 8-10-79;
- (c) The practice of substituting materials for those originally specified for "commercial reasons" (NCR QF203) or expediency, as in the use of concrete in electrical duct banks (p. 23 Keppler Report)*;

*March 22, 1979 Keppler Investigation Report conducted by Region III, Dec. 78 - Jan. 79.

- (d) continued work on the diesel generator building while unresolved safety issues existed, which precluded thorough consideration of Option 2 - Removal and Replacement Plan; and
- (e) the failure to freely comply with NRC testing requests to further evaluate soil settlements remediation, inasmuch as such programs are not allowed time for in the new completion schedule presented July 29, 1980.

April 20, 1981 Supplement to Contention 2

Further examples of the effect of financial and time pressures on soil settlement issues:

Examples	Effect on soil settlement issues
1. 11/7/78 Bechtel action item: "proceed with preparations for preload as rapidly as possible"	1. Root causes not adeq. investigated. Organizational deficiencies not eliminated prior to proceeding with remediation
2. 11/7/78 decision to fill pond "immediately, because the amount of river water available for filling is restricted"	2. Affected piezometric measurements during preload
3. 11/7/78 "5-month period is available in the schedule for preloading"	3. The surcharge was removed at the end of this 5 months despite lack of NRC satisfaction that secondary consolidation was assured
4. Failure to grout gaps prior to cutting of duct banks, failure to cut condensate lines when first suggested, failure to break up mudmat at DGB	4. Resulted in additional stresses to DGB which could have been avoided
5. Choice to continue construction of DGB	5. Eliminated practical consideration of Removal & Replacement Option

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|--|---|
| 6. Early FSAR submittal and inadequate review of FSAR | 6. Precluded early detection of inconsistencies which could have prevented some of the s.s. problems |
| 7. Failure to reconstruct geometry of area prior to fill placement, failure to await NRC approval before proceeding with Preload, selection of "least costly feasible alternative" for DGB | 7. Varying degrees of caution and conservatism were foregone in favor of cost and schedule advantages |
| 8. Failure to excavate loose sands as committed to in PSAR | 8. Contributed to inadequacy of subsoils |
| 9. Installation of preload instrumentation was subject to time pressure assoc. with frost protection considerations | 9. Expenditures for preload instrumentation (CJD 11/1/78 memo) prior to formal adoption of preload = premature commitment |
| 10. Appeals to NRC to consider financial plight and schedule deadlines as in Seismic Deferral Motion | 10. If granted, would affect seismic--soil settlement standards |
| 11. Depth and breadth of surcharge limited by practical consideration of DGB, Turbine B. structures | 11. Afforded less than optimum conditions for surcharge |
| 12. Changes to design (DGB foundation), material, or procedural [sic] specifications without proper approval | 12. Contributed to settlement or stress problems and allowed conflicts to go unnoticed as preventative indicators |
57. The Staff filed testimony by Darl Hood, Joseph Kane and Eugene Gallagher in response to Stamiris' Contention 2. The Staff's prefiled testimony which follows Tr. 2530 is hereafter referred to as Staff Testimony on Contention 2. CPC submitted testimony by Stephen Howell in response to

Contention 2(a) and (d). Mr. Howell's prefiled testimony follows Tr. 2802. It is hereafter referred to as Howell. CPC submitted testimony by Benjamin Marguglio in response to Contention 2(c). Mr. Marguglio's prefiled testimony follows Tr. 1425. It is hereafter referred to as Marguglio. CPC submitted testimony by James Cook in response to Contention 2(e). Mr. Cook's prefiled testimony follows Tr. 1693. It is hereafter referred to as Cook. CPC also submitted testimony by Gilbert Keeley in response to Contention 2(a) and supplementary examples 8 and 9. Mr. Keeley's prefiled testimony follows Tr. 1163. It is hereafter referred to as Keeley. Finally, CPC submitted testimony by Dr. Ralph Peck in response to supplementary examples 1, 2, 3 and 11 to Contention 2. Dr. Peck's testimony follows Tr. 3211. It is hereafter referred to as Peck. Intervenor Stamiris presented no direct testimony but rather attempted to rely on cross-examination to support Contention 2. Intervenor Marshall conducted limited cross-examination of Staff and CPC witnesses.

58. During the hearing, Intervenor Stamiris conceded that cost and schedule considerations are a practical and realistic part of any nuclear plant project. Tr. 2853. She contends, however, that there have been unusual time and financial pressures at the Midland project and that these unusual pressures have led to unusual responses by CPC. Tr. 2854. Although not expressly stated in Stamiris' Contention 2, it became apparent during

the course of the hearing that Intervenor Stamiris believed that the steam contract between CPC and Dow Chemical Company (Dow) was a major cause of the "financial and time schedule pressures" referred to in Contention 2. Accordingly, we allowed cross-examination of the witnesses on the contract between CPC and Dow.

59. Mr. Howell, Executive Vice President of CPC, testified to the general terms of the steam contract between CPC and Dow. He explained that the contract called for CPC's best efforts and provided that if CPC cannot supply processed steam to the Dow plant by December 31, 1984, Dow has the option to withdraw from the contract with appropriate payment of costs. Tr. 2850. Mr. Howell added that Dow's costs, should it choose to withdraw from the contract, would be in the neighborhood of a half million dollars. Id.
60. Mr. Cook, Vice President of CPC, testified that in the latter part of 1979 CPC realized that the Midland Plant could not be completed on the then existing schedule. Cook, p. 5. Although Mr. Cook was not part of the Midland project at the time, he opined that this realization resulted from Three Mile Island requirements and from an analysis by CPC and Bechtel on the status of the project. Tr. 1718. Mr. Cook admitted that the revised completion dates presented by Bechtel in 1979 extended beyond the December 1984 steam contract date. Tr. 1719. He explained that CPC was strongly motivated to improve on Bechtel's estimated completion dates but that the steam contract with Dow was not the major reason behind the motivation. Id.

61. Staff testimony of Mr. Hood responded to Stamiris' Contention 2(a) which addressed early submission of the FSAR. Mr. Hood's direct testimony referred to a written statement by CPC which indicated that the FSAR was submitted early in order to provide additional time for the operating license hearings due to anticipated intervention. Staff Testimony on Contention 2, p. 7. Mr. Hood testified that the Midland FSAR was tendered to the NRC in August 1977. Id. Pursuant to 10 CFR 2.101, the Staff performed an acceptance review and determined that the FSAR was sufficiently complete for docketing. Id. Mr. Hood testified that it is not unusual for the Staff to accept and initiate review of an FSAR without inclusion of all the material which eventually will be required for completion of that review. Id., p. 8; Tr. 3693. In addition, Mr. Hood explained that the difficulty associated with certain FSAR statements, i.e. composition and compaction requirements of the fill, did not involve information excluded from early versions of the FSAR, but rather involved their accuracy. Id. Thus, the Staff concluded that early submission of the FSAR had no bearing on the soil settlement problems, nor did it compromise applicable health and safety regulations. Id., p. 9.
62. CPC testimony of Mr. Howell on Stamiris' Contention 2(a) was substantially consistent with the Staff testimony. Mr. Howell testified that CPC's decision to file the FSAR early was influenced by the expectation of a lengthy hearing associated with public intervention and not by improper motives. Howell, p. 20. His testimony explained that the NRC reviewed the FSAR and found it acceptable for docketing. Id. Mr. Howell noted

that revision and supplementation of the FSAR following its initial filing is typical. Id. pp. 9-10. He concluded that early submittal of the FSAR did not contribute to the FSAR inconsistencies. Tr. 2869-70.

63. Based on the facts presented above, the Board finds no support for Contention 2(a). All of the testimony indicated that there was nothing unusual with CPC's early submission of the FSAR. Furthermore, we note that both the Staff and CPC witnesses did not believe there was any connection between the early FSAR submittal and the FSAR inconsistencies that were discovered later. Thus, we find that early submittal of the FSAR did not directly or adversely affect resolution of soil settlement issues.
64. Staff testimony of Mr. Kane responded to Stamiris' Contention 2(b). Mr. Kane testified that the Staff's understanding of the "expediency" statement attributed to Dr. Peck was that the proposed remedies to underpin the electrical penetration area structures and the feedwater isolation valve pits could be completed within the construction schedule which then existed. Tr. 3681. Mr. Kane referred to the August 10, 1979, 50.55(e) interim report from Mr. Howell to Mr. Keppler attached to which was a document containing Dr. Peck's alleged "expediency" statement. Mr. Kane stated that the Staff was not concerned with Dr. Peck's statement since the underpinning design ultimately would have to be reviewed and ^{approved} ~~approached~~ by the Staff. Id. The Staff concluded that Dr. Peck's statement did not demonstrate financial and time schedule pressures which adversely affected resolution of the soil settlement issues. Tr. 3682.

65. Dr. Peck gave no direct testimony on Contention 2 (b) nor was he cross-examined on the subject.

66. Based on the facts presented above, the Board finds no support for Contention 2(b). We note that Intervenor Stamiris chose neither to question Dr. Peck concerning the "expediency" statement nor to introduce the document containing the statement. Furthermore, the only testimony offered on Contention 2(b) concluded that it did not represent an example of financial and time pressures which adversely affected resolution of the soil settlement problem.

67. Staff testimony of Mr. Gallagher responded to Stamiris' Contention 2(c). Contention 2(c) referred to NCR QF 203 (nonconformance report) as an example of when materials were substituted for those originally specified for commercial reasons. Staff testimony on Contention 2 attached NCR QF 203 which identified three instances where user test reports for granular soil material did not meet specification gradation limits. See Attachment 2. In one of the three instances (user test report 0836) the NCR stated that the nonconforming material was accepted for commercial reasons. Staff Testimony on Contention 2, pp. 8-9; Attachment 2, pp. 5-6. Mr. Gallagher testified that the in-process corrective action for the three cases was found acceptable based on a review of the facts. Staff Testimony on Contention 2, p. 10. He concluded that none of the three nonconforming conditions adversely or directly affected resolution of the soil settlement issue. Id.

68. Contention 2(c) cited the use of concrete in electrical duct banks which was addressed in inspection report 78-20 as an example of expediency. Mr. Gallagher testified that investigation report 78-20 was not concerned with the substitution of lean concrete for soil but instead was concerned that design controls did not verify whether the substitution of concrete would affect the design interface of the structure. Staff Testimony on Contention 2, p. 10. In addition, expediency was not the issue in investigation report 78-20. The issue was the adequacy of the design coordination associated with the substitution of concrete in the electrical duct bank area. Id. Mr. Gallagher testified that concrete was substituted for soil for ease of construction; he explained that it would have been difficult to compact soil in the small areas surrounding the electrical duct banks. Tr. 2566. He concluded that the substitution of the lean concrete had nothing to do with expediency or time and financial pressures. Tr. 2563, 2567, 2572. In fact, Mr. Gallagher testified that he is not aware of any instances where time and financial pressures affected soil settlement actions taken by CPC. Tr. 2542.

69. CPC testimony of Mr. Marguglio responded to Contention 2(c). His testimony was similar to that provided by the Staff. With respect to NCR QF 203, Mr. Marguglio testified that the materials in question complied with the construction specifications. Marguglio, p. 41. He explained that the NCR had been written because the materials did not satisfy the standards found in the "receiving inspection plan". Id. That plan was an internally developed document which had stricter requirements for the

materials than the requirements found in the construction specifications. Id. Mr. Marguglio concluded that the receiving plan was incorrect and that in fact material that met the construction specifications had been used. Id.

70. With respect to the substitution of lean concrete for soils materials, Mr. Marguglio testified that the substitution was made because of the difficulty in compacting soils material around the electrical duct banks. Marguglio, p. 41. The substitution was in accordance with construction specification C-211 which provided for the use of lean concrete instead of soils material. Id. Mr. Marguglio concluded that there was no basis for the allegation in Contention 2(c) that financial and schedule pressures compelled CPC to take certain actions involving soils materials that compromised health and safety and caused the DGB settlement. Marguglio, pp. 41-42.

71. Based on the facts presented above, the Board finds no support for Stamiris' Contention 2(c). We note that none of the actions which the contention cited either resulted in a compromise of health and safety regulations or adversely affected the soil settlement problem.

72. Staff testimony of Mr. Hood responded to Stamiris' Contention 2(d). The Staff, disagreeing with the contention, stated that continued work

on the DGB did not foreclose consideration of the removal and replacement option as a viable alternative. Staff Testimony on Contention 2, p. 11. During cross-examination, Mr. Hood clarified that he used the word "viable" in the sense that the removal and replacement option is technically possible or feasible; his use of the word did not address the economics of the option. Tr. 4307, 4310. He commented that implementation of the removal and replacement option in 1981 would be more difficult than implementation in 1978 because of several structures adjacent to the DGB which had not been constructed in 1978. Tr. 4311. Mr. Hood concluded that the removal and replacement option remains a viable alternative should it prove necessary. Staff Testimony on Contention 2, p. 11. The Staff further noted that the decision to continue construction on the DGB involved considerable financial risk since in the event the preload was not successful, the removal and replacement option would have to be implemented. Id.

