

Minutes/Midland

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MINUTES OF THE ACRS AD HOC SUBCOMMITTEE ON
MIDLAND PLANT UNITS 1 & 2

Washington, D. C.
April 29, 1982

The ACRS Ad Hoc Subcommittee on Midland Plant Units 1 and 2 held a meeting in Room 1046, 1717 H St., N. W., Washington, D.C. The purpose of the meeting was to discuss remedial action being taken by Consumers Power Company regarding the Midland soils issues. The meeting was entirely open to the public. Notice of this meeting was published in the Federal Register on Tuesday, April 13, 1982. A copy of this notice is included as Attachment A. A list of attendees for this meeting is included as Attachment B. The schedule for the meeting is included as Attachment C, and a list of all reference material (including slides and documents provided to the Subcommittee at the meeting) is included as Attachment D. A complete set of handouts has been included in the ACRS files. There were no oral statements made by members of the public. A written statement, Attachment E, was received from Ms. Mary Sinclair. The Designated Federal Employee for this meeting was Mr. David C. Fischer.

SUBCOMMITTEE CHAIRMAN'S OPENING REMARKS

Dr. Siess opened the meeting with a statement on the purpose and goal of the meeting. He said that the Subcommittee would be trying to develop an understanding of the remedial actions that are being proposed by Consumers Power Company in connection with the foundation problems that have developed at the site. Dr. Siess explained that the Subcommittee would in effect be auditing the NRC Staff's review in this area. He said that the Subcommittee wanted to

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know what the Staff viewed as the problems in terms of the health and safety of the public. He asked the NRC Staff what the proposed solutions were, whether they were acceptable to the Staff, and if so, why. He also asked to be told the basis on which they would be found acceptable if they are not yet acceptable to the Staff. Dr. Siess indicated that the meeting would not address how Consumers Power Company got into the foundation problems. He outlined how the meeting would be conducted (i.e., He hoped to place emphasis on presentations by the Staff, and to avoid extensive detailed questions).

BACKGROUND INFORMATION FROM THE NRC'S MIDLAND PLANT LICENSING PROJECT MANAGER

Mr. Darl Hood (NRR/DL) said that the NRC Staff would be discussing the remedial actions that have been or will be undertaken to provide suitable foundations for several safety-related structures and underground utilities at the Midland site. He said that the foundation difficulties result from inadequately compacted and highly variable fill soils which were recognized to be deficient after significant construction had already occurred. He said that the uniqueness of both the problem and the proposed repair had prompted the Staff to inform the ACRS of the proposed remedies. The Staff was seeking ACRS advice and guidance on the concept and on the applicants' proposed actions before taking irrevocable steps relative to safety-related structures at the Midland site. Mr. Hood said that the Staff was seeking neither concurrence nor a formal recommendation from the Committee, but rather, the Staff hoped to get ACRS views as to the viability of the proposed fixes. Mr. Hood then briefly described the Midland Plant. He said that overall construction is now about 70% completed, and except for structures repair work, all concrete construction work for safety-related structures is essentially complete. Midland Unit 2 is scheduled for fuel loading in July of 1983, and Unit 1 in December of 83. Mr. Hood explained that the

Midland site was constructed by raising the original ground surface elevation about 30 feet to a final plant grade at elevation 634 ft. The cooling pond is located in the borrow area used to secure the material for the fill. The groundwater table at the site is influenced by the cooling pond level at elevation 627 feet. The major Category 1 structures at the Midland site are the reactor building, the auxiliary building, the diesel generator building, the service water pump structure, buried pipes and tanks, and the borated water storage tanks. Mr. Hood explained which Category 1 structures are located on fill and which are located on the original soil. The reactor building is located on original soil and is not experiencing foundation problems. The plant fill beneath several of the other seismic Category 1 structures was found to include loose sands, a potential liquefaction concern. He explained that the applicant has adopted permanent site dewatering to eliminate the liquefaction potential under the diesel generator building and the railroad bay area of the auxiliary building. (The design basis for the dewatering system recognizes water released from failed pipes near critical structures). He also mentioned that the applicant has a plan to remove sand beneath the 26-inch diameter service water piping near the service water pump structure and adjacent circulating water intake pump structure to eliminate potential liquefaction concerns.

Mr. Hood gave a brief chronology of the more significant events relative to the settlement matter. He discussed when there was first indication that the compaction of the soil was significantly less than measured during the placement of the fill. He explained that a 20-foot sand preload (or surcharge) had been placed inside and around the diesel generator building to accelerate the compaction of the fill. The quality assurance deficiencies with respect to soils placement were briefly mentioned. Mr. Hood said that QA deficiencies prompted the Staff to question the integrity of the cooling pond dikes. Mr. Kane (NRR/DE) explained that there are several locations where the service water discharge pipes are at the top of the emergency cooling pond reservoir and at the base of the overall cooling pond dike. He said that failure of the upper dike could damage these pipes if the slopes were not stable. Two slopes were of concern to the Staff, the large pond dike, which is built of fill material, and the emergency cooling water reservoir, which is an excavated slope in natural materials. Mr. Kane said that the applicant has conducted slope stability analyses. The results of these analyses indicate to the Staff that these slopes have a sufficient margin of safety (i.e., sufficient shear strength and stability). Mr. Hood said also that the Staff was unable to find adequate basis for Midland's safe shutdown earthquake. Consequently, the Staff began to reevaluate the seismic design of Midland. (Midland was originally designed for a safe shutdown earthquake characterized by a zero period acceleration of 0.12g and a Housner spectrum modified between 0.2 and 0.6 Hz.) The Staff has determined a site-specific response spectra. A seismic margin study still remains to be conducted.

In December 1979, the Staff issued an order modifying Midland's construction permit (CP). This order suspended all construction-related remedial work on the Midland plant until a CP amendment for the soils remedial work was requested by the applicant and approved by the Staff. This order was stayed by the applicant's request for a formal hearing by the ASLB. The applicant has, however, complied with the intent of the order since its issuance.

