UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

January 6, 1981

[redacted]

Region
Director
1-Page

MEMORANDUM FOR: Chairman Ahearne
Commissioner Gilinsky
Commissioner Hendrie
Commissioner Bradford

FROM: William J. Dircks, Executive Director for Operations

SUBJECT: DAILY STAFF NOTES, JANUARY 5, 1981

IE

1. Consumers Power Company (Midland Nuclear Power Station) - Proposed Imposition of Civil Penalties - $38,000 (EN-80-58).

2. Brunswick Unit 1 (Carolina Power & Light Co.) - Malfunction of Target Rock Safety Relief Valve, (PNO-II-81-01).

3. Dresden 2 (Commonwealth Edison) - Minor Release of Contaminated Steam During Isolation Condenser Testing, (PNO-III-81-01).

4. Industrial Inspection Industries, Inc., North Canton, Ohio - Stolen Radiographic Camera, (PNO-III-81-02).

5. Fort St. Vrain (Public Service Co. of Colorado) - Malfunction of the Main Steam Hot Reheat Valves, (PNO-IV-81-01).

6. Atlas Minerals Corporation, Moab, Utah - Uranium Mill Fire, (PNO-IV-81-02).

1-6-80
9:30
CM

CPC DEP. EX. NO. 4
FOR ID., AS OF 1/6/81

LAW OFFICES
MYRON M. CHERNEY
ONE IBM PLAZA
CHICAGO, ILLINOIS 60611
(312) 565-1177

November 20, 1978

Mr. J. G. Keppler, Regional Director
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Re: CONSUMERS POWER COMPANY
(Midland Plant, Units 1 and 2)
Docket Nos. 50-329 and 50-330
(Operating Licenses Proceeding)

Dear Mr. Keppler:

I have received from Mr. Olmstead of the Nuclear Regulatory Commission a copy of a letter and report from Consumers-Bechtel to you, which were attached as enclosures to my copy of his November 16th letter to the Licensing Board. The report from Bechtel-Consumers is dated September 22, 1978 and accompanied your cover memorandum to Mr. Thornberg dated November, 1978. At page 2 of your November 1, 1978 letter to Mr. Thornberg you state:

> "In our view, this deficiency [that is, the deficiency in connection with the diesel generator building settlement] has the potential for affecting the design adequacy of several safety related structures at the Midland site."

In view of the seriousness of this statement and the enormous sums of money which Consumers continues to spend, I should like a more full explanation, including a submission or a listing of all memorandums, communications, letters and reviews, whether formal or informal, which form the basis for the Region III's conclusions made by you. Please also tell me how you justify continued construction, in view of this serious breach of quality control, unless, of course,

8008060578

1978

you are content to permit "magic" to ensure safety. I am most concerned over what appears to be a cavalier attitude towards construction. Can it be that your organization (whether intentionally or otherwise and whether conscious or unconscious) is affected by the amounts of money Consumers has spent so that you blind your eyes to reality. If so, you do a disservice not only to the people of the United States but also to the utilities who unfortunately take advantage of such lax enforcement. Do we need a serious accident before enforcement, in your mind at least, equals the importance of monetary investment?

Also attached with your letter to Mr. Thornberg of November 1 were communications sent to you from Consumers Power Company, in particular a letter from Howell dated September 29, 1978 and a September 22, 1978 Interim Report No. 1, apparently issued by Mr. Martinez of Bechtel tb Mr. Keeley of Consumers Power Company.

In connection with the last mentioned report, page 3 has a significant deletion whereby Consumers Power or Bechtel apparently deleted information submitted regarding what you labeled as a serious safety problem, i.e. the diesel building settlement. The report states:

> "This portion of the Bechtel Report is deleted because it contains a premature discussion of possible corrective action options."

In view of the lackluster performance at Consumers' Midland site, the history of the defects and bad workmanship at the Palisades site, and the overall shenanigans of Consumers (including the allegations of dishonesty), I am surprised and astounded that Region III compliance would permit Consumers or Bechtel to delete information on a serious safety issue without even a whimper being heard from the Nuclear Regulatory Commission.

Please let me know whether you plan to follow up with Consumers and obtain the information which they have withheld. It simply is incredible that this issue has to be raised by me (or anyone outside of the NRC) and was not followed up on by anyone at the NRC.

I also wish to inform you that my lines of communication have reported to me that the resident inspector currently on the Midland site may not be doing his job and may, in fact, have been co-opted by Midland personnel. Before I take any action, I would like you to make your own investigation to determine whether this person should be replaced and whether the resident inspector operation is working.

I am requesting all of the information in this letter on an immediate timeframe. If it is necessary for me to make a Freedom of Information Act request or take other steps to secure the information, please let me know immediately.

In view of all of these situations I should also like to request advance notice of any inspection which Region III intends to make at the Midland plant, so that either I or a representative on my behalf can make arrangements to be in attendance. If any inspection is to be surprise in nature, I will pledge my confidence to maintain the confidentiality of any such unannounced on-site vistitation and inspection. I would appreciate sufficient advance notice to permit me to arrange my schedule so as to conform with any upcoming inspection (or to permit making arrangements for the attendance on my behalf, of a representative). Please let me know at your earliest convenience whether such arrangements will be made.

I realize this is a harsh and direct letter. But these problems at Midland have been repetitive so long that I can no longer believe that anyone takes them seriously. If you and others at the NRC worry about what shutting down Midland will do to the development of nuclear power more than what eventually will occur throughout the U.S. nuclear industry, if Consumers becomes the example to follow, then such persons should resign and join the industry, letting others more concerned with good government replace them.

I don't mind my principles losing in an honest adjudication. I have no respect, however, when I or my clients' interest cannot get a fair deal.

Sincerely,

Myron M. Cherry

MMC/ay

PD DCP. EX. NO.
FOR ID., AS OF 1/6/81

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

November 24, 1978

MEMORANDUM FOR: H. D. Thornburg, Director, Division of Reactor Construction Inspection, IE

FROM: James G. Keppler, Director

SUBJECT: LETTER FROM MYRON CHERRY - MIDLAND

The attached letter from Mr. Cherry regarding the Midland construction project is provided for your information. Region III is preparing a response to this letter and will ~~discuss it with you prior to issuance~~.

I discussed Mr. Cherry's charges regarding the resident inspector (page 3) with ~~Morris Howard (Acting Director)~~ earlier today and asked him whether we should turn this matter over to OIA immediately or whether we should solicit more specific information from Mr. Cherry in our response to him. Morris indicated he would ~~discuss the matter with OIA and get back to me~~.

James G. Keppler
Director

Attachment:
Letter, Cherry to Keppler, dtd 11/20/78

cc w/attachment:
J. G. Davis, IE
E. M. Howard, IE
W. J. Olmstead, ELD

~~7812280334~~

DOCKET NO. 6

FILE AS OF 1/6/81

SHH JAN 11 '79

CC. MM - ILB

JLB

BWM

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

DEC 14 378

Mr. Myron M. Cherry
One IBM Plaza
Chicago, Illinois 60611

Dear Mr. Cherry:

This is in reply to your letter of November 20, 1978, concerning the diesel generator building settlement problem at Consumers Power Company's Midland site and your serious assertion that "the resident inspector may have been co-opted by Midland personnel". The information requested by your letter is provided in the enclosure.

I would like to assure you that this office shares your interest in the proper construction of nuclear power plants. Recognizing the history of this project, ~~the NRC has given considerable inspection attention toward verifying that the licensee and its contractors are satisfying applicable regulatory requirements. While some deficiencies in the implementation of the quality assurance programs have been found during construction since the scheduling suspension in 1973, in our judgment these deficiencies were isolated rather than generic in nature, were resolved in a responsible manner, and did not represent a serious breakdown in quality assurance.~~ In this regard, I have not forgotten the commitments I made before the ASLB in 1974 and will not hesitate to recommend strong enforcement action should a serious breakdown in quality assurance occur.

With respect to the diesel generator building settlement problem, we have not yet determined the basic cause of the problem nor when it occurred. We have initiated an investigation into the circumstances of the settling problem and will base our enforcement actions on the findings from this investigation.

With respect to your assertion regarding the resident inspector, I have referred this matter to our Headquarters for investigation by the NRC's Office of Inspector and Auditor. ~~You will be contacted by that office directly to obtain specific information relative to this matter.~~

If you have any questions regarding this response, please contact me.

Sincerely,

James G. Keppler
James G. Keppler
Director

7812280198

Enclosure:
Information Requested by
Myron Cherry w/attachments

cc w/enclosure and Incoming
Letter
J. G. Davis, IE
H. D. Thornburg, IE
W. J. Olmstead, ELD
R. Fortuna, OLA
R. S. Boyd, NRR
PDR
Local PDR

ENCLOSURE 1

1. Requested Information

"In view of the seriousness of this statement[1/] and the enormous sums of money which Consumers continues to spend, I should like a more full explanation, including a submission or a listing of all memorandums, communications, letters and reviews, whether formal or informal, which form the basis for the Region III's conclusions made by you."

Summary Response

The Resident Inspector was initially informed by Consumers Power Company of a possible problem with the settlement of the Diesel Generator Building on August 21, 1978. Subsequently, on September 7, 1978, Region III was informed that the settlement was considered reportable pursuant to 10 CFR 50.55(e). A listing of correspondence generated in connection with this matter is provided as Attachment 1. (Copies of the listed correspondence are provided)

The concerns which prompted me to raise this problem as a potential safety issue can be summarized as follows:

a. Evidence of settlement in excess of design specifications has been observed with the Diesel Generator Building. This building is a safety related structure in that it houses the emergency diesel generators, which are required to provide emergency power to equipment important to nuclear safety in the event of loss of normal offsite power. Our concern was that proper operability of the diesel generators could be affected by the excessive settlement.

b. The excessive settlement of the Diesel Generator Building appears to be related to the fact that sufficient compaction of the supporting soil was not achieved. This, in turn, appears to result from random fill material being used to support the structure rather than "controlled, compacted cohesive soils" (FSAR commitment). Several other buildings or portions of foundations are also supported by random fill material. As such, although no excessive settlement of these structures had been observed to date, we are concerned that the potential may exist for excessive settlement which could possibly affect the operability of safety related equipment.

1/ Statement in memorandum from J. G. Keppler to H. D. Thornburg dated November 1, 1978 — "In our view, this deficiency has the potential for affecting the design adequacy of several safety related structures at the Midland site."

In that the issue is a design question and one which involves the design criteria initially reviewed and accepted by the NRC, we recommended that this problem be evaluated by the NRC's Office of Nuclear Reactor Regulation --- the NRC Office responsible for assuring that the facility design meets the General Design Criteria contained in Appendix A of 10 CFR Part 50. This transfer of review responsibility was formally completed on November 17, 1978.

2. Requested Information

"Please also tell me how you justify continued construction, in view of this serious breach of quality control, unless, of course, you are content to permit "magic" to ensure safety. I am most concerned over what appears to be a cavalier attitude towards construction. Can it be that your organization (whether intentionally or otherwise and whether conscious or unconscious) is affected by the amounts of money Consumers has spent so that you blind your eyes to reality. If so, you do a disservice not only to the people of the United States but also to the utilities who unfortunately take advantage of such lax enforcement. Do we need a serious accident before enforcement, in your mind at least, equals the importance of monetary investment?"

Summary Response

As discussed in my letter, the NRC has not yet determined fully the fundamental cause(s) that has resulted in the excessive settlement of the Diesel Generator Building --- nor have we established the time frame associated with the problem. We have initiated an investigation to determine the facts associated with the problem and will base our enforcement actions on the findings from this investigation.

With respect to the ~~safety implications of continued construction~~, the following considerations are important:

a. ~~The underlying philosophy of the design of nuclear~~ power facilities and the NRC regulation of them is the defense-in-depth concept. This concept consists of three levels of safety involving: (1) the design for safety in normal operation, providing tolerances for system malfunctions, (2) the assumption that incidents will nonetheless occur and the inclusion of safety systems in the facility to minimize damage and protect the public, and (3) the inclusion of systems to protect the public based on the analysis of very unlikely accidents.

In the safety design of nuclear power plants, the objective is to achieve a competent design at each level and for each physical barrier provided to prevent the release of radioactivity from the plant. At the same time, it is realized that, although extensive efforts are made to obtain high quality, perfection can never be achieved because of the normal deficiencies in all processes involving men and materials. In fact, it is the realization that deficiencies will occur that has led the safety design of reactors to be based on the defense-in-depth concept.

Saying it another way, nuclear facilities are protected by exacting standards of design and construction, independent safety systems and redundant safety systems to provide protection in the unlikely event of multiple failures. Because of "defense-in-depth," nuclear reactors do not require perfect performance and perfect quality for the protection of the health and safety of the public.

b. The excessive settlement problem with the Diesel Generator Building is recognized and will have to be resolved to the satisfaction of the NRC.

c. The settlement of other safety related structures is within design specifications and is being monitored continuously. As such, there is no problem at this time. However, this matter will be considered as part of the NRC's overall evaluation of this problem.

d. ~~Resolving this soils foundation problem, which is being investigated, deficiencies identified at Midland since the soils/welding problems (1973-1974) have not been indicative of a serious breakdown in the quality assurance or quality control programs.~~

e. ~~The amount of money spent by Consumers Power Company has not been a factor in our inspection and enforcement decisions.~~

With respect to your comments about what you characterize as our "cavalier attitude towards construction," I want you to know that while public health and safety is not predicated on error-free construction, my staff and I are every bit as concerned as you are that nuclear power plants are built with proper attention to quality. The NRC has the authority to stop construction or operation of a facility if there is sufficient cause to do so

and, in fact, has taken such action at Midland. As you know, I testified before the Midland Atomic Safety and Licensing Board in July 1974: "I want to go on record as saying that it is my position that if the Company fails to live up to its obligations that we're not afraid to step in and stop construction just like we did this time." I continue to stand behind that statement.

3. Requested Information

"In connection with the last mentioned report, page 3 has a significant deletion whereby Consumers Power or Bechtel apparently deleted information submitted regarding what you labeled as a serious safety problem, i.e., the diesel building settlement .... Please let me know whether you plan to follow up with Consumers and obtain the information which they have withheld."

Summary Response

The interim report on the settling of the Diesel Generator Building was submitted in accordance with the requirements of 10 CFR 50.55(e). This regulation provides that an interim report on a reportable deficiency be provided if the final report can not be submitted within the 30-day period.

The written report of a reportable construction deficiency is to include a description of the deficiency, an analysis of the safety implication and the corrective actions taken, and sufficient information to permit analysis and evaluation of the deficiency and of the corrective action. The final report will contain the above information. It should be noted that no corrective action had been taken at the time Consumers Power Company submitted the interim report and, as such, I have no basic problem with the deletion of the preliminary discussion from the Bechtel Report.

My staff has seen the full Bechtel report at the site, including the deleted section. I will assure you that the final report will satisfy the requirements of 10 CFR 50.55(e).

4. Requested Information

"In view of all of these situations I should also like to request advance notice of any inspection which Region III intends to make at the Midland plant, so that either I or a representative on my behalf can make arrangements to be in attendance. If any inspection is to be surprise in nature, I will pledge my confidence to maintain the confidentiality of any such unannounced on-site visitation and inspection. I would appreciate sufficient advance notice to permit me to arrange my schedule so as to conform with any upcoming inspection (or to permit making arrangements for the attendance on my behalf of a representative). Please let me know at your earliest convenience whether such arrangements will be made."

Summary Response

The NRC has, for some time, permitted government representatives or interested members of the public to accompany NRC inspectors during an inspection. To accompany the inspector an individual must agree to follow the "Protocol for Accompaniment on NRC Inspections" (a copy is enclosed)(Attachment 2) and obtain permission from the licensee for access to the site.

The resident inspector is routinely at the site 40 hours a week, and his inspection effort is supplemented by inspections by personnel from the Regional office. The inspections by Regional Office personnel are usually scheduled about a week in advance.

It would not be practical to routinely notify you of inspections sufficiently far in advance to make the necessary arrangements to accompany our inspectors. If you would inform us of the general time you are interested in accompanying our inspectors, we could probably adjust inspection schedules to accomodate you.

Most inspections are not announced to the licensee in advance. Your making arrangements with the licensee to enter the construction site would no doubt indicate an inspection were imminent. In the past, however, this has not proved to be an obstacle in permitting the accompaniment.

