

5711 Summerset Drive
Midland, MI 48640
April 26, 1982

Dr. Chester Siess, Acting Chairman
Midland ACRS Subcommittee
3110 Newmark Laboratories
208 N. Romine
University of Illinois
Urbana, Illinois 61801

Dear Dr. Siess:

I am communicating with you in regard to the ACRS meeting that is being planned for April 29 in Washington, D.C. on the soil settlement problems at the Midland nuclear plant.

As a citizen participant in the licensing proceedings since the construction license was first noticed, I believe that I have some perspective on the problems at the Midland nuclear plant that can be useful to the ACRS Subcommittee deliberations.

The soil settlement problem at Midland is one of many quality control problems that have plagued this plant since even before the construction permit was noticed for public hearing. The soil settlement problem, however, is perhaps the most serious and most extensive of the many quality control problems at Midland.

A summary of the soil settlement preliminary findings and the numerous violations of 10CFR 50 Appendix B Quality Assurance that they represent can be found on p 9 - 11, in NRC Staff Testimony of Eugene J. Gallagher with Respect to Quality Assurance Program Implementation prior to December 6, 1979. (June 8, 1981) (Enclosed)

You are undoubtedly aware of the December 6, 1979 Order in which the NRC asked for a halt on construction of safety related buildings pending review of the action that Consumers had undertaken for the buildings that were settling at an abnormal rate at the site.

I would like to discuss some background events that have come up during the soils hearings beyond what is set forth in the December 6, 1979 Order.

Page Two
Dr. Chester Siess
April 26, 1982

There are numerous examples of a pattern of laxity toward PSAR/FSAR design recommendations throughout the construction site, and specifically in the construction buildings affected by the poorly compacted soil which this ACRC Committee is considering. Not only is there evidence of poor communications, but deliberate withholding of significant information from the NRC is a part of the record.

In 1977, evidence of soil settlement deficiencies was available to Consumers Power Co. and Bechtel, the construction engineer, prior to their beginning the construction of the diesel generator building. Consumers Power Co. makes the following admission in their recent Findings of Fact that this evidence "which if given different weight would have revealed the plant wide soils conditions in time to have prevented the problems which now confronts us". In addition, in 1978, information regarding the unusual settlement of the administration building in 1977 was withheld from the NRC. Today, Consumers Power Co. QA management still defends these incredibly irresponsible decisions.

When unusual settlement of the administration building occurred in 1977, it was torn down, the soil was recompacted properly and the building rebuilt.

The decision on safety related buildings, however, that were subsequently built on this poorly compacted soil was to preload the buildings with sand--"a fix" that Consumers admits was the least costly approach to try to solve the problem. This attempt at a cheap, quick "fix" is now the subject of these extensive soil settlement hearings. The NRC is requiring much more extensive remedial action.

Because some of the poorly compacted soil is also under part of the dike of the cooling pond, water has been seeping in throughout the plant site since the cooling pond was filled.

While the original PSAR in 1969 included the provision of a permanent site dewatering plan, it was subsequently eliminated without NRC concurrence. However, because of the leakage from the cooling pond, an extensive dewatering system has been instituted.

The NRC's DEIS states that the water from the dewatering system throughout the plant site will be pumped back into the cooling pond. I believe the question should be raised as to how this will effect the chemical content of the cooling pond water which must be carefully controlled for cooling the reactors, since the wastes, oil spills, and inevitable accidental radioactive spills on the plant site will undoubtedly enter that dewatering system.

Page Three
Dr. Chester Siess
April 26, 1982

As further evidence of an indifferent attitude toward the PSAR/FSAR design, it should be noted that in the mid-70's the foundations of the diesel generator building and the borated water storage tanks were changed from the mat foundation plans without NRC concurrence. In 1981, the auxiliary building seismic analysis was found to be deficient.

During NRC testimony in the soil settlement hearings, the FSAR has been referred to as merely a "historical document" instead of regarding it as a design commitment. Consumers has been allowed to initiate independently significant design modifications and has changed the FSAR after the fact to indicate how the plant was actually built. This amounts to building the plant first and then drawing up the blueprint. This practice can hardly assure this community and industry here of safe construction of these plants.

More recently, at the evidentiary hearing on February 2, 1982, Judges Harbour and Decker outlined their concerns about the QA program for the underpinning structures (Tr 7122-28). As Judge Harbour pointed out, the underpinning activities themselves have the potential for producing irreversible damage in safety class structures or for altering the conditions of the structures on which seismic analyses are based.

The fact that there are already indications of inadequate quality assurance performance in soils remedial areas has been described in the memo from R. L. Spessard to Darrell Eisenhut dated April 9, 1982. Again, we find the problem of misleading information and lack of adequate QA procedures. (copy enclosed)

Recently, we invited researchers from the Government Accountability Project (GAP) of the Institute of Policy Studies, Washington, D.C., to come to Midland to take testimony from workers at the Midland nuclear plant who have personal knowledge of serious quality control violations on site--many of them occurring at the buildings that are under consideration at the April 29 meeting. The testimony from the workers was secured by Attorney Tom Devine of GAP and can be made available to you when we have it ready.

The GAP organization was successful in finding numerous problems at the Zimmer nuclear plant which have required further NRC and ACRS action. Their findings at Midland are even more extensive than those at Zimmer.

I sincerely hope the ACRS deliberations will take into account the dismal, past and continuing QA record at the Midland nuclear plants and particularly in those buildings affected by the soil settlement problems that will be the subject of discussion on April 29.