Mr. Hood showed diagrams of and outlined the Staff's concern related to the:

- . auxiliary building isolation valve pits
- . auxiliary building electrical penetration area
- . service water pump structure
- . borated water storage tank (BWST)
- . underground piping (e.g., service water lines, duct banks)
- . underground tanks (i.e., diesel fuel oil tanks and control room pressurization tanks)

He mentioned the applicant's three phase corrective action for the BWST differential settlement. First, a surcharge was placed on the adjacent valve pits and the surrounding areas (preparatory measures to eliminate stress in the tank). Next, the applicant will construct a reinforcing ring beam around the existing ring beam wall. Finally, the tank will be reset on the existing ring wall.

OVERVIEW BY THE NRC STAFF'S DIVISION OF ENGINEERING

Mr. Knight (NRR/DE) discussed the safety significance of the foundation problems at Midland and outlined the remedial actions being taken by Consumers

for each structure. He said that there are two basic regulatory requirements related to nuclear power plant safety. Nuclear power parts must be built to recognized codes and standards (modified as necessary to account for the particularly critical nature of nuclear power plants) and the various safety systems at the nuclear power plants must remain functional under both normal and extreme conditions. To this end, Mr. Knight said that the Staff seeks to provide reasonable assurance that structural integrity will be maintained in both the systems and the structures at Midland. He said that the Staff intends to assure system and structural stability with regard to future soil settlement (e.g., where differential settlement might cause a problem with a buried pipe anchored to a structure). The Staff is attempting to find out about the structures and their foundation condition so that it might accurately predict the dynamic response of those structures and systems. The information acquired will be used to qualify plant equipment and to design plant systems. The Staff is interested in problems resulting from both differential settlement and gross deformation of lines over their life. The Staff will evaluate the effects of past and future settlement, including the structural response to future differential settlement. Mr. Knight next gave an overview of the remedial action proposed by Consumers Power Company for each structure. The proposed remedial actions for each structure are summarized in the table below:

<u>Structure</u>	<u>Fix</u>
Auxiliary building control tower and electrical penetration wings	Underpinning (to ensure that there isn't settlement in the future), monitor
Diesel generator building	Surcharge, evaluate cracks, repair cracks, monitor

<u>Structure</u>	<u>Fix</u>
Service water pump structure	Underpin, monitor
Borated water storage tanks	Surcharge (including valve pit) construct new foundation ring, monitor.
Underground Utilities	Gage piping quality, replace 36" header, monitor

Mr. Knight said that the Staff and the applicant have agreed on criteria for evaluating the 26" diameter buried pipes at Midland.

Mr. Knight very briefly compared the Midland original seismic design spectra, the Midland site-specific spectra, and the corresponding (anchored at a zero period acceleration of 0.12g) Regulatory Guide 1.60 spectra. He made this comparison for the original ground level and for the top of the fill material. He indicated that the site-specific spectra exceeded the original spectra at certain frequencies by as much as a factor of 2 (e.g., for the fill, the site-specific spectra exceeds the original spectra by a factor of 1.25 at 20 hz, 1.80 at 10 hz, 1.92 at 5 hz, 1.22 at 4 hz, and 1.40 at 2.5 hz). Mr. Knight said that the newly computed site-specific seismic response spectra have affected the structures that are founded on the fill. The remedial actions to be taken on several structures have been affected by the site-specific response spectra. Dr. Siess suggested that the Staff and the applicant determine the seismic margins that exist for Midland with the new site-specific spectra. Knight informed the Subcommittee that the applicant is conducting a seismic margin analysis on several major structures requiring remedial actions. Dr. Siess noted that the Reg Guide 1.60 spectra that correspond to a 0.12g zero-period

acceleration more or less envelope Midland's site-specific response spectra. He also noted that the permanent site dewatering system being used to preclude the liquefaction potential is based on a zero-period ground acceleration of 0.19g.

COMMENTS BY CONSUMERS POWER COMPANY

Mr. J. Cook, V.P., Consumers Power Company, offered to have Mr. Swanberg, from Bechtel give a general description of the underpinning program for the auxiliary building using a model of the building. After informing Mr. Cook that the Subcommittee was more interested in the results of the repair program as opposed to how corrective actions will be taken, Dr. Siess agreed to hearing a short presentation. Mr. Cook informed the Subcommittee that the remedial programs for the affected buildings are being prosecuted on an individual project basis. He said that Consumers has been working for years with technical experts from Consumers, Bechtel, and around the country to correct the various soils-related structural problems at Midland. He said that completing these remedial actions is close to being on the critical path towards plant licensing.

DISCUSSION OF THE MIDLAND AUXILIARY BUILDING UNDERPINNING

Mr. Swanberg of Bechtel explained the planned auxiliary building underpinning operation using a model of the building. He said that the auxiliary building is founded at two levels. The major portion of the building has its foundation on original soil at elevation 562 feet. The electrical penetration area and control tower areas of the building are founded on fill material at approximately 609 feet (plant fill grade is approximately 634 feet). There are areas of inadequately compacted fill underneath the electrical

penetration area. Underpinning of the electrical penetration area and control tower areas are proposed to remedy this situation. The control tower area is a box-type structure and is integral with the auxiliary building. It is a reinforced concrete structure and shares a common wall with the auxiliary building down to 562 feet. Some of the load of the control tower area is being supported by the fill beneath it and some by the auxiliary building proper. The decision to underpin the control tower area was due to the inadequately compacted fill under the electrical penetration area (not differential settlement). The electrical penetration area will be supported on a continuous reinforced concrete wall that will be extended down to firm supporting material at approximately 560 feet. The control tower will be supported on a continuous reinforced concrete wall around the control tower and pinned at either side to the auxiliary building proper. The underpinning will also be tied to the control tower base slab. To install this underpinning, considerable excavation will be required beneath these structures. Temporary underpinning supports will be used. These temporary supports will allow use of one continuous pour of concrete to form the underpinning structure. The temporary underpinning will become integral with the permanent underpinning. Mr. Swanberg then briefly explained the design basis for the underpinning. While the structures themselves have been analyzed for the FSAR safe shutdown earthquake (SSE), the underpinning system is designed for the effects of the site-specific response spectra. Specifically, the underpinning system is designed for 1.5 times the forces of the FSAR SSE (The site-specific spectra is equivalent to approximately 1.3 times the SSE). Finally, Mr. Swanberg outlined for the Subcommittee the precision monitoring system which will be in place during installation of the underpinning system.

and for the life of the plant. This monitoring program will involve settlement, stress, and crack monitoring of the auxiliary building.