ATTACHMENT 1

Docket No. 50-329
Docket No. 50-330

CORRESPONDENCE RELATED TO DIESEL GENERATOR BUILDING SETTLEMENT

09/07/78 - Verbal notification and tracking form for licensee reports per 10 CFR 50.55(e) (Site inspector notified of possible settlement problem on 8/21/78)

09/08/78 - IE Morning Report item

09/29/78 - Interim report from licensee, Howell to Keppler

10/24/78 - Acknowledgement letter for 9/29/78 interim report

11/01/78 - Memo, Keppler to Thornburg, w/attachments requesting transfer of lead responsibility

11/03/78 - Transmittal letter, Appendix A, and IE Report Nos. 50-329/78-13 and 50-330/78-13

11/03/78 - Memo, Olmstead to Vassallo

11/07/78 - Second interim report from licensee, Howell to Keppler

11/08/78 - Transmittal letter and IE Report Nos. 50-329/78-14 and 50-330/78-14

11/09/78 - Memo, Thornburg to Gower

11/13/78 - Memo, Vassallo to Engelhardt

11/13/78 - Memo, Bryan to Vassallo

11/17/78 - Transmittal letter and IE Report Nos. 50-329/78-12 and 50-330/78-12

11/17/78 - Transfer of lead responsibility, Reinmuth (IE) to Vassallo (NRR)

11/22/78 - Acknowledgement letter for 11/7/78 interim report

ATTACHMENT 2

Protocol for Accompaniment on NRC Inspections

Persons who accompany on inspections, conducted by the Nuclear Regulatory Commission, Office of Inspection and Enforcement, do so under the following terms and conditions:

1. Persons accompanying on NRC inspections are present during the inspection as observers, not as participants. Specific approval for the accompaniment must be obtained from the Office of Inspection and Enforcement prior to an observer accompanying an NRC inspector.

2. Accompaniment is to observe typical NRC inspection activities and techniques and is not an inspection by the observer of the NRC nor of the licensee. Hence, accompaniment is limited to no more than two observers on any single inspection and to not more than ten percent of NRC inspections at any licensed facility.

3. Observers accompanying on NRC inspections shall not, in any manner, interfere with the orderly conduct of the inspection. NRC inspectors are authorized to refuse to permit continued accompaniment by any individual whose conduct interferes with a fair and orderly inspection or whose conduct does not follow the terms and conditions included within this protocol.

4. Observers accompanying on NRC inspections must stay physically present with an NRC inspector throughout the course of the inspection.

5. Observers accompanying on NRC inspections may be present during any discussion by the NRC inspector with the licensee with regard to inspection of matters covered by the accompaniment. This includes the discussion with licensee management at the conclusion of the inspection.

6. Observers receiving information of a proprietary or physical security nature shall safeguard such information such that it is not disclosed to unauthorized persons.

7. Observers accompanying on NRC inspections do so at their own risk. The Nuclear Regulatory Commission will accept no responsibility for injuries and exposure to harmful substances which may be received during the inspection and will assume no liability of any kind for action to or by the accompanying individual. Observers accompanying on NRC inspections agree to waive all claims of liability against the Commission.

8. The NRC will not make arrangements for the persons accompanying the NRC inspector to gain access to the licensee's facility but will inform the licensee that the NRC has no objection to the specific individuals accompanying the NRC inspectors as observers. Specific arrangements to gain access to the licensees' facilities must be made directly by the accompanying individual.

Signature of Accompanying Individual

Date

REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

October ~~18,~~ 1979

MEMORANDUM FOR:

R. C. Knop	R. Cook
D. W. Hayes	T. Vandel
D. H. Danielson	F. Jablonski
K. Naidu	E. Lee
G. Maxwell	G. Gallagher
W. Hansen	K. Ward
P. Barrett	I. Yin

FROM: G. Fiorelli, Chief, Reactor Construction and Engineering Support Branch

SUBJECT: ~~MIDLAND CONSTRUCTION STATUS REPORT AS OF OCTOBER 1,~~ 1979

The attached report was finalized based on your feedback requested in my memo of October 5, 1979. If you still feel adjustments are necessary please contact me. If you consider the report characterizes your current assessment of the Midland project, please concur and pass it along promptly.

G. Fiorelli

G. Fiorelli, Chief
Reactor Construction and
Engineering Support Branch

Enclosure: As stated

~~cc: J. G. Keppler~~

14 page attachment not copied - Jim Gallagher page ~~4~~ has it also one of the exhibits in his deposition.

8103230475

1-6-81

JAMES G. KEPPLER - BIOGRAPHICAL INFORMATION

James G. Keppler has been Regional Director of the Nuclear Regulatory Commission's Region III Office of Inspection and Enforcement since 1973. (The Nuclear Regulatory Commission was formed in January 1975 to take over the regulatory functions of the old Atomic Energy Commission (AEC). The research and development activities of the AEC were assumed by the Department of Energy.)

The Regional Office in Glen Ellyn is responsible for inspection and enforcement activities at NRC licensed facilities in eight midwestern states. This encompasses 20 nuclear power plants now in operation, 21 plants licensed for construction or under licensing review, 12 operating research reactors, four fuel facilities and approximately 3700 byproduct materials licenses -- generally for medical, industrial, research or educational applications.

Mr. Keppler joined the AEC in 1965 as a reactor inspector. Prior to his present post as Regional Director, he was Chief of the Reactor Testing and Operations Branch in the AEC Headquarters in Bethesda, Maryland.

He is a 1956 graduate of LeMoyne College in New York State. Mr. Keppler's experience in the nuclear field includes nine years with General Electric Company, first in its Aircraft Nuclear Propulsion Department and later in its Atomic Power Equipment Department.

Dup Ex 1
Gould 1-8-81

RESUME

Name: Charles Howard Gould Date: March 27, 1979
Wife's Name: Susanna Derby Gould

Department: Civil Engineering S.S.#: 292-30-3407

Date of Birth: August 12, 1935

Present academic rank: Lecturer, January 6, 1977

Degrees, with field, instruction and date:

Bachelor of Civil Engineering, Renselaer Polytechnic Institute, 1957
MSE (Construction Engineering and Management), University of Michigan, expected August, 1979

Appointment fractions during present term: 90% appointment academic year 1978-79

Other teaching experience: no previous teaching experience

Full-time industrial experience:

1957-61
Civil Engineering Corps, U.S. Navy. Maintenance and construction of shore establishment.

1961-70
Manager/Engineer, Raymond International, Inc. Heavy construction contracting.
Major Assignments:
1. Resident Manager for construction of hydroelectric complex, Liberia, Africa.
2. General Manager of special foundations.
3. Chief Planning Engineer.

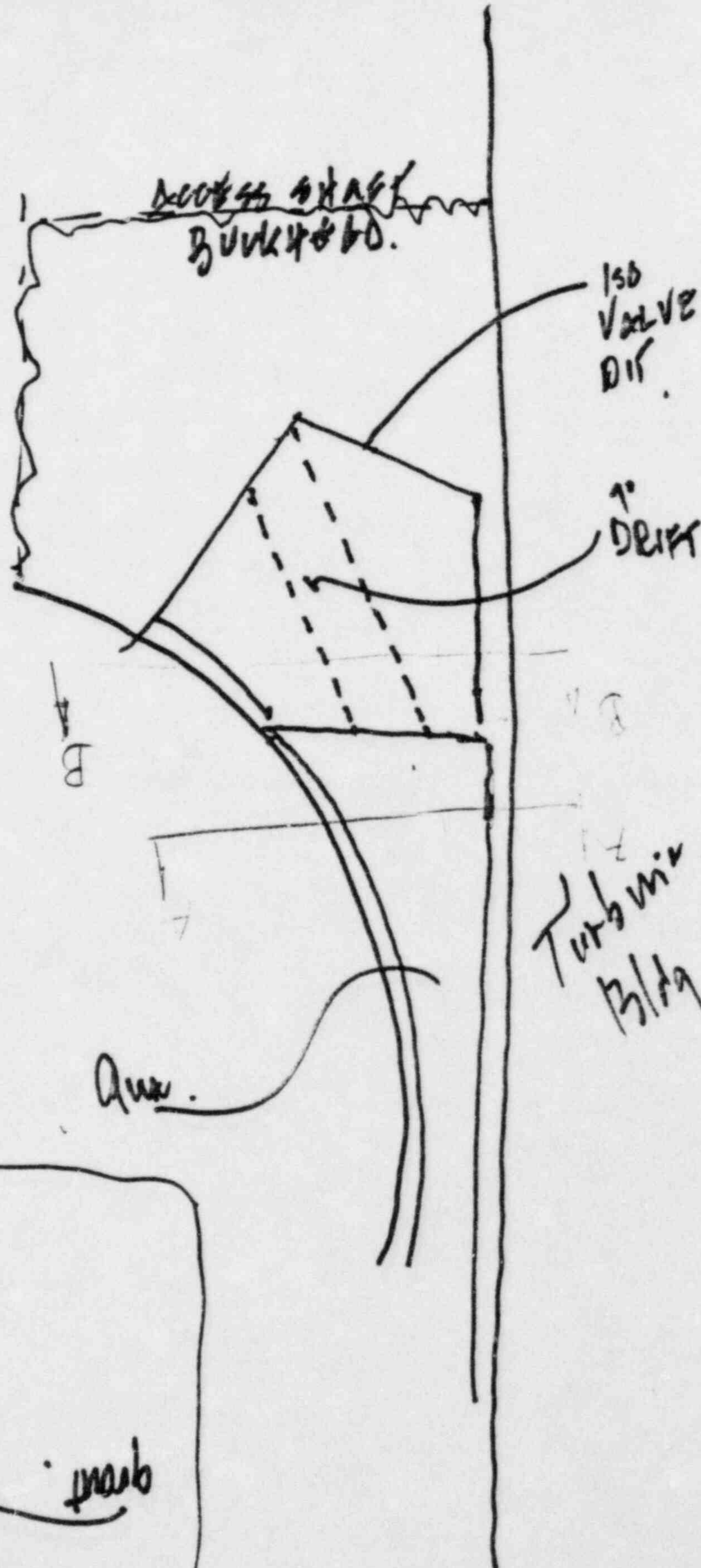
1970-76
Vice President and Director, Mergentime Corporation. Heavy construction contracting.
Major Projects:
1. Subways: 2 stations, Washington, D.C.
   Tunneling and underpinning, Edmonton, Alberta, Canada
2. Deep Excavations: National Gallery of Art
   Transit Authority Bldg.
3. Underpinning: Smithsonian
   Conowingo Dam

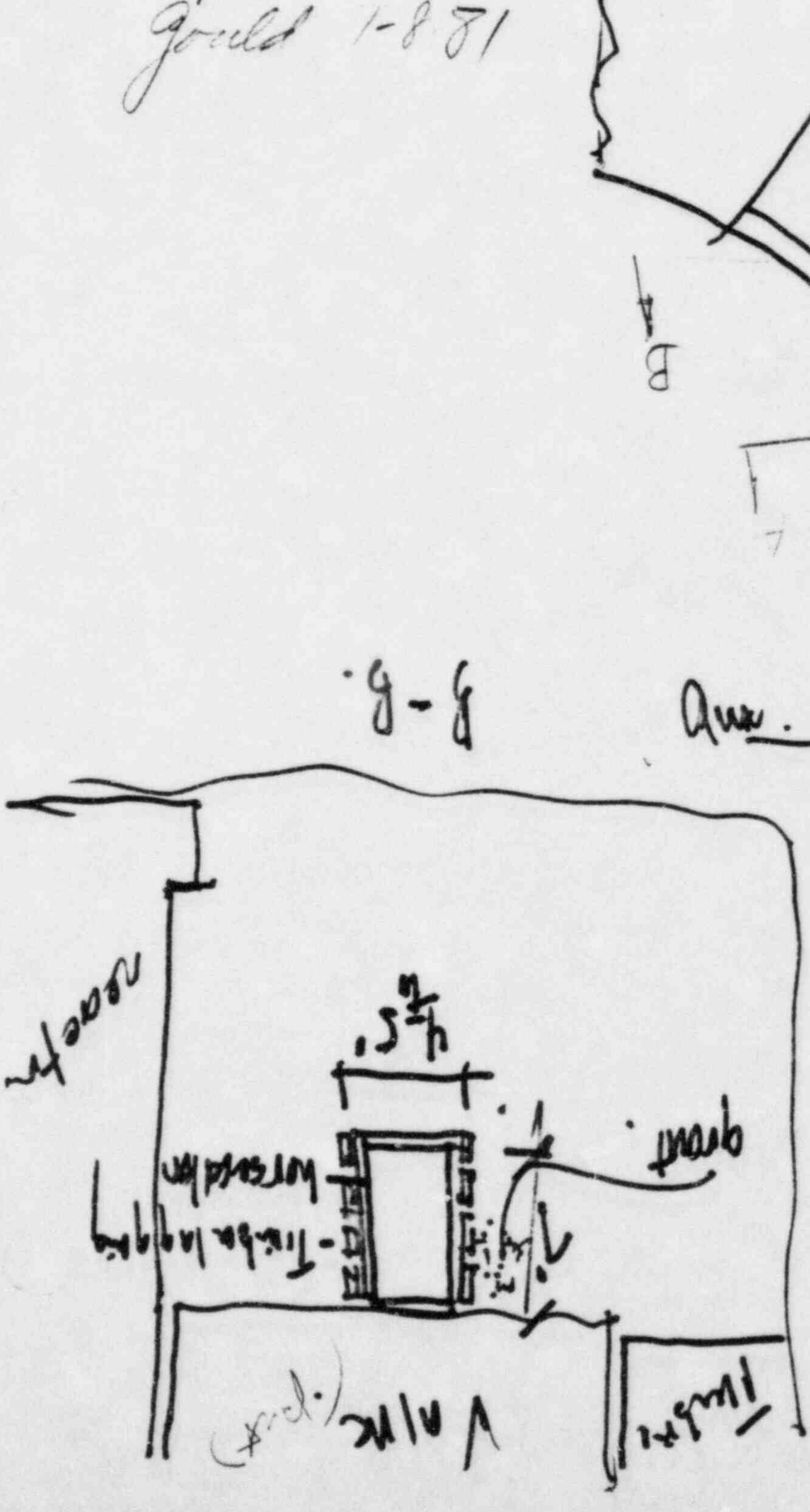
Part-time industrial experience: none

States in which registered: New York, District of Columbia and Alberta, Canada

Consulting work in the past five years: Construction planning, estimating, and management. Expert witness.

Dup X2
Gould 1-8-81





Dep Ex #1 (1-14-8)

7/80

M. T. DAVISSON

CONSULTING ENGINEER

EDUCATION

Akron State University, Bachelor of Civil Engineering, 1954
University of Illinois, Master of Science, Civil Engineering, 1955
University of Illinois, Doctor of Philosophy, Civil Engineering, 1960

PROFESSIONAL REGISTRATION

Ohio, Illinois - Professional Engineer
Illinois - Structural Engineer

EXPERIENCE

Responsible charge of site investigations, laboratory testing, engineering reports, plans, specifications, construction control, failure investigations, claims, expert testimony, prebid investigations, design of temporary structures for construction, field testing, dewatering and design of special construction equipment. Project experience includes foundations of all types for office and apartment building, heavy mill structures, mining structures, truck terminals, grain storage facilities, industrial plants, machines for power plants and paper mills, commercial developments, utility company structures, power plants - fossil and nuclear, chemical plants, oil refineries, warehouses, schools, jails, parking garages above and below ground, hangars, hospitals, hotels, museums, banks and post office facilities. Embankment and dam experience includes river locks and dams, earth and rockfill dams, cellular cofferdams, and reservoir liners. Tunnel experience includes cut-and-cover and sunken-tube types. River and port facilities include grain terminals, ore docks, material storage docks, bulkheads, trestles, cells and related structures. Other experience includes offshore structures for the petroleum industry, sewage treatment plants, highway and railway bridges including temporary structures for construction, braced excavations, tiebacks, landslides and transit facilities. Specialized experience includes: protective construction such as Minuteman, pile supported runways at LaGuardia, caisson foundations for the North River project, Northumberland Bridge crossing, mining subsidence, structural and foundation failures, vibratory pile driving, pile driving equipment development and pile driving systems.