73. On cross-examination, Mr. Hood testified that Dr. Peck considered both the removal and replacement option and the surcharge option acceptable approaches at the December 4, 1978 meeting. Tr. 4231; see Staff Testimony on Contention 2, Attachment 11. He testified further that he had no direct evidence that Dr. Peck felt that the removal and replacement option was better from an engineering standpoint than the surcharge option. Tr. 4426.
74. The direct testimony of Mr. Howell responded to Stamiris' Contention 2(d). Mr. Howell's testimony submitted that both the premise and conclusion of

Contention 2(d) were incorrect. Howell, p. 21. He stated that the contention is factually incorrect since work on the DGB was stopped on August 1978 soon after the excessive settlement was discovered and was not resumed until a complete investigation determined the cause of the settlement and the safety consequences of resuming construction. Id. Furthermore, construction was resumed with the concurrence of the soils consultants who had recommended surcharging as an appropriate remedy. Id. Tr. 2872. Mr. Howell testified that adding more weight to the structure by continuing with construction could only complement the surcharge program. Howell, p. 21.

75 Mr. Howell's testimony described the process by which the remedy for the DGB was selected. Initially the best consultants in the field were retained. Howell, p. 22. Their task was to present remedial options to the project management. Id. Out of six options that were developed only two were found suitable - surcharging the DGB or removing and replacing the DGB. Howell, pp. 22-23. The consultants ultimately recommended the former option and CPC chose to proceed with the surcharge program. Howell, p. 23.

76. Mr. Howell testified that only after a viable technical solution to the DGB settlement was found were other factors such as cost and construction schedule considered. Howell, p. 22. In this regard, Mr. Howell stated that CPC's philosophy has always been that the technical adequacy of a solution is a prerequisite to the consideration of its time and financial consequences. Id. The surcharge option was the more attractive solution

since not only was it technically adequate but also because it was somewhat less expensive and time consuming than the removal and replacement solution. Howell, p. 23. Moreover, the surcharge approach did not preclude the removal and replacement option. Mr. Howell's testimony concluded that, in view of the results of the surcharge program, it had not compromised any applicable health and safety regulations. Howell, p. 24.

77. On cross-examination, Mr. Howell testified that the surcharge option had not been adopted for all practical purposes in October 1978. Tr. 2886. While Mr. Howell personally does not advocate the removal and replacement option, he stated that the option is both technically and economically feasible. Tr. 2887-88.
78. Mr. Keeley testified on cross-examination that the removal and replacement option was carefully considered prior to the decision to proceed with the surcharge option. Tr. 1273. He admitted, however, that he recalled no indepth discussion of the removal and replacement option in either 50.55(e) or 50.54(f) submittals. Tr. 1407. He stated that the removal and replacement option was ruled out in late fall of 1978 and that the surcharge program was formally adopted in December 1978. Tr. 1243-44. Mr. Keeley testified, as did Mr. Howell, that the removal and replacement option was economically feasible should circumstances require its implementation. Tr. 1351.
79. On cross-examination, Dr. Peck testified that work on the DGB was stopped soon after the settlement was discovered and recommenced roughly after the

surcharge was placed. Tr. 3347. He stated that he and Dr. Hendron formally recommended the surcharge option to Bechtel and CPC at the November 7, 1978 meeting in Champaign, Illinois. Tr. 3414; see Stamiris exhibit 22.

80. Dr. Peck testified that after assessing the removal and replacement option on its geotechnical merits he concluded that it would result in an inferior foundation compared to the foundation that would result from surcharging the DGB. Tr. 3337-39. Thus, although he could not recall precisely what he had said at the December 4, 1978 meeting with the NRC, he doubted that he had said anything to the effect of "[s]hort of removing all of the fill above the hard glacial till, a 'preload program' would be the best approach." Tr. 3342-43; see Staff Testimony on Contention 1, Attachment 11, p. 3.

The NRC Staff has difficulty with this statement

81. Consistent with the testimony of other witnesses, Dr. Peck stated that the removal and replacement option could still be implemented at this date. Tr. 3477. He added, however, that it would be somewhat difficult because of the relatively confined area around the DGB. Tr. 3473-74.

82. Dr. Hendron testified that the surcharge option had not been selected for all practical purposes in October 1978. Tr. 4074. In this regard, he stated that his comments during the October 8, 1978 inspection and discussion indicated that surcharging was one possible way of approaching

the problem, not that surcharging was the only or recommended approach. Tr. 4010; see Stamiris exhibit 20. Dr. Hendron stated that all options, including the removal and replacement of the DGB and fill, were discussed openly at the November 6, 1978 meeting. Tr. 4037, 4045-46, 4048, 4074; see Stamiris exhibit 22. Dr. Hendron testified that he was not aware of anyone who thought that he believed that the removal and replacement option was superior to the surcharge option. Tr. 4049. Nor did he ever think that it was a better option. Id.

83. Based on the facts presented above, the Board finds no support for Contention 2(d). Although there was little documentary evidence of how thoroughly the removal and replacement option was considered, we note that four witnesses testified that it was considered prior to adoption of the surcharge program and we have no reason to question their credibility. Moreover, neither continued work on the DGB nor the surcharge program precluded implementation of the removal and replacement option. As all the witnesses testified, that option could be implemented today should it become necessary.

84. Although the Staff and CPC submitted direct testimony in response to Stamiris' Contention 2(e), Staff Testimony on Contention 2, pp. 11-12; Cook, pp. 19-21, Intervenor Stamiris subsequently withdrew that part of Contention 2. Intervenor Statement of Intent to Omit Certain Contentions, June 1, 1981. Accordingly, we make no finding with respect to Contention 2(e).

85. Staff testimony of Mr. Hood responded to item 1 in Stamiris' supplement to Contention 2. Item 1 referred to notes of a November 7, 1978 meeting which included the following action item: "[p]roceed with preparations for preload as rapidly as possible." Staff Testimony on Contention 2, p. 12; Attachment 3, p. 5. Mr. Hood testified that the action item appeared to result from a discussion during the meeting which indicated that a 5-month period was available in the schedule for preloading and that Dr. Peck recommended proceeding with the instrumentation and preload as rapidly as possible. Id. pp. 12-13; Id., p. 2.

86. Mr. Hood testified that the investigations into the root causes of the soil settlement and the possible organizational deficiencies were not completed as of November 7, 1978, nor prior to proceeding with the DGB surcharge. Staff Testimony on Contention 2, p. 13. In fact, the Staff had told CPC during a December 4, 1978 meeting that "while attention to remedial action is important, determination of the exact cause is also quite important for verifying the adequacy of the remedial action, assessing the extent of the matter relative to other structures, and in precluding repetition of such matters in the future." Id.; see Staff Testimony on Contention 1, Attachment 11, p. 7. The Staff's interest in identifying root causes was reflected also in 50.54(f) Request 1 which was issued on March 21, 1979. Staff Testimony on Contention 2, p. 13; Tr. 4314. While Mr. Hood agreed with item 1 to the extent that the surcharge was started prior to the identification of

root causes and organizational deficiencies, he reached no conclusion on whether the above facts adversely affected resolution of soil settlement issues or compromised pertinent health and safety regulations.

87. The direct testimony of Dr. Peck responded to item 1 in Stamiris' supplement to Contention 2. He testified that since the fill was obviously setting progressively under its own weight and contained clay which would cause progressive settlement, no more information on root causes was needed to conclude that surcharging was the appropriate remedy. Peck, p. 2. He noted that the surcharge could be in place and producing its beneficial effects while the organizational deficiencies, if any, were remedied. Id.

88. On cross-examination, Dr. Peck defined root causes as those factors that he should know about as an engineer in order to solve the specific engineering problem presented by the DGB. Tr. 3219. He stated that organizational deficiencies were irrelevant in terms of reaching his decision to proceed with the surcharge. Tr. 3220. He admitted, however, that organizational deficiencies were not irrelevant in terms of implementing his surcharge program. Tr. 3221.

89. With respect to scheduling pressures, Dr. Peck testified that he was aware of the fact that there were schedules associated with the DGB surcharge which Bechtel and CPC wanted to meet. Tr. 3346. He recalled,

however, that he did not start working immediately; thus, some matter took priority over the apparent urgency caused by scheduling pressures. Tr. 3346.

90. On cross-examination both Mr. Keeley and Mr. Howell stated that the determination of root causes of the DGB settlement was not necessary prior to undertaking remedial measures. Tr. 1242, 2941. Mr. Howell recalled that at the time the decision to surcharge was made the identification of root causes was under investigation. Tr. 2941. He added that he was not aware of any organizational deficiencies in the quality assurance program. Id. Mr. Keeley testified that root causes were not clearly established until Question 23 was answered in November 1979. Tr. 1242; see Marguglio, p. 39. However, he stated that the "people problem" which in part had caused the DGB settlement had been identified and resolved prior to proceeding with any remedial actions. Tr. 1243, 1288-89.

91. Based on the facts presented above, the Board finds that root causes were not fully identified and remedied prior to starting the surcharge program. In the absence of probative evidence to support Intervenor Stamiris' claim that the failure to adequately investigate root causes was due to financial and time pressures, however, we deny the claim. In fact, in light of CPC's claim that there was no need to consider root causes, its failure to do so can hardly be attributed to financial and time pressures. We note, however, that prudent engineering decisions

are made after considering time and financial factors and that such considerations are in no way improper. The adequacy of the surcharge will be addressed at future hearings.

92. Staff testimony of Mr. Kane responded to item 2 in Stamiris' supplement to Contention 2. The statement referenced in item 2 regarding filling the cooling pond immediately was found in Bechtel meeting notes. Staff Testimony on Contention 2, p. 14; Attachment 3, p. 2. Mr. Kane testified that CPC's decision to fill the cooling pond "immediately because of the amount of river water available for filling is restricted" did affect the piezometric measurements during the surcharge. Staff Testimony on Contention 2, p. 14. Mr. Kane explained that the coincident effects on piezometric monitoring caused by seepage from the raised pond and excess pore water pressures under the surcharge were identified by the Staff and its consultants, the U.S. Army Corps of Engineer, as an important reason for being unable to fully accept CPC's conclusion regarding the success of the surcharge program. Id.; Attachment 4. Indeed, the Staff has insisted on additional borings and laboratory tests in order to verify the effectiveness of the surcharge program. Staff Testimony on Contention 2, p. 14; Tr. 4149. Mr. Kane concluded that schedule pressures did compel CPC to accept less than the best sequence in the pond raising-surcharge placement operations and that these pressures may have adversely affected resolution of the soil settlement issues. Id.

93. On cross-examination, Mr. Kane gave a detailed explanation of how the raising of the pond affected the piezometric measurements. He explained that piezometers were one of the devices being used to evaluate the effectiveness of the surcharge. Tr. 4148. Mr. Kane testified that the simultaneous raising of the pond and placement of the surcharge complicated evaluation of the piezometric data because the piezometers were reflecting not only the influence of the surcharge but also the influence of the rising water table due to the filling of the cooling pond. Id. He indicated that the Staff had difficulty in factoring out of the piezometric readings the effect of the pond raising. Id. Mr. Kane stated that, during depositions of Bechtel personnel, the Staff, without success, requested an explanation of how to separate the effects of the two events. Id. Mr. Kane opined that the fact that Bechtel deponents directed the Staff to Dr. Peck for an explanation indicated the difficulty that both Bechtel and the Staff were having in evaluating the effect of the pond raising on the rising piezometric level. Id.

94. Mr. Kane testified that another problem associated with the raising of the pond was the concern that the fill had originally been placed dry of optimum and that as a result of seepage from the pond there would be additional compressibility of the fill. Tr. 4148. He explained that it was important to fully saturate the fill to make sure that softening and compression occurred. Tr. 4149. In this regard, he stated that the Staff is not convinced that the fill was fully saturated during the surcharge. Tr. 4443, 4466-67. Mr. Kane noted that the fact that the

majority of piezometers did not respond to the surcharge load as predicted increased the Staff's uncertainty regarding full saturation of the fill. Tr. 4443. In Mr. Kane's opinion, interpretation of piezometer data would have been considerably easier had the pond level been raised, the soil saturated, and the surcharge then placed. Tr. 4149. Such an approach, he explained, would have established a baseline for measuring the piezometer levels. Id.

95. On cross-examination, Mr. Kane stated that he had no evidence that Dr. Peck was not able to evaluate the piezometer readings because of the rise in groundwater level associated with the filling of the cooling pond. Tr. 4415.