Yours sincerely,

Mary Sinclair
Mary Sinclair

MS/jt

cc: Tom Devine, Government Accountability Project

safety analysis report which had been submitted by Consumers was consistent with the design and construction of the Midland project.

Q. 12. Summarize your preliminary investigation findings.

A summary of the preliminary investigation findings were presented to Consumers on February 23, 1979 at the Region III office. These findings are documented in Attachment 4. In summary, the findings related to quality assurance deficiencies, are:

- * The FSAR did not correctly state the type of fill material supporting safety related structures. This is a violation of 10 CFR 50 Appendix B quality assurance criterion III. (Design Control)
- * The FSAR included conflicting values for the settlement of the diesel generator building founded on spread footings. This is a violation of 10 CFR 50 Appendix B quality assurance criterion III. (Design Control)
- * The compaction requirement for clay material was not followed. This is a violation of 10 CFR 50 Appendix B quality assurance criterion V. (Instructions, Procedures and Drawings)
- * The compaction requirement for sand was not correctly translated into the construction specifications. This is a violation of 10 CFR 50 Appendix B quality assurance criterion V. (Instructions, Procedures and Drawings)
- * Moisture control was not properly implemented. This is a violation of 10 CFR 50 Appendix B quality assurance criterion XVI. (Corrective Action)
- * Soil was not protected from frost action nor removed prior to resuming work. This is a violation of 10 CFR 50 Appendix B quality assurance criterion III. (Design Control)
- * The root causes of nonconforming conditions were not adequately corrected to preclude repetition. This is a violation of 10 CFR 50 Appendix B quality assurance criterion XVI. (Corrective Action)
- * The settlement calculations for the diesel generator building were based on conditions of foundation type, load intensity and

soil compressibility other than the actual conditions. This is a violation of 10 CFR 50 Appendix B quality assurance criterion III. (Design Control)

* Consumers did not adequately investigate the extent of the soil problem after the settlement of the administration building footings. This is a violation of 10 CFR 50 Appendix B quality assurance criterion XVI. (Corrective Action)

* Program changes were not implemented to preclude erroneous selection of the laboratory compaction standards (maximum density and optimum moisture content) after the settlement of the administration building footings. This is a violation of 10 CFR 50 Appendix B quality assurance criterion XVI. (Corrective Action)

[We subsequently determined that the last two items should not have been listed as quality assurance deficiencies because the administration building is not subject to quality assurance requirements.]

* Concrete material was permitted to be used in lieu of fill material without consideration of the effects on structures. This is a violation of 10 CFR 50 Appendix B quality assurance criterion V. (Instructions, Procedures and Drawings)

* Personnel directing the soils operation were not trained in the area of soil work, nor was a geotechnical soils engineer present on-site as required. This is a violation of 10 CFR 50 Appendix B quality assurance criterion II. (Quality Assurance program)

* Inspection procedures were relaxed from original procedural requirements which provided insufficient hold points to ascertain back-fill material was installed properly. This is a violation of 10 CFR 50 Appendix B quality assurance criterion X. (Inspection)

* The sampling (surveillance) plan was infrequent and inadequate to verify conformance. This is a violation of 10 CFR 50 Appendix B quality assurance criterion X. (Inspection)

Based on the above findings it was my conclusion and it is my conclusion now that:

- (1) There was inadequate control and supervision of the plant fill.
- (2) Corrective action regarding nonconformances was inadequate.
- (3) Construction specifications and design bases were not followed.
- (4) Interface between design organization and construction was inadequate.
- (5) The FSAR contained inconsistent, incorrect and unsupported statements. (copied from page II)

5711 Summerset Drive
Midland, MI 48640
April 26, 1982

Dr. Chester Siess, Acting Chairman
Midland ACRS Subcommittee
3110 Newmark Laboratories
208 N. Romine
University of Illinois
Urbana, Illinois 61801

Dear Dr. Siess:

I am communicating with you in regard to the ACRS meeting that is being planned for April 29 in Washington, D.C. on the soil settlement problems at the Midland nuclear plant.

As a citizen participant in the licensing proceedings since the construction license was first noticed, I believe that I have some perspective on the problems at the Midland nuclear plant that can be useful to the ACRS Subcommittee deliberations.

The soil settlement problem at Midland is one of many quality control problems that have plagued this plant since even before the construction permit was noticed for public hearing. The soil settlement problem, however, is perhaps the most serious and most extensive of the many quality control problems at Midland.

A summary of the soil settlement preliminary findings and the numerous violations of 10CFR 50 Appendix B Quality Assurance that they represent can be found on p 9 - 11, in NRC Staff Testimony of Eugene J. Gallagher with Respect to Quality Assurance Program Implementation prior to December 6, 1979. (June 8, 1981) (Enclosed)

You are undoubtedly aware of the December 6, 1979 Order in which the NRC asked for a halt on construction of safety related buildings pending review of the action that Consumers had undertaken for the buildings that were settling at an abnormal rate at the site.

I would like to discuss some background events that have come up during the soils hearings beyond what is set forth in the December 6, 1979 Order.

Page Two
Dr. Chester Siess
April 26, 1982

There are numerous examples of a pattern of laxity toward PSAR/FSAR design recommendations throughout the construction site, and specifically in the construction buildings affected by the poorly compacted soil which this ACRC Committee is considering. Not only is there evidence of poor communications, but deliberate withholding of significant information from the NRC is a part of the record.