Research experience includes: pile buckling, laterally loaded piles and piers, vibratory pile driving, dynamics of pile driving, soil properties for tar sands, one-dimensional soil properties, rock properties, settlement behavior of structures, load transfer in piles, pile load testing, wave equation analysis of pile driving, diesel hammers, inspection of foundation construction, pile driving equipment development and properties of hammer cushions.

PROFESSIONAL ACTIVITIES

Committee on Deep Foundations, Past Chairman, ASCE
Task Committee for Manual on Pile Foundations, ASCE
Committee on Standards, Excavations and Foundations, ASCE
Committee on Foundations for Bridges and Other Structures, Past Chairman, TRB
Committee on Concrete Piles, Chairman, ACI
Committee on Drilled Piers, ACI
Committee on Concrete and Foundations, AREA
Committee on Tests on Deep Foundations, Vice Chairman, ASTM
Committee on Round Timbers, ASTM

PROFESSIONAL & TECHNICAL SOCIETIES

American Society of Civil Engineers
American Concrete Institute
American Railway Engineering Association
American Society for Testing and Materials
National Society of Professional Engineers
Transportation Research Board
International Society for Soil Mechanics and Foundation Engineering

AWARDS

Recipient of the Second Annual Alfred A. Raymond Award, 1959, for the paper "Lateral Stability of a Flexible Pier." First place award in international competition for original papers on foundation engineering.

Recipient of the Collingwood Prize, 1964, presented by the American Society of Civil Engineers for the paper "Laterally Loaded Piles in a Layered Soil System."

PROFESSIONAL POSITIONS

Civil Engineer, E. J. McDonald, Akron, Ohio, 1954
Structural Engineer, Clark, Dietz and Associates, Urbana, Illinois, 1955-1956
Research Assistant in Civil Engineering, University of Illinois, 1956-1958
Assistant in Civil Engineering, University of Illinois, 1958-1959
Consulting Engineer, 1958 - to date
Instructor in Civil Engineering, University of Illinois, 1959-1960
Assistant Professor of Civil Engineering, University of Illinois, 1960-1963
Civil Engineer, Naval Civil Engineering Laboratory, Port Hueneme, California, 1962
Associate Professor of Civil Engineering, University of Illinois, 1963-1971
Visiting Associate Professor of Civil Engineering, University of California, 1964
Professor of Civil Engineering, University of Illinois, 1971 - to date

OTHER POSITIONS

Building Construction, Heavy and Highway Construction, Surveying, Municipal Engineering, 1947-1954

PUBLICATIONS

See Attached List

PUBLICATIONS - M. T. DAVISSON

1. Peck, R. B.; M. T. Davisson; and V. Hansen. Discussion of "Soil Modulus for Laterally Loaded Piles." by B. McClelland and J. A. Focht, Jr. Transactions, ASCE 123 (1958): 1065-1069.

2. Davisson, M. T. Discussion of "Experimental Study of Beams on Elastic Foundations." by R. L. Thoms. Proceedings, ASCE 87, EM1 (February 1961): 171-172.

3. Deere, D. U. and M. T. Davisson. "Behavior of Grain Elevator Foundations Subjected to Cyclic Loading." Proceedings, Fifth International Conference on Soil Mechanics and Foundation Engineering, Paris: Vol. 1, 629-633, 1961.

4. Peck, R. B. and M. T. Davisson. Discussion of "Design and Stability Considerations for Unique Pier." by J. Michalos and D. P. Billington. Transactions, ASCE 127, Part IV (1962): 414-424.

5. Peck, R. B. and M. T. Davisson. Discussion of "Friction Pile Groups in Cohesive Soil." by R. L. Kondner. Proceedings, ASCE 89, SM1 (February 1963): 279-285.

6. Davisson, M. T. and H. L. Gill. "Laterally Loaded Piles in a Layered Soil System." Proceedings, ASCE 89, SM3 (May 1963): 63-94.

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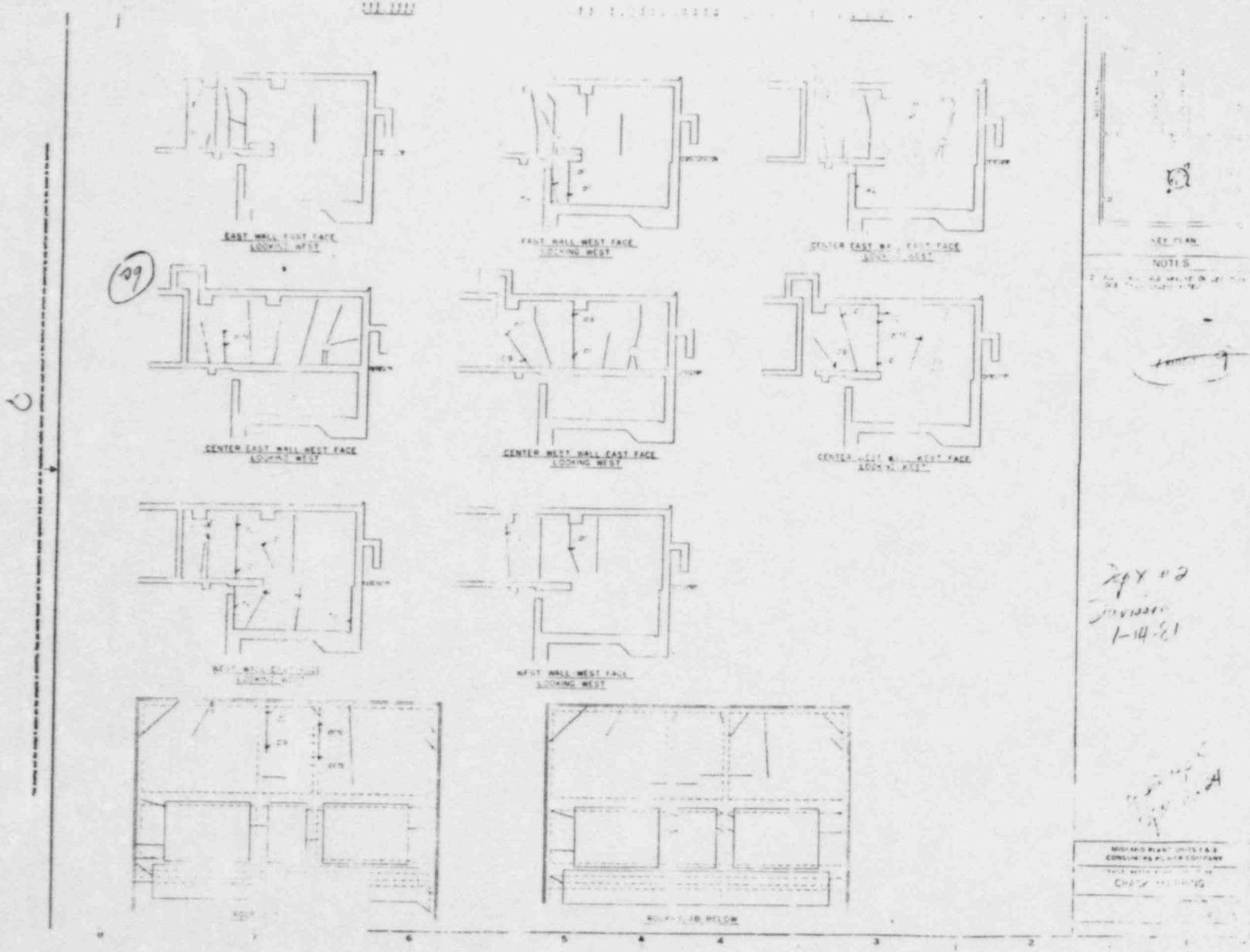
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KEY PLAN
NOTES
Apx #2
1-14-81

Bechtel Associates Professional Corporation
777 East Eisenhower Parkway
Ann Arbor, Michigan
Mail Address P.O. Box 1000, Ann Arbor, Michigan 48106

EXHIBIT 10

(72)

25 March 1980

Dep X 3
Davisson (1-14-81)

Dr. M. T. Davisson
14 Lake Park Road
Champaign, IL 61820

Subject: Midland Units 1 & 2
Service Water Pump Structure

Dear Tom:

Enclosed is Technical Specification Number 7220-C-94(Q) for furnishing, installing, and testing closed end pipe piles for supporting the north end of the service water pump structure at the Midland site.

The project has suggested that we conduct a pile load test under the technical requirements of the above mentioned specification utilizing an existing contract with Canonie at Midland regarding a pipe bridge between the plant and Dow Chemical facilities. This testing will be under Q/A requirements. We would appreciate recieving any comments you may have on the specification especially with respect to the pile load test requirements.

Assuming all goes well we will be installing and testing the pile within two to three weeks. At such time we would appreciate having your representative attend the installation and testing.

Please let me know if you need any further information to complete this review. Thank you.

Sincerely,

Sherif S. Afifi
Assistant Chief Soils Engineer

Cy AM/aa
Enclosure

E 11
EXHIBIT
3675

Dep X 4 (1-14-81)
Davisson

M. T. DAVISSON
FOUNDATION ENGINEER

2217 Civil Engineering Building
Urbana, Illinois 61801
Area 217: 333-2544

Reply to:
14 Lake Park Road
Champaign, Illinois 61820
Area 217: 359-5206

CONTROL
DISTRIBUTION
DIR
MGR 1
ADMIN
DRFT
SOILS 2
CS
PRC
Proj M
Proj E
JOB 7220 1240 2140
REC'D APR 1 1980

Memo to: S. S. Afifi

From: M. T. Davisson

Date: 3/29/80

Re: Review of Midland Service Water Pump Structure
Load Test & Pile Driving Spec.
See Afifi letter of 25 March 1980

My review comments are made in the margins of the attached spec.

Note that I did not receive the concrete spec. for review.

BECHTEL ASSOCIATES PROFESSIONAL CORPORATION
ANN ARBOR, MICHIGAN

TECHNICAL SPECIFICATION

FOR

FURNISHING, INSTALLING, AND TESTING

CLOSED END PIPE PILES

No	DATE	REVISIONS	BY	CH'K	APP'D
0	12-8-77	ISSUED FOR FIELD USE			

ORIGIN			JOB No 7220	
BAPC	BECHTEL	CONSUMERS POWER COMPANY MIDLAND PLANTS UNITS 1 AND 2 MIDLAND, MICHIGAN	SPEC/DES GUIDE No	REV
			7220-C-94(Q)	0

SHEET 1 OF 111

AA-C-10

SHEET	LATEST REV.	SHEET	LATEST REV.	SHEET	LATEST REV.	SHEET	LATEST REV	SHEET	LATEST REV.	SHEET	LATEST REV	SHEET	LATEST REV
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ATT.1													
SH 1	0												
SH 2	0												

NO.	DATE	REVISIONS	BY	CHK'D	APP'D	NO.	DATE	REVISIONS	BY	CHK'D	APP
0	10-8-79	ISSUED FOR FIELD USE									

BECHTEL

FACING SHEET

CONSUMERS POWER COMPANY
MIDLAND PLANTS UNITS 1 & 2
MIDLAND, MICHIGAN

JOB No. 7220

C-94(Q)

11

REV. 0

AAG-1N273

TECHNICAL SPECIFICATION

FOR

SUBCONTRACT FOR

FURNISHING, INSTALLING, AND TESTING

CLOSED END PIPE PILES

CONTENTS

APPENDIXES

1.0 SCOPE

1.1 ITEMS INCLUDED

The following items are included under the scope of this subcontract and involve furnishing, installing, and testing closed-end steel pipe piles. This specification includes quality-related work (Q-listed) where specifically noted and shall be performed in accordance with Subcontractor's quality assurance (QA) program (Appendix A) and this specification.

1.1.1 Furnishing, delivering, predrilling, and driving of steel pipe piles

1.1.2 Unloading, sorting, storing, and handling of piles

1.1.3 Splicing piles as required

1.1.4 Furnishing and installing splice plates, end closures, and steel plate pile caps as required

1.1.5 Reading and recording test pile data

1.1.6 Cutting off piles to required elevations

1.1.7 Placing reinforcing steel and concrete in piles

1.1.8 Site cleanup and removal of all waste material

1.1.9 Surveying to establish cutoff elevation

1.1.10 Furnishing and installing test pile and all equipment for testing

1.1.11 Performing all load tests

1.1.12 Transfer of load from the corbel to the piles

1.2 RELATED ITEMS NOT INCLUDED

1.2.1 Excavation, backfill, and grading

1.2.2 Establishing plant horizontal and vertical surveying control points

1.2.3 Evaluating test pile data

1.2.4 Furnishing concrete

1.2.5 Testing concrete

1.2.6 Furnishing reinforcing steel

1.2.7 The Contractor shall provide local dewatering such that all excavated work will be performed in a dry condition.

2.0 ABBREVIATIONS

ACI	American Concrete Institute
ASTM	American Society of Testing and Materials
AWS	American Welding Society

3.0 REFERENCED CODES AND STANDARDS

ACI	304-1977	Measuring, Mixing, and Placing Concrete
ASTM	A 36-1977a	Structural Steel
ASTM	A 252-77a	Welded and Seamless Steel Pipe Piles
ASTM	D 1143-74	Testing Piles Under Axial Compressive Load
AWS	D1.1-1979	Structural Welding Code

4.0 DOCUMENTATION REQUIREMENTS

4.1 Engineering and quality verification documents shall be submitted to Contractor by Subcontractor. Permission to proceed, based upon Contractor's review of the procedures, does not constitute acceptance or approval of design details, calculations, analyses, test methods, or materials developed or selected by Subcontractor and does not relieve Subcontractor from full compliance with contractual obligations. The submittal requirements are summarized in Form G-321-D,

attached. These requirements are augmented by detailed requirements in this specification.

4.2 As a minimum, Subcontractor shall submit the following procedures (in detail, including hold points and witness points) to Contractor's satisfaction.

4.2.1 General pile procedure - This procedure shall include the overall concept of the work involved, including the interface of all the operations listed below.

4.2.2 Pile installation procedure

4.2.3 Load transfer procedure

4.2.4 Cleaning and placing concrete in the pile procedure

4.2.5 Pile testing procedure

4.2.6 Welding procedures and qualifications

4.2.7 Final cleanup procedure

5.0 MATERIAL REQUIREMENTS

5.1 PIPE PILES

Pipe piles shall conform to ASTM A 252, Grade 2, be seamless, and shall be one piece without splices below the cutoff elevation. Previously used or rejected pipe shall not be used.

5.2 MISCELLANEOUS STEEL

5.2.1 Steel for splicing, end closures, and miscellaneous metal shall conform to ASTM A 36. The closure plate shall be 1-1/2 inches thick minimum and have an outside diameter of 15 inches

5.2.2 Pipe caps shall conform to ASTM A 36 and shall protect the pile being driven.

5.3 MILL TEST REPORTS

Materials shall conform to the above standard specifications, and Subcontractor shall submit to Contractor certified copies of mill test

reports covering chemical composition and physical properties of all material used as specified by the applicable specifications.

5.4 CONCRETE

Concrete for filling piles shall be provided by Contractor and shall conform to ASTM C 94, using Portland Cement Type I. Compressive strength shall be a minimum of 6,000 psi at 28 days. The maximum aggregate size shall be 3/4 inch. Slump shall be ~~a maximum of~~ 5 inches ± 1 inch. ± 1"

6.0 DESIGN REQUIREMENTS

6.1 Pile size shall be as shown in Table 1. The pile length and capacities indicated are estimated. They may be adjusted after the load test.

TABLE 1

Design Capacity (tons)	Outside Diameter (inches)	Minimum Wall Thickness (inches)	Length (ft)
100	14.00	0.5	55

6.2 Piles shall be of sufficient strength to prevent distortion during driving of the pile or adjacent piles.

6.3 Piles shall have the butt end square cut and a closure plate welded to the tip end. Subcontractor shall submit, to the satisfaction of the Contractor, detail drawings showing proposed fit-up.

7.0 FIELD OPERATIONS

Piles shall be fabricated full length for the length of the pile to be left in place. Field splices may be made on the piles for the length of the pile not to be left in place (i.e., cutoff section). Field splicing locations and details shall be subject to approval of Contractor. All splices shall be such as to fully develop the capacity of the pile. Splicing details shall be submitted to Contractor for approval prior to use.

Delete 6.2 You cannot specify pile & tell it how it behaves - Must accept the result.