NRC STAFF, GEOTECHNICAL ENGINEERING BRANCH PRESENTATION

Mr. Joe Kane (NRR/DE/GEB) described Midland's plant fill problems in very general terms. He talked about remedial actions being taken by Consumers Power Company from the aspect of assuring foundation stability. He also indicated those areas where the Staff is in general agreement with the applicant regarding the adequacy of structure foundations. Mr. Kane began by identifying those Category 1 structures on original (natural) soils and those on plant fill. He summarized the information that the Staff has which indicates that a plant fill problem exists (e.g., records of soil and structural settlement, blow count readings, simplified soil profiles, and soil unit loadings). He showed the Subcommittee evidence that there has been settlement of the Midland fill with and without structural loading, that the fill is highly variable, and that there is differential settlement within the fill. Mr. Kane showed slides which specified the foundation support problem and proposed remedial measures for the various Category 1 structures of interest. Some of this material duplicated material already presented by Mr. Knight, however, Mr. Kane presented the following additional information:

<u>Structure</u>	<u>Foundation Support Problem</u>	<u>Proposed Remedial Measures</u>
Feedwater Isolation valve pits	Loose and soft fill layers	Replace loose and soft fill soils with compacted granular fill
Aux. Building Railroad bay	Liquefaction potential in loose fill	Eliminate problem with permanent dewatering system

Diesel Fuel Oil Tanks	Isolated Layer of loose fill	Not required because of limited extent
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Auxiliary Building: Mr. Kane described the clay on which the auxiliary building underpinning will rest. He said that the Staff approves of the quality of this foundation material. The Staff believes that the auxiliary building underpinning is a positive solution to the auxiliary building foundation problems. To assure that underpinning will reach competent material and will be undisturbed, the Staff is requiring that monitoring be done during underpinning construction. This monitoring for foundation adequacy will include a check on soil bearing capacity using a cone penetrometer and a check on the soil modulus using a load test. Monitoring for settlement cracks, and groundwater level will also be required.

Service Water Pump Structure: Mr. Kane next described the underpinning plan for the service water pump structure. He outlined the soil properties on which this underpinning will be founded. Again he said that the Staff agrees with the applicant that this fix is on competent foundation material and will eliminate the plant fill problem. A monitoring program similar to that required for the auxiliary building will be required for the service water pump structure. Dr. Siess questioned whether this monitoring plan is different than that done for previously constructed Category 1 structures being constructed today. The NRC Staff said that this monitoring plan is more extensive than is normally required.

Borated Water Storage Tank: Mr. Kane explained that when the problems with the diesel generator were first discovered, the applicant decided to surcharge the borated water storage tanks (BWST) with water. Shortly after this surcharge took place, cracks were observed in the tank ring beam foundations (beam which support the walls of the tank). This cracking was caused by differential settlement. The fill beneath the BWST is predominately clay and therefore liquefaction is not a problem for this structure. The differential settlement of the ring beam has also caused the staff to question whether the BWST was overstressed. According to Mr. Kane, the applicant has made a detailed analysis which has demonstrated that the tank has not been overstressed. The Staff believes that the completed surcharge program both on the valve pit and on the tank itself will result in tolerable future settlements. The stresses from these settlements have been conservatively designed for in the new ring beam design. The ring beam strengthening is being placed on the outside of the existing ring beam. The Staff indicated that the applicants proposed monitoring plan gives them additional confidence that design stress levels will not be exceeded throughout the life of the plant.

Diesel Generator Building: The diesel generator building is founded on both clays and sands. In order to accelerate the settlement of the fill under this building, a 20-foot surcharge was placed in and around the structure.

The applicant has committed to producing a diesel pedestal which will not interfere with future diesel operation (i.e., by shimming or whatever else is necessary). The Staff said that they would be satisfied with the diesel generator building settlement problem if the structure is stabilized to the point where anticipated future settlement is small. Differential settlement of the diesel generator building relative to equipment contained in the structure was discussed. Mr. J. Cook indicated that this differential settlement was part of the design basis for systems in the structure. Mr. Knight said that analyses are being done that add stresses induced by differential settlement to the other stresses. The Staff will ensure that the combined stress is within allowable limits. Neither the Staff nor the applicant were aware of any design margin specifically related to differential settlement stresses. Mr. Cook said that he would research and report back to the ACRS on how much of the code allowable stress is consumed by the differential settlement contribution to stress and how much is consumed by the seismic contribution to stress. Mr. Kane next addressed diesel generator building settlement caused by the permanent site dewatering system. He said that settlement of the natural soils as well as the fill will occur because you are removing the buoyant force caused by the water and thereby producing a net downward force on the soil and/or fill. The applicant has made an estimate of future settlement based on dewatering and other conditions that could occur. These estimates are being used by the applicant in his structural analysis to demonstrate that the structure is capable of withstanding those differential settlements. The Staff is in agreement with the applicant with regard to the settlement values that should be used in the structural analysis. Mr. Kane indicated that the applicant is currently working on the structural analysis,

addressing the settlements that occurred before and during the surcharge.

Underground Utilities: Mr. Kane stated that borings and pipe profiles indicate settlement problems exist for some buried pipes at the Midland plant. He said that these problems are being remedied by either re-embedment or replacement (e.g., poor plant fill may be removed from around a buried pipe and then backfilled with stabilized fill). He said that the applicant has proposed a monitoring program that includes both settlement monitoring and strain measurements.