In 1977, evidence of soil settlement deficiencies was available to Consumers Power Co. and Bechtel, the construction engineer, prior to their beginning the construction of the diesel generator building. Consumers Power Co. makes the following admission in their recent Findings of Fact that this evidence "which if given different weight would have revealed the plant wide soils conditions in time to have prevented the problems which now confronts us". In addition, in 1978, information regarding the unusual settlement of the administration building in 1977 was withheld from the NRC. Today, Consumers Power Co. QA management still defends these incredibly irresponsible decisions.

When unusual settlement of the administration building occurred in 1977, it was torn down, the soil was recompacted properly and the building rebuilt.

The decision on safety related buildings, however, that were subsequently built on this poorly compacted soil was to preload the buildings with sand--"a fix" that Consumers admits was the least costly approach to try to solve the problem. This attempt at a cheap, quick "fix" is now the subject of these extensive soil settlement hearings. The NRC is requiring much more extensive remedial action.

Because some of the poorly compacted soil is also under part of the dike of the cooling pond, water has been seeping in throughout the plant site since the cooling pond was filled.

While the original PSAR in 1969 included the provision of a permanent site dewatering plan, it was subsequently eliminated without NRC concurrence. However, because of the leakage from the cooling pond, an extensive dewatering system has been instituted.

The NRC's DEIS states that the water from the dewatering system throughout the plant site will be pumped back into the cooling pond. I believe the question should be raised as to how this will effect the chemical content of the cooling pond water which must be carefully controlled for cooling the reactors, since the wastes, oil spills, and inevitable accidental radioactive spills on the plant site will undoubtedly enter that dewatering system.

Page Three
Dr. Chester Siess
April 26, 1982

As further evidence of an indifferent attitude toward the PSAR/FSAR design, it should be noted that in the mid-70's the foundations of the diesel generator building and the borated water storage tanks were changed from the mat foundation plans without NRC concurrence. In 1981, the auxiliary building seismic analysis was found to be deficient.

During NRC testimony in the soil settlement hearings, the FSAR has been referred to as merely a "historical document" instead of regarding it as a design commitment. Consumers has been allowed to initiate independently significant design modifications and has changed the FSAR after the fact to indicate how the plant was actually built. This amounts to building the plant first and then drawing up the blueprint. This practice can hardly assure this community and industry here of safe construction of these plants.

More recently, at the evidentiary hearing on February 2, 1982, Judges Harbour and Decker outlined their concerns about the QA program for the underpinning structures (Tr 7122-28). As Judge Harbour pointed out, the underpinning activities themselves have the potential for producing irreversible damage in safety class structures or for altering the conditions of the structures on which seismic analyses are based.

The fact that there are already indications of inadequate quality assurance performance in soils remedial areas has been described in the memo from R. L. Spessard to Darrell Eisenhut dated April 9, 1982. Again, we find the problem of misleading information and lack of adequate QA procedures. (copy enclosed)

Recently, we invited researchers from the Government Accountability Project (GAP) of the Institute of Policy Studies, Washington, D.C., to come to Midland to take testimony from workers at the Midland nuclear plant who have personal knowledge of serious quality control violations on site--many of them occurring at the buildings that are under consideration at the April 29 meeting. The testimony from the workers was secured by Attorney Tom Devine of GAP and can be made available to you when we have it ready.

The GAP organization was successful in finding numerous problems at the Zimmer nuclear plant which have required further NRC and ACRS action. Their findings at Midland are even more extensive than those at Zimmer.

I sincerely hope the ACRS deliberations will take into account the dismal, past and continuing QA record at the Midland nuclear plants and particularly in those buildings affected by the soil settlement problems that will be the subject of discussion on April 29.

Yours sincerely,

Mary Sinclair
Mary Sinclair

MS/jt

cc: Tom Devine, Government Accountability Project

safety analysis report which had been submitted by Consumers was consistent with the design and construction of the Midland project.

Q. 12. Summarize your preliminary investigation findings.

A summary of the preliminary investigation findings were presented to Consumers on February 23, 1979 at the Region III office. These findings are documented in Attachment 4. In summary, the findings related to quality assurance deficiencies, are:

- * The FSAR did not correctly state the type of fill material supporting safety related structures. This is a violation of 10 CFR 50 Appendix B quality assurance criterion III. (Design Control)
- * The FSAR included conflicting values for the settlement of the diesel generator building founded on spread footings. This is a violation of 10 CFR 50 Appendix B quality assurance criterion III. (Design Control)
- * The compaction requirement for clay material was not followed. This is a violation of 10 CFR 50 Appendix B quality assurance criterion V. (Instructions, Procedures and Drawings)
- * The compaction requirement for sand was not correctly translated into the construction specifications. This is a violation of 10 CFR 50 Appendix B quality assurance criterion V. (Instructions, Procedures and Drawings)
- * Moisture control was not properly implemented. This is a violation of 10 CFR 50 Appendix B quality assurance criterion XVI. (Corrective Action)
- * Soil was not protected from frost action nor removed prior to resuming work. This is a violation of 10 CFR 50 Appendix B quality assurance criterion III. (Design Control)
- * The root causes of nonconforming conditions were not adequately corrected to preclude repetition. This is a violation of 10 CFR 50 Appendix B quality assurance criterion XVI. (Corrective Action)
- * The settlement calculations for the diesel generator building were based on conditions of foundation type, load intensity and

soil compressibility other than the actual conditions. This is a violation of 10 CFR 50 Appendix B quality assurance criterion III. (Design Control)

* Consumers did not adequately investigate the extent of the soil problem after the settlement of the administration building footings. This is a violation of 10 CFR 50 Appendix B quality assurance criterion XVI. (Corrective Action)

* Program changes were not implemented to preclude erroneous selection of the laboratory compaction standards (maximum density and optimum moisture content) after the settlement of the administration building footings. This is a violation of 10 CFR 50 Appendix B quality assurance criterion XVI. (Corrective Action)

[We subsequently determined that the last two items should not have been listed as quality assurance deficiencies because the administration building is not subject to quality assurance requirements.]