Redundant - see 7.0, 10.1

See 5.1

Subcontractor shall submit to Contractor for approval of the manufacturer's maintenance instructions and specifications showing hammer timing

7.1 DRIVING EQUIPMENT REQUIREMENTS

7.1.1 ~~The driving equipment shall be a type designed for driving steel closed end pipe piles~~. The equipment shall be in good working condition and shall be subject to review and approval of Contractor. Such equipment shall be furnished in the quantity and capacity necessary to perform the driving required by this specification. The valve mechanism of steam and air hammers shall be so maintained that position of stroke, length of stroke, and number of blows per minute for which the hammer is designed will be attained. ~~Driving equipment shall be equipped with pressure gages located as close to the hammer as possible or other devices, both of which are calibrated to measure efficiency and permit monitoring energy output and adequacy of equipment operation.~~ Hammers shall be operated at final drive ~~at all times~~ at the pressure, speed, and stroke recommended in writing by the manufacturer. Boiler or compressor capacity shall be sufficient to operate the hammer continuously at the full rated speed and energy.

7.1.2 Drivers shall have leads extending down to the lowest point of the hammer will travel, supporting the pile firmly in position while maintaining axial alignment of the pile with the hammer.

7.1.3 The hammer energy (manufacturer's rated energy) shall be a minimum of 32,500 ft-lb, and a maximum of 50,000 ft-lb.

7.1.4 Hammers shall be single acting ~~and~~ air/steam hammers ~~shall be capable of delivering the energy given above.~~

7.1.5 ~~The pile driver shall have a minimum power source of 500 hp.~~

7.1.6 Pile cap blocks and driving caps shall be suitable for the proper operation of the hammer, have the correct shape and dimensions, and provide adequate fit to and protection for the pile. Cap block material shall consist of alternate layers of Micarta plastic and aluminum

disks. They shall be subject to approval by Contractor.

7.2 PILE HANDLING REQUIREMENTS

7.2.1 ~~Piles shall be handled and lifted so as not to exceed the design bending stresses. Piles shall be braced in the leads to prevent whipping during driving. The pile shall be supported in rigid leads that extend to within 2 feet of the elevation the pile enters the ground.~~ Before driving is started, the leads and pile shall be plumbed. A satisfactory driving cap shall be provided to prevent damage to the top of the pile and to hold the pile centered under the hammer.

7.2.2 ~~Piles of high slenderness ratios shall be handled and driven in a manner that shall prevent overstressing or dislocation of pile tip during driving.~~

7.3 PILE DRIVING PROCEDURES

7.3.1 After assembly, all piles shall be approved by Contractor before being driven.

7.3.2 Predrilling shall be required to an approximate elevation of 600 feet for all piles, or as directed by Contractor. Jetting shall not be allowed.

7.3.3 Piles shall be accurately positioned with heads square to the driving axis, and shall be driven plumb. The maximum allowable deviation from the indicated location at the cutoff elevation for any pile shall be 3 inches, measured in any direction, ~~but the algebraic sum of the deviation for all the piles shall not exceed 3 inches in any direction.~~

7.3.4 Unless otherwise approved in writing by Contractor, piles exceeding this tolerance shall be withdrawn and redriven by and at the expense of Subcontractor.

7.3.5 Piles shall be spliced when required with full-penetration butt welds all around. ~~Splices shall be located in the section of the pile that will not be left in place~~. Plate splices may be used only with written approval of Contractor. Splices shall be made and installed to ensure good alignment of the spliced parts. ~~Welding shall be done in accordance with AWS D1.1.~~

7.3.6 Piles shall be driven only upon approval and in the presence of Contractor. Unless otherwise approved, driving shall not be done within 25 feet of concrete that has been in place less than 3 days. Each pile shall, without interruption, be driven to the required resistance, unless delayed by splicing operations, by unforeseen causes or as otherwise required by Contractor. ~~If driving is interrupted before final penetration is reached, at least 12 inches of penetration shall be obtained before the final blowcount is taken.~~

7.3.7 Piles shall be driven to the specified blowcount determined by Contractor from the pile load tests performed before the start of production driving. The hammer used in the production driving shall ~~have the same rated energy as the~~ be the same hammer used for the test.

7.3.8 Piles shall penetrate ~~approximately to~~ into the bearing stratum, which occurs at an approximate elevation of 580 feet, and shall obtain the minimum number of blowcounts determined by the test load unless otherwise directed by Contractor.

7.3.9 After driving, all piles shall be cut off square at the cutoff elevation, and the surplus material shall be disposed of as directed by Contractor.

7.3.10 The following procedures shall be followed for the pile driving:

a. After initial driving and before another adjacent pile in the same cluster is driven, the elevation of each pile shall be established.

b. Uplift of the driven piles shall be checked by resurveying the pile after all piles in the same cluster are driven.

c. All piles which have an uplift of more than 1/2 inch shall be redriven as indicated in Sections 7.3.10.d and 7.3.10.e. ~~Any piles with an uplift of 2 inches or more shall be brought to the attention of Contractor for evaluation on an individual basis.~~

You damn well better be watching

d. The piles to be redriven shall be marked at 1/2-inch intervals and blowcounts shall be recorded for each 1/2 inch of redrive.

e. The piles with uplift of less than 2 inches shall be redriven to a minimum resistance of 10 blows per 1/2 inch using the hammer described in Section 7.1. This blowcount figure is based on available information and is subject to change after evaluation of pile driving data.

f. Complete records of uplift of piles and redriving shall be maintained and submitted to Contractor for review daily.

The redriving of the piles shall not be considered as a pay item.

7.3.11 Piles determined by Contractor to be damaged, mislocated, or driven out of alignment shall be withdrawn and replaced with new piles or cut off and abandoned as directed by Contractor. and a new pile driven. All activities involved in withdrawing, cutting off, and abandoning, driving, and replacing shall be by, and at the expense of, Subcontractor.

7.3.12 No pile driving shall be carried out while a pile load test is in progress.

7.3.13 Pile centerlines are located 21 inches from the edge of the building (reference Drawing C-2000). The top of the pile during driving shall at all times be above el 656'-0". After the pile has been driven to the desired depth, it shall be cut at the elevation shown on the design drawings.

8.0 CONCRETE PLACEMENT

8.1 Subcontractor shall submit to the satisfaction of Contractor a detailed procedure, including hold points and witness points, describing the placing of concrete in the piles. As a minimum, the placing and consolidation of the concrete shall be in accordance with ~~Articles 11.0 and 12.0 of Specification 7220-C-94(Q)~~ unless otherwise specified herein. (see Appendix B

Need copy for review

8.2 Concrete shall not be placed until installation of the shells has been approved by Contractor.

8.3 Prior to filling with concrete, all piles shall be inspected and all water and debris shall be removed from the pile to the satisfaction of Contractor. Subcontractor shall provide equipment necessary for inspection (lights and mirrors). Piles shall be free of deformations that reduce the cross-sectional area of the pile by more than 5%. All piles shall be watertight.

8.4 Concrete shall be placed continuously in a manner to eliminate segregation and voids in the concrete according to the recommendations of ACI 304. The method of placement and equipment shall be approved by Contractor prior to the start of this work.

8.5 Contractor shall perform slump, percent air content, temperature, unit weight, and compressive strength cylinder tests on the concrete placed. Perform each day concrete is placed. ACI Mix

8.6 Subcontractor shall assist Contractor when performing all concrete testing.

8.7 The concrete shall be water-cured a minimum of 7 continuous days, starting as soon as the application of water does not damage the concrete surface.

9.0 APPROVALS AND RECORDS

9.1 Driving shall not be started without prior written approval as to the type and weight of hammer to be used.

9.2 Subcontractor shall be responsible for maintaining the pile driving record. As a minimum, the driving record shall include the following information:

a. Date and time of driving

b. Type and size of hammer and hammer blows per minute at specified pressure

c. Location and description of pile

d. Designation of pile section

e. Length of pile taken into the leads

f. Tip elevation when driving is completed

g. Cutoff elevation

h. Number of blows per foot

i. Total number of blows per pile

j. Number of blows per inch for the last 6 inches of penetration

k. Number and location of any piles redriven and the hourly time required

10.0 WELDING

10.1 All welding shall be performed in accordance with AWS D1.1. Contractor shall approve all welding procedures.

10.2 All welders shall be qualified to the applicable welding procedures in accordance with AWS D1.1.

11.0 TESTING

11.1 TEST REQUIREMENTS

11.1.1 One pile shall be installed separate from the others for the purpose of performing the required load test. The locations of such a pile shall be as shown in design drawings or as instructed by Contractor.

11.1.2 All test loads shall be performed in the presence of Contractor.

11.1.3 No pile shall be tested until 5 days after being driven. The load test shall be complete without interruption.

11.1.4 Subcontractor shall supply load test equipment with a capacity of 300% of the pile design capacity. Test piles shall be of the same size and material as the production piles and shall be driven with the same equipment and method as specified for the production piles.

11.1.4 → 7.3.7

11.2 TEST METHOD

11.2.1 The load test setup and testing shall conform to ASTM D 1143, modified as specified herein. The loading device shall be in accordance with ASTM D 1143, Section 2.3, apply load by hydraulic jack from anchor piles or Section 2.4, applying load by hydraulic jack from weighed box or platform (reference Figure 1).

D1143-74

11.2.2 Where anchor piles are used, the arrangement shall consist of at least four piles with a minimum of two piles on each side capable of resisting a load a minimum of 300% of the design

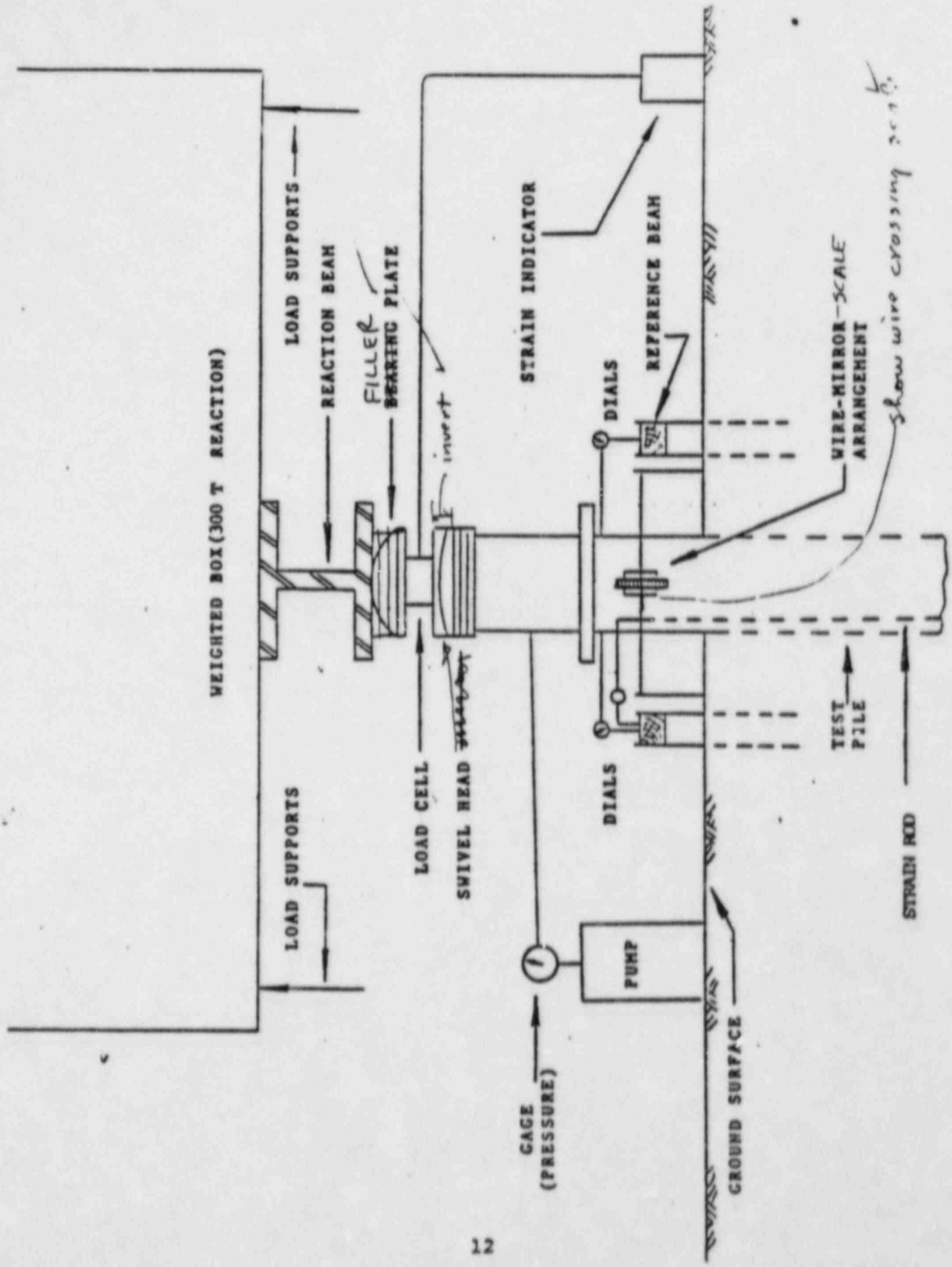
WEIGHTED BOX (300 T REACTION)
LOAD SUPPORTS
REACTION BEAM
FILLER
BEARING PLATE
LOAD CELL
SWIVEL HEAD
STRAIN INDICATOR
DIALS
REFERENCE BEAM
WIRE-MIRROR-SCALE ARRANGEMENT
Show wire crossing
TEST PILE
STRAIN ROD
DIALS
LOAD SUPPORTS
PUMP
GAGE (PRESSURE)
GROUND SURFACE

FIGURE 1

capacity of the test pile. The load shall be applied by a hydraulic jack(s) equipped with a calibrated load cell and gages accurate to within 2% of the applied load. The loading frame shall be designed so that the jacking load is distributed equally to all reaction piles.

11.2.3 For weighted box or platform arrangement, the weight shall be such that a static test load of at least 300% of the design capacity can be applied to the test pile.

11.2.4 A sketch showing an acceptable load test setup is shown in Figure 1.

11.2.5 Subcontractor shall submit its proposed load test arrangement drawings along with the proposal.

11.3 COMPRESSION LOAD TESTS

11.3.1 Subcontractor shall test the piles for bearing in accordance with ASTM D 1143 with modifications specified herein.

11.3.2 Load tests shall be carried to three times the pile design load and shall be in accordance with Sections 4.1, 4.2, and 4.4 of ASTM D 1143. Settlement readings shall be taken and recorded at the instant the load increment is reached and then every 10 minutes, ~~until the settlement ratio has diminished to 0.0002 inch per 10 minutes~~. The reaction piles, if used, shall also be monitored. Deflection shall be taken before each load increment.

11.3.3 Cyclic load tests shall be performed after completion of the load tests described in Section 12.3.2. The piles shall be reloaded from 0 to 100 tons and sustained at 100 tons for 1 hour. The load shall than be cycled three times between 95 and 105 tons ~~at intervals of 1 to every 10 minutes~~ as rapidly as readings can be accurately made.

11.3.4 Subcontractor shall prepare the report specified in Section 6 of ASTM D 1143-74 and submit to Contractor for approval prior to starting production work.

11.4 MEASURING EQUIPMENT

11.4.1 The primary measuring system shall be dial gages conforming to Sections 3.1, 3.2, and 3.2.1 of ASTM D 1143 and a secondary measuring system shall consist of two wire mirrors and scales conforming to Sections 3.1 and 3.2.2 of ASTM D 1143-74. 1143-74

11.4.2 A strain rod 3/8 inch in diameter within a 5/8-inch id and 3/4-inch od oil-filled steel tube extending to the tip of the test pile shall be installed on designated piles as shown in Figure 1. Strain measurements shall be taken after application of each test load increment.

11.5 EQUIPMENT CERTIFICATION

Subcontractor shall be responsible for supplying all testing equipment, jacks, gages, load cells, and similar items. Such equipment shall be certified and calibrated by a reputable testing laboratory within 30 days of the start of the project and each time the equipment is removed from the site.

12.0 TRANSFERRING OF LOAD

12.1 After the piles have been successfully installed by Subcontractor and the bearing plates, girder, jacking stand, and corbel have been installed by Contractor, Subcontractor shall then transfer the load on to the piles.

12.2 The transfer of load shall be in accordance with Subcontractor's procedure. Subcontractor shall submit, to the satisfaction of Contractor, a procedure describing all hold points and witness points in detail and the proposed method of transferring the load on to the piles. The load shall be transferred simultaneously to all piles at 75 tons per pile.