Permanent Site Dewatering: Mr. Kane explained that throughout the site there are loose sands that are potentially liquefiable. Permanent site dewatering is being used to avoid the potential for liquefaction under the diesel generator building and under the auxiliary building's railroad bay area. This concern is being resolved for other Category 1 structures by either underpinning the structure, demonstrating that the loose sands are concentrated in localized areas, convincing the Staff that the soil condition is not extensive and not a liquefaction concern, and/or by replacing or re-bedding the pipes in the affected area. For the diesel generator building and the railroad bay area, the applicant is proposing a permanent site dewatering system that consists of 29 interceptor wells and 20 backup interceptor wells. The wells are located to pick up the major recharge source, which is the cooling pond. The wells have been installed in natural sand (alluvial and not till) down to elevation 575 to 590. The proposed system was checked by a full-scale field drawdown and recharge test. The system operates by drawing the water level down to elevation 595. The zone of liquifiable sands

are above elevation 610. If the dewatering system were to fail (as demonstrated by the recharge test) there would be at least 60 days before the water level reached elevation 610. This would provide ample time to repair the system (including drilling new wells if necessary) and shut the plant down. Mr. Kane indicated that the Staff had no disagreements with the Applicant regarding the dewatering system. He said that the technical specifications for the dewatering system operation still need to be developed prior to initial plant operation. Mr. Kane later explained that the system is not seismic Category 1 since there is ample time to shut the plant down before the water level rises from elevation 595 to 610 (as demonstrated by the recharge test).

Dr. Siess summarized the Geotechnical Engineering Branch's conclusions as far as the foundations are concerned. He indicated that from a geotechnical point of view (not necessarily a structural point of view) the Staff is satisfied with the applicant's proposed foundation remedial actions. The Staff is still reviewing some monitoring programs and some technical specification changes; but, subject to completion of structural analysis, successful underpinning, etc., the Geotechnical Branch is satisfied. Mr. Kane agreed with this assessment.

NRC STAFF, STRUCTURAL ENGINEERING BRANCH PRESENTATION

Mr. Frank Rinaldi (NRR/DE/SEB) discussed proposed changes to the design of Category 1 structures resulting from the soils problems at Midland. For each structure he:

- . provided a brief description of the structure,
- . outlined remedial actions proposed to improve structural integrity,

- . summarized the Staff's structural concern,
- . gave a status of the applicant's responsiveness to each Staff concern,
- . listed the confirmatory issues (essentially open items) related to the structure, and
- . showed sketches of the structure and proposed modifications to the structure.

Structures discussed include: the auxiliary building (including the adjacent feedwater isolation valve pits), the service water pump structure, the diesel generator buildings, and the borated water storage tanks. For each of these structures, the Staff is requiring the applicant to have settlement monitoring, crack monitoring, and crack repair programs.

Auxiliary Building: Mr. Rinaldi explained that the auxiliary building is a concrete structure with a steel framing superstructure. He pointed out that the major portion of the structure is supported on till and that the control tower and electrical penetration wings are supported on fill. He discussed the proposed underpinning of the structure in detail. The control tower, electrical penetration wings, and feedwater isolation valve pits will be underpinned. This underpinning will involve placement of a reinforced concrete pedestal around the perimeter of the structure down to till material. In order to accomplish this underpinning he said that Consumers would first employ a temporary underpinning scheme. Temporary pier structures will provide support for the turbine building, the control tower, and the electrical penetration area structure. Temporary underpinning of the turbine building is being done because some excavation beneath the turbine building is required to gain access to the control tower. The control tower temporary supports

will become part of its permanent underpinning. A temporary post-tensioning system has been provided across the control tower to eliminate problems of overstressing the roof and the upper structure. Mr. Rinaldi said that the Staff is concerned about the load transfer mechanism between the underpinning and the structure (both for the temporary and permanent underpinning situations). The applicant has agreed to use the Staff approved seismic site-specific spectra to evaluate the structural design and to perform a safety margin evaluation for the modified structure. Confirmatory issues related to the auxiliary building were highlighted. Several of these involve requests by the Staff for information from the Applicant. Of particular note is the fact that the Staff is asking the Applicant to perform a parametric analysis of the construction condition using a subgrade modulus of 70 kcf. The applicant has already made an analysis using a softer subgrade modulus (30 kcf) for the stiff clay under the auxiliary building. A higher modulus under the auxiliary building could lead to more structural stress because it would be stiffer than the underpinning. Mr. Rinaldi said that the point where the corner of the electrical penetration area is undermined is the most critical time during the underpinning evolution. The staff desires the reanalysis to better understand the expected structural stresses at this point in the underpinning evolution. The Staff will also be requiring the applicant to calculate settlements and the resultant stresses. During the underpinning evolution these computed settlements will be compared to measured settlements. An analysis has been conducted for the construction condition at several stages as material is removed from beneath the EPA and control tower area and replaced with structural elements (e.g., grillage beams and columns). The applicant (Mr. Swanberg, Bechtel) then identified the acceptance criteria being used regarding differential settlement effects. The acceptance criteria are based on ACI 318 with an additional expression to cover the

differential settlement effect. A 1.4 load factor is being used on the effects due to differential settlement. Mr. Swanberg said that the analyses include dead loads, an estimated portion of the live loads, and the settlement load. The Staff has agreed with this approach. While the margins to overstress at certain sections of the structure were not available, Mr. Swanberg stated that there was no overstressing based on the aforementioned analysis. Dr. Zudans suggested that there is no need for performing this type of an analysis. He said that the real structure is already deformed as much as it will be before underpinning. It can be inspected to see whether there is stress any place. He said that an inspection would provide a much better description than might be derived by a computer code. Dr. Siess concluded this discussion of the auxiliary building by stating that the whole underpinning job depends on how well you control the relative deformations during the underpinning.

Service Water Pump Structure: Mr. Rinaldi described the service water pump structure (SWPS) as a two-level rectangular reinforced concrete structure founded partly on till and partly on fill. He indicated that the Staff's concerns and the applicant's proposed fixes are similar to those for the auxiliary building. He said that the Staff and the applicant are reaching an understanding as to the approach to be taken in analyzing this structure. The Staff is particularly concerned with cracks in the SWPS. The cracks in this structure are being analyzed in depth because the structure has experienced differential settlement. The Staff wants to dismiss any concern over possible overstressing due to this differential settlement. Crack evaluation and reanalysis for the seismic site-specific spectra are not yet complete.

The Staff hopes to determine if cracks in the structure are volume-change cracks and consequently of no concern. If the cracks are structural cracks, then the Staff will analyze the stresses in the rebar and the potential for rebar corrosion. A crack repair program will be initiated if necessary. The applicant has proposed certain criteria to evaluate these cracks and they have been found acceptable to the Staff. Crack maps of the walls of this structure were shown. Dr. Siess suggested that the cracks in this structure were due chiefly to volumetric changes in the concrete, not due to the differential settlement. He questioned the need to evaluate the potential for rebar corrosion resulting from cracks in this structure.