* Concrete material was permitted to be used in lieu of fill material without consideration of the effects on structures. This is a violation of 10 CFR 50 Appendix B quality assurance criterion V. (Instructions, Procedures and Drawings)

* Personnel directing the soils operation were not trained in the area of soil work, nor was a geotechnical soils engineer present on-site as required. This is a violation of 10 CFR 50 Appendix B quality assurance criterion II. (Quality Assurance program)

* Inspection procedures were relaxed from original procedural requirements which provided insufficient hold points to ascertain back-fill material was installed properly. This is a violation of 10 CFR 50 Appendix B quality assurance criterion X. (Inspection)

* The sampling (surveillance) plan was infrequent and inadequate to verify conformance. This is a violation of 10 CFR 50 Appendix B quality assurance criterion X. (Inspection)

Based on the above findings it was my conclusion and it is my conclusion now that:

- (1) There was inadequate control and supervision of the plant fill.
- (2) Corrective action regarding nonconformances was inadequate.
- (3) Construction specifications and design bases were not followed.
- (4) Interface between design organization and construction was inadequate.
- (5) The FSAR contained inconsistent, incorrect and unsupported statements. (copied from page 11)

5711 Summerset Drive
Midland, MI 48640
April 26, 1982

Dr. Chester Siess, Acting Chairman
Midland ACRS Subcommittee
3110 Newmark Laboratories
208 N. Romine
University of Illinois
Urbana, Illinois 61801

Dear Dr. Siess:

I am communicating with you in regard to the ACRS meeting that is being planned for April 29 in Washington, D.C. on the soil settlement problems at the Midland nuclear plant.

As a citizen participant in the licensing proceedings since the construction license was first noticed, I believe that I have some perspective on the problems at the Midland nuclear plant that can be useful to the ACRS Subcommittee deliberations.

The soil settlement problem at Midland is one of many quality control problems that have plagued this plant since even before the construction permit was noticed for public hearing. The soil settlement problem, however, is perhaps the most serious and most extensive of the many quality control problems at Midland.

A summary of the soil settlement preliminary findings and the numerous violations of 10CFR 50 Appendix B Quality Assurance that they represent can be found on p 9 - 11, in NRC Staff Testimony of Eugene J. Gallagher with Respect to Quality Assurance Program Implementation prior to December 6, 1979. (June 8, 1981) (Enclosed)

You are undoubtedly aware of the December 6, 1979 Order in which the NRC asked for a halt on construction of safety related buildings pending review of the action that Consumers had undertaken for the buildings that were settling at an abnormal rate at the site.

I would like to discuss some background events that have come up during the soils hearings beyond what is set forth in the December 6, 1979 Order.

Page Two
Dr. Chester Siess
April 26, 1982

There are numerous examples of a pattern of laxity toward PSAR/FSAR design recommendations throughout the construction site, and specifically in the construction buildings affected by the poorly compacted soil which this ACRC Committee is considering. Not only is there evidence of poor communications, but deliberate withholding of significant information from the NRC is a part of the record.

In 1977, evidence of soil settlement deficiencies was available to Consumers Power Co. and Bechtel, the construction engineer, prior to their beginning the construction of the diesel generator building. Consumers Power Co. makes the following admission in their recent Findings of Fact that this evidence "which if given different weight would have revealed the plant wide soils conditions in time to have prevented the problems which now confronts us". In addition, in 1978, information regarding the unusual settlement of the administration building in 1977 was withheld from the NRC. Today, Consumers Power Co. QA management still defends these incredibly irresponsible decisions.

When unusual settlement of the administration building occurred in 1977, it was torn down, the soil was recompacted properly and the building rebuilt.

The decision on safety related buildings, however, that were subsequently built on this poorly compacted soil was to preload the buildings with sand--"a fix" that Consumers admits was the least costly approach to try to solve the problem. This attempt at a cheap, quick "fix" is now the subject of these extensive soil settlement hearings. The NRC is requiring much more extensive remedial action.

Because some of the poorly compacted soil is also under part of the dike of the cooling pond, water has been seeping in throughout the plant site since the cooling pond was filled.

While the original PSAR in 1969 included the provision of a permanent site dewatering plan, it was subsequently eliminated without NRC concurrence. However, because of the leakage from the cooling pond, an extensive dewatering system has been instituted.

The NRC's DEIS states that the water from the dewatering system throughout the plant site will be pumped back into the cooling pond. I believe the question should be raised as to how this will effect the chemical content of the cooling pond water which must be carefully controlled for cooling the reactors, since the wastes, oil spills, and inevitable accidental radioactive spills on the plant site will undoubtedly enter that dewatering system.

Page Three
Dr. Chester Siess
April 26, 1982

As further evidence of an indifferent attitude toward the PSAR/FSAR design, it should be noted that in the mid-70's the foundations of the diesel generator building and the borated water storage tanks were changed from the mat foundation plans without NRC concurrence. In 1981, the auxiliary building seismic analysis was found to be deficient.

During NRC testimony in the soil settlement hearings, the FSAR has been referred to as merely a "historical document" instead of regarding it as a design commitment. Consumers has been allowed to initiate independently significant design modifications and has changed the FSAR after the fact to indicate how the plant was actually built. This amounts to building the plant first and then drawing up the blueprint. This practice can hardly assure this community and industry here of safe construction of these plants.