13.0 CLEANING AND RESTORATION

Subcontractor shall restore the work area to the same condition that existed prior to the start of operation and to the satisfaction of Contractor.

14.0 QUALITY ASSURANCE REQUIREMENTS

Subcontractor's QA program shall be in accordance with Specification 7220-G-23, Appendix A, Attachment 2.1 The following operations are to be controlled in accordance with Subcontractor's approved QA program.

14.1 The installation, testing, concreting, grouting, load transfer, and all other incidentals for the permanent piles for the service water pump structure

14.2 Because of the nature of the work, an independent overlay inspection shall be performed by Contractor in accordance with this specification and Subcontractor's procedure.

15.0 MEASUREMENT FOR PAYMENT

15.1 Mobilization and preparatory work shall be measured as a lump sum for each rig. Mobilization and preparatory work shall consist of furnishing, transporting, and assembling the tools, equipment, supplies, and materials required for the work at the site. It shall also include construction of temporary facilities required by Subcontractor, demobilization, and site cleanup.

15.2 PRODUCTION PILES

This item shall be measured in feet as the number of feet of vertical pile satisfactorily installed and as measured from the tip elevation to the design cutoff elevation along the centerline of each pile accepted. This item includes storing, handling, supporting, driving, providing closure plates, redriving, cleaning and inspection, installing concrete, and all other work necessary to complete the pile.

15.3 WASTE PILE

This item shall be measured in feet as the number of feet of unused pile wasted from the standard pile length specified for the order by Contractor. This item includes transportation to the site disposal area designated by Contractor.

15.4 ANCHOR PILE

This item shall be measured in units as the number of satisfactorily installed anchor piles required by the load test.

15.5 PILE TESTS

Pile tests shall be measured in units as the number of tests satisfactorily performed. A test shall include furnishing and setup of loading devices and measuring equipment, application, removal, and maintenance of load; and all other items necessary to complete the test. Test piles shall be measured for payment as indicated in Section 15.2.

15.6 ON AND OFF PILE DRIVING RIGS

Providing and removing pile-driving rigs because of changes in schedule as requested by Contractor shall be measured as a unit.

15.7 PREDRILLING

This item shall be measured in feet as the number of feet of predrilling approved by Contractor. This item includes equipment and material, and drilling and disposing of mud, water, and soil.

EXHIBIT 3

AUG 13 1979

To File

From TCCooke

Date August 10, 1979

Subject MIDLAND PROJECT GWO 7020 - PRE-MEETING AND GENERAL MEETING WITH CONSULTANTS
File: B3.0.3 UFI: 00234-S Serial: CSC-4306

Consumers Power Company

INTERNAL CORRESPONDENCE

CC Attendees
GSKeeley, P14-408B
DBMiller
RMWheeler
KCBrooks(2)

Attendees:

Karl Wiedner, Bechtel
Phil Martinez, Bechtel
Sheriff Afifi, Bechtel
Bimal Dhar, Bechtel
Al Boos, Bechtel
Art Arnold, Bechtel
Dr. Ralph Peck, Consultant
Dr. A. Hendron, Jr., Consultant
Dr. M. T. Davisson, Consultant
Chuck Gould, Consultant
Dick Loughney, Consultant
Tom Cooke, Consumers Power Company
Don Sibbald, Consumers Power Company
Don Horn, Consumers Power Company
Thiru Thiruvengandam, Consumers Power Co.

Please note that serials CSC-4274 and CSC-4255, above subject, omitted the location and dates of the meetings. Both meetings were held in Denver, Colorado. The Pre-Meeting (CSC-4274) was held on June 27, 1979, and the General Meeting (CSC-4255) was held on June 28, 1979.

Please attach this letter to your copy of the meeting notes.

sld

Dep x 5
Davisson (1-12-81)

CAH 23

7907 (Cal.) AUG 10 1979

TO File

FROM TCCooke/RMW

DATE August 8, 1979

SUBJECT MIDLAND PROJECT GWO 7020 - MEETING TO DISCUSS CONSULTANTS' REVISED PROPOSAL - CHANGE TO PERMANENT DEWATERING - JUNE 22, 1979
File: B3.0.3 UFI#-00234 Serial: CSC-4297

Consumers Power Company

INTERNAL CORRESPONDENCE

CC Attendees
KCBrooks (2)

Attendees

Consumers Power Company

T. C. Cooke
G. S. Keeley
D. B. Miller
W. R. Bird
B. W. Marguglio
D. E. Horn
T. R. Thiruvengadam
D. E. Sibbald
K. R. Kline

Bechtel Power Corporation

S. Afifi
R. L. Rixford
G. L. Richardson
L. A. Dreisbach
J. Milandin
G. Tuveson
A. J. Boos
D. Jinnett
R. Simanek
P. A. Martinez
W. Jones
J. Wanzeck
S. Blue
T. Johnson

After lunch at a meeting in Ann Arbor on June 19, 1979, the consultants got together and decided that there may be some advantages to the Project in installing a permanent dewatering system as an alternative to some of the fixes transmitted to the NRC in conjunction with the 50.54f. questions. In the opinion of the consultants, this revised scheme would resolve all questions for potential liquefaction; and, therefore, eliminate the problems associated with the chemical grout. The consultants had noted that the chemical grout in the area of the Diesel Generator Building would not be completed until June or July 1980 at the earliest. They also discussed the problems with the grout penetrating building cracks, utilities, etc. The railroad bay grouting is not required and no longer needs to be considered. The consultants also requested that the need for complete mining below the Auxiliary Building wings be re-evaluated if liquefaction problems are eliminated.

They stated there is a possibility the remaining work would include shear velocity testing underneath the Auxiliary Building electrical penetration areas to estimate contact stresses with possible grouting of local void areas. Profiling of pipes before and after dewatering and duct bank checks and verification would also have to be made. The piling solution for the service water structures will remain

unaffected. Resolution of whether or not permanent dewatering system would have to be a safety system and structure, the possibility of combining the permanent system with the temporary system, installation of Q-list monitoring wells, and a system to monitor the effluent for fines would be required. At the meeting on June 22, 1979, Mr. Tuveson also noted that he would have to recheck his design calculations on the buildings to see whether or not the removal of the buoyant forces would have any effect on the 40-year life of the structures.

The consultants apparently believe that the dewatering system would be easier to defend to the NRC and that it is a less complicated fix for liquefaction.

It was noted on June 22, 1979 that the consultants possibly did not consider the structural recheck required without the buoyant support or the FSAR revisions, which were primarily administrative in nature. W. Jones noted that the cost of total dewatering would be in the neighborhood of $10 to $15 Million with required redundancies. This was for a cased well with permanent submersible pumps considered. Dewatering for the Diesel Generator only would cost approximately $2 Million. This would be balanced by a savings of $2 Million for grouting, $2.2 Million for underpinning, $750,000 for dewatering, with nothing allowed for elimination of tie-up of the Diesel Generator area or mining obstructions.

As a sidelight, I&E Report 79-10 discussing Air Bubbles in the Tank Farm, was also suggested as a topic for the July 10 meeting with the NRC in Washington. Prior to the Thursday meeting with the consultants in Denver (June 28), a matrix should be drawn to show the advantages and disadvantages of various methods proposed to date. This would include not only our responses to the 50.54f. items and the consultants' latest proposal, but also some of the earlier alternates used which were previously discarded for one reason or another, since conditions have changed. These items will be discussed prior to the Thursday meeting with the consultants in Denver and at a meeting in Ann Arbor at 8:00 AM on June 27. It was also decided to send the MCAR 6 Interim Report with a copy letter noting that there are other evaluations being made at this time and mentioning the dewatering option.

pp

AUG 9 1979

To File

From TCCooke/RMW

Date August 6, 1979

Consumers Power Company

Internal Correspondence

Subject MIDLAND PROJECT GWO 7020
GENERAL MEETING WITH CONSULTANTS
File: B3.0.3 Serial: CSC-4255 UFI#-00234-S

CC Attendees
GSKeeley, P14-408B
DBMiller
KCBrooks (2)

Attendees:

Karl Wiedner, Bechtel
Phil Martinez, Bechtel
Sherif Afifi, Bechtel
Bimal Dhar, Bechtel
Al Boos, Bechtel
Art Arnold, Bechtel
Dr. Ralph Peck, Consultant
Dr. A. Hendron, Jr., Consultant
Dr. M. T. Davisson, Consultant
Chuck Gould, Consultant
Dick Loughney, Consultant
Tom Cooke, Consumers Power Co.
Don Sibbald, Consumers Power Co.
Don Horn, Consumers Power Co.
Thiru Thiruvengadam, Consumers Power Co.

Introduction

P. A. Martinez noted that this meeting was being held to finalize the consultants' recommendations for information to be sent to the NRC on July 6 in preparation for the July 18 meeting. Mr. Martinez also stated that liquefaction and treatment of material below the Class I structures were the main topics and he briefly reviewed the discussion of the previous evening.

Liquefaction Potential and Sand Backfill around Category I Containment Structures

There is no problem with dewatering since the till can easily support the containment load of 10KSF. Containment Building diameter change of approximately 1/4" due to pre-stressing is too trivial to consider and should be deleted from any concerns. The consultants stated that the permanent dewatering system should be designed to do the job regardless of site conditions (dike locations). After completion of the conceptual design, the initial wells should be installed and dewatering should quickly determine (a few weeks after start of pumping) what is required for the minimum practical design. The permanent dewatering system should contain sufficient redundancy, with more units than required for maintenance purposes. Routine maintenance and renovation over the years will take up a certain number of wells. Total system redundancy would not be required because there would be a time lag from the cessation of pumping before water in an area could rise to a critical level. It would probably be a good idea to have some standby (non-Q) power available for the pumps. To be practical, all power block areas should be dewatered whether problems are known or not. It was noted that Regulatory Guides overlooked the pumping of fines, however, this was thought to be key point and wells generally should be kept 50' minimum from structures on the permanent dewatering system. Continuous sand zones in till would be advantageous for drainage,

however, that condition cannot be assured. Mr. Loughney stated that we should put a ring of wells around the power block. The wells should extend to the clay till. Some of the temporary dewatering wells should be made permanent to allow draining of any crown water (rain, etc). It was again noted that the water would take a week or two to return to the power block area if the system stopped pumping. Since we would have time to make repairs or shut the plant down, only the piezometers need to be Q-listed. Mr. Loughney estimated that the wells should be at about 12' centers with sand vertical drains possibly to help drain crown and perched water tables and some wells in the middle for balance (critical area). The designer would have to plan his systems so as to prevent fines extraction (proper screens and/or distance). For an area of 600' x 500', Mr. Loughney estimated that 250 to 300 wells maximum with submersible pumps would be required on the perimeter. They could be of the type that has heavy wall plastic well screen which would be good for about 40 years. The pumps would normally have a five-year life and cost about $300 each. It could be assumed that about 20 to 30 pumps would go out each year. Timers would be required for the pumps and 440V would be the best voltage. The total well cost would be approximately $3,000 per well. Added to that would have to be the piezometers (Q-listed) and temporary or observations wells. Non-Q standby generators, if desired, could be purchased and installed for about $40,000. The cost of that, the piping and the electrical should be around $2 Million. It was estimated that $25,000 to $35,000 a year maintenance cost would be required after, say, 25 wells go out, and to take care of acid treatment of the wells at three-month intervals. A chemical grout curtain in sand around some pipes could be considered at a later date. However, this should not be a problem. If local clay areas are encountered, the wells should still remain at 12' intervals. The additional settlement due to the dewatering would be in the range of 0-1/2". The design changes required for a wet versus dry fill would be primarily administrative in nature in the FSAR below Elevation 618'. The bearing capacity and sliding friction would be enhanced. The settlement calculations have to be revised in any event. Wells should extend down to till. It was noted that the wells would be much more positive than grouting to prevent liquefaction. It would not be possible to ensure the grouting effectiveness. Dewatering totally eliminates the liquefaction problem.

Removal of Surcharge

The consultants noted that it would take approximately eight weeks of accurate readings prior to removal of the surcharge to obtain required evidence, even though an accurate prediction could probably be made at this time by bracketing the residual settlement expected. Although rebound is independent of long-term settlement, the data will be useful. The consultants need to see the trend on the settlement first Dewatering of the Auxiliary Building would change the trend conditions slightly. That would be the earliest time (present schedule) to remove the surcharge with dependable information. It was noted that about 0.032" has been the maximum deflection in the last three weeks, however, all of the data needs to have temperature corrections applied. Goldberg-Zoino-Dunnicliff are working on correcting the data for temperature. It was also noted that due to long-term settlement, some flexibility in the utilities may have to be designed into the connections based on the settlement predictions which could include differential settlement.

Chemical Grouting

Art Arnold noted that because of verification problems with chemical grout, it would not be necessary unless a very permeable trench was encountered during dewatering. Silica grout in the sand may be acceptable for that situation. It can be deleted as a remedial action from the responses because it is too much of a problem to prove to everyone's satisfaction that adequate grouting has been performed.

Need for Removal of Loose Sands Under the Diesel-Generator Structures

This requirement disappears with Option 5, however, settlement of sand due to vibration has to be calculated. The diesel generator should be started as soon as possible to induce the maximum settlement due to vibration. It is expected that this will be in the range 1/2 to 1" and take place in a few weeks. It would be better for predicting long-term settlement if the water table was not lowered. No other vibratory means approach the use of the diesel generator for pre-vibrating the foundations. Mr. Davisson noted that he needed the diesel generator rpm for his information. Mr. Afifi noted that the running of the generators would also help the seismic calculations. The exact amount of settlement will be determined at a later date based on refined data. At present, a refined calculation is needed because old calculations were based on saturated sand. Mr. Davisson noted that we should look hard at connections of utilities to the diesel generator and the building and that allowance should be made for a maximum of one-foot movement in any direction. This allowance would be over kill for any potential problems. The problem was further complicated because of the fact that there is sand on the north side of the foundation and clay on the south side of the foundation. The pre-load would predict an additional long-term settlement of the clay, then after the diesel generator run, any settlement due to vibration could be determined. We could then add seismic settlement of sand from the earthquake motion and dewatering settlement.

Need for Removal of Loose Sands and/or Soft Clays under Electrical Penetration Areas of FW Valve Pits

B. Dhar summarized the Auxiliary Building electrical penetration areas analysis. He included static and dynamic loads, horizontal and torsional loads. Mr. Dhar noted that the horizontal shear of approximately 1,200 to 1,300 Kips would be transferred to the soil and possibly through the soil to the Turbine Building and/or Containment Building which are analyzed as separate structures. It was noted that the upper floors of the Auxiliary Building wingwalls have a two-inch styrofoam cushion between the two floors and the Containment Building. The shear modulus is calculated from a composite 1,200 foot per second shear wave velocity. The cantilever portion of the structure is probably resting partially on the till and some load is being taken up by the structure. Based on preliminary analysis, a deflection of 1/4" to 1/2" is anticipated based on an uncracked section and ACI 381 "E" Value. The steel would reach a tensile stress of 50 KSI. 1,500 Kips vertical support at the end of wingwall would eliminate any serious cracking problem. This assumes that the soil would be taking zero load. If the structure is required to take the total moment load, two areas would be over-stressed. One would be the wall framing at the southwest area of the control tower and the other would be at the diaphram wall. At 3,000

Kips, there would be zero deflection in the structure (3,000 Kips vertical support applied at the end of the wingwall). A detailed analysis is in progress which will take approximately two to three weeks. The wingwalls could be tied to the Turbine Building slab for the horizontal support. We would also have to change the Auxiliary Building seismic analysis model to some extent. Chuck Gould then outlined the options for taking care of the Auxiliary Building electrical penetration areas problem as follows:

a. Temporary support of valve pit

b. Possible sky hook for the 1,500 Kip load contingent on further structure analysis

c. Excavate 7' beyond the bottom of the slab

d. Grout the loose sand to stabilize the working face

e. Start temporary Turbine Building slab support

f. After stabilizing, start work on five 4' diameter jacking caissons

g. Transfer the load from the sky hook and move to Unit 2

h. Install the remaining caissons for the 3,000 Kip load

i. Possibly drift east and soldier pile to support the excavation when the mass is removed (also serves as bearing support for the Turbine Building)

j. Excavate the fill

k. Fill the material back with lean concrete and then dry pack or grout afterwards. The maximum depth of lean concrete would be about 29'. It would take a long time to dry pack. The possibility of caissons settling would be discussed.