Diesel Generator Building: Mr. Rinaldi described the diesel generator building as a rectangular box-like reinforced concrete structure with independent diesel-generator pedestals. He described the surcharge and dewatering program which has been conducted to remedy the differential settlement and potential liquefaction problems. As a result of differential settlement, the structure was hung up on an attached duct bank. This produced the differential settlement which cracked the concrete structure. Prior to placing the surcharge in and around this structure, the duct bank was detached from the structure. Provisions have now been made for about one foot of building settlement relative to the duct banks. Crack maps of the diesel generator building were shown. Dr. Siess pointed out that the bottom set of cracks appeared to be formed before the top portion of the structure was poured. The largest cracks shown were about 0.023 inches. Crack maps were shown for the diesel generator building at various stages of the structure's life. The trend of measured

settlement was compared to these crack maps. The duct bank layout was shown and the location of the duct bank was compared to the crack patterns. The finite element model used to analyze the structure for stresses due to settlement was described.

Borated Water Storage Tanks (BWST): The BWSTs are 500,000 gallon stainless steel storage tanks each supported on a reinforced concrete ring in an enclosed sand medium. Problems with these structures relate to the valve pit and ring foundations. A surcharge was placed on the tank and valve pit to control the effects of differential settlement. In addition, the Applicant has proposed to construct an additional ring concentric to the original support ring and provide dowels to tie the two together. The new support ring is designed so that it can carry the entire BWST load. In addition, the new support ring will be capable of withstanding differential settlement loads. The value of the differential settlement used to design the new ring is conservative in that it is based on settlement not taking credit for the surcharge which was done and it also does not reflect the stiffness that the old ring beam will provide. Dr. Scavuzzo expressed his concern that the BWST load will be transmitted to the new support ring through dowels as opposed to a more direct method such as a bearing pad across the top. Dr. Scavuzzo's concern was shared by Dr. Siess. However, Dr. Siess believes that most of the BWST load will be transferred by the shear on the concrete surfaces (provided there is enough steel crossing the faces). At any rate, Dr. Siess indicated that future BWST settlement monitoring should pick up any potential problems before they become significant.

Mr. S. Poulos (NRR/DE/GEB) discussed the monitoring program which will be used

while underpinning structures at Midland. He showed the Subcommittee where measurements would be made during underpinning to control construction. He indicated that monitoring was particularly important on the auxiliary building because it is stiff enough to be very sensitive to differential movements which could occur during underpinning. The Applicant has computed that they will allow a differential settlement between the main auxiliary building and the southerly end of the control tower of 0.13 inches (in the down direction), at which point they would stop work. Deep seated benchmarks and dial gauges will be used to measure settlement. Strain gauges will also be used to monitor the structures to be underpinned. Mr. Poulos said that the Applicant has committed to using the benchmark readings to control construction.

Mr. Gould of Mergentime, the underpinning contractor, stated that Mergentime has done underpinning jobs where they had held the differential settlement to less than an eighth of an inch. He indicated that accurate and elaborate instrumentation would be used to monitor the underpinning job at Midland. He mentioned that strict job controls would also be maintained throughout the evolution. Mr. Gould said that Mergentime would attempt to limit the auxiliary building settlement to an eighth of an inch.

Buried Piping: Dr. W. P. Chen from Energy Technology Engineering Center (ETEC) discussed underground piping at the Midland site. He said that the Staff is primarily concerned about the effects of soil settlement on structural integrity and the functional adequacy of underground piping systems and related components. Affected seismic Category 1 piping include the service water, borated water, emergency diesel fuel, and control room pressurization systems. Affected

non-seismic Category 1 lines included circulating water lines, condensate water lines, and oily waste lines. Dr. Chen identified numerous problems related to the underground piping at Midland. Proposed solutions to problems associated with seismic Category 1 systems were outlined. The effects of failures of non-seismic Category 1 systems on seismic Category 1 systems were addressed. Pipe replacement with similar or thicker-walled piping was discussed. The relationship of curvature to pipe buckling was mentioned. Dr. Chen explained that Consumers has proposed a strain/ovalization monitoring program for selected buried piping at Midland. He said that future soil settlement will also be monitored and Technical Specification limits will be established to ensure the integrity of underground piping. The strains at building penetrations and rattlespaces at building penetrations will also be monitored for some piping runs. For small-diameter pipes that have not been rebedded, control of pipe functional integrity will be based on pipe ovality (a maximum pipe ovality of 5-10 percent will be allowed). The criteria that the Staff used to evaluate buried pipes and the basis for these criteria were reviewed. Criteria have been established for pipe strength, pipe buckling, minimum rattlespace, nozzle and other interface loads, and for the effects of non-seismic Category 1 piping on seismic Category 1 piping. Dr. Scavuzzo suggested that the Staff ensure that the pipe joints be designed stronger than the pipes themselves. He indicated that piping systems tend to fail at the joints when subjected to seismic loads. Dr. Lewis of Bechtel informed the Subcommittee that all buried piping of concern have redundant piping runs. Finally, Mr. Chen briefly outlined the ongoing NRC Staff reviews related to Midland's underground piping.

Mr. Bosnak (NRC/NRR/MEB) indicated that an inquiry has been made to the ASME code committee as to the adequacy of current codes for buried piping (e.g., to account for local buckling).

Mr. Cook briefly described the work Consumers Power Company has undertaken to determine the adequacy of Midland's seismic design. Specifically, he mentioned the seismic margin evaluation of Midland which Consumers is sponsoring. Mr. Cook also indicated that Consumers will be doing further analyses to see if there can be justification for allowing larger amounts of building deflection during the underpinning work.

SUBCOMMITTEE CONCLUSIONS AND RECOMMENDATIONS

The Subcommittee members and consultants expressed general satisfaction with the Staff's efforts related to Midland soils problems. Dr. Siess stated that he would report on this meeting at the next full Committee meeting. He indicated that he would ask the Committee to approve some general statement regarding the adequacy of the Staff's review of the Midland soils issues and said he would recommend that this matter be resolved in a manner satisfactory to the regulatory Staff.