96. The direct testimony of Dr. Peck responded to item 2 in Stamiris' supplement to Contention 2. Dr. Peck testified that he and Dr. Hendron made the recommendation to raise the pond level and thereby submerge the piezometer tips and the surrounding sands. Peck, p. 3. They recommended this course of action in order to avoid the complexities in measurement that would be introduced by pore-air pressures assuming the plant fill contained large amounts of air. Id. Dr. Peck stated that there was no evidence that, if the pond was raised to its maximum level, the groundwater beneath the DGB would reach a stable elevation. Id. In view of this consideration, Dr. Peck submitted that the best course of action was to allow the pond level to rise quickly and to proceed with the surcharging. Id.

*Purpose in future
NRC testimony -
Dr. Peck & Dr. Hendron
have been able to
analyze to their
satisfaction but they
have never directly
addressed
this issue directly
They have never stated
in their opinion what
portion of the piezometer
rise was due to
raising the pond.*

On cross-examination, Dr. Peck stated that he could not recall the pond elevation which existed in December 1978 nor did he know whether any piezometer was actually placed above the elevation of the cooling pond which existed in December 1978. Tr. 3232.

97. Another reason advanced for raising the pond level was the hypothesis that the clays in the fill might be dry of optimum and thus it would be desirable to submerge as much of the clay as possible. Peck, p. 4. This hypothesis, however, was later proven to be wrong. Tr. 3231.
98. On cross-examination, Dr. Peck explained the complexities that are associated with measuring the pore pressure of partially saturated soils. Tr. 3227. Specifically, if soils are only partially saturated, there is air pressure as well as water pressure in the soil. Id. Dr. Peck stated that the instruments used to measure air and water pressure are much more complex than piezometers which simply measure water pressure. Id.
99. To measure water pressure, Dr. Peck explained that 100 percent saturation is not required; however, to get satisfactory readings the free water surface must be above the piezometer sensor. Tr. 3227-28. Dr. Peck admitted that the soils were only partially saturated up to the foundation level of 628 feet at the time the surcharge was placed. Tr. 3230. He also noted that stand pipe piezometers, not the complex instruments which measure both water and air pressure, were relied on exclusively to measure pore pressure. Id.
100. Dr. Peck testified that the piezometer levels reflected in a general way the rising and falling levels of the cooling pond. Tr. 3240. He concluded that the effects of the rising level of the cooling pond introduced an additional consideration to his interpretation of the piezometer data but did not give him any difficulty in his interpretation. Tr. 3464-65.

This hypothesis (not placed dry of optimum) was not proven wrong Pursue in testimony

Pursue in testimony
Recognizing the small piez. rise what portion is cooling pond influence

101. On cross-examination, Dr. Peck stated that some of the piezometers gave anomalous readings. Tr. 3241, 3244-45. In his opinion, however, it is not unusual for piezometers to occasionally give such readings. Tr. 3241. Dr. Peck explained that the anomalous readings were not the fault of the instruments but the result of misreadings, miscalculations and misplottings. Tr. 3250. In short, he stated that most of the anomalies were bookkeeping errors. Id. Dr. Peck added that most of the anomalous readings have now been satisfactorily explained and that there remain only several isolated examples of anomalous readings. Id. He testified that overall a surprising number of the piezometer readings were consistent with each other. Tr. 3241-42. Dr. Peck concluded that the piezometers gave accurate readings for all practical engineering purposes. Tr. 3230-31.
102. On cross-examination, Dr. Peck confirmed that during a November 7, 1978 meeting he, along with the other consultants, suggested that the best sequence would be to place the preload and then to quickly raise the cooling pond to its operating level. Tr. 3236; Staff Testimony on Contention 2, Attachment 3, p. 2. However, as the meeting notes reflected, it was decided to fill the cooling pond immediately and to simultaneously place the surcharge. Id.
103. On redirect, Dr. Peck testified that it was his understanding of the "best sequence" statement in the meeting notes that the placement of the surcharge and the raising of the cooling pond could be carried out either

simultaneously or consecutively. Tr. 3464. In his opinion, the simultaneous implementation of the two operations was appropriate. Id.

104. On cross-examination, Dr. Hendron stated that the piezometers in the vicinity of the DGB could have been reflecting the influences of both the rise in the pond level and placement of the surcharge. Tr. 4096.
105. Based on the facts presented above, the Board finds that the decision to raise the cooling pond level did affect the piezometric measurements as alleged in item 2 of Stamiris' Contention 2. With respect to whether the best sequence was followed in raising the cooling pond, not only does the Staff testimony conflict with CPC testimony but also the testimony of the ~~CPC~~ witness appeared to be self-contradictory. We note that insofar as, ^{one of} the Staff's need for the borings resulted from the decision to raise the pond at the same time as placing the surcharge, the decision may have adversely affected the timely resolution of the soil settlement issues. We do find, however, that there was no probative evidence that CPC's decision to fill the pond immediately was due to time or financial pressures and accordingly deny this portion of Intervenor Stamiris' Contention. As stated above, the adequacy of the surcharge will be addressed at future hearings.

106. Staff testimony of Mr. Kane responded to item 3 in Stamiris' supplement to Contention 2. The Staff testimony noted that the minutes of a November 7, 1978 meeting among CPC, Bechtel and Bechtel's consultants indicated that a 5-month period was available in the schedule for pre-loading. Staff Testimony on Contention 2, p. 15; Attachment 3, p. 2. The Staff agreed with item 3 insofar as it alleged that the surcharge was removed without the Staff being satisfied that secondary consolidation was assured. Staff Testimony on Contention 2, p. 15. The Staff acknowledged, however, that CPC did give the Staff advance notice of its decision to remove the surcharge. Id.
107. Mr. Kane testified that the reason the Staff was not satisfied with the effectiveness of the surcharge program was due to CPC's practice of not identifying acceptable criteria to the Staff before implementing the remedial action. Staff Testimony on Contention 2, p. 15; see Attachment 5, p. 2. Mr. Kane concluded that the Staff's determination regarding secondary consolidation and the success of the surcharge program will depend on the review of the boring data and the laboratory test results. Staff Testimony on Contention 2, p. 16.
108. CPC testimony of Dr. Peck responded to item 3 in Stamiris' supplement to Contention 2. He testified that on August 15, 1979, when he approved the removal of the surcharge, the settlement and piezometric data conclusively demonstrated completion of primary consolidation. Peck, p. 4. Dr. Peck stated that the decision to remove the surcharge was not dictated by any

predetermined duration. Id. In response to item 3, Dr. Peck submitted that the NRC had no logical technical basis for believing secondary consolidation had not been achieved. Id.

109. On cross-examination, Dr. Peck clarified that no one from the NRC ever told him that the Staff firmly believed that secondary consolidation had not been achieved. Tr. 3238. In Dr. Peck's view, however, the Staff possessed information which provided the technical basis for the con-

clusion that secondary consolidation had been achieved. Tr. 3276-77.
Dr. Peck indicates that NRC had nine volumes of information in response to Stamiris question which has the time frame of Aug. 1979 when surcharge was removed. The facts are at this time (Aug. 1979) NRC had only Vol. 1. The remaining 8 volumes were ultimately submitted in response to NRC questions.

110. Dr. Peck testified that the statements made on pages 3-4 of Attachment 4 to Mr. Singh's testimony are all technical statements. Tr. 3462. He added that if they were correct they would also be logical statements. Id. Dr. Peck concluded that those statements did not form a logical technical basis for the judgment that secondary consolidation had not been achieved during the surcharge program. Tr. 3469.

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111. With respect to the statement in the November 7, 1978 meeting notes that a "5-month period is available in the schedule for preloading", Dr. Peck did not recall some one stating that only a 5-month period was available. Tr. 3276. He emphasized that no time constraints were placed on him with regard to the time available for executing the surcharge. Tr. 3349-50. Dr. Peck testified that while he was aware of a certain urgency associated with the surcharge program, he did not let schedule considerations

influence his judgment on how long the surcharge must be kept in place. Tr. 3348.

112. Dr. Hendron testified that the key to the success of a surcharge is the length of time it is in place. Tr. 4050. He stated that he was not aware of a 5-month schedule factor related to the time available for implementation of the surcharge. Id. However, he did comment that whenever somebody made a comment at a meeting about how many months were available for the surcharge he and Dr. Peck cut short such comments. Tr. 4050-51. Dr. Hendron testified that the decision to remove the surcharge was based on the settlement and piezometric data, not on scheduling constraints. Tr. 4051.

113. Based on the facts set forth above, the Board finds that although the November 7, 1978 meeting notes state that a "5-month period is available in the schedule for preloading", the consultants' decision as to when to remove the surcharge was not influenced by any such scheduling concerns. Thus, in the absence of probative evidence demonstrating that the timing of the surcharge removal was dictated by schedule or financial considerations, we deny item 3. We further find that the surcharge was removed before the NRC was satisfied that secondary consolidation had been achieved. We note that the issue of whether the timing of the surcharge removal has adversely affected resolution of the soils issue will be addressed when testimony on the boring data and laboratory test results is provided.

114. Staff testimony of Mr. Kane responded to item 4 in Stamiris' supplement to Contention 2. Item 4 alleged that the failure to take certain actions resulted in additional, avoidable stresses to the DGB. With respect to the failure to grout the gaps prior to cutting the duct banks, the Staff could not conclude that grouting the gaps prior to isolating the duct banks would have been the better approach. Staff Testimony on Contention 2, p. 17. Mr. Kane testified that there are advantages and disadvantages associated with the decision to grout prior and the decision to grout after isolating the duct banks. Id. Mr. Kane surmised that the decision not to grout the gaps prior to isolating the duct banks probably resulted in some immediate stress relief in bay areas 3 and 4 when the duct banks were actually released. Id., pp. 17-18. He added it was uncertain as to the extent that beneficial reduction in additional stresses to other portions of the DGB would have resulted had the grouting been done prior to cutting the duct banks. Id., p. 18.
115. With respect to the alleged failure to cut the condensate lines, the Staff testified that it understood that the lines had actually been cut. Staff Testimony on Contention 2, p. 18. The Staff therefore concluded that the cut lines did not cause additional stress to the DGB. Id.
116. With respect to breaking up the mudmat beneath the DGB, the Staff stated that this decision probably lessened the stresses imposed during the surcharge since the DGB's foundation was stiffer and better able to span any soft soil areas. Staff Testimony on Contention 2, p. 18. On the other

hand, the decision not to break up the mudmat reduced the effectiveness of the surcharge in consolidating the softer foundation soils which were bridged by the foundation and the mudmat. Id. pp. 18-19.

117. The Staff Testimony concluded that the three actions referenced in item 4 did not adversely affect resolution of the soil settlement issues. Staff Testimony on Contention 2, p. 19.
118. On cross-examination, Mr. Kane testified that although the consultants initially recommended grouting the gaps prior to isolating the duct banks, it was his understanding that, upon further reflection, the consultants and Bechtel concluded it was not necessary to grout the gaps. Tr. 4172-75. Mr. Kane stated that the gaps have now been grouted. Tr. 4177. Mr. Hood interjected that the grouting occurred after the December 1979 Order. Id.
119. On further cross-examination, Mr. Kane testified that he was aware of the fact that the NRC was notified by Interim Report No. 4, dated February 16, 1979, that the condensate lines had been cut and that there would be surveillance of the cut lines. Tr. 4404. Mr. Hood believed that the condensate lines had been cut after the start of the surcharge program but prior to the placement of the total surcharge. Tr. 4199.
120. While CPC witnesses did not file any direct testimony on item 4, Drs. Peck and Hendron were cross-examined on the matter.

121. Dr. Peck testified that at the November 1978 meeting several people may have suggested grouting the gaps before releasing the duct banks.

Tr. 3365. Further thought was given to the matter, however, and as Dr. Peck recalled, the decision was that prior grouting was not necessary.

Id. Dr. Peck added that the issue of when to grout was of minor concern to him and that he had no strong preference on the issue. Tr. 3366. On the other hand, Dr. Hendron thought it advisable to grout the gaps prior to releasing the duct banks. Tr. 4054; see Stamiris exhibit 22, p. 5. He stated that had the gaps been grouted, the load distribution would have been more uniform. Tr. 4054-55. Nevertheless, Dr. Hendron believed that the building was strong enough to take the differential load.

Tr. 4055. Furthermore, he did not think that the failure to grout the gaps affected the effectiveness of the surcharge. Tr. 4103.

122. With respect to the failure to break up the mudmat, Dr. Peck testified that it was neither necessary nor desirable to take such action. Tr. 3383. He recalled that the matter had been discussed but was deemed to be of little significance to the DGB problem. Id. Indeed, Dr. Peck stated that he had neither an original recommendation nor a suggestion on how to deal with the mudmat. Tr. 3409-10. If the mudmat has not already broken up and if it should break up in the future, Dr. Peck concluded that such action would not result in significant additional settlement of the DGB. Tr. 3471.

123. Dr. Hendron testified that he did not remember recommending that the mudmat beneath the DGB be broken up. Tr. 4078. Nor did he remember whether any of the other consultants made the recommendation. Tr. 4080. Like Dr. Peck, Dr. Hendron stated that he had no strong views on the subject of breaking up the mudmat. Tr. 4078. He indicated that the mudmat probably was broken up during the surcharge considering the fact that it was constructed from unreinforced and quite thin concrete. Tr. 4080, 4103.