It was noted that the work could stop at Step h. Davisson then discussed some other options to include using the valve pit for access, removal of the soil under the valve pit to the till, and a tie to the electrical penetration area for horizontal shear. Possibly tying into the access gallery or mining valve pit fill, filling with concrete and tying in for horizontal loads would be a way to proceed. It was decided that we should install the caissons and transfer the horizontal load to the valve pit or Turbine Building slab with mining the balance of material under the electrical penetration area only if required by analysis.

The meeting then broke to allow the consultants time to write their preliminary report, a copy of which is attached. This report was briefly discussed following the break.

pp

28 June 1979

Re: Midland Units 1 and 2

The following comments are made by the consultants with respect to items of the agenda discussed today. The ~~items~~ numbers of the headings corresponding to the agenda items

cc: T. E. Johnson
J. C. Hink
B. Dhar
R. L. Rinford
K. Wiedner
P. A. Martinez
R. L. Castleberry
P. K. Chen
W. R. Ferris
T. C. Cook (CPCo.)
T. Thiruvengadam (CPCo.)

~~Permanent Dewatering System~~ ~~Preliminary~~

An exterior deepwell dewatering system can be used to dewater the plant site, with a ~~stop~~ dewatering system being used to remove the crown of the ground water within the dewatered area.

Sufficient redundancy can be provided to assure that the ground water will remain within the desired levels in the event of a disruption or failure of any part of the system.

It is anticipated that after the dewatering system has been operational for over six months that the system could be down from 1 to 2 weeks without the ground water rising above critical level.

The nature of the site, existing soil and backfilled soil is such that after the initial dewatering of the site, the quantity of flow entering into the dewatered area would be ~~about~~ less than ~~300~~ 400 gpm.

As determined ~~by~~ during the initial dewatering installation the spacing of the dewatering wells ~~would~~ could be adopted to compensate for any unforseen soil conditions encountered and or any sources of recharge from the backfill placed around pipe lines extending to the pond and or any ~~other~~ unforseen leaks

operational pipes located at critical points

Any equipment used to mopup the water within the exterior dewatering system would be left in place.

The required observation wells would be installed with the necessary controls at the proper locations to ascertain that the ~~desired~~ desired dewatered conditions are being obtained. The dewatering system would be on, but because of the built-in conservatism, the dewatering system would not. ~~frequent~~ monitoring of the ground water levels and the operating deepwells would be scheduled.

Repair, or replacement of non functioning pumps would be done when sufficient pumps are down.

Scheduled cleaning of the well screens would be performed about every 3 to 6 month period

Assuming a perimeter of 3000 feet the rough estimated cost of an exterior deepwell system complete with the ~~new~~ necessary discharge, electrical controls and wiring and standby generators would be about $1,200000. This assumes 250-300 deepwells.

To this should be added the cost of the interior mopup system, the observation wells and their controls, (probably $20,000) and the yearly maintenance cost.

The estimated yearly ~~maintenance~~ maintenance cost for treating the wells and repairing and or replacing the deepwell pumps is about $55,000.

To the above the cost of the monitoring should be added.

~~Attachment~~

2) Liquefaction Potential

Liquefaction analyses have been conducted by Bechtel, on the basis of Standard Penetration Tests, of the compacted sands below the Diesel Generator Building and various portions of the Auxiliary Building. These analyses have shown that the sands are not dense but do have a Factor of Safety against liquefaction of about 1.5 for an SSE with a maximum ground acceleration of 0.12g. Nevertheless, due to the erratic nature of the backfill, there is the possibility that some loose pockets could liquefy under the

SSE ~~for~~ (0.12g's) and if the SSE were raised to ~~0.20g~~ a higher level, then liquifaction of much of the sand backfill would be a problem.

General areal dewatering is recommended to eliminate the liquefaction potential. The goal would be to lower the piezometric levels from the present ones to somewhere near the top of the till. Dewatering is a more positive fix than chemical grouting because the former can be positively monitored by piezometers whereas it may never be possible to positively prove the beneficial effects of grouting.

Even though liquefaction of loose sands is eliminated by densifying, the seismic shaking will result in some residual settlement after an earthquake. The magnitude of these settlements should be estimated by Boulder, and should account for the effect of sampling disturbance due to free water surface.

5/23

(1/4)

Memo Re: Agenda Item # 5

Support of Auxiliary Building

Date: 28 June 1979 Denver Holiday Inn Airport

By: M.T. Davisson — C.H. Gould

Information furnished to consultants is listed below: (approximate)

1. Containment analyzed as though free of other structures
2. Auxiliary " " " " " " " "
3. Turbine " " " " " " " "
4. Peak impulse amplitude of auxiliary structure at cg is 0.38 in. for 0.12 g.
5. Auxiliary wings figure OK on uncracked section, but steel stress is 40 ksi on cracked section
6. 1500K at E&W ends of wings relieves overstress
7. 3000K " " " " " " restores original zero deflection
8. Horizontal force in each wing is 1250K

Methods of fix considered by consultants are:

A. Remove and replace with mass conc unsuitable material under valve pits and wings and permanently support K line of Turbine building on jack piles. Temporary support of wings with caissons at E&W ends

up to 3000 kips each.

B. Permanent support by caissons of E & W ends of wings with 3000 kips each end. Remove unsuitable material under valve pit and replace with mass concrete. Support K-line of Turbine Building with jack piles as required. Options are:

(1) Tie auxiliary building to Turbine mat for lateral seismic resistance

(2) Tie auxiliary building to valve pit and the concrete fill beneath it. Option is:

(a) Also tie valve pit to buttress access shafts for additional lateral resistance.

Construction procedures for jacked caissons have been thoroughly reviewed ~~by~~ in prior meetings. However, concept B above calls for permanent category I caissons; jack piles are not recommended. The following items are pertinent to jacked caissons:

(3/4)

1. Steel casing is ignored for permanent load carrying.

2. Concrete is now Q

3. Till is the supporting material.

4. Design pressure on till is twice that under the ~~Commitment~~ PSAR commitment. This is offset by following advantages:

   a. Proof load test to 1.5 times working load greatly exceeds the 1.12 (perhaps more 1.20) times working load in a ~~seismic~~ event. Analysis shows bearing value ~~capacity~~ has adequate factor of safety, exceeding 2.5.

   b. Procedure calls for regacking piles to assure proper load sharing, as with temporary caissons.

We feel that solution B(1) above represents sound engineering. However, if NRC requirements dictate solution B(2) involves ~~tying~~ taking Category I to Category I.

(4/4)

~~Question~~ The consultants request the answers to the following:

1. Static deflection configuration of auxiliary wings under full cantilever treatment, cracked and uncracked.

2. Seismic analysis of auxiliary building with deflection configuration, accelerations at each floor level, edge forces due to rocking, horizontal forces to be resisted and locations.

3. Analysis of auxiliary wing stresses and deflections with 1500K and 3000K each at E and W ends.

~~4. Any available data on history of~~

M.T. Darisson
C.H. Gould
A.J. Hendron, Jr
R. Loughney
R.B. Peck

3. Corel Generator Building

Removal of Surcharge. The longer the full surcharge can remain on the area, the more reliable will be the prediction of the clay-seated portion of the long-term settlement. For this reason, we would prefer to maintain constant conditions as long as ~~possible~~ practicable. We realize, however, that practical considerations do not permit an indefinite delay in surcharge removal. If a suitable means for making reliable temperature corrections to the readings of the piezo settlement gages, which is imperative, we believe that removal could, if necessary, begin by in August. # To this end, we suggest the fabrication and use of possibly four dummy gages, each consisting of a pair of rods in a casing of the same type as that in the actual gages. One rod of each pair would be of identical size and material to that in the ~~each~~ actual gages, and the other of invar of the same dimensions. Each assembly would terminate in a block of concrete placed on top of the fill ~~adjacent to~~ inside the building, adjacent to an active gage. The locations would be selected to

(over)

provide a range in length of dummy gages corresponding to the maximum range of the active gages in the building.

In addition, ~~xxx xxxxx~~ all readings should be interpreted carefully and corrected for thermal effects. To the extent possible, readings should be made under constant conditions, as in the early morning.

Loose sands beneath the building will not compromise the static bearing capacity or lead to settlement under static loads applied after surcharge removal. Some settlement must be expected due to vibration of the ~~xxx~~ diesel engines; this should preferably be induced by operating the machines before general dewatering of the area, whereupon the settlement will be correspondingly reduced during use of the machines in the future. Earthquake-induced settlements are discussed under Liquefaction Potential.

5) Need for Removal of Soft Sandy Under-
Diesel Generator Structure

If general, permanent lantern
is adopted, there is no need to excavate
the loose sandy soils for the diesel generator
building. Their static stiffness and
bearing capacity is fully adequate for the
static and dynamic loads being imposed. The
connection of pipes and the building
or equipment within the building must
be capable of taking the differential settlements
arising from the fact that the sands on
the north side of the Diesel generator
building will undergo more seismic
induced settlement than the sands

side of the structure supported on cohesive backfill is not likely to settle significantly under the seismic loading."

(-1) ~~Fork form liquefaction potential problem disappears if permanent dewatering is adopted~~

7. <u>Service Water Structure</u>

(-2) Service water structure underpinning with driven piles and a corbel is a positive solution. Even if liquefaction occurs, the piles maintain their buckling load as a minimum. The analysis of the structure should treat ~~the~~ piles in the normal manner; if the buckling load is ~~[illegible]~~ lower bound, the analyses should treat the piles as applying an upward load equal to the buckling load to the structure. The horizontal forces det-

main portion of the structure.

BECHTEL ASSOCIATES PROFESSIONAL CORPC
ANN ARBOR, MICHIGAN

Cover Sheet
Note 4
Revised/COMMENTS
only

Notes Incrd
12/14-15/80

D+6
Jansen (1-12-81)

TECHNICAL SPECIFICATION

FOR

FURNISHING, INSTALLING, AND TESTING

CLOSED END PIPE PILES

MEMO FROM P. K. CHEN
ANN ARBOR
DATE 12/15/80
TO:

Tom:

This is the final spec.
to be issued for bids. Please
review & advise us promptly.
I will call you the first part
of next week.
What is your comment on the unit price
also the date of the meeting
to discuss the spec. if necessary.

Thanks.

Call me if you have questions.
313-994-7887

No.	DATE	REVISIONS	BY	CH'K	APPR
2	"	Revised as noted			
1	4/16/80	Revised As Noted			
0	12-8-79	ISSUED FOR FIELD USE			

ORIGIN: BAPC

CONSUMERS POWER COMPANY
MIDLAND PLANTS UNITS 1 AND 2
MIDLAND, MICHIGAN

JOB No. 7220
SPEC/DES GUIDE No: 7220-C-94(Q)
REV: 2

SHEET 1 OF iii

AA-G-100373

SHEET	LATEST REV.	SHEET	LATEST REV.	SHEET	LATEST REV.	SHEET	LATEST REV.	SHEET	LATEST REV.	SHEET	LATEST REV.	SHEET	LATEST REV.
i	2	SH 3	0										
ii	2	SH 4	0										
iii	2	ATT. 2	7										
1	2	ATT. 3	0										
2	2												
3	2	APPX. B											
4	2	22	0										
5	2	23	0										
6	2	24	0										
7	2	25	0										
8	2												
9	2	Fig. 1	1										
10	2	Fig. 2	2										
11	2	Fig. 3	2										
12	2												
13	2												
14	2												
15	2												
16	2												
APPX. A													
A-1	0												
ATT. 1													
SH 1	2												
SH 2	0												

NO.	DATE	REVISIONS	BY	CHK'D	APP'D	NO.	DATE	REVISIONS	BY	CHK'D	APP'D
2		Revised as noted									
1	4-16-80	Revised As Noted									
0	10-2-79	ISSUED FOR FIELD USE									

BECHTEL

FACING SHEET

CONSUMERS POWER COMPANY
MIDLAND PLANTS UNITS 1 & 2
MIDLAND, MICHIGAN

JOB No. 7220

C-94(Q)

ii

REV. 2

TECHNICAL SPECIFICATION

FOR

SUBCONTRACT FOR

FURNISHING, INSTALLING, AND TESTING

CLOSED END PIPE PILES

CONTENTS

APPENDIXES

FIGURES

1.0 SCOPE

1.1 ITEMS INCLUDED

The following items are included under the scope of this subcontract and involve furnishing, installing, and testing closed-end steel pipe piles. This specification includes quality-related work (Q-listed) where specifically noted and shall be performed in accordance with Subcontractor's quality assurance (QA) program (Appendix A) and this specification.

1.1.1 Furnishing, delivering, preaugering, and driving of steel pipe piles and pipe casings | 2

1.1.2 Unloading, sorting, storing, and handling of piles

1.1.3 Splicing of test piles as permitted and required | 2

1.1.4 Furnishing and installing splice plates, end closures, and steel plate pile caps as required

1.1.5 Reading and recording test pile data, production pile test data, building movements, and preparing pile test report | 2

1.1.6 Cutting off piles to required elevations

1.1.7 Placing reinforcing steel and concrete in piles and making test concrete cylinders to be approved by testing laboratory | 2

1.1.8 Site cleanup and removal of all waste material

1.1.9 Surveying to establish pile locations, cutoff elevation and to check heave of driven piles | 2

1.1.10 Furnishing and installing test pile and all equipment for testing

1.1.11 Performing all load tests

1.1.12 Transfer of load from the corbel to the piles

1.2 RELATED ITEMS NOT INCLUDED

1.2.1 Excavation, backfill, and grading

1.2.2 Establishing plant horizontal and vertical surveying control points

1.2.3 Evaluating test pile data

1.2.4 Furnishing concrete

1.2.5 Testing concrete

1.2.6 Furnishing reinforcing steel

1.2.7 The Contractor shall provide local dewatering such that all excavated work will be performed in a dry condition.

1.2.8 Locating buried utilities | 2

2.0 ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials	2
ACI	American Concrete Institute	
ASTM	American Society of Testing and Materials	
AWS	American Welding Society	

3.0 REFERENCED CODES AND STANDARDS

AASHTO M115-1978	Asphalt for Dampproofing and Waterproofing	2
AASHTO M116-1943	Primer for Use with Asphalt in Dampproofing and Waterproofing	
ACI 304-1977	Measuring, Mixing, and Placing Concrete	
ASTM A 36-1978	Structural Steel	
ASTM A 252-77a	Welded and Seamless Steel Pipe Piles	

A53

ASTM	A 615-78	Deformed Billet Steel Bars for Concrete Reinforcement
ASTM	D 1143-74	Testing Piles Under Axial Compressive Load
AWS	D1.1-1977	Structural Welding Code

4.0 DOCUMENTATION REQUIREMENTS

4.1 Engineering and quality verification documents shall be submitted to Contractor by Subcontractor. Permission to proceed, based upon Contractor's review of the procedures, does not constitute acceptance or approval of design details, calculations, analyses, test methods, or materials developed or selected by Subcontractor and does not relieve Subcontractor from full compliance with contractual obligations. The submittal requirements are summarized in Form G-321-D, attached. These requirements are augmented by detailed requirements in this specification.

4.2 As a minimum, Subcontractor shall submit the following procedures (in detail, including hold points and witness points) to Contractor's satisfaction.

4.2.1 General pile procedure - This procedure shall include the overall concept of the work involved, including the interface of all the operations listed below.

4.2.2 Pile installation procedure

4.2.3 Pile transfer procedure

4.2.4 Cleaning and placing concrete in the pile procedure

4.2.5 Pile testing procedure

4.2.6 Welding procedures and qualifications

4.2.7 Final cleanup procedure

5.0 MATERIAL REQUIREMENTS

5.1 PIPE PILES

Pipe piles shall conform to ASTM A 252, Grade 2, be seamless, and shall be one piece

without splices below the cutoff elevation. Previously used or rejected pipe shall not be used. Splicing of test piles is acceptable, provided it meets the requirements of Sections 7.3.5 and 10.1.

5.2 REINFORCING STEEL

Reinforcing steel shall conform to ASTM A 615, Grade 60. Bars supplied for welding shall have carbon content below 0.30% and manganese content below 0.60%.

Does A615 cover this, or is there a spec in addition? 2

5.3 MISCELLANEOUS STEEL

16"-2" ok

Steel for splicing, end closures, and miscellaneous metal shall conform to ASTM A 36. The closure plate shall be 1-1/2 inches thick minimum and have an outside diameter flush with the pipe.