More recently, at the evidentiary hearing on February 2, 1982, Judges Harbour and Decker outlined their concerns about the QA program for the underpinning structures (Tr 7122-28). As Judge Harbour pointed out, the underpinning activities themselves have the potential for producing irreversible damage in safety class structures or for altering the conditions of the structures on which seismic analyses are based.

The fact that there are already indications of inadequate quality assurance performance in soils remedial areas has been described in the memo from R. L. Spessard to Darrell Eisenhut dated April 9, 1982. Again, we find the problem of misleading information and lack of adequate QA procedures. (copy enclosed)

Recently, we invited researchers from the Government Accountability Project (GAP) of the Institute of Policy Studies, Washington, D.C., to come to Midland to take testimony from workers at the Midland nuclear plant who have personal knowledge of serious quality control violations on site--many of them occurring at the buildings that are under consideration at the April 29 meeting. The testimony from the workers was secured by Attorney Tom Devine of GAP and can be made available to you when we have it ready.

The GAP organization was successful in finding numerous problems at the Zimmer nuclear plant which have required further NRC and ACRS action. Their findings at Midland are even more extensive than those at Zimmer.

I sincerely hope the ACRS deliberations will take into account the dismal, past and continuing QA record at the Midland nuclear plants and particularly in those buildings affected by the soil settlement problems that will be the subject of discussion on April 29.

Yours sincerely,

Mary Sinclair
Mary Sinclair

MS/jt
cc: Tom Devine, Government Accountability Project

safety analysis report which had been submitted by Consumers was consistent with the design and construction of the Midland project.

Q. 12. Summarize your preliminary investigation findings.

A summary of the preliminary investigation findings were presented to Consumers on February 23, 1979 at the Region III office. These findings are documented in Attachment 4. In summary, the findings related to quality assurance deficiencies, are:

- * The FSAR did not correctly state the type of fill material supporting safety related structures. This is a violation of 10 CFR 50 Appendix B quality assurance criterion III. (Design Control)

- * The FSAR included conflicting values for the settlement of the diesel generator building founded on spread footings. This is a violation of 10 CFR 50 Appendix B quality assurance criterion III. (Design Control)

- * The compaction requirement for clay material was not followed. This is a violation of 10 CFR 50 Appendix B quality assurance criterion V. (Instructions, Procedures and Drawings)

- * The compaction requirement for sand was not correctly translated into the construction specifications. This is a violation of 10 CFR 50 Appendix B quality assurance criterion V. (Instructions, Procedures and Drawings)

- * Moisture control was not properly implemented. This is a violation of 10 CFR 50 Appendix B quality assurance criterion XVI. (Corrective Action)

- * Soil was not protected from frost action nor removed prior to resuming work. This is a violation of 10 CFR 50 Appendix B quality assurance criterion III. (Design Control)

- * The root causes of nonconforming conditions were not adequately corrected to preclude repetition. This is a violation of 10 CFR 50 Appendix B quality assurance criterion XVI. (Corrective Action)

- * The settlement calculations for the diesel generator building were based on conditions of foundation type, load intensity and

soil compressibility other than the actual conditions. This is a violation of 10 CFR 50 Appendix B quality assurance criterion III. (Design Control)

* Consumers did not adequately investigate the extent of the soil problem after the settlement of the administration building footings. This is a violation of 10 CFR 50 Appendix B quality assurance criterion XVI. (Corrective Action)

* Program changes were not implemented to preclude erroneous selection of the laboratory compaction standards (maximum density and optimum moisture content) after the settlement of the administration building footings. This is a violation of 10 CFR 50 Appendix B quality assurance criterion XVI. (Corrective Action)

[We subsequently determined that the last two items should not have been listed as quality assurance deficiencies because the administration building is not subject to quality assurance requirements.]

* Concrete material was permitted to be used in lieu of fill material without consideration of the effects on structures. This is a violation of 10 CFR 50 Appendix B quality assurance criterion V. (Instructions, Procedures and Drawings)

* Personnel directing the soils operation were not trained in the area of soil work, nor was a geotechnical soils engineer present on-site as required. This is a violation of 10 CFR 50 Appendix B quality assurance criterion II. (Quality Assurance program)

* Inspection procedures were relaxed from original procedural requirements which provided insufficient hold points to ascertain back-fill material was installed properly. This is a violation of 10 CFR 50 Appendix B quality assurance criterion X. (Inspection)

* The sampling (surveillance) plan was infrequent and inadequate to verify conformance. This is a violation of 10 CFR 50 Appendix B quality assurance criterion X. (Inspection)

Based on the above findings it was my conclusion and it is my conclusion now that:

- (1) There was inadequate control and supervision of the plant fill.
- (2) Corrective action regarding nonconformances was inadequate.
- (3) Construction specifications and design bases were not followed.
- (4) Interface between design organization and construction was inadequate.
- (5) The FSAP contained inconsistent, incorrect and unsupported statements. (copied from page 11)

DOCUMENTS SUMMARIZING THE SOILS-RELATED ISSUES AT MIDLAND

1. Summary of Soils-Related Issues at the Midland Nuclear Plant.
2. Selected Consumers Power Company submittals related to Midland's Auxiliary Building and Feedwater Isolation Valve Pit.
3. Selected Consumers Power Company submittals related to Midland's Borated Water Storage Tank.
4. Selected Consumers Power Company submittals related to Midland's Diesel Generator Building.
5. Selected Consumers Power Company submittals related to Midland's Permanent Plant Dewatering.
6. Selected Consumers Power Company submittals related to Midland's Service Water Pump Structure.
7. Selected Consumers Power Company submittals related to Midland's Underground Utilities.
8. Selected NRC Documents Related to Midland's Soils and Structural Settlement Issues.