124. With respect to cutting the condensate lines, Dr. Hendron testified that he may have made such a recommendation. Tr. 4058. He did recall that the recommendation to cut the lines was followed and that he had not specified a time frame in which they must be cut. Tr. 4059, 4062.

125. Based on the facts set forth above, we find no support for item 4 to Contention 2. There was no evidence that the alleged failures to grout the gaps, to cut the condensate lines and to break up the mudmat were the result of time or financial pressures. Moreover, there was no evidence demonstrating that these failures adversely affected resolution of the soil settlement issues.

126. Staff testimony of Mr. Kane responded to item 5 in Stamiris' supplement to Contention 2. Mr. Kane testified that item 5 alleged essentially the same facts as Contention 2(d), i.e. that the decision to continue work on the DGB was dictated by time and financial pressures and eliminated

consideration of the removal and replacement option. Staff Testimony on Contention 2, p. 19. Mr. Kane stated that CPC's decision to continue construction of the DGB does make it more difficult and costly to proceed with the removal and replacement option, but that it does not eliminate the option. Id. The Staff concluded that CPC's decision to proceed with construction evidenced its willingness to proceed at its own risk. Id. Furthermore, the Staff did not view CPC's decision in this regard as having an adverse impact on the resolution of the soil settlement matter. Id.

127. Neither CPC nor Intervenor Stamiris adduced direct testimony on item 5.

128. Based on the facts presented above, the Board finds that item 5 alleges matters identical to Contention 2(d). Accordingly, as stated in paragraph 83, we find no support for the claim that continued work on the DGB precluded consideration or implementation of the removal and replacement option.

129. Staff testimony of Mr. Hood responded to item 6 in Stamiris' supplement to Contention 2. Mr. Hood testified that, had the FSAR been tendered in August 1978 instead of August 1977, little or no detection of inconsistencies related to soil settlement problems would have occurred during this interval. Staff Testimony on Contention 2, p. 20. The basis for the Staff's position on this matter was set forth in CPC's response to 50.54(f) Request 1. Id. That response explained that the inconsistencies

between the FSAR and the PSAR which related to the DGB settlement were found in sections of the FSAR that were inactive since the work had been completed. Id. Because of the inactive status of these FSAR sections, they would not have been reviewed and hence the inconsistencies would not have been found. Id.

130. On cross-examination, Mr. Hood reiterated that early submittal of the FSAR made no difference in terms of detecting or precluding the inconsistencies. Tr. 4317, 4322.
131. Intervenor Stamiris submitted that item 6 was not directed to the timing of the FSAR submission but rather with its inadequate review. Tr. 4323. Mr. Hood responded that if the draft sections of the FSAR had been rigorously reviewed, the incorrect statements would have been found. Tr. 4324. Mr. Hood postulated further that had the inconsistencies been discovered, it probably would have simply resulted in the correction of a calculation. Tr. 4327. He doubted seriously that early detection of the inconsistencies would have revealed the existence of a soil settlement problem. Id.; Tr. 4341.
132. Neither CPC nor Intervenor Stamiris presented direct testimony in response to item 6.
133. Based on the facts set forth above, the Board finds no support for item 6. We note that the claim in item 6 is very similar to the claim

in Contention 2(a). There, we found that early submittal of the FSAR did not directly or adversely affect resolution of soil settlement issues. See paragraph 63. We make the same finding here. In addition, there was no evidence indicating that early detection of the inconsistencies would have prevented the soil settlement problems.

134. Staff testimony of Mr. Kane responded to items 7, 9 and 11 in Stamiris' supplement to Contention 2. The Staff viewed items 7, 9 and 11 as allegations relating to the adequacy and conservatism of the DGB surcharge program and therefore responded to them collectively. Staff Testimony on Contention 2, pp. 20-21. The Staff acknowledged that decisions made by CPC are influenced by cost and schedule considerations. Id., p. 20. The Staff did not view these considerations as inappropriate, but rather recognized them as legitimate concerns of an applicant. Id. These concerns were taken into consideration when the Staff exercised its regulatory responsibility of firmly insisting upon acceptable margins of safety necessary to protect the public's health and safety. Id. With respect to item 11, the Staff submitted that the significant issue was not whether the optimum conditions prevailed during the surcharge but whether the surcharge was successfully executed. Id. The latter issue will be addressed later in conjunction with the evidentiary hearing involving the adequacy of the surcharge program. Id. The Staff concluded that the examples listed in items 7, 9 and 11 did not adversely affect resolution of the soil settlement problem. Id.

135. On cross-examination, Mr. Kane testified that the Staff's conclusion that items 7, 9 and 11 have not adversely affected resolution of the soil settlement issue was dependent on the fact that the removal and replacement option is still an alternative. Tr. 4348-49. In fact, the Staff had testified earlier that the removal and replacement option remains a viable alternative should it prove necessary. Staff Testimony on Contention 2, p. 11.
136. With respect to item 7, Mr. Kane testified that no one from the NRC told CPC not to proceed with the surcharge. Tr. 4412, 4455. In this connection, Mr. Hood testified that he did not recall CPC specifically requesting the Staff to approve the surcharge program. Tr. 4169. Indeed, the reason Mr. Hood stated that CPC was proceeding at its own risk with the surcharge program was precisely because the Staff could not conclude that the DGB after the surcharge would meet the regulatory requirements. Tr. 2664 2678; see Staff Testimony on Contention 1, Attachment 11, p. 7.
137. With respect to item 11, Mr. Kane further testified that the uneven settlement of the DGB ~~that resulted from the surcharge~~ was not affected by the amount of surcharge applied ^{near the Turbine Building.} Tr. 4362. He explained that the smaller amount of settlement that occurred on the north side of the DGB (near the Turbine Building) was the result of the compressibility of the materials not the weight of the surcharge. Tr. 4363.

✓ 138. CPC did not adduce direct testimony on items 7 and 11; however, Drs. Peck and Hendron were cross-examined on item 11. CPC witness Keeley filed direct testimony in response to item 9. Mr. Keeley^e was not cross-examination^{ed} on item 9 but Mr. Howell was.

139. With respect to item 9, Mr. Keeley testified that while various remedial measures were being evaluated, a field engineer recommended, and the DGB Task Force decided, that certain instrumentation related to the surcharge option be installed prior to the placement of frost protection. Keeley, pp. 8-9. Mr. Keeley explained that since certain surcharge instrumentation required subsurface installation, it was advantageous to install that instrumentation prior to placement of the frost protection (a thin layer of fill placed over existing grade to protect the lower layers from freezing during the surcharge). Id., p. 9. Mr. Keeley concluded that although certain instrumentation was installed before the final selection of the surcharge option, the cost of the instrumentation and its installation was minimal and had no effect on the choice of remedial action. Id.

140. On cross-examination, Mr. Howell testified that some surcharge instrumentation work was done in the Fall of 1978 before the decision was made to surcharge the DGB. Tr. 2872, 2885. Mr. Howell did not believe that CPC's actions in this regard were improper or inconsistent with good management. Tr. 2885-86. He added that it was prudent for management to have contingency plans or to pursue parallel approaches to the problem

before a final decision was made. Tr. 2836. Mr. Howell estimated that the cost of the instrumentation installation was in the range of tens of thousands of dollars and that that cost constituted only a few percent of the total cost of the surcharge program. Tr. 2395. Mr. Howell, like Mr. Keeley, concluded that the cost of the instrumentation installation had no effect on the selection of the surcharge option. Tr. 2980.

141. With respect to item 11, Dr. Peck testified that the DGB settled somewhat less on the north side adjacent to the Turbine Building. Tr. 3283. Dr. Peck postulated that the amount of settlement near the Turbine Building may have been due to the sand fill in the area. Id. Dr. Hendron likewise testified that the DGB settled more on the south than the north side. Tr. 4064. He explained that this phenomenon was due to the type of soils beneath the DGB and not to the magnitude of the surcharge. Id.
142. Based on the facts set forth above, the Board finds no evidentiary support for items 7, 9 and 11 in Contention 2. We agree with CPC and the Staff that cost and schedule factors are legitimate concerns. We find no evidence to show that those concerns, as they related to items 7, 9 and 11, adversely affected resolution of the soil settlement issues.
143. Staff testimony of Mr. Kane responded to item 8 in Stamiris' supplement to Contention 2. Mr. Kane testified that in February 1978, the Staff

issued FSAR question 362.2 which sought documentation from CPC of the method used to remove the loose natural sands (sands with less than 75% relative density) from the foundations of safety related structures as committed to in the PSAR. Staff Testimony on Contention 2, p. 22. In response to question 362.2, CPC provided the results of boring explorations which had been drilled in August and September of 1978 and additional explorations made in 1979. Id. These borings were all drilled after the area fill had been placed. Id. The results of these borings did not indicate the presence of loose natural sands beneath safety related structures. Id. Thus, the Staff was unable to conclude that CPC failed to excavate the loose natural sands as committed to in the PSAR or that this failure contributed to the inadequacy of the subsoils. Id.

144. On cross-examination, Mr. Kane attempted to clarify his direct testimony. He explained that when question 362.2 was issued, CPC did not have the documentation which the question requested. Tr. 4365. As a result, CPC took various borings to determine whether loose sands were present in certain areas. Id. The blow counts from the borings indicated that the sands were not loose. Id.

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145. Mr. Kane testified that he believed the sands were the same ones that pursuant to the PSAR were to be removed. ^{Tr. 4365.} However, due to the placement of the fill, they now had different properties. ^{Id.} ~~Tr. 4365.~~ Nevertheless,

he stated that he could not conclude that CPC had failed to excavate the loose sands. Tr. 4381-82.

✓ 146. CPC witness ~~X~~. Keeley responded to item 8 in Stamiris' supplement to Contention 2. His testimony was similar to that of the Staff. He explained that analyses of the borings, which were done in response to FSAR question 362.2, indicated that the naturally occurring sands at the site met the density requirements with the exception of a few isolated lenses of no significance to safety related structures. Keeley, p. 16. Mr. Keeley indicated that the matter was discussed with the Staff in April 1979 and was considered a closed issue. Id. He concluded that resolution of the loose sands issue was unrelated to financial and time pressures. Keeley, p. 17. In fact, Mr. Keeley asserted that CPC had taken the necessary steps and had incurred the necessary expense, both in money and time, to insure that a satisfactory technical solution was achieved. Id.

147. On cross-examination, Mr. Keeley testified that the borings were taken because CPC could not prove that the loose sands in fact had been removed. Tr. 1294-96. When Mr. Keeley's attention was directed to page 2 of Attachment C of Stamiris exhibit 1, he admitted that the document indicated that the sands had not been removed. Tr. 1296. With regard to the statement in the document that "[i]t was too late to economically excavate the loose sands since they had for the most part been covered by backfill", Mr. Keeley stated that he would be remiss in his

outies as a project manager if he did not consider cost and schedule factors when making engineering decisions. Id. Furthermore, in this case, the sands were found to be adequately compacted and therefore their presence did not compromise the safety of any structure. Tr. 1297.

148. Based on the facts set forth above, the Board finds no support for item 8. Although CPC admitted that the loose sands had not been removed, there was no evidence demonstrating that the failure to remove was the result of undue or improper financial or schedule pressures. In addition, we find that the failure to remove the loose sands neither compromised the safety of any structures nor adversely affected resolution of the soil settlement issues.
149. Staff testimony of Mr. Hood responded to item 10 in Stamiris' supplement to Contention 2. Mr. Hood concluded that the resolution of the "Seismic Deferral Motion" was in accord with the Staff's position and did not compromise applicable health and safety regulations. Staff Testimony on Contention 2, p. 22; Tr. 4366-68.
150. CPC witnesses presented no direct testimony on item 10. Nor were they cross-examined with respect to the "Seismic Deferral Motion".
151. Based on the facts set forth above, we find that CPC's "Seismic Deferral Motion" did not represent time and financial pressures which adversely

affected resolution of the soil settlement issues. Accordingly, we find no support for item 10 to Contention 2.

152. Staff testimony of Mr. Hood responded to item 12 in Stamiris' supplement to Contention 2. Mr. Hood stated that the alleged changes to design, material or procedural specifications were manifestations of the quality assurance breakdown prior to December 6, 1979. Staff Testimony on Contention 2, p. 23. Mr. Hood concluded that the quality assurance program satisfied all NRC criteria and that the Staff now has reasonable assurance that quality assurance and quality control programs will be appropriately implemented with respect to future soils construction activities. Id.

153. On cross-examination, Mr. Hood explained that his reasonable assurance conclusion with respect to quality assurance implementation was based on the testimony of Messrs. Keppler and Gilray. Tr. 4371. He clarified that his direct testimony did not imply that the changes to design, material or procedural specifications should not have been made without the Staff's approval. Tr. 4430. Mr. Hood further clarified that his direct testimony did not conclude that these changes were caused by time or schedule pressures. Id.