Why? 2

5.4 MILL TEST REPORTS

Materials shall conform to the above standard specifications, and Subcontractor shall submit to Contractor certified copies of mill test reports covering chemical composition and physical properties of all material used as specified by the applicable specifications.

5.5 CONCRETE | 2

Concrete for filling piles shall be provided by Contractor and shall conform to ASTM C 94, using Portland Cement Type I. Compressive strength shall be a minimum of 6,000 psi at 28 days. The maximum aggregate size shall be 3/4 inch. Slump shall be a maximum of 5 inches +1 inch. One cubic foot of cement grout shall be placed in pile prior to pouring concrete. 2

6.0 DESIGN REQUIREMENTS

6.1 Pile size shall be as shown in Table 1. The pile length and capacities indicated are estimated. They may be adjusted after the load test.

TABLE 1

Design Capacity (tons)	Outside Diameter (inches)	Minimum Wall Thickness (inches)	Length (ft)	End Closure Plate Diameter (inches)
100	14.00	0.594	55[1]	1-1/2x14

[1]Pile for pullout test shall be 34 feet and will not require design capacity of 100 tons

6.2 Piles shall have a closure plate welded to the tip end flush with the pipe. Subcontractor shall submit, to the satisfaction of the Contractor, detail drawings showing proposed fit-up. Any defects or deviations from specified requirements shall be approved by the Contractor.

7.0 FIELD OPERATIONS

7.1 DRIVING EQUIPMENT REQUIREMENTS

7.1.1 The equipment shall be in good working condition and shall be subject to review and approval of Contractor. Such equipment shall be furnished in the quantity and capacity necessary to perform the driving required by this specification. The mechanism of steam and air hammers shall be so maintained that the position of stroke and length of stroke for which the hammer is designed will be attained. Hammers shall be operated at final drive at the stroke recommended in writing by the manufacturer. Subcontractor shall submit to Contractor a complete copy of the manufacturer's maintenance instructions showing hammer timing instructions and specifications. Boiler or compressor capacity shall be sufficient to operate the hammer continuously at the full rated speed and energy.

7.1.2 Drivers shall have leads extending down to the lowest point the hammer will

travel, supporting the pile firmly in position while maintaining axial alignment of the pile with the hammer.

7.1.3 The hammer energy (manufacturer's rated energy) shall be a minimum of 37,500 ft-lb, and a maximum of 50,000 ft-lb. | A

7.1.4 Single acting air/steam hammers shall be used.

7.1.5 Pile cap blocks and ~~driving caps~~ driving head shall be suitable for the proper operation of the hammer, have the correct shape and dimensions, and provide adequate fit to and protection for the pile. Cap block material shall consist of alternate layers of Micarta plastic and aluminum disks. They shall be subject to approval by the Contractor.

7.2 PILE HANDLING REQUIREMENTS

7.2.1 Piles shall be handled and lifted so as not to exceed the design bending stress of 21.0 ksi. Piles shall be braced in the leads to prevent whipping during driving. The pile shall be supported in rigid leads ~~that extend to within 2 feet of the elevation the pile enters the ground~~. Before driving is started, the leads and pile shall be plumbed. A satisfactory driving cap shall be provided to prevent damage to the top of the pile and to hold the pile centered under the hammer.

7.2.2 Piles shall be handled and lifted in a manner that will prevent overstress, excessive bending stresses, damage, or mislocation of pile tip during driving. | A

7.3 PILE DRIVING PROCEDURES

7.3.1 After assembly, all piles shall be approved by Contractor before being driven.

7.3.2 ~~In order to permit the piles to be set directly on the till prior to driving~~ Preaugering shall be required to an approximate elevation of 600 feet for all piles, or as directed by | A

Contractor. Preaugering hole diameter shall be equal to or greater than the pile. Jetting shall not be allowed. No predrilling shall be allowed after spudding in of pile for pullout test. △

7.3.3 Piles shall be accurately positioned with heads square to the driving axis, and shall be driven plumb. The maximum allowable deviation from the indicated location at the cutoff elevation for any pile shall be 3 inches, measured in any direction.

2% tolerance

7.3.4 Unless otherwise approved in writing by Contractor, piles exceeding this tolerance shall be withdrawn and redriven by and at the expense of Subcontractor.

7.3.5 Only the test piles shall be spliced when required with full-penetration butt welds all around. Plate splices may be used only with written approval of Contractor. Prior to use, splicing details shall be submitted to Contractor for approval. Splices shall be made and installed to ensure good alignment of the spliced parts. △

7.3.6 ~~Except for the test pile, a bitumen coating shall be applied to the piles for their length in the fill. The surface coat shall be AASHTO M 115, Type B. The prime coat shall be AASHTO M 116.~~ △

why

7.3.7 Piles shall be driven only upon approval and in the presence of Contractor. Unless otherwise approved, driving shall not be done within 25 feet of concrete that has been in place less than 3 days. Each pile shall, without interruption, be driven to the required resistance, unless delayed by unforeseen causes or as otherwise required by Contractor. Care shall be taken to not drive piles more than 10% higher than nominal design driving requirement. △

7.3.8 Piles shall be driven to the specified blowcount determined by Contractor from the pile load tests performed before

J675

M. T. DAVISSON

FOUNDATION ENGINEER

2217 Civil Engineering Building
Urbana, Illinois 61801
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Reply to:

14 Lake Park Road
Champaign, Illinois 61820
Area 217:359-5206

12/15/80

Mtg. Capital Area Arbor - Nilland - Envirotech Pre-Stressed Piles
Ed Burke - MRWJ

Now want 16 piles @ 300T ultimate

@ 25 ksi" 14"OD X 0.750 A_{ST} = 31.2 ksi"
14"OD X 0.594 A_{ST} = 25.0 ksi"

0.594
2
1.138
12.81 2

Energy 50,000 ft-lb / 3/4 = 37,500 ft-lb

Rec. 1400 X 0.750" if 300T Ru required

Acon. 122.7 ksi" psi = 2934

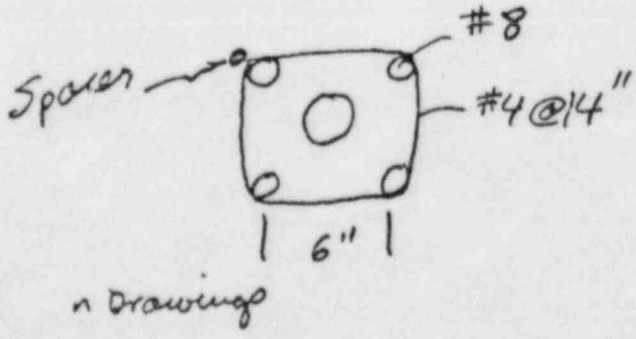
Pump Concrete f'_c = 6000

1400 X 0.594 @ 85.05
1400 X 0.750 106.13
31.2 ksi"

Rebar

16"OD 0.500 = 24.35 ksi"
14.75 16"OD 0.625 = 30.19 ksi"

1600 X 0.656 @ 107.50
31.6 ksi"

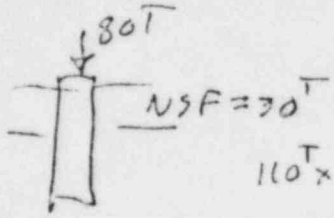


n drawings

Ru req'd 300T
NSF 30T neutralized by 180T EQ Load

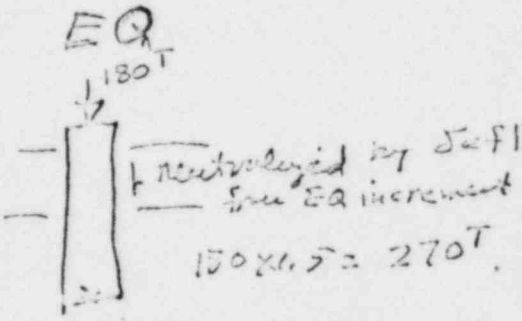
Need 1.5 × 180 = 270T below NSF area

Normal condition



110T × 2.5 = 275T
30
305T Ru Req'd

EQ



150 × 1.5 = 270T.

Recommend against bitumen coating for reducing NSF
Too sophisticated for NRC

Suggest Preload 4 piles at a time
Load to 180T – 200T & hold Pretest
Get rid of creep
Prefer 210T

Sequence
4 to 210T dial log t then go to 210T
get rid of creep show No creep

Can cycle pile for dyn. modulus after 210T

Do all 16 piles
Then get 16 Jacks and lock off at 80T

Test Pile @ 30T increments
test to 210T — 110T (0) – 210T (210) – 110T (0) – 210T (210T) continue to 390T max
revise to 3 cycles
hold 2 hrs.

Test program

14 × 0.594
14 × 0.750
16 × 0.656

Drive
Capping
Then Select

TP NSF pile

ALT TP

the start of production driving. The hammer used in the production driving shall have the same rated energy as the hammer used for the test.

model and

shall be the same

7.3.9 Piles shall penetrate into the bearing stratum, which occurs at an approximate elevation of 580 feet, and shall obtain the minimum number of blowcounts determined by the test load unless otherwise directed by Contractor. The pile for the pullout test shall not penetrate below fill. | △ △

7.3.10 After driving, all piles shall be cut off square at the cutoff elevation, and the surplus material shall be disposed of as directed by Contractor.

7.3.11 The following procedures shall be followed for the pile driving: | △

a. After initial driving and before another adjacent pile in the same cluster is driven, the elevation of each pile shall be established.

b. Uplift of the driven piles shall be checked by resurveying the pile to .01 inch after all piles in the same cluster are driven. | △

0.001 ft

c. All piles which have an uplift of more than 1/2 inch shall be redriven to the original pile elevation and blowcount criteria determined in Section 7.3.8. | △

checkcomment to NRC — Redrive All piles

d. The piles to be redriven shall be marked at 1/2-inch intervals and blowcounts shall be recorded for each 1/2 inch of redrive.

e. Complete records of uplift of piles and redriving shall be maintained and submitted to Contractor for review daily. | △

The redriving of the piles ~~shall not be~~ is considered as a pay item.

incidental

7.3.12 Piles determined by Contractor to be damaged, mislocated, or driven out of alignment shall be withdrawn and | △

replaced with new piles or cut off and abandoned as directed by Contractor. and a new pile driven. All activities involved in withdrawing, cutting off, and abandoning, driving, and replacing shall be by, and at the expense of, Subcontractor. Abandoned piles shall be filled with concrete and abandoned holes shall be filled with sand and gravel. △

7.3.13 No pile driving shall be carried out while a pile load test is in progress.

7.3.14 Pile centerlines are located 21 inches from the edge of the building (reference Drawing C-2000). The top of the pile during driving shall at all times be above el 656'-0". After the pile has been driven to the desired depth, it shall be cut off at the elevation shown on the design drawings. | △ ✓ | △

7.3.15 Should obstructions (including timbers or boulders) be encountered which prevent securing adequate penetration or cause any pile to drift from its required position, driving shall cease and the pile shall be considered a completed pile for the length driven for payment purposes, unless the removal of such obstructions by the Subcontractor is authorized by the Contractor and the pile material is undamaged, permitting further driving. △ ✓

8.0 CONCRETE PLACEMENT

8.1 Subcontractor shall submit to the satisfaction of Contractor a detailed procedure, including hold points and witness points, describing the placing of concrete in the piles. As a minimum, the placing and consolidation of the concrete shall be in accordance with Appendix B of this specification, unless otherwise specified herein. ✓

8.2 Concrete shall not be placed until installation of the pipe has been approved by Contractor. ✓ | △

8.3 Prior to filling with concrete, all piles shall be inspected and all water and debris shall be removed from the pile to the ✓

satisfaction of Contractor. Subcontractor shall provide equipment necessary for inspection (lights and mirrors). Piles shall be free of deformations that reduce the cross-sectional area of the pile by more than 5%. All piles shall be watertight.

8.4 Concrete shall be placed continuously by means of hoppers and drop chutes in order to eliminate segregation and voids in the concrete according to the recommendations of ACI 304. The drop chute shall extend at least 3 feet into the pipe pile. The method of placement and equipment shall be approved by Contractor prior to the start of this work. | 4

8.5 Contractor shall perform slump, percent air content, temperature, unit weight, and compressive strength cylinder tests on concrete batches for each truck load.

8.6 Subcontractor shall assist Contractor when performing all concrete testing.

8.7 Concrete in the top 5 feet of each pipe pile shall be vibrated during placing. | 4

9.0 APPROVALS AND RECORDS

9.1 Driving shall not be started without prior written approval, ~~as to the type and weight of hammer to be used.~~

9.2 Subcontractor shall be responsible for maintaining the pile driving record (reference Figure 1). As a minimum, the driving record shall include the following information (numbered to correspond to pertinent items in Figure 1):

1. Production day number
2. Rig number
3. Pile designation
4. Actual length of pile under the hammer; if spliced, the length of each piece
5. Description of pile cross-section
6. Start time in hour and minute when the hammer first starts driving the pile on a given day

7. Finish time in hour and minute when the hammer strikes the last blow on a given day for a given set-up of the hammer on the pile (Redriving of a pile is treated as a complete separate drive with respect to both start and finish time.)

8. Date of driving

9. Name of person preparing the pile driving record

10. Blow count and depth in feet which the pile penetrated under the static weight of the hammer

11. Blow count recorded in 5-foot intervals when the pile is penetrating easily

12. Blow count recorded in 1-foot intervals when the pile is penetrating sufficiently slowly

13. Depth and time at which driving is stopped temporarily

14. Blow count recorded in 1-inch intervals when final bearing is imminent and penetration is sufficiently slow

15. Approximate ground elevation at location of the pile

16. The final depth of penetration of the pile below ground (Depth should be measured from ground elevation.)

17. The final rate of penetration in ~~blows per foot or~~ blows per inch

18. Hammer model

19. Blow rate (The number of hammer blows per minute should be recorded for firm driving when the hammer is operating essentially as it does at final bearing. The rate should be in the range indicated by the hammer manufacturer. This should be recorded several times per day as a minimum, plus as many times as required for the inspector to develop a feel for proper hammer speed.)

20. Boiler or compressor pressure shall be recorded several times per day and shall always be adequate to maintain hammer speed at final driving. It should also be as recommended by the hammer manufacturer.

21. Remarks covering reasons for delays, other than any unusual or nonroutine items noticed during the driving operation, e.g., pile damage, drift of the pile off center after hitting an obstruction, or reasons for rejection

22. The depth to which drilling or spudding was performed prior to driving, if applicable

23. The length of pile preaugered through overburden above cut-off elevation, if applicable (This is the difference between ground elevation and cut-off elevation.)

24. The pile footage marks at which splices were made and remaining length of pile under the hammer if the head is trimmed of damaged material prior to splicing

25. Indication if the record applies to redriving a pile

26. Indication if the pile has been rejected (The reasons for rejection should be stated under remarks.)

27. Location, names of project, owner, engineer and contractor

10.0 WELDING

10.1 All welding shall be performed in accordance with AWS D1.1. Contractor shall approve all welding procedures.

10.2 All welders shall be qualified to the applicable welding procedures in accordance with AWS D1.1.

10.3 Welding electrodes shall be approved by the Contractor prior to the start of work.

11.0 TESTING

11.1 TEST REQUIREMENTS

11.1.1 One pile shall be installed separate from the others for the purpose of performing the required load test. The locations of such a pile shall be as shown in design drawings or as instructed by Contractor.

11.1.2 All test loads shall be performed in the presence of Contractor.

11.1.3 No pile shall be tested until 5 days after being driven. The load test shall be complete without interruption.

11.1.4 Subcontractor shall supply load test equipment with a capacity of 300% of the pile design capacity. Test piles shall be of the same size and material (could be non-Q) as the production piles.

400T

11.2 TEST METHOD

11.2.1 The load test setup and testing shall conform to ASTM D 1143, modified as specified herein. The loading device shall be in accordance with ASTM D 1143, Section 2.3, apply load by hydraulic jack from anchor piles or Section 2.4, applying load by hydraulic jack from weighted box or platform (reference Figure 2). | E

11.2.2 Where anchor piles are used, the arrangement shall consist of at least four piles with a minimum of two piles on each side capable of resisting a load a minimum of 150% of the design capacity of the test pile. The load shall be applied by a hydraulic jack(s) equipped with a calibrated load cell and gages accurate to within 2% of the applied load. The loading frame shall be designed so that the jacking load is distributed equally to all reaction piles.