UPDATE COPY

DATE

CHRONOLOGY REGARDING PLANT FILL DEFICIENCIES

02/07/78	Applicant's verbal report to Region III of abnormal settlement of Diesel Generator Building (DGB)
09/29/78	First 50.55(e) interim report on DGB settlement issued
11/01/78	Region III requests NRR review support on soils compaction adequacy
11/07/78	Second 50.55(e) interim report on DGB settlement issued
11/24-27/78	Investigation by Region III on DGB settlement, documented by inspection report 50-329/78-12; 50-330/78-12
12/03-04/78	Meeting and site tour on DGB settlement
12/14/78	Special Prehearing Conference on OL issues
12/21/78	Third 50.55(e) interim report on DGB settlement issued
12/21/78	50.55(e) notification that applicant has selected preload as corrective action for DGB
01/05/79	Supplement to third 50.55(e) interim report on DGB settlement
01/26/79	Start of surcharge placement for DGB
02/23/79	OL Prehearing Conference Order - accepts W. Marshall contention 2 and M. Sinclair contention 24 on soils
02/23/79	Meeting with Region III on soils QA
02/23/79	Fourth 50.55(c) interim report on DGB settlement
03/05/79	Meeting with Region III and NRR on Region III investigation
03/06/79	Site visit
03/21/79	Staff issues first set of 50.54(f) questions regarding plant fill (Questions 1-22)
03/22/79	Region III issues investigation report on soils 50-329/78-20; 50-330/78-20
03/28/79	Accident occurs at Three Mile Island, Unit 2
✓ 04/24/79	Applicant's initial response to 50.54(f) requests regarding plant fill
✓ 04/30/79	Revision 5 to 50.55(e) interim report on DGB settlement

ATTACHMENT 6

DATE

CHRONOLOGY REGARDING PLANT FILL DEFICIENCIES

05/31/79	Revision 1 to Applicant's response to 50.54(f) requests regarding plant fill
06/07/79	Site visit by staff to observe test pits in plant fill
06/25/79	Revision 6 to 50.55(e) interim report on DGB settlement
07/09/79	Revision 2 to Applicant's response to 50.54(f) requests regarding plant fill
✓ 07/18/79	Meeting on results of DGB preload program, site investigation, proposed fixes including caissons, underpinning and dewatering (Summary: Applicant's 50.54(e) report dated August 10, 1979)
07/19/79	Meeting on site geology
09/05/79	Revision 7 to 50.55(e) interim report on DGB settlement
09/05/79	Meeting on draft 50.54(f) question 23 regarding ^{soils} mils QA
09/11/79	Staff issues 50.54(f) question 23 regarding ^{soils} mils QA
✓ 09/13/79	Revision 3 to response to 50.54(f) request ^s regarding plant fill
✓ 10/16/79	Staff announces that U.S. Army Corps of Engineering to assist with geotechnical engineering review
11/02/79	Revision 8 to 50.55(e) interim report on DGB settlement
✓ 11/13/79	Revision 4 to response to 50.54(f) requests regarding plant fill
11/14/79	Initial site visit by Corps of Engineering
11/19/79	Staff issues supplemental 50.54(f) questions 24-35
12/06/79	NRC issues order requiring modification of construction permits prior to proceeding with soils remedial activities
12/19/79	Applicant files Amendment 72 requesting modifications of CP's and requesting staff approval of proposed soils remedial Activities
12/26/79	Applicant requests hearing on NRC's 12/06/79 order

DATE

CHRONOLOGY REGARDING PLANT FILL DEFICIENCIES

01/16/80 Meeting on 50.54(f) responses and proposed remedial activities on plant fill (Summary issued 02/04/80)

02/07/80 Applicant's notice of termination of 50.55(e) reporting on DGB Settlement

02/11/80 Submittal of documents referenced by Amendment 72

02/26/80 NRC announces that Naval Surface Weapons Center to assist in structural engineering review

02/27-28/80 Meeting and site tour regarding plant fill deficiencies and remedial actions

02/28/80 Revision 5 to responses, ^{to} 50.54(f) requests regarding plant fill

02/29/80 NRC announces that Energy Technology Engineering Center to assist in Mechanical Engineering review

04/01/80 Staff requests additional reports, drawings and other information on plant fill deficiencies and fixes

06/30/80 Staff requests additional soils exploration, sampling, and laboratory tests (Questions 36-38)

07/07/80 Staff provides guidelines for future audit on seismic and structural design calculations

07/31/80 Meeting to discuss soils remedial actions and staff request for additional borings and tests

08/04/80 Staff letter forwarded ^{ing} Corps of Engineering request for information and soils testing (Question 39-48)

08/27/80 Staff requests information on site dewatering (Questions 49-53)

08/28/80 Site tour for NRC management and consultants

08/29/80 Meeting to hear applicant's appeal of staff request for additional borings and tests (Question 37)

10/07/80 - Oral depositions of staff, applicant, Bechtel and consultants during discovery for soils (OM, OL) hearing

02/28/81
3 / 81

NAME

CHRONOLOGY REGARDING PLANT FILL DEFICIENCIES

10/14/80 Staff position letter providing acceptable alternatives for determining seismic input

10/20/80 Staff letter expressing concerns for underground piping stressess

11/10/80 Staff letter denying applicant's appeal ^{position regarding} of staff request for additional soils exploration, sampling and lab tests