NOTE: A transcript of the open portion of the meeting is on file at the NRC Public Document Room at 1717 H Street, N. W., Washington, DC or can be obtained from Alderson Reporters, 300 7th Street, S. W., Washington DC 292-554-2345.

Subcommittees regarding safety related activities including proposed changes in "C Regulatory Guides, reactor pressure vessel "thermal shock"; urgency and safeguards considerations at nuclear facilities; consideration of extreme environmental events at nuclear facilities; and proposed plan of action for resolution of steam generator tube deficiencies in nuclear plants.

***H. Meeting with NRC**

Commissioners (Tentative)—Discuss regulatory issues including the proposed NRC Long Range Research Program Plan, proposed NRC quantitative safety goals, ACRS plan of action for review of the Clinch River Breeder Reactor, ACRS review of NRC Staff plan for resolution of thermal shock of reactor pressure vessels, and ACRS comments regarding instrumentation for monitoring reactor pressure vessel water level or inventory.

***I. Reports by NRC Staff**—Regarding current activities including repairs and restart of the Robert E. Ginna Nuclear Station, operation deficiencies at the D. C. Cook Nuclear Station, proposed cooperative LOFT research program, the status of Three Mile Island Unit 1 steam generator tube repairs, and consideration of seismic events in emergency planning.

June 3-5, 1982: Agenda to be announced.

July 8-10, 1982: Agenda to be announced.

Dated: April 8, 1982.

Thomas J. Chilk,

Acting Advisory Committee Management Officer.

[FR Doc. 82-10086 Filed 4-12-82; 8:46 am]

BILLING CODE 7590-01-01

Advisory Committee on Reactor Safeguards, Subcommittee on Metal Components; Meeting

The ACRS Subcommittee on Metal Components will hold a meeting on April 29, 1982, Room 1187, 1717 H Street, NW., Washington D.C. The Subcommittee will discuss with the NRC Staff the status of Unresolved Safety Issues A-3, A-4 and A-5 and other related matters. In addition, the utility owners group on steam generator will present an update of steam generator issues and possible resolutions.

In accordance with the procedure outlined in the Federal Register on September 30, 1981 (46 FR 47903), oral or written statements may be presented by members of the public, recordings will be permitted only during those portions of the meeting when a transcript is being kept, and questions may be asked only by members of the Subcommittee, its

consultants, and Staff. Persons desiring to make oral statements should notify the Designated Federal Employee as far in advance as practicable so that appropriate arrangements can be made to allow the necessary time during the meeting for such statements.

The entire meeting will be open to public attendance except for those sessions during which the Subcommittee finds it necessary to discuss proprietary information and industrial security. One or more closed sessions may be necessary to discuss such information. (SUNSHINE ACT EXEMPTION 4). To the extent practicable, these closed sessions will be held so as to minimize inconvenience to members of the public attendance. The agenda for subject meeting shall be as follows:

Thursday, April 29, 1982—8:30 a.m. until the conclusion of business

During the initial portion of the meeting, the Subcommittee, along with any of its consultants who may be present, will exchange preliminary views regarding matters to be considered during the balance of the meeting.

Further information regarding topics to be discussed, whether the meeting has been cancelled or rescheduled, the Chairman's ruling on requests for the opportunity to present oral statements and the time allotted therefor can be obtained by a prepaid telephone call to the cognizant Designated Federal Employee, Mr. Elpidio Igne (telephone 202/634-1414) between 8:15 a.m. and 5:00 p.m., EST.

I have determined, in accordance with Subsection 10(d) of the Federal Advisory Committee Act, that it may be necessary to close some portions of this meeting to protect proprietary information and industrial security. The authority for such closure is Exemption (4) to the Sunshine Act, 5 U.S.C. 552b(c)(4).

Dated: April 8, 1982.

John C. Hoyle,

Advisory Committee Management Officer.

[FR Doc. 82-10086 Filed 4-12-82; 8:45 am]

BILLING CODE 7590-01-01

Advisory Committee on Reactor Safeguards, Subcommittee on Midland Plant Units 1 and 2; Meeting

The ACRS Subcommittee on Midland Plant Units 1 and 2 will hold a meeting on April 29, 1982, Room 1046, 1717 H Street, NW., Washington, D.C. The Subcommittee will discuss remedial action being taken by Consumers Power

Company regarding the Midland soils issues.

In accordance with the procedures outlined in the Federal Register on September 30, 1981 (46 FR 47903), oral or written statements may be presented by members of the public, recordings will be permitted only during those portions of the meeting when transcript is being kept, and questions may be asked only by members of the Subcommittee, its consultants, and Staff. Persons desiring to make oral statements should notify the Designated Federal Employee as far in advance as practicable so that appropriate arrangements can be made to allow the necessary time during the meeting for such statements.

The entire meeting will be open to public attendance except for those sessions which will be closed to protect proprietary information (Sunshine Act Exemption 4). One or more closed sessions may be necessary to discuss such information. To the extent practicable, these closed sessions will be held so as to minimize inconvenience to members of the public in attendance.

The agenda for subject meeting shall be as follows:

Thursday, April 29, 1982—8:00 a.m. until the conclusion of business.

During the initial portion of the meeting, the Subcommittee, along with any of its consultants who may be present, will exchange preliminary views regarding matters to be considered during the balance of the meeting.

The Subcommittee will then hear presentations by and hold discussions with representatives of the Consumers Power Company, the NRC Staff, their consultants, and other interested persons regarding this review.

Further information regarding topics to be discussed, whether the meeting has been cancelled or rescheduled, the Chairman's ruling on requests for the opportunity to present oral statements and the time allotted therefor can be obtained by a prepaid telephone call to the cognizant Designated Federal Employee, Mr. David Fisher (telephone 202/634-1413) between 8:15 a.m. and 5:00 p.m., EST.

I have determined, in accordance with Subsection 10(d) of the Federal Advisory Committee Act, that it may be necessary to close portions of this meeting to public attendance to protect proprietary information. The authority for such closure is Exemption (4) of the Sunshine Act, 5 U.S.C. 552b(c)(4).

ATTACHMENT A

MEETING DATE: April 29, 1982

SUBCOMMITTEE MEETING: Midland 1 & 2

LOCATION: Room 1046, 1717 H St., NW, Washington, D.C.