400T
390T

bourdon

11.2.3 For weighted box or platform arrangement, the weight shall be such that a static test load of at least

300% of the design capacity can be applied to the test pile.

11.2.4 A sketch showing an acceptable load test setup is shown in Figure 2.

11.2.5 Subcontractor shall submit its proposed load test arrangement drawings along with the proposal.

11.3 COMPRESSION LOAD TESTS

11.3.1 Subcontractor shall test the piles for bearing in accordance with ASTM D 1143 with modifications specified herein.

11.3.2 Load tests shall be carried to three times the pile design load and shall be in accordance with Sections 4.1, 4.2, and ~~4.4~~ of ASTM D 1143. Settlement readings shall be taken and recorded at the instant the load increment is reached and then every 10 minutes. The reaction piles, if used, shall also be monitored. Deflection shall be taken before each load increment. The pile shall be held at the maximum load for a time to be specified by the Contractor. | 2

11.3.3 Cyclic load tests shall be performed after completion of the load tests described in Section 11.3.2. The piles shall be reloaded from 0 to 100 tons and sustained at 100 tons for 1 hour. The load shall then be cycled three times between 95 and 105 tons as rapidly as the readings can be accurately made. | 2

11.3.4 Subcontractor shall prepare the report specified in Section 6 of ASTM D 1143 and submit to Contractor for approval prior to starting production work.

11.4 MEASURING EQUIPMENT

11.4.1 The primary measuring system shall be dial gages conforming to Sections 3.1, 3.2, and 3.2.1 of ASTM D 1143 and a secondary measuring system shall consist of two wire mirrors and scales conforming to Sections 3.1 and 3.2.2 of ASTM D 1143.

11.4.2 A strain rod 3/8 inch in diameter within a 5/8-inch id and 3/4-inch od oil-filled steel tube extending to the tip of the test pile shall be installed on designated piles as shown in Figure Q?. Strain measurements shall be taken after application of each test load increment.

11.5 VERTICAL PULLOUT TEST

The vertical pullout test shall be conducted by reversing the hydraulic jack and applying an uplift load increment of 25% of the tension work load per hour, using the same cycle of testing and time intervals specified for the vertical compression load tests.

11.6 EQUIPMENT CERTIFICATION

Subcontractor shall be responsible for supplying all testing equipment, jacks, gages, load cells, and similar items. Such equipment shall be certified and calibrated by a reputable testing laboratory with equipment traceable to the National Bureau of Standards prior to project use and recalibrated 6 months thereafter.

12.0 TRANSFERRING OF LOAD

12.1 After the piles have been successfully installed by Subcontractor and the bearing plates, grider, jacking stand, and corbel have been installed by Contractor, Subcontractor shall then transfer the load on to the piles. At transfer, pile concrete shall have attained its 28-day compressive strength. | 4

12.2 The transfer of load shall be in accordance with Subcontractor's procedure. Subcontractor shall submit, to the satisfaction of Contractor, a procedure describing all hold points and witness points in detail and the proposed method of transferring the load on to the piles.

13.0 CLEANING AND RESTORATION

Subcontractor shall restore the work area to the same condition that existed prior to the start of operation and to the satisfaction of Contractor.

14.0 QUALITY ASSURANCE REQUIREMENTS

14.1 Subcontractor's QA program shall be in accordance with Appendix A of this specification, unless otherwise stated. The following operations are to be controlled in accordance with Subcontractor's approved QA program.

14.1.1 The installation, testing, concreting, grouting, load transfer, and all other incidentals for the permanent piles for the service water pump structure

14.1.2 Because of the nature of the work, an independent overlay inspection shall be performed by Contractor in accordance with this specification and Subcontractor's procedure. Witness and hold points have been established throughout the specification. These witness and hold points must be maintained. | 4

15.0 MEASUREMENT FOR PAYMENT

15.1 Mobilization and preparatory work shall be measured as a lump sum for each rig. Mobilization and preparatory work shall consist of furnishing, transporting, and assembling the tools, equipment, supplies, and materials required for the work at the site. It shall also include construction of temporary facilities required by Subcontractor, demobilization, and site cleanup.

15.2 PRODUCTION PILES

This item shall be measured in feet as the number of feet of vertical pile satisfactorily installed and as measured from the tip elevation to the design cutoff elevation along the centerline of each pile accepted. This item includes storing, handling, supporting, driving, providing closure plates, redriving, cleaning and inspection, installing concrete, and all other work necessary to complete the pile.

15.3 WASTE PILE

This item shall be measured in feet as the number of feet of unused pile wasted from the

standard pile length specified for the order by Contractor. This item includes transportation to the site disposal area designated by Contractor.

15.4 ANCHOR PILE

This item shall be measured in units as the number of satisfactorily installed anchor piles required by the load test.

15.5 PILE TESTS

Pile tests shall be measured in units as the number of tests satisfactorily performed. A test shall include furnishing and setup of loading devices and measuring equipment, application, removal, and maintenance of load; and all other items necessary to complete the test. Test piles shall be measured for payment as indicated in Section 15.2.

15.6 ON AND OFF PILE DRIVING RIGS

Providing and removing pile-driving rigs because of changes in schedule as requested by Contractor shall be measured as a unit.

15.7 PREAUGERING | 4

This item shall be measured in feet as the number of feet of preaugering approved by Contractor. This item includes equipment and material, and drilling and disposing of mud, water, and soil. | 4

15.8 SPLICES FOR TEST PILES

This item shall be measured in units as the number of splices satisfactorily installed at locations approved by the Contractor.

15.9 STANDBY TIME

Standby time shall be measured by the hour for unmanned or manned driving rigs and includes all time spent in waiting to proceed with the work at the request of the Contractor. 4

15.10 OUT-OF-SEQUENCE MOVE

This item shall be measured by the hour and includes time lost as a result of any Contractor-requested interruptions of the

agreed driving sequence, relocating equipment and material to a new location, and continuance of pile driving in a new sequence.

15.11 OBSTRUCTED PILES

This item shall be measured in feet as the number of feet of vertical pile installed to the point of obstruction which may prevent adequate penetration or cause the pile to drift, unless the removal of such obstructions is authorized by the Contractor and the pile material is undamaged, permitting further driving.

APPENDIX A

QUALITY ASSURANCE REQUIREMENTS FOR Q-LISTED MATERIALS AND WORK

1.0 Subcontractor shall establish and maintain an effective quality assurance program which will meet the applicable requirements of Specification G-23 to ensure that all materials and workmanship hereunder for Seismic Category I structures confrom to the specification.

2.0 Contractor shall have free access to all work and shall have the authority to stop work or reject shipment if the specification requirements, including those for documentation, have not been fulfilled.

3.0 Subcontractor shall furnish documentation in accordance with the specifications as summarized and directed by Form G-321-D. To complete Form G-321-D, Subcontractor shall check in column 8 which documents are being transmitted, and shall sign line 21. Subcontractor shall fill in lines 13 through 20 as applicable. Entries such as "NA" (not applicable) and "See attached sheets" are permissible. The completed Form G-321-D is then used as a cover sheet as directed in Instructions for Preparing G-321-D.

ATTACHMENTS

1. Form G-321-D, Engineering and Quality Verfication Document

2. Specification 7220-G-23, General Requirements for Supplier Quality Assurance Programs, Rev 7

3. Data Sheet 1, Quality Assurance Program Elements, Rev 0

Appendix A
Attachment 1

READ INSTRUCTIONS ON BACK BEFORE FILLING IN FORM

These requirements for Engineering and Quality Verification Documents are to be fulfilled in accordance with the schedule set forth below. Supplier's failure to comply with these requirements may result in order cancellation or withholding of payment until compliance is established.

1. Document Category Number	2. Specification Paragraph Reference	3. Kind of Copies	ENGINEERING DOCUMENTS 4. Quantity Required Initial	4. Quantity Required Final	5. Prior Approval Required Yes	5. Prior Approval Required No	QUALITY VERIFICATION DOCUMENTS 6. Quantity Required for Release	7. Distribution Code	8. Supplier Conformance Check	9. Inspection Release	10. Engineering Review	11. Field QCE Check In	12. Remarks
10.1		Reproducible	1	1	X		NA	*					Package of sample Quality Verification documents showing format and typical content.
		Microfilm											
4.1E	4.2	Reproducible	1	1	X		NA						For each procedure listed in par. 4.2
		Microfilm											
17.1V	5.4	Reproducible	.	NA		X	1	C					
		Microfilm											
1.3E	6.2	Reproducible	1	1	X		NA						
		Microfilm											
1.3E	7.3.5	Reproducible	1	1	X		NA						
		Microfilm											
25.0V	7.1.1&7.1.5	Reproducible		NA		X	1	C					
		Microfilm											
25.0V	8.2	Reproducible		1	X		NA						
		Microfilm											
25.0V	9.0	Reproducible		1		X	1	C					
		Microfilm											
12.0E	10.0	Reproducible	1	1	X		1	C					
		Microfilm											
1.3E	11.0	Reproducible	1	1	X		NA						
		Microfilm											
6.0E	14.0	Reproducible	1	1	X		1	C					A controlled copy to be sent to QC. and Engr.
		Microfilm											
4.2E	7.1.1	Reproducible		1	X		1	C					
		Microfilm											
11.0E	10.3		1	1	X		1	C					

13. Supplier's Order No.	14. Supplier's Part No.	15. Supplier's Part Name	16. Quantity
17. Buyer's Req. Item No.	18. Buyer's Line/Equip., Tag or Code No.	19. Buyer's Part Name	20. Traceability

21. Supplier's Conformance Statement — We certify that the listed work and required documents meet the requirements of the procuring documents. Supplier _____ (Signature) _____ (Title) _____ Date

Authorized Deviations ☐ YES, Noted under 12, Remarks ☐ NONE

22. Inspection Release Statement — Work was released based on satisfactory completion of inspection and review of documentation. Bechtel Inspector _____ (Signature) _____ Date

23. Engineering Review Statement — The Quality Verification Documents submitted to Engineering with this form have been reviewed for conformance to the specified requirements and are acceptable. Engineer _____ (Signature) _____ Date

24. QCE Check-in Statement — This form and the Quality Verification Documents referenced hereon have been received and their relationship to the hardware items verified. CONTROL NO. _____ FILE NO. _____ QCE _____ (Signature) _____ Date

After QCE Check-in Distribute to: Procurement Manager, Field Office Manager, Material Supervisor

G 321.0
AA REV 2
5/74

MIDLAND PLANTS - UNITS 1 & 2
CONSUMERS POWER COMPANY

ENGINEERING AND QUALITY VERIFICATION DOCUMENT REQUIREMENTS

JOB NO. 7220
P.O./SPEC. NUMBER C-94 Q
SHEET 1 OF 4
REV 2

REPRODUCTION OF THIS FORM IS AUTHORIZED

QUALITY VERIFICATION DOCUMENT TRANSMITTAL - REPRODUCE THIS SIDE ONLY

INSTRUCTIONS FOR PREPARING G-321-D

A. PURPOSE. This is a multi-purpose form to be used by Buyer/Contractor to specifically identify documents required of the supplier to satisfy specification requirements, and is to be used by the supplier as a cover sheet for Quality Verification Documents when submitting them to the Buyer/Contractor.

GENERAL INFORMATION. Engineering (E) and Quality Verification (V) Documents are identified by Category number and title in section H. below.

C. USE. A copy of the front of this form shall be completed by the supplier and provided to the Buyer's/Contractor's inspector along with the applicable Quality Verification Documents for his review prior to release of the unit(s).

D. DISTRIBUTION. All Engineering (E) Documents are to be sent to the Project Engineer at the address shown below (Code a).

When inspection release is completed, the Verification (V) Documents are to be distributed to the respective addresses shown below in accordance with the distribution code specified in Column 7. A copy of the completed Form G-321-D must accompany each "package" of Verification Documents to its destination. Also a copy of completed Form G-321-D is to be included with the hardware shipment and a copy sent separately to the Project Field Quality Control Engineer at the jobsite.

Code a
Bechtel Associates Proffessional Corp.
P. O. Box 1000
Ann Arbor, Michigan 48106
Attn: Project Engineer, Job 7220

Code b. With hardware shipment
Bechtel Power Corp.
3500 E. Miller Road
Midland, Michigan 48640

Code c
Bechtel Power Corp.
P. O. Box 2167
Midland, Michigan 48640
Attn: Quality Control Engineer

E. DEFINITIONS OF TERMS. (See also Document Category Definitions G-321 SUP A)

Supplier - This is a generic term and is synonymous with the terms seller, vendor, contractor, subcontractor, sub supplier, etc.
Reproducible - Can be reg ibly duplicated by either microreproduction or electrostatic dry process.
Microfilm - 35mm microfilm conforming to the requirements of the procurement documents. When not specified, supplier shall submit his standard for approval.
Prior Approval Required - Bechtel approval required prior to use of documents in the design, fabrication, installation, or other work process.
Initial - the first submittal of a document in accordance with the schedule mutually agreed to by the Buyer and the supplier.
Final - the submittal that reflects the resolution of review comments; the complete submittal required. Both are to be accepted prior to rendering final payment. Drawings submitted as Fin[illegible] must be full size reproducibles made from original docu[illegible]. Adjacent to the title block, each drawing must be certified and show Buyer's job title, job number, purchase order number, unit, equipment, tag or code number, and the manufacturer's serial number(s).
Certified - Individual's Signature and Title of an authorized and responsible employee of the supplier.
N.A. - Not applicable. Can be used for individual entries, columns and lines by Project engineering, and for individual entries by the supplier.

F. BECHTEL ENTRY INSTRUCTIONS

Entry No.	Information Required
1	Enter Document Category Number.
2	Enter Specification paragraph reference.
3	Make no entry. Relates to kind of copies required.
4	Enter the number of each kind of copy for "initial" or "final" submittals of Engineering Documents.
5	Enter approval requirement by X under "Yes" or "No" column.
6	Enter the number of each kind of copy of Quality Verification Documents required for release of the item or installation.
7	Enter Quality Verification Document distribution code letter in accordance with paragraph D above.
8	Make no entry. For supplier use only.
9	Bechtel Inspector to complete upon release. Sign on line 22.
10	Enter Bechtel Engineering review confirmation. Sign on line 23.
11	Bechtel QCE to complete check-in. Sign on line 24.
12	Enter remarks as appropriate.

G. SUPPLIER ENTRY INSTRUCTIONS

Entry No.	Information Required
8	Enter number of pages of each type of Quality Verification Documents being submitted for the unit(s) being released. Sign Statement of Conformance on line 21.
12	Enter remarks as appropriate. When a deviation has occurred, reference the deviation(s) and Buyer/Contractor's authorization in this column, and include the authorization document(s) in the Verification Document Package.
13, 14, 15	Enter information as required.
16	Enter the numbers of units covered by the Quality Verification Documents being submitted. For each requisition item no. being released, provide a separate copy of this completed form and the supporting Quality Verification Documents.
17, 18, 19	Enter information as required.
20	Enter identification number(s) traceable to the unit(s) being released, e.g. serial no., heat no. of major component, cable reel no. or other unique designator.

H. DOCUMENT CATEGORY NUMBERS. Engineering (E) and Quality Verification (V) Document Requirements as entered in Column 1, and defined in G-321-SUP A Document Category Definitions. For details, see specification paragraph(s) referenced in Column 2.

- 1.0 DRAWINGS (E)
  - 1.1 Outline Dimensions, Services and Foundation Mounting Details
  - 1.2 Assembly Drawings
  - 1.3 Shop Detail Drawings
  - 1.4 Wiring Diagrams
  - 1.5 Control Logic Diagrams
  - 1.6 P & IDs
- 2.0 PARTS LIST AND COST (E)
- 3.0 COMPLETED BECHTEL DATA SHEETS (E)
- 4.0 INSTRUCTIONS (E)
  - 4.1 Erection/Installation
  - 4.2 Operating
  - 4.3 Maintenance
  - 4.4 Site Storage and Handling
- 5.0 SCHEDULES - ENGINEERING AND FABRICATION/ERECTION (E)
- 6.0 QUALITY ASSURANCE MANUAL PROCEDURES (E)
- 7.0 SEISMIC DATA REPORT (E)
- 8.0 ANALYSIS AND DESIGN REPORT (E)
- 9.0 ACOUSTIC DATA REPORT