154. Neither CPC nor Intervenor Stamiris adduced any direct testimony on item 12.

155. Based on the facts set forth above, the Board finds no support for item 12. While the quality assurance deficiencies in part caused the DGB settlement problem, there was no showing that these deficiencies either resulted from time or financial pressures or adversely affected the resolution of the soil settlement issue.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of
CONSUMERS POWER COMPANY
(Midland Plant, Units 1 and 2)

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Docket Nos. 50-329 OM & OL
50-330 OM & OL

TESTIMONY OF JOSEPH D. KANE WITH RESPECT TO THE QUALITY
QUALITY ASSURANCE PROGRAM IMPLEMENTATION PRIOR TO DECEMBER 6, 1979

Q.1. Please state your name and position with the NRC.

A. My name is Joseph D. Kane. My position with the U.S. Nuclear
Regulatory Commission is Principal Geotechnical Engineer and I am
assigned to the Geotechnical Engineering Section of the Hydrologic
and Geotechnical Engineering Branch, Division of Engineering, Office
of Nuclear Reactor Regulation.

Q.2. Have you prepared a statement of professional qualifications?

A. Yes. A copy of this statement is attached.

Q.3. Please state the nature of the responsibilities that you have had
with respect to the Midland Plant, Units 1 & 2.

A. My review involvement with the Midland project essentially began in
November 1979 when I was assigned the responsibility of serving as
technical monitor for the interagency contract between the NRC and
the U.S. Army Corps of Engineers, Detroit District (hereafter the
Corps). The purpose of this interagency contract was to obtain the

~~51-6194076~~ 8A

service of expert technical personnel from the Corps to assist the NRC in the safety review of the Midland project in the field of geotechnical engineering. My responsibilities as contract technical monitor include assisting the Corps in their review efforts, examining and commenting on their evaluation reports and coordinating the Corps review efforts with other NRC Branches in technical areas of overlapping safety concern. In addition I have assisted in preparation of interrogatories and responses to interrogatories with regards to the soil settlement problem at the Midland plant. Since November 1979 my involvement in the review of the Midland project has steadily increased to the point that it is now the major portion of my work at NRC. In addition to responding to Consumers appeal actions (e.g., the appeal of the June 30, 1980 request for additional borings and laboratory testing) and participation in discovery deposition proceedings, I am extensively involved in the assessment of the adequacy of the remedial measures proposed by Consumers. These remedial fixes are necessary to address the many problems caused by the unanticipated settlement of safety related structures and piping due to the improperly compacted plant fill.

Q.4. Please state the purpose of this testimony.

A. The purpose of this testimony is to supplement the testimony prepared by Eugene J. Gallagher. In response to question 32, Mr. Gallagher stated that quality assurance deficiencies resulted in the plant

fill being insufficiently compacted. My testimony demonstrates that if the original compaction control requirements set forth in the PSAR had been followed, the plant fill settlement problem would not have occurred.

Q.5. What is the basis for your response to Question 4?

A. As indicated in Mr. Gallagher's testimony in response to Question 22, the NRC at the PSAR licensing stage considered the designated minimum compaction criteria and recommended moisture content placement control to be design and construction commitments by CPC. (The compaction criteria and moisture control requirement at the PSAR stage are summarized in Table 2.5.4, sheet 3 of the FSAR in response to NRC question 362.15). The significance of these commitments is extremely important to the expected performance of the plant fill. The engineering profession widely recognizes the importance of adequate controls on compaction and moisture content for soils which are intended to satisfactorily support structures. This wide recognition comes about because of the acknowledged relationship between the state of a soil's compactness and the soil's accepted behavior as an engineering material. CPC, when they indicated that soils which were to support structures would be compacted to a stated percentage of a laboratory established maximum density at a moisture content near optimum, were, in effect, convincing the NRC Staff at the CP Stage that engineering properties of compressibility and shear strength would be acceptable. What has been experienced at Midland (i.e., the plant fill significantly

settling under its own weight; foundation supporting safety related structures having very low penetration resistance to spoon samplers; and extensive cracking of structures founded on compacted fill) proves that soils were not compacted to the designated minimum compaction criteria established at the PSAR stage.

Q.6. Do other engineers share your conclusion that the cause of the plant fill settlement problem resulted from inadequate compaction or construction of an unsatisfactory plant fill?

A. Yes. Engineers from both the Corps and the NRC staff have the opinion that inadequate compaction and failure to attain the minimum compaction criteria designated at the PSAR stage are the major reasons for the settlement problem at Midland. In addition, in my opinion, statements obtained in the discovery depositions from Bechtel and their consultants support this conclusion. The following is from lines 7-10 at page 97 of the deposition of Sherif Afifi (Bechtel employee) taken on October 29, 1980;

BY MR. PATON:

Q. Doctor, do you have any opinion as to what caused the extensive settlement problem in the plant fill at Midland?

A. Inadequate compaction.

The following is from lines 18-25 at page 15 and lines 1-3 at page 16 of the deposition of Dr. Ralph B. Peck (Bechtel consultant) taken on January 13, 1981;

Q. All right. What is your opinion of the quality of the soils placement that had taken place prior to your being hired on the Midland project?

MR. FARNELL: Are you talking about the whole power plant? Or are you talking about specific parts of it?

MR. JONES: The soils portions of the project with which he was closely associated.

- A. My opinion, or perhaps you could say it was my conclusion was that the fill beneath the diesel generator building area and some neighboring areas was not a satisfactory fill.

The following is from lines 5-16 at page 41 of the deposition of Dr.

Alfred J. Hendron (Bechtel consultant) taken on January 27, 1981;

- Q. With respect to your construction of the fill do you have any opinion as to the quality of that work?

Were you going to speak?

MS. BLOOM: Yes, I was going to -- I think we have outlined what kind of work we are talking about here.

MR. JONES: Construction of fill?

THE WITNESS: I think when a fill is settle two to four inches under its own weight, and some places have a very low slow [sic] count which obviously something went wrong and I cannot say whose fault or what it might have been, but, there were some bad fills there, not as good as it should have been. I shouldn't say bad fills, there is a difference.

PROFESSIONAL QUALIFICATIONS AND EXPERIENCE

NAME: Joseph D. Kane

ADDRESS: 7421 Miller Fall Road
Derwood, MD 20855

EDUCATION: B.S. Civil Engineering 1961
Villanova University

M.S. Civil Engineering 1973
Villanova University

Post-degree studies, Soils and Foundation Engineering
University of California 1972
University of Maryland 1978

PROFESSIONAL REGISTRATION:

Registered Professional Engineer (1966) - Pennsylvania 12032E

PROFESSIONAL SOCIETY:

American Society of Civil Engineers

EMPLOYMENT POSITIONS:

February 1980 - Present	Principal Geotechnical Engineer U.S. Nuclear Regulatory Commission
May 1977 - February 1980	Geotechnical Engineer U.S. Nuclear Regulatory Commission
October 1975 - May 1977	Soils Engineer U.S. Nuclear Regulatory Commission
August 1973 - October 1975	Supervisory Civil Engineer Chief, Soils Design Section U.S. Army Corps of Engineers Philadelphia District
January 1963 - August 1973	Civil Engineer Soils Design Section U.S. Army Corps of Engineers Philadelphia District
January 1962 - January 1963	Design Engineer McCormick - Taylor Associates Philadelphia, Pa.

PROFESSIONAL EXPERIENCE SUMMARY:

1975 to Present

In NRC Division of Engineering, Geotechnical Engineering Section, Mr. Kane has specialized in soil mechanics and foundation engineering. Experiences in this position have included the following:

- a. Evaluation of the foundation adequacy of proposed sites for nuclear facilities with respect to design and operational safety. This work has included evaluation of geotechnical, soils and rock mechanics, foundation and earthquake engineering related aspects. The results of this review effort are summarized in a safety evaluation report for each of the proposed facilities which have included nuclear power plants, nuclear fuel reprocessing plants and uranium mill tailings waste systems.
- b. Serving as a technical adviser for soil and foundation engineering related aspects in the development of regulatory guides, acceptance and performance criteria that are intended to assure construction and operational safety of nuclear facilities.
- c. Serving as a technical representative for the Office of Nuclear Reactor Regulation on the NRC Advisory Group concerned with federal dam safety.
- d. Serving as an instructor for the Office of State Programs in the training of state personnel who are responsible for construction and operational inspections of uranium mill tailings embankment retention systems.

1963 to 1975

During this period Mr. Kane was employed with the U.S. Army Corps of Engineers, Philadelphia District and attained the position, Chief, Soils Design Section, Foundations and Materials Branch, in 1973. Professional experiences with the Corps of Engineers have included the following:

- a. The embankment and foundation design of four large multi-purpose earth and rockfill dams with appurtenant structures (spillways, inlet and outlet structures, control towers, flood protection facilities, etc.). Responsibilities ranged from the initial planning of

Professional Qualifications
and Experience
Joseph D. Kane

-3-

subsurface investigations to select the most feasible sites through all design stages which were culminated in the final preparation of construction plans and specifications. This work included planning and evaluation of laboratory testing programs, studies on slope stability, seepage control and dewatering systems, settlement, bearing capacity, liquefaction, embankment safety instrumentation and slope protection.

- b. Served as a technical consultant to field offices charged with construction inspections for assuring completion of structures in compliance with design analysis and contract specifications. Participated in the development of needed modifications during construction whenever significant changed site conditions were uncovered.
- c. Directed the efforts of engineers in the Soils Design Section in other fields of civil work projects that included the embankment and foundation design of levees, waterfront pile supported structures and disposal basins for the retention of hydraulic dredge waste.

1962 to 1963

Served as design and project engineer for private consulting firm. This work included the design of large federally funded highways, a race track and various structures constructed to provide a Pennsylvania State park marina.

Midland Plant, Units 1 and 2
Docket Nos. 50-329/330
Input Into NRC Staff Testimony
Prepared by: Joseph Kane

Stamiris Contention No. 2b)

- A. The Staff's understanding of Dr. R. B. Peck's statement of August 10, 1979 (Refer to 50.55(e) Interim Reports, document transmitted in letter of August 10, 1979 from S. Howell to J. Keppler, Section 5, Page 5) is that the proposed operations to underpin the Electrical Penetration Area Structures and the Feedwater Isolation Valve Pits were suitable for being completed within the construction schedule which existed at that time. The Staff did not have problems with this statement by Dr. Peck since the statement itself did not eliminate the establishment and need for approval by the staff of a proper underpinning design nor of requiring high quality construction with appropriate controls. The Staff is unable to conclude that Dr. Peck's statement demonstrated financial and time schedule pressures on Consumers that adversely affected resolution of the soil settlement issue.

Dr. Peck - Response to Stamiris Contentions #2

P 214

7/14/81

This is a portion of the testimony of Ralph B. Peck. I reside at 1101 Warm Sands Drive SE, Albuquerque, New Mexico.

I graduated from Rensselaer Polytechnic Institute in 1934 with the degree of Civil Engineer and in 1937 received the degree of Doctor of Civil Engineering with a major in Structures. From April 1938 to January 1939 I attended the Graduate School of Engineering, Harvard University, where I attended the courses in Soil Mechanics and Foundation Engineering and served as a laboratory assistant to Professor Arthur Casagrande.

I am a registered Structural Engineer in the State of Illinois and was a member of the Illinois Structural Engineering Examining Board from 1959 to 1969. I am registered as a Professional Engineer in Illinois and Hawaii, and as a Civil Engineer in California. My detailed experience record will be attached to my testimony concerning the diesel generator building preload.

I am a consultant to Bechtel with regard to certain geotechnical aspects of the Midland Project site. I have been associated with the Midland plant from September 28, 1978 to date.

The purpose of this testimony is to address certain contentions of Barbara Stamiris. These contentions and my response follow.

STAMIRIS ANSWERS TO CONSUMERS POWER
INTERROGATORIE ON CONTENTION 2

2A. Further examples of the effect of financial and time pressures on soil settlement issues:* Table A

2A. Example

1. 11/7/78 Bechtel action item: "proceed with preparations for preload as rapidly as possible"

2B. Effect on soil settlement issues

1. Root causes not adeq. investigated, organizational deficiencies not eliminated prior to proceeding with remediation

Dr. Peck's Response

It is noted that the quoted statement deals with "preparations for preload," not the actual institution of the preload. Moreover, since it was obvious that the fill was settling progressively under its own weight and was known to contain clay which would cause a progressive settlement, no further information was needed regarding "root causes" to conclude that surcharging would be appropriate. The surcharge could be acting and producing its beneficial affects while organizational deficiencies, if any, were being remedied.