ATTENDANCE LIST

PLEASE
PRINT

NAME	AFFILIATION
1. C SISS	ACRS MEMBER
2. W MADIS	
3. Z ZUDANS	ACRS CONSULTANT
4. R SCARFED	"
5. J. OSTBERG	"
6. D FISCHER	DESIGNATED FEDERAL EMPLOYEE
7. K. Drehobl	Consumers Power Co.
8. A RYAN	NRC - Mechanical Engin
9. G HARSTEAD	NRC - Staff Consultant (HEA)
10. H.N. SINGH	U.S. Army Corps of Engineers Chicago
11. J D. Kiene	NRC, NRR, DE, HGEB
12. Steve J. Peules	NRR, Geotechnical Engineers Inc.
13. George Lang	NRC
14. E F GOODWIN	NRR
15. Dale Hood	NRR/DA/LB4
16. E. G. ADENSAM	NRR/DA/LB4
17. J P KNIGHT	NRR/DA
18. Norman J SAARI	Consumers Power Co.
19. Paul Rau	Midland Daily News
20. DENNIS M. RUDZIN	NRC Consumers Power Co.
21. J. W. COOK	N-D Environmental Power Co.
22. J. K. Meisenheimer	CONSUMERS POWER Co
23. [unclear]	Consumers Power Co
24. N. Swanberg	BECHTEL

MEETING DATE: April 29, 1982
 SUBCOMMITTEE MEETING: Midland 1 & 2
 LOCATION: Room 1046, 1717 H St., NW, Washington, D.C.

ATTENDANCE LIST

PLEASE
PRINT

	NAME	AFFILIATION
1.	A. J. BOOS	BECHTEL
2.	J. A. MOONEY	CONSUMERS POWER COMPANY
3.	T. R. THROVENGADAM	CONSUMERS POWER COMPANY
4.	(H. G. ...)	NECESSARY ^{MANAGER} - CONSUMERS POWER BECHTEL
5.	T. J. Sullivan	CONSUMERS POWER CO
6.	J. E. BRUNNER	"
7.	T. T. Johnson	BECHTEL
8.	B. D. HAR	BECHTEL
9.	F. H. ...	Director, ... ^{Cons. Co}
10.	J. E. ANDERSON	BECHTEL
11.	S. S. AFIFI	Bechtel
12.	W. C. PARRIS JR	Bechtel
13.	R. J. ...	Bechtel
14.	A. J. ...	Bechtel
15.	F. B. Peck	Bechtel
16.	D. F. LEWIS	BECHTEL
17.	Bill Lewis	Necessaire, Moss ...
18.	W. Gene ...	OTL/PGH - Consultant to Consumers
19.	N. RAMANUJAM	CONSUMERS POWER
20.	D. H. ...	Midland Cycle (Consultant to CPCO)
21.	M. A. SOREN	Bechtel
22.	K. B. ...	CPCO - Consumers Power Co.
23.	D. A. WISLEY	STRUCTURAL MECHANICS ASSN.
24.	R. D. PAMABELL	STRUCTURAL MECHANICS ASSO

MEETING DATE: April 29, 1982
 SUBCOMMITTEE MEETING: Midland 1 & 2
 LOCATION: Room 1046, 1717 H St., NW, Washington, D.C.

ATTENDANCE LIST

PLEASE
PRINT

NAME	AFFILIATION
1. W. P. CHEN	ENERGY TECHNOLOGY ENGINEERING CENTER
2. Billie Garde	Government Accountability Project
3. H M FORTICILLA	BUREAU OF COR CORP ORATION
4. MARY COFFMAN	CAPITAL BROADCAST NEWS
5. KEVIN FLANIGAN	" " " "
6. FRANK RINALDI	NRC / NRR / SEB
7. PAO C. HUANG	NRC Consultant
8. JOHN P. MATRA JR	NRC CONSULTANT
9. R. J. BOSNAK	NRC / NRR / MEB
10. MARK HARTZMAN	NRC / NRR / MEB
11. MICHAEL BLUME	NRC / OGC
12. R. B. LANDSMAN	NRC / RTI
13. C. C. WILLIAMS	NRC / RTI
14. F. O. BERNY	NRC / MFR / DF
15. M. D. White	Doub & Muntzing
16.	
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APRIL 26, 1982

REVISED TENTAIVE SCHEDULE FOR THE
APRIL 29, 1982
ACRS SUBCOMMITTEE MEETING ON MIDLAND PLANT UNITS 1 & 2
ROOM 1046, 1717 H ST., NW, WASHINGTON, DC

APPROXIMATE TIME

SPEAKER

8:30 a.m.	I. CHAIRMAN'S OPENING STATEMENT	C. Siess
	A. Discussion of Schedule	
	B. Meeting Goals	
8:45 a.m.	II. STAFF INTRODUCTION/OVERVIEW (NRR/DL)	
	A. Why the ACRS Has Been Asked to Review These Issues at This Time	E. Adensam
	B. Brief Chronology Regarding Plant FilI Deficiencies and Schedule of Future Events (Including ALSB Hearing Status)	D. Hood
	C. General Discussion of the Soils and Structural Settlement Issues (Including Why No Problem With Reactor Building) at Midland	D. Hood
	D. Identification of the Safety Significance of These Issues	J. Kinght
	E. General Discussion of the Proposed and Implemented Corrective Actions, Including Relationship to Seismic Site-Specific Spectra (Phased Program)	J. Knight
	F. Staff General Comments on the Proposed Fixes and Proposed Criteria	
	G. Discussion	
9:45 a.m.	III. CONSUMERS POWER COMPANY OVERVIEW OF SOILS AND STRUCTURAL SETTLEMENT ISSUES AT MIDLAND, INCLUDING THEIR EFFECT ON THE LICENSING SCHEDULE	
10:15 a.m.	BREAK	
	IV. TECHNICAL DISCUSSION	
	A. Auxiliary Building and Feedwater Isolation Valve Pit	
10:30 a.m.	1. NRC Staff (DE)	
	a. Statement of problems	
	b. Proposed solution(s)	
	c. Criteria used and basis for acceptability	
	d. Future NRC Staff actions	
11:30 a.m.	2. Response by Consumers Power Company	
12:00 noon	LUNCH	