11/14/80 Applicant replies to underground pipe stress concerns

11/21/80 Amendment 85 submitted responding to Questions 39-44, 46-53

11/24/80 Meeting on systematic appraisal of licensee performance (SALP)

01/27/81 Site visit to observe BWST concrete foundation cracking

01/28-29/81 Special Prehearing Conference on plant fill issues

02/20/81 50.55(e) report 81-03 on cracking in BWST foundations (subsequent interim reports issued 4/3/81, 6/12/81, 6/26/81, 7/21/81, 8/28/81, 10/26/81, 11/13/81, 11/24/81, 12/11/81, and 1/18/82)

03/02/81 Parts I and III of applicant's report on site specific response spectra

03/23/81 Applicant's letter announcing underpinning of service water pump structure will be based upon a perimeter wall concept, rather than piles

04/20-24/81 Design audit of seismic Category I structures and seismic calculations (Summary issued March 2, 1982)

04/27/81 Special Prehearing Conference on plant fill issues

05/05-07/81 Meeting on Underground pipes, Amendment 85, solid pier concept for Auxiliary Building underpinning, and Borated Water Storage Tank foundations

05/13/81 Part II report by applicant on site specific response spectra

06/17/81 Addendum to Part I report on site specific response spectra (original ground surface)

7/7-18/81

OM, OL hearing on QA ~~matter~~ ^{iss} related to soils areas

- 5 -

DATE

CHRONOLOGY REGARDING PLANT FILL DEFICIENCIES

06/19/81	Preliminary results of soils boring and testing program for cooling pond dikes
S 06/30/81	Meeting on seismic margin review criteria
— 07/15/81	Telephone conference discussion on BWST surcharge (Summary issued July 29, 1981)
— 07/27/81	Report on final results of soil boring and testing program for perimeter and baffle dike area
07/27/81	Transmittal of update of site settlement measurements and piezometer data
08/04-13/81	OM, OL hearing on Stamiris' contentions
7/51 08/11/81	Applicant's report on basis for rejection of 1966 Parkfield Earthquake Accelerograms for site specific response spectra
— 08/26/81	Transmittal of technical report and drawings on SWPS underpinning
— 09/08/81	Meeting on seismic input ^a parameters
✓ 09/11/81	Applicant's letter with updated settlement plots for several structures on fill
S 09/16/81	Meeting on site specific response spectra
✓ 09/17/81	Meeting on SWPS remedial actions (Summary 11/23/81)
✓ 09/22/81	Transmittal of Part I of report on soil borings and tests For Auxiliary Building
09/24/81	Telephone conversation in which staff requests additional information on soil concerns for Diesel Generator Building
09/25/81	Staff concurrence on surcharging valve pits for BWSTs
09/25/81	Transmittal of applicant's proposed seismic margin review criteria
09/30/81	Transmittal of technical report and drawings on Auxiliary Building and dynamic models for Auxiliary Building and SWPS

DATE

CHRONOLOGY REGARDING PLANT FILL DEFICIENCIES

09/30/81	Meeting on DGB soil borings and testing results
10/01/81	Meeting on Auxiliary Building underpinning (Summary 2/5/82)
— 10/02/81	Meeting on seismic models for Auxiliary Building and SWPS (Summary 1/25/82)
✓ 10/02/81	Transmittal of DGB concrete crack analysis
— 10/06-07/81	Meeting on underground pipes and DGB settlement measurements (Two summaries issued 2/5/82)
10/13-16/81	Hearing on seismic issues
✓ 10/19/81	Responses to open items from structural design audit of April 20-24, 1981
✓ 10/21/81	Applicant's letter responding to verbal requests of 9/24/81 regarding DGB
10/26/81	Parts 1 and 2 of Woodward-Clyde report "Test Results, Auxiliary Building, Soil Boring and Testing Program"
10/26/81	Amendment 97 (Revision 12 to Responses to NRC Requests Regarding Plant Fill and settlement update report)
10/28/81	BWSTs filled with water
✓ 10/28/81	Request for staff concurrence for construction of access shafts and freewall in preparation for underpinning of Auxiliary Building
10/30/81	Telephone conversation in which staff requests additional information on remedial action for Auxiliary Building
✓ 11/04/81	Meeting on Auxiliary Building and response to October 30 requests (summary issued 12/31/81)
✓ 11/06/81	Response to staff requests on Sept. 17, 1981, on SWPS underpinning
✓ 11/06/81	Test Results of soil boring and testing for SWPS
— 11/10/81	Transmittal of results of soil borings and tests for BWSTs
11/12/81	Meeting on soils remedial action schedules (summary issued 11/23/81)

DATE

CHRONOLOGY REGARDING PLANT FILL DEFICIENCIES

✓ 11/13/81 "Design Report for the BWST Foundation Analysis"

✓ 11/16/81 Transmittal of letter "Response to NRC Request for Additional Information Pertaining to the Proposed Underpinning of the Auxiliary Building and FWIV Pits". Includes alteration to the FWIVP underpinning configuration

11/17/81 Meeting on construction schedules for remedial underpinning for Auxiliary Building & SWPS

✓ 11/24/81 Staff concurrence for construction of vertical access shafts and freeze wall in preparation for underpinning the Auxiliary Building and Feedwater Isolation Valve Pits

11/24/81 Staff visit to observe underpinning of structures near the Philadelphia subway tunnel

also enclosed
✓ 11/24/81 Transmittal of results (Part II of Woodward-Clyde report) of soil boring and testing program for Auxiliary Building

— 11/24/81 Staff given copy of report "Seismic Safety Margin Evaluation Workshop" (Summary March 16, 1982)