*Check
Hed
12/13*

*See questions
use for discussion
of detrimental
effects*

2A. Example

2. 11/7/78 decision to fill pond "immediately, because the amount of river water available for filling is restricted"

*Contention 2 reads: "Consumers Power Company's financial and time schedule pressures have directly and adversely affected resolution of soil settlement issues, which constitutes a compromise of applicable health and safety regulations as demonstrated by:"

2B. Effect on soil settlement issues

2. Affected piezometric measurements during preload

Dr. Peck's Response

See questions

In order to avoid the complexities in measurement that would be introduced by pore-air pressures if the plant fill were to contain large amounts of air, Dr. Hendron and I concurred in the desirability of allowing the pond level to rise so that the tips of the piezometers and their surrounding capsules of sand would be below groundwater level. The effect of the presence of air would thus be minimized.

If piez tips are filled, it doesn't necessarily mean that clay soils have been saturated

Check Kane Testman's

If groundwater level beneath the Diesel Generator Building could have been held at a constant high level throughout the surcharge process, constant base conditions for interpretation of excess pore pressures would have existed. However, it was not possible to raise the pond quickly to a maximum elevation and maintain it at that maximum level, and there was no evidence that, even if this were done, the groundwater levels beneath the Diesel Generator Building would necessarily reach a stable elevation. It was my opinion that the best course of action, taking into account these considerations, was to allow the pond level to rise as rapidly as possible and to proceed with the surcharging.

question

Furthermore, filling the pond had a beneficial effect on the piezometric measurements, in that submergence of the piezometer tips permitted the use of reliable standpipe-type piezometers without introducing excessive time lags.

Finally, ^{VI}_h addition, since at this early stage of investigation the hypothesis was still being entertained that the clays might be dry of optimum, it was considered desirable to submerge as much of the clay as possible. The implications of these decisions in the light of the observed behavior are considered subsequently in my testimony concerning the Diesel Generator Building preload.

2A. Example

3. 11/7/78 "5 month period is available in the schedule for preloading"

3. Effect on soil settlement issues

The surcharge was removed at the end of this 5 months despite lack of NRC satisfaction that secondary consolidation was assured

Dr. Peck's Response

I approved removal of the surcharge on August 15, 1979 because both settlement and piezometric data conclusively demonstrated completion of primary consolidation. The timing of this approval was unrelated to any predetermined duration. The NRC had no logical technical basis for believing secondary consolidation had not been achieved.

-question

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Lone
Testimony
Pg. 15/16

2A. Example

11. Depth and breadth of surcharge limited by practical consideration of DGB, Turbine B. structures

11. Effect on soil settlement issues

Afforded less than optimum conditions for surcharge

Dr. Peck's Response

Quite properly, when surcharging was being considered, a review of available space was made to determine whether there was sufficient area to place a surcharge fill needed to achieve the necessary stress levels in the subsoil. Adequate area and vertical space were available to obtain needed surcharge stresses, except adjacent to the Turbine Building. There a retaining system was constructed to permit placement of enough surcharge to achieve the needed stress levels. Thus conditions were fully sufficient for successful surcharge.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of
CONSUMERS POWER COMPANY
(Midland Plant, Units 1 and 2)

)
)
) Docket Nos. 50-329-OM
) 50-330-OM
) 50-329-OL
) 50-330-OL
)

CERTIFICATE OF SERVICE

I, Alan S. Farnell, hereby certify that a copy of the testimony of Ralph B. Peck dealing with certain Stamiris contentions was served upon all persons shown in the attached service list by deposit in the United States mail, first class, this 30th day of June, 1981.

Alan S. Farnell
Alan S. Farnell

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Background for removing loose natural sands (Refer to Q362.2)

FSAR, Amend 9 stated all natural sands w/ Dr < 75% would be removed beneath Cat-I structures & beneath non-Cat-I where they could endanger Cat-I structures

Feb
Dan Gillen in 1978 in Q362.2 asked CPC what methods did they use to map & remove sands w/ Dr < 75%. Referred them to Fig. 2.5-21 which showed loose sands under tank farm area.

CPC in Nov. 1978, Rev. 15 to the FSAR indicated that borings ^{completed} in Aug & Sept. 1978 (apparently in response to D. Gillen's questions) had been made to check if natural sands w/ Dr < 75% had been removed. Rev. 15 (11/78) indicated:

1. Using Gibbs & Holt's relationship, N in range of 20 to 25 blows would be required to obtain 75% relative density.
2. Most borings completed in Aug & Sept. 1978 showed N > 20 to 25 blows per foot EXCEPT DG-7, DG-28 & CT-1 ^{Condensate Tank} where blows ranged between 9 & 17. These excepted values of N were considered to be ⁱⁿ isolated sand lenses.

CPC in Feb. 1979, Rev. 18 to the FSAR indicated the following

1. At depths of 0 to 15' Dr = 75%, blow count of 10 to 15 blows/foot are needed.
2. D series boring all had N > 20 (-: no problem) except D-48 which had one N value = 5 @ Et. 595. Boring D-48A, 5' away had N = 20 @ Et. 600.
3. Now w/ the ²' of fill, N values of 20 to 25 blows/ft are needed @ depths between 25' to 35'. T series of borings (tank farm area) had N > 20 to 25 - no problem.
4. Isolated large sand lenses @ borings DG-7, DG-28 & CT-1 (N from 9 to 17) @ Et. 595 to 605.

Question 362.2 (2.5.4.5.1)

Question 1 and the resulting discussion on Page 8.00-1 included in Amendment Number 9 to your PSAR stated that all natural sands with relative densities less than 75% would be removed beneath all Class I structures and beneath non-Class I structures so sited that their failure could endanger the adjacent Class I structures. Discuss the methods employed in mapping and removing the sands having less than 75% relative density. Provide plan and sectional figures showing the areas where these materials were removed. Figure A9-2 of the PSAR which displays subsurface profiles of Class I piping should be updated to show removal of sands of less than 75% relative density and be presented in the FSAR. Figure 2.5-21 of the FSAR shows loose sands beneath the Class I tanks although they were to have been removed. Explain this inconsistency, and provide proper documentation of as-built conditions.

Responses

Numerous borings were made in August and September 1978 to determine that all natural sands with relative densities less than 75% had been removed beneath all Class I structures, piping, and non-Class I structures so that their failure could not endanger the adjacent Class I structures. These boring locations are shown in Figure 2.5-40A. Up to a 35 foot thick compacted fill has been placed in the plant area to achieve a final plant grade elevation of 634 feet.

Split spoon samples were obtained for the natural sands encountered using a standard split spoon sampler. This procedure utilized a 140-pound hammer falling 30 inches to drive a 1-3/8 inch inside diameter split spoon sampler (ASTM D 1586). Blows required to advance the sampler through each 6 inch increment were recorded. The standard penetration test blowcount is the number of blows corresponding to the last foot of sampler penetration. Standard penetration test blowcounts are presented in these boring logs. A tabulation of the blowcounts associated with the natural sands is shown in Table 2.5-25. These logs and updated soil cross-sections will be presented in a later amendment.

The blowcount obtained from the standard penetration test can be used as a measure of the relative density of sand in situ as described by Gibbs and Holtz.⁽¹⁾ Based on such a relationship, a standard penetration test with the range of 20 to 25 blows would be required to obtain 75% relative density (see FSAR Figure 2.5-42). By examining all the borings, most blowcounts of the natural sands are greatly in excess of the required blowcount range of 20 to 25 blows with the exception of the few sand lenses encountered in the following borings.

Responses to NRC Questions
Midland 1&2

<u>Boring Number</u>	<u>Elevation</u>	<u>Blowcount (blows/ft)</u>
DG-7	604	17
DG-7	601	17
DG-7	600	10
DG-7	599	15
DG-28	601	9
CT-1	603	11

15

It is seen that the existing natural sands are dense with a relative density much greater than 75%. The sand lenses with the relatively low blowcounts encountered in borings DG-7, DG-9, DG-28, and CT-1 are isolated and will not endanger the integrity of plant structures.

⁽¹⁾ H.J. Gibbs and W.G. Holtz, "Research on Determining the Density of Sands by Spoon Penetration Testing," Proceedings-Fourth International Conference on Soil Mechanics and Foundation Engineering, Vol I (1957), London, England, pp 35-39

Responses to NRC Questions
Midland 1&2

Question 362.2 (2.5.4.5.1)

Question 1 and the resulting discussion on Page 8.00-1 included in Amendment Number 9 to your PSAR stated that all natural sands with relative densities less than 75% would be removed beneath all Class 1 structures and beneath non-Class 1 structures so sited that their failure could endanger the adjacent Class 1 structures. Discuss the methods employed in mapping and removing the sands having less than 75% relative density. Provide plan and sectional figures showing the areas where these materials were removed. Figure A9-2 of the PSAR which displays subsurface profiles of Class 1 piping should be updated to show removal of sands of less than 75% relative density and be presented in the FSAR. Figure 2.5-21 of the FSAR shows loose sands beneath the Class 1 tanks although they were to have been removed. Explain this inconsistency, and provide proper documentation of as-built conditions.

Responses

In 1970, 61 soil borings were made at the possible locations of Category I structures and systems to investigate loose surficial sands. These were shallow depth borings with depths ranging from 9 to 40 feet. The borings were designated D-1 through D-60 and are included in Appendix 2A. The locations of the borings are shown on FSAR Figure 2.5-17.

It is seen from Figure 2.5-42 that standard penetration blowcount values of 10 to 15 blows per foot are required at depths from zero to 15 feet for a relative density of 75%. Examination of Table 2.5-25 and the boring logs shows the D-borings had the blowcounts necessary for relative densities in excess of 75%. Standard penetration blowcounts were recorded at various depths in these borings. Blowcount values were in excess of 20 blows per foot with one exception. Borehole D-48 (refer to Table 2.5-25) indicated one blowcount of five at an elevation approximately 595 feet. However, borehole D-48A, located 5 feet away from D-48, showed a minimum blowcount of 20 at approximately 600 feet elevation.

Shortly after the D-borings were completed, project activities were postponed from 1970 to 1973 because soil borings under one of the Category I tanks were not made until 1978. The subsurface profile shown in Figure 2.5-21, Rev 1 (January 8, 1979), indicated the possible existence of loose sands.

During 1978, numerous soil borings were made in the tank farm area and elsewhere in the plant area. These borings are designated T, C, H_T, L_N, E, D, D_G, Q, and CT, and their locations are included in Figure 2.5-17. The boring logs are included in Appendix 2A.

Responses to NRC Questions
Midland 1&2

The plant area now consists of man-made fill ranging from 25 to 35 feet high. Under this condition, standard penetration blowcount values of 20 to 25 blows per foot are required⁽¹⁾ for a relative density of 75% at depths between 25 to 35 feet as can be seen from Figure 2.5-42. The T-borings in the tank farm area register blowcounts more than the minimum for a relative density of 75% (refer to Table 2.5-25). Therefore, the sands can be classified as moderately dense to dense. Based on this, the subsurface profile, Figure 2.5-21, has been revised excluding the possible existence of loose sands.

18

A few borings elsewhere in the plant area, namely DG-7, DG-28, and CT-1, indicate blowcounts of 9 to 17 blows per foot at elevations of 599 to 604 feet. These are isolated lenses and will not endanger the integrity of Category I structures.

Based on the facts discussed above, it is concluded that the surficial sands existing in the plant area have relative densities greater than 75%.

⁽¹⁾ H.J. Gibbs and W.G. Holtz, "Research on Determining the Density of Sands by Spoon Penetration Testing," Proceedings-Fourth International Conference on Soil Mechanics and Foundation Engineering, Vol. I (1957), London, England, pp 35-39

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Responses to NRC Questions
Midland 1&2

Question 362.2 (2.5.4.5.1)

Question 1 and the resulting discussion on Page 8.00-1 included in Amendment Number 9 to your PSAR stated that all natural sands with relative densities less than 75% would be removed beneath all Class I structures and beneath non-Class 1 structures so sited that their failure could endanger the adjacent Class 1 structures. Discuss the methods employed in mapping and removing the sands having less than 75% relative density. Provide plan and sectional figures showing the areas where these materials were removed. Figure A9-2 of the PSAR which displays subsurface profiles of Class 1 piping should be updated to show removal of sands of less than 75% relative density and be presented in the FSAR. Figure 2.5-21 of the FSAR shows loose sands beneath the Class 1 tanks although they were to have been removed. Explain this inconsistency, and provide proper documentation of as-built conditions.

6

Responses

In 1970, 61 soil borings were made at the possible locations of Category I structures and systems to investigate loose surficial sands. These were shallow depth borings with depths ranging from 9 to 40 feet. The borings were designated D-1 through D-60 and are included in Appendix 2A. The locations of the borings are shown on FSAR Figure 2.5-17.

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18

Shortly after the D-borings were completed, project activities were postponed from 1970 to 1973. Because soil borings under one of the seismic Category I tanks were not made until 1978, the subsurface profile shown in Figure 2.5-21, Rev 1 (January 8, 1979), indicated the possible existence of loose sands.