ATTACHMENT C

APPROXIMATE TIME

- 1:00 p.m. B. Service Water Pump Structure
1. NRC Staff (DE)
- a. Statement of problems
- b. Proposed solution(s)
- c. Criteria used and basis for acceptability
- d. Future NRC Staff actions
- 1:30 p.m. 2. Response by Consumers Power Company
- C. Borated Water Storage Tank
- 1:50 p.m. 1. NRC Staff (DE)
- a. Statement of problems
- b. Proposed solution(s)
- c. Criteria used and basis for acceptability
- d. Future NRC Staff actions
- 2:10 p.m. 2. Response by Consumers Power Company
- D. Underground Utilities, Pipes, Etc.
- 2:25 p.m. 1. NRC Staff (DE)
- a. Statement of problems
- b. Proposed solution(s)
- c. Criteria used and basis for acceptability
- d. Future NRC Staff actions
- 3:10 p.m. 2. Response by Consumers Power Company
- 3:25 p.m. BREAK
- E. Permanent Dewatering System
- 3:35 p.m. 1. NRC Staff (DE)
- a. Statement of problems
- b. Proposed solution(s)
- c. Criteria used and basis for acceptability
- d. Future NRC Staff actions
- 3:55 p.m. 2. Response by Consumers Power Company

REVISID
TENTATIVE SCHEDULE
MIDLAND
APRIL 29, 1982

- 3 -

4/26/82

APPROXIMATE TIME

- 4:15 p.m. F. Diesel Generator Building
 - 1. NRC Staff (DE)
 - a. Statement of problems
 - b. Proposed solution(s)
 - c. Criteria used and basis for acceptability
 - d. Future NRC Staff actions
 - 2. Response by Consumers Power Company
- 4:45 p.m.
- 5:00 p.m. V. OPEN EXECUTIVE SESSION/CHAIRMAN'S CLOSING REMARKS
- 5:30 p.m. ADJOURNMENT

Reference Documents for the April 29, 1982 ACRS Ad Hoc Subcommittee Meeting on
Midland Plant Units 1 & 2

1. Letter from J. Cook, Consumers Power Company, to H. Denton, NRC, Subject: Summary of Soils-Related Issues at the Midland Nuclear Plant, dated April 19, 1982.
2. Letter from K. Drehobl, Consumers Power Company, to D. Fischer, ACRS, Subject: Midland Project Soils Information, dated April 12, 1982
3. Geotechnical Engineering, Inc. Trip Report Nos. 3 and 4, Bethesda Meeting of February 24, 25 & 26, 1982 Midland Plant Underpinning dated March 3, 1982
4. Summary of February 23-26, 1982 Meeting on Remedial Actions for Structures on Plant Fill dated March 12, 1982
5. Summary of January 18 & 19, 1981, Audit and Plans for Excavation Beneath Midland Feedwater Valve Pits and Turbine Building for Auxiliary Building Underpinning dated March 10, 1982
6. Summary of January 13, 1982 Meeting on Borated Water Storage Tanks dated February 8, 1982
7. Telecon Summary of December 21, 1982 Regarding Freezeway Effects, Mr. J. Kane with CP Co. dated January 5, 1982
8. Summary of November 12, 1981 Meeting on Construction Schedules for Foundation Modifications to Auxiliary Building dated November 23, 1981
9. Summary of November 4, 1981 Meeting to Discuss Remedial Plans for Auxiliary Building and Feedwater Isolation Valve Pit Foundations dated December 31, 1981
10. Testimony of Frank Rinaldi and John Matra for the NRC Staff Regarding the Dynamic and Static Models for Category 1 Structures Founded on Fill Material.
11. Summary of September 17, 1981 Meeting on Foundation Modifications for Service Water Pump Structure dated November 23, 1981
12. Summary of August 5, 1981 Meeting on Surcharging of Valve Pits of the Borated Water Storage Tank Foundations dated September 11, 1981
13. Summary of May 5, 6, 7 & 8, 1981 Meeting on Plant Fill Remedial Issues dated September 2, 1981
14. Summary of January 20, 1981 Meeting on Underground Piping dated September 23, 1981

Documents and Slides Provided at the Meeting

1. Letter from M. Sinclair to Dr. C. Siess, ACRS, Subject: Midland Soil Settlement, dated April 26, 1982
2. Slides used by D. Hood (NRR/DL/LB4) Project Manager's Introduction/Overview (15 slides)
3. Slides used by J. Knight (NRR, DE), NRC Staff Introduction/Overview (6 slides)
4. Slide used by N. Swanberg, Bechtel, Underpinning Plan at Elevation 603' (1 slide)
5. Slides used by J. Kane (NRR/DE/HGEB), Geotechnical Engineering Evaluation of Midland Foundations (23 slides)
6. Slides used by F. Finaldi (NRR/DE/SEB), Structural Engineering Evaluation of Midland Structures
 - a. Auxiliary Building and Feedwater Isolation Valve Pits (10 slides)
 - b. Service Water Pump Structure (9 slides)
 - c. Diesel Generator Building (15 slides)
 - d. Borated Water Storage Tanks (6 slides)
7. Slides used by W. Chen (ETEC), Underground Piping at Midland Plant Units 1 & 2 (8 slides)

Ms Mary Sinclair

April 29, 1982

ACRS Ad Hoc Subcommittee mtg on
Midland

5711 Summerset Dr.

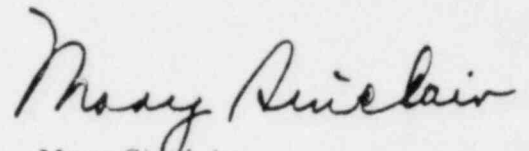
Midland, MI 48640

April 26, 1982

Memo from Mary Sinclair:

On Thursday, April 29, the Advisory Committee On Reactor Safeguards Subcommittee on Midland (ACRS) is meeting in Washington, D.C. to review soil settlement problems. This is a special meeting called by the NRC

The ACRS has invited comments and background from all participants. Enclosed is a statement of the problems that Barbara Stamiris and I as citizen participants in the licensing hearings view as important in the deliberations of the Committee.



Mary Sinclair
(517) 835-1303

MS/jt

Enclsoure

ATTACHMENT E

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 II)