✓ 11/24/81 BWST Foundation OL Design Calculations plus enclosure 1: "Design Report for the BWST Foundation Analysis" (55(e) Report 81-03 #9)

12/01-04/81 Hearing - Auxiliary Building Underpinning

— 12/03/81 Underpinning of the Auxiliary Building - Computational Results (supplements September 30, 1981, letter)

12/10/81 Meeting on Cracks in Auxiliary Building, SWPS & DGB

12/14-18/81 Hearing on Seismic Models and SALP and QA Organization

✓ 12/15/81 CFCO letter on Underground Pipe with several related enclosures

also enclosed
✓ 12/30/81 Staff issues proposed findings of fact and conclusions of law (QA)

— 01/04/82 Staff receives advanced copy of Applicant's draft Testimony (12/31/81) on Service Water Pump Structure

✓ 01/06/82 Applicant's letter on effects of Auxiliary Building Freeze Wall on Utilities and Structures

DATE

CHRONOLOGY REGARDING PLANT FILL DEFICIENCIES

01/07/82	General Quality Plan for Underpinning & Quality Plans and Q-list activities for SWPS and Auxiliary Building Underpinning
— 01/11/82	Meeting on Cracks (Summary March 16, 1982)
01/12/82	Meeting in Glen Ellen on QA Organization change and General Quality Plan on Underpinning (Summary January 29, 1982)
✓ 01/13/82	Meeting on BWST (Summary February 8, 1982)
✓ 01/18/82	BWST Foundation ^L Design Calculations including SMA report on tank stresses (same letter also dated January 11, 1982)
✓* 01/18-19/82 <i>Not yet received</i>	Audit Meeting Prior to Excavation beneath FIVP & TB (Phase II of Underpinning Construction) (Summaries March 10, 1982, and March 16, 1982) ✓
✓ 01/20/82 <i>Not yet received</i>	Meeting on Freeze Wall effects (Ann Arbor) (Summaries March 10 and 16, 1982) ✓
01/21-22/82	Meeting on Underground Pipes
✓ 01/25/82	Applicant's letter - Evaluation Report for the FIVPs
01/26/82	Applicant's letter - Quality Assurance Organization change
01/26/82	Telecon discussion ^{on} surcharge results for BWST foundations
01/28/82	Applicant's letter to ASLB on QA Organization (1/26/82 letter) and Audit reports regarding qualifications of Bechtel electrical inspection ^{for} ✓
✓ 01/29/82	Evaluation Report for Auxiliary Building Control Tower & EP Areas on cracks
02/02/82	Hearing on QA ^V Organizational change
02/02-05/82	Audit meeting prior to Excavation Beneath Auxiliary Building and Auxiliary Building Cracks
✓ 02/04/82	Applicant's letter on Augering method for soldier pile holes for access shaft of the Auxiliary Building
✓ 02/16/82	Applicant's letter with enclosure on Evaluation Report for concrete cracks in the Diesel Generator Building

DATE

CHRONOLOGY REGARDING PLANT FILL DEFICIENCIES

02/16-19/82 Hearing on BWST and Underground Pipe

✓ 02/23-26/82 Meetings on DGB, SWPS, BWST Surcharge Removal, Dewatering
Recharge test results (17 days of data) and Additional Settlements for Auxiliary Building Monitoring (Summary March 12, 1982)

— 02/25/82 Staff receives advanced copy of Applicant's draft testimony (1-8-82) on structural reanalysis of DGB, excluding Appendix C

✓ 02/26/82 Staff letter of concurrence for removal of surcharge from BWST valve pits

— 03/02/82 Applicant's letter with report responding to request for Additional Information, "Service Water Pump Structure Three-Dimensional, Finite-Element Models" (This is an appendix to SWPS Technical Report dated 8/25/81)

✓ 03/02/82 Applicant's letter with report "Evaluation of Cracking in Service Water Pump Structure at Midland Plant"

— 03/03/82 Meeting on Dewatering Criteria (Summary March 16, 1982)

— 03/04/82 Meeting on hearing schedules

03/10/82 Applicant's letter on settlement of Underground Diesel Fuel oil Tanker due to Seismic Shakedown

03/10/82 Applicant's letter on protection of excavation face for the Auxiliary Building underpinning access shaft

03/10/82 Meeting on QA for underpinning (Summary March 12, 1982)

— 03/12/82 NRC notified of loose sands beneath SW piping (Summary March 16, 1982)

03/16/82 Meeting with Director, NRR on schedules

03/16/82 Applicant's letter providing additional information on buried piping, with enclosures on future monitoring program and replacement of 26" and 36" SW piping

03/16-19/82 Audit on SWPS Underpinning

03/18/82 Applicant's letter regarding surcharge removal for the BWST valve pits

Applicant's letter Forwarding Woodward-Clyde Consultant's report,
"Test Results, Retaining Walls, Soil Boring and Testing Program, Midland
CHRONOLOGY REGARDING PLANT FILL DEFICIENCIES Plant-Units 1 and 2,"
dated November 6, 1981.

03/23/82

DATE

03/22/82

Staff letter compiling information requested for completion
of staff review of Phase 2 Underpinning for Auxiliary
Building

03/26/82

Staff letter of concurrence to grout cracks in the existing
concrete foundations of the BWSTs

03/29/82

Applicant's letter Forwarding Dames and Moore's "Report,
Soil Dynamic Modulus Study, Midland Units 1 and 2" dated
March 5, 1982

03/30/82

Meeting with Region III on QA implementation for installation
of underpinning instrumentation

4/1/82

Meeting with Director of NRR on schedules for completion of
Midland plant reviews