Numerous soil borings were made in the tank farm area and elsewhere in the plant area. These borings are designated T, C, H_T, L_N, E, D, D_G, Q, and CT, and their locations are included in Figure 2.5-17. The boring logs are included in Appendix 2A.

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18

Responses to NRC Questions
Midland 1&2

The plant area now consists of man-made fill ranging from 25 to 35 feet high. Under this condition, standard penetration blowcount values of 20 to 25 blows per foot are required⁽¹⁾ for a relative density of 75% at depths between 25 to 35 feet as can be seen from Figure 2.5-42. The T-borings in the tank farm area register blowcounts more than the minimum for a relative density of 75% (refer to Table 2.5-25). Therefore, the sands can be classified as moderately dense to dense. Based on this, the subsurface profile, Figure 2.5-21, has been revised excluding the possible existence of loose sands.

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Based on the facts discussed above, it is concluded that the surficial sands existing in the plant area have relative densities greater than 75%.

⁽¹⁾ H.J. Gibbs and W.G. Holtz, "Research on Determining the Density of Sands by Spoon Penetration Testing," Proceedings-Fourth International Conference on Soil Mechanics and Foundation Engineering, Vol I (1957), London, England, pp 35-39

15

**DRAFT -
KANE INPUT INTO
NRC RESPONSE TO
STAMIRIS
CONTENTION NO. 2**

Midland Plant, Units 1 and 2
Docket No. 50-329, 330
Input Into NRC Staff Testimony
Prepared by: Joseph Kane

5/10/79
? Contention: times or
safety?
must be supply

Stamiris Contention No. 2b)

A. The Staff's understanding of Dr. R. B. Peck's statement of August 10, 1979 (Refer to 50.55(e) Interim Reports, document transmitted in letter of August 10, 1979 from S. Howell to J. Keppler, Section 5, page 5) is that the proposed operations to underpin the Electrical Penetration Area Structures and the Feedwater Isolation Valve Pits were suitable for being completed within the construction schedule which existed at that time. The Staff did not have problems with this statement by Dr. Peck since the statement itself did not eliminate the establishment and need for approval by the staff of a proper underpinning design nor of requiring high quality construction with appropriate controls. The Staff is unable to conclude that Dr. Peck's statement demonstrated financial and time schedule pressures on Consumers that adversely affected resolution of the soil settlement issue. ~~The statement by Dr. Peck does directly affect resolution of the soil settlement issue because~~ ^{but the Staff does acknowledge that} ~~The statement by Dr. Peck does directly~~ } wing

Supplement to Stamiris Contention No. 2, Item 2

A. The Staff agrees with Stamiris contention no. 2, item 2, that Consumers decision to fill the cooling pond "immediately, because the amount of river water available for filling is restricted" (Refer to 50.54(f), documents. Vol. 4, Tab 12, Page 2) did affect the piezometric measurements during preloading. The coincident effects on piezometric monitoring ^{independent} and the degree of saturation of the fill.

caused by seepage still developing from the raised pond and also due to the development of excess pore water pressures under the surcharge loading was identified in the past by the Staff and its Consultant as being an important reason for not being able to fully accept Consumer's conclusion on the effectiveness of the surcharge program. To overcome this problem the NRC has attempted to independently verify the effectiveness of the surcharge program by requiring the additional borings and laboratory testing for the Diesel Generator Building foundation soils.

The Staff would agree that the time schedule pressures did compel Consumers to accept less than the best sequence in the pond raising - surcharge placement operations and therefore these pressures have adversely affected resolution of the Supplement to Stamiris Contention No. 2, Item 3) soil settlement issues.

- A. The Staff agrees with Stamiris that the minutes of a meeting held November 7, 1978 between Consumers, Bechtel and their Consultants does indicate "a 5-month period is available in the schedule for preloading". (Refer to 50.54(f) documents, Vol. 4, Tab 12, Page 2). The Staff also agrees with the Stamiris contention that the surcharge was removed without *informed of the degree to state of consolidation of the fill.* NRC being ~~satisfied that secondary consolidation was assured.~~

~~There are reasons why NRC was not satisfied but it is admitted that~~

However, Consumers did notify the NRC of their intentions to remove the surcharge fill prior to actually removing it. The reasons this situation developed can be traced to Consumers past position of not identifying the criteria that would be acceptable to the NRC staff in advance of completing the remedial action. Consumers position and resulting difficulty that it presented to the Staff is illustrated in the following paragraph taken from the "Summary of July 18, 1979 Meeting on Soil Deficiencies

at the Midland Plant Site" (Attachment 1) which states:

"The staff noted that the response to its 10 CFR 50.54 requests for acceptance criteria for remedial actions (e.g., questions 4, 6, etc.) had not resulted in identification of criteria in advance of the remedial action. Rather the reply notes that the criteria will be determined during or after the remedial action. The staff stated that this approach by the applicant does not provide for timely staff feedback at the outset, but rather the staff must await results of the program to determine what acceptance criteria were used and if they are acceptable. Thus, the remedial action is being conducted entirely at the applicant's own risk."

The learning process which NRC underwent through the year 1979

- understanding the full extent of the plant fill settlement problem at the Midland site; realizing the potential difficulties that could develop in permitting Consumers to proceed with other remedial work at their own risk - were all important factors which were considered by the NRC prior to issuing the December 6, 1979 Order.

Supplement to Stamiris Contention No. 2, Item 4)

Probably not true - SEB response.

A. The Staff does agree that grouting of the gaps between the footings and the foundation soils of the Diesel Generator Building (Refer to 50.54(f) documents, Vol. 4, Tab 12, Page 3) prior to cutting the duct banks and surcharging would have resulted in lower stresses being imposed on the Diesel Generator Building.

It is the Staff's understanding that the condensate lines were actually cut prior to surcharging and therefore, these unconnected lines were not a cause of additional stresses to the Diesel Generator Building.

With regards to not breaking up the mudmat beneath the Diesel Generator Building, it is likely this decision lessened the stresses imposed during surcharging since the structure foundation was stiffer and better able to span any soft soil areas that may have existed. There is a trade off however, in that not breaking up the mud mat reduced the effectiveness of the surcharge, in consolidating the softer foundation soils which were being bridged by the structures foundation and mudmat. If in the future during plant operation, new or extended cracking of the wall footings and mudmat were to occur, redistribution of loading pressures could result and possibly lead to additional settlement.

A The Staff therefore concludes that, of the three examples listed in this contention item, the failure to grout the gaps would be considered as an example of the time schedule pressures which could have a direct and adverse effect on the resolution of the soil settlement issues. Supplement to Stamiris Contention No. 2 Item 5)

A. Consumer's decision to continue construction of the Diesel Generator

Building does make it more difficult and costly to select the removal and replacement option, but it does not eliminate this option. The Staff views this decision by Consumers as their willingness to proceed at their own risk but not as an adverse effect on resolution of the soil settlement problem.

Supplement to Stamiris Contention No. 2, Item 7, 9 and 11)

The Staff is uncertain as to the meaning of "reconstruct geometry of area" in the beginning of Item 7.
A. The Staff recognizes that decisions and actions by Consumers are naturally affected by cost and schedule considerations. The Staff views the intent of Items 7, 9 and 11 of ^{Supplemental} Stamiris contention as questions on the adequacy and conservativeness of the selected preloading solution to remedy the plant fill settlement ^{affects on} ~~problem~~ at the Diesel Generator Building with the acknowledgement of the financial and schedule pressures on Consumers. The Staff does not feel that these competing concerns are

irreconcilable, but rather views its regulatory responsibility as recognizing the needs of the Applicants, but yet, firmly insisting on a reasonable margin of safety that assures protection of the health and safety of the public. The Staff therefore concludes that the examples listed in Items 7, 9 and 11 have not adversely affected resolution of the soil settlement issue.

Supplement to Stamiris Contention No. 2, Item 8)

- A. The following Staff testimony is directed to discussions on the natural sands since it was the loose natural sand materials which Consumers had committed to removing in the PSAR.

The NRC Staff in February 1978 in their review of the PSAR questioned Consumers (Q 362.2) and required documentation on the method Consumers used to remove the loose sands (sands with less than 75 percent relative density) from the foundations of Class I safety related ^{structures}, as they had committed to do in the PSAR. Consumers, in subsequent submittals in response to NRC Question 362.2, provided the results of boring explorations which had been drilled in August and September, 1978 and in 1979. Fortunately for Consumers, the late results and evaluation of the boring information which they have documented did not indicate the presence of loose natural sands beneath Class I safety related structures. Based on these facts the Staff is unable to conclude that Consumers failed to excavate loose sands as committed to in the PSAR and that this failure had contributed to the inadequacy of the subsoils.

2. Consumers Power Company's financial and time schedule pressures have directly and adversely affected resolution of soil settlement issues, which constitutes a compromise of applicable health and safety regulations as demonstrated by:

Darl

a) the admission (in response to §50.54(f) question #1 requesting identification of deficiencies which contributed to soil settlement problems) that the FSAR was submitted early due to forecasted OL intervention, before some of the material required to be included was available;

Kane

b) ^{See pg. 5 of Sect 5, Aug 10, 1979 ltr. from Howe to Keppler} the choice of remedial actions being based in part on expediency, ^{suited to the construction schedule} as noted in Consumers Power Company consultant R. B. Peck's statement of 8-10-79;

Gallagher

c) the practice of substituting materials for those originally specified for "commercial reasons" (NCR QF203) or expediency, as in the use of concrete in electrical duct banks (p. 23 Keppler Report)*;

Darl

d) continued work on the diesel generator building while unresolved safety issues existed, which precluded thorough consideration of Option 2 - Removal and Replacement Plan; and

* March 22, 1979 Keppler Investigation Report conducted by Region III, Dec. 78-Jan. 79.

Part 1

e) the failure to freely comply with NRC testing requests to further evaluate soil settlements remediation, inasmuch as such programs are not allowed time for in the new completion schedule presented July 29, 1980.

4-20-81 Supplement to Contention 2

Further examples of the effect of financial and time pressures on soil settlement issues: Table A, ...

2A. Examples

2B. Effect on soil settlement issues

1. 11/7/78 Fachtel action item: "proceed with preparations for preload as rapidly as possible"

1. Root causes not adeq. investigated, Organizational deficiencies not eliminated prior to proceeding with remediation

2. 11/7/78 decision to fill pond "immediately, because the amount of river water available for filling is restricted" ^{pg 2 (Tab 12)}

2. Affected piezometric measurements during preload

3. 11/7/78 "5 month period is available in the schedule for preloading" (Tab 12) pg. 2

3. The surcharge was removed at the end of this 5 months despite lack of NRC satisfaction that secondary consolidation was assured

4. Failure to grout gaps prior to cutting of duct banks, failure to cut consolidate lines when 1st suggested, failure to break up mudmat at DGB ^{Tab 18, pg 1 of 78} ^{Dec. 12, 1978} ^{Tab 12, pg. 3}

4. Resulted in additional stresses to DGB which could have been avoided

5. Choice to continue construction of DGB

5. Eliminated practical consideration of Removal & Replacement Option

6. Early FSAR submittal and inadequate review of FSAR

6. Precluded early detection of inconsistencies which could have prevented some of the s.s. problems

7. Failure to reconstruct geometry of area prior to fill placement, failure to await NRC approval before proceeding with Preload

7. Varying degrees of caution and conservatism were foregone in favor of cost and schedule advantages

selection of "least costly feasible alternative" for DGE. *not forecasting alternatives*

8. Failure to excavate loose sands as committed to in PSAR

8. Contributed to inadequacy of subsoils

9. Installation of preload instrumentation was subject to time pressure assoc. with frost protection considerations

9. Expenditures for preload instrumentation (CJD 11/1/78 memo) prior to formal adoption of preload = premature commitment

10. Appeals to NRC to consider financial plight and schedule deadlines as in Seismic Deferral Motion

10. If granted, would affect seismic -soil settlement standards

11. Depth and breadth of surcharge limited by practical consideration of DGB, Turbine E. structures

11. Afforded less than optimum conditions for surcharge

12. Changes to design (DGB foundation), material, or procedural specifications without proper approval

12. Contributed to settlement or stress problems and allowed conflicts to go unnoticed as preventative indicators

DRAFT

Midland Plant, Units 1 and 2
Docket No. 50-329, 330
Input Into NRC Staff Testimony
Prepared by: Joseph Kane

Stamiris Contention No. 2b) — *To be filed on July 23, 1981*

A. The Staff's understanding of Dr. R. B. Peck's statement of August 10, 1979 (Refer to 50.55(e) Interim Reports, document transmitted in letter of August 10, 1979 from S. Howell to J. Keppler, Section 5, page 5) is that the proposed operations to underpin the Electrical Penetration Area Structures and the Feedwater Isolation Valve Pits were suitable for being completed within the construction schedule which existed at that time. The Staff did not have problems with this statement by Dr. Peck since the statement itself did not eliminate the establishment and need for approval by the staff of a proper underpinning design nor of requiring high quality construction with appropriate controls. The Staff is unable to conclude that Dr. Peck's statement demonstrated financial and time schedule pressures on Consumers that adversely affected resolution of the soil settlement issue. ~~The statement by Dr. Peck does directly affect resolution of the soil settlement issue.~~

Supplement to Stamiris Contention No. 2, Item 2 *File on Jun 5, 1981*

A. The Staff agrees with Stamiris contention no. 2, item 2, ^{to the extent} that Consumers decision to fill the cooling pond "immediately, because the amount of river water available for filling is restricted" (Refer to 50.54(f), MAKE Attachment documents, Vol. 4, Tab 12, Page 2) did affect the piezometric measurements during preloading. The coincident effects on piezometric monitoring

Distinguish between "resolution" of soil settlement issues
- Settlement caused problem to structures which need to be "resolved" by a fix
- Issues developed between Consumers and Staff on acceptability of fix which need to be "resolved"

Reasons for requiring saturation (raising pond) before placing surcharge:

1. Saturation is being introduced because of the ^{potential} problem of originally placing the fill on dry side of optimum. Assuming the same magnitude of loading will be applied (either before or after saturation) the amount of settlement will be the same, whenever saturated.
2. Saturating before surcharging and allowing sufficient time for steady seepage condition to develop before loading would have eliminated the influence of developing seepage on piezometric levels caused by seepage still developing from the raised pond and also due to

the development of excess pore water pressures under the surcharge loading ^{the Corps of Engineers,}
~~were~~ identified ~~in the past~~ by the Staff and its Consultant, as being an

Refer to 2nd Day
 of Kane Deposition
 pg. 21

important reason for not being able to fully accept Consumer's conclusion on the effectiveness of the surcharge program. To overcome this problem the NRC has attempted to independently verify the effectiveness of the surcharge program by requiring the additional borings and laboratory testing for the Diesel Generator Building foundation soils.

The Staff would agree that the time schedule pressures did compel Consumers to accept ^{less than the best sequence in the pond raising - surcharge placement operations and therefore these pressures may have adversely affected resolution of the soil settlement issues.}
 Supplement to Stamiris Contention No. 2, Item 3)

A. The Staff agrees with Stamiris that the minutes of a meeting held November 7, 1978 between Consumers, ^{Bechtel's} Bechtel and their Consultants does indicate "a 5-month period is available in the schedule for preloading". (Attachment)
 (Refer to 50.54(f) documents, Vol. 4, Tab 12, Page 2). The Staff also agrees with the Stamiris contention that the surcharge was removed without NRC being satisfied that secondary consolidation was assured.

~~There are reasons why NRC was not satisfied by~~ ^{however,} It is admitted, that

Consumers did notify the NRC of their intentions to remove the surcharge fill prior to actually removing it. ^{the NRC was not satisfied with the} The reasons, ~~this situation developed~~

can be traced to Consumers, ^{former practice} ~~past~~ position of not identifying the criteria that would be acceptable to the NRC staff in advance of completing the remedial action. Consumers ^{practice} ~~position~~ and ^{the} resulting difficulty that it presented to the Staff is illustrated in the following paragraph taken from the "Summary of July 18, 1979 Meeting on Soil Deficiencies

effectiveness of the surcharge program

at the Midland Plant Site" (Attachment 1) which states:

"The staff noted that the response to its 10 CFR 50.54 requests for acceptance criteria for remedial actions (e.g., questions 4, 6, etc.) had not resulted in identification of criteria in advance of the remedial action. Rather the reply notes that the criteria will be determined during or after the remedial action. The staff stated that this approach by the applicant does not provide for timely staff feedback at the outset, but rather the staff must await results of the program to determine what acceptance criteria were used, and if they are acceptable. Thus, the remedial action is being conducted entirely at the applicant's own risk."

*Statement needed
cannot
conclude
await
results*

~~The learning process which NRC underwent through the year 1979 - understanding the full extent of the plant fill settlement problem at the Midland site; realizing the potential difficulties that could develop in permitting Consumers to proceed with other remedial work at their own risk - were all important factors which were considered by the NRC prior to issuing the December 6, 1979 Order.~~

Supplement to Stamiris Contention No. 2, Item 4)

*Discuss w/
Darl & Frank*

~~A. The Staff does agree that, ^{failure to} grouting of the gaps between the footings and the foundation soils of the Diesel Generator Building (Refer to 50.54(i) documents, Vol. 4, Tab 12, Page 3) prior to cutting the duct banks and surcharging, ^{likely caused additional} would have resulted in lower stresses, ^{to be} being imposed on the Diesel Generator Building.~~

It is the Staff's understanding that the condensate lines were actually cut prior to surcharging and therefore, these unconnected lines were not a cause of additional stresses to the Diesel Generator Building.

*In back of each issue
state whether I know ^{or don't know} if it were time pressures
or technical decisions for these actions*

With regards to not breaking up the mudmat beneath the Diesel Generator Building, it is likely this decision lessened the stresses imposed during surcharging since the structure foundation was stiffer and better able to span any soft soil areas that may have existed. There is a trade off however, in that not breaking up the mud mat reduced the effectiveness of the surcharge, in consolidating the softer foundation soils which were being bridged by the structures foundation and mudmat. If in the future during plant operation, new or extended cracking of the wall footings and mudmat were to occur, redistribution of loading pressures could result and possibly lead to additional settlement.

The Staff therefore concludes that, of the three examples listed in this contention item, the failure to grout the gaps would be considered as an example of the time schedule pressures which could have a direct and adverse effect on the resolution of the soil settlement issues. Supplement to Stamiris Contention No. 2 Item 5)

A. Consumer's decision to continue construction of the Diesel Generator Building does make it more difficult and costly to select the removal and replacement option, but it does not eliminate this option. The Staff views this decision by consumers as their willingness to proceed at their own risk but the Staff does not view this decision as an adverse effect on resolution of the soil settlement problem.

Supplement to Stamiris Contention No. 2, Item 7, 9 and 11)

The Staff is uncertain as to the meaning of "reconstruct geometry of area" in the beginning of Item 7 and therefore the Staff is unable to respond to this aspect of the contention.

A. The Staff recognizes that decisions and actions by consumers are naturally affected by cost and schedule considerations. The Staff views the intent of Items 7, 9 and 11 of Supplemental Stamiris contention as questions on the adequacy and conservativeness of the selected preloading solution to remedy the plant fill settlement ~~problem~~ ^{effects on} at the Diesel Generator Building with the acknowledgement of the financial and schedule pressures on consumers. The Staff does not feel that these competing concerns are

The question to be answered is whether grouting the gap and then cutting the dirt bank would have prevented the abrupt settlement & redistribution of loading. Acquisition of soil of surrounding

Check the dimensions of the gap which existed prior to surcharging

The Staff is unable to respond to this aspect of the contention.

irreconcilable, but rather views its regulatory responsibility as recognizing the needs of the Applicants, but yet, firmly insisting on a reasonable margin of safety that assures protection of the health and safety of the public. The Staff therefore concludes that the examples listed in Items 7, 9 and 11 have not adversely affected resolution of the soil settlement issue.

Supplement to Stamiris Contention No. 2, Item 8)

- A. The following Staff testimony is directed to discussions on the natural sands since it was the loose natural sand materials which Consumers had committed to removing in the PSAR.

The NRC Staff in February 1978 in their review of the FSAR questioned Consumers (Q 362.2) and required documentation on the method Consumers used to remove the loose sands (sands with less than 75 percent relative density) from the foundations of Class I safety related ^{structures} as they had committed to do in the PSAR. Consumers, in subsequent submittals in response to NRC Question 362.2, provided the results of boring explorations which had been drilled in August and September ^{of} 1978 and additional explorations in 1979. ~~_____~~ The late results and evaluation of the boring information which ^{Consumers has} ~~they~~ documented did not indicate the presence of loose natural sands beneath Class I safety related structures. Based on these facts the Staff is unable to conclude that Consumers failed to excavate loose sands as committed to in the PSAR and that this failure had contributed to the inadequacy of the subsoils.

DRAFT

5/27/81
J. Kane

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

CONSUMERS POWER COMPANY

(Midland Plant, Units 1 and 2)

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)
)
)

Docket Nos. 50-329 OM & OL
50-330 OM & OL

NRC STAFF TESTIMONY IN
RESPONSE TO STAMIRIS CONTENTION NO. 5

Q.1. Please state your name and position with the NRC.

A. My name is Joseph D. Kane. My position with the U.S. Nuclear Regulatory Commission is Principal Geotechnical Engineer and I am assigned to the Geotechnical Engineering Section of the Hydrologic and Geotechnical Engineering Branch, Division of Engineering, Office of Nuclear Reactor Regulation.

Q.2. Have you prepared a statement of professional qualifications?

A. Yes. A copy of this statement is attached.

Q.3. Please state the nature of your responsibilities with respect to the Midland Plant, Units 1 and 2.

A. Since November 1979 I have served as the technical monitor for the Midland portion of an interagency contractual agreement between the NRC and the U.S. Army Corps of Engineers, Detroit District (hereafter

the Corps). By this contract the Corps has been assisting the NRC staff in the safety review of the Midland Project in the field of geotechnical engineering. In addition to, and as a consequence of, my serving as contract technical monitor, I have become directly involved in the assessment of the adequacy of the remedial measures which have been proposed by Consumers to correct the plant fill settlement problem.

Q.4. Please state the purpose of this testimony.

A. The purpose of this testimony is to provide the NRC Staff response to Stamiris Contention No. 5.

Q.5. What is the Staff's position with respect to Contention No. 5?

A. Contention No. 5 reads as follows:

5. The additional information and testing requested of Consumers Power Company by the NRC and its consultant, the Army Corps of Engineers, on June 30, 1980 and August 4, 1980, is essential to the Staff's evaluation of Consumers Power Company's remedial soils settlement action. Without this information and testing, the Staff does not have reasonable assurance that the plant can be operated without undue risk to the health and safety of the public (part II, p. 3, Order of Modification). The requests must therefore be responded to fully and complied with totally.

The following paragraphs indicate the status of Consumer's response to the Staff's positions and requests for information that is reflected in Stamiris's Contention No. 5. Because the June 30, 1980 (Attachment 1) and August 4, 1980 (Attachment 2) letters are directed to different aspects of the Midland review, we will discuss them separately and attempt to indicate the current status of the contents of these letters.

In the June 30, 1980 letter, the Staff requested Consumers to perform additional explorations and laboratory testing to support certain geotechnical engineering assumptions on the plant fill settlement problem and on proposed remedial measures. On August 29, 1980 at a meeting in Midland (Attachment 3) Consumers appealed the Staff position requiring additional explorations and testing to the NRC Division Director of Engineering. Based on new information presented at the August 29, 1980 meeting and in a subsequent report submittal dated September 14, 1980, the scope of explorations requested by the staff was modified. The subsequent decision by NRC Management to require the additional soil borings and laboratory testing and deny the appeal is documented in NRC letter of November 10, 1980 to Consumers (Attachment 4).

In late February 1981, Consumers verbally indicated to NRC that their plans were to complete the NRC requested borings and testing, while still indicating their disagreement with the need for this work. This decision by Consumers was formally documented in their letter of March 23, 1981 (Attachment 5) to the NRC.

The requested borings were completed by mid-May 1981. During the conduct of the borings in the field the Staff was continuously kept informed of these activities by both Consumers and the Staff's consultant, the U.S. Army Corps of Engineers. Arrangements to have the Corps at the site and observe almost the entire drilling and sampling program had been made by NRC in response to Consumers invitation to have witnesses directly observe these activities.

Consumers has indicated the laboratory test results will be submitted in stages beginning in early June 1981 as this work is completed and analyzed by them. It is the Staff's intention to evaluate the laboratory data as it is submitted and as permitted by the staff time demands of the summer hearings. The Staff plans to summarize their evaluation of this information, with the help of the Corps, and provide testimony to the ASLB by the time of the fall hearings.

The second letter referred to in Stairis Contention No. 5 is the August 4, 1980 letter (Attachment 2) from the NRC to Consumers. This letter transmitted a report from the U.S. Army Corps of Engineers (July 7, 1980) which identified unresolved issues related to geotechnical engineering and provided recommendations on a course of action for resolving those issues.

In response to the August 4, 1980 letter, Consumers on November 21, 1980 submitted Amendment 85 to their Application for Construction Permits and Operating Licenses. This submittal by Consumers, which fills several volumes and addresses the unresolved safety review issues of structures and components founded on the plant fill, was reviewed by the NRC and their Consultants. The results of this review in the field of geotechnical engineering are contained in the Corps letter report of April 16, 1981 (Attachment 6). The content of the Corps letter report is the best reflection of the current status of the Midland review in the area of geotechnical engineering. This letter was the subject of extensive discussions between the Staff and Consumers and their consultants during meetings held in Bethesda on May 5, 6 and 7, 1981.

Records in folder labeled
"ASLB Hearing - Response to
Contentions" maintained by
Joseph Kane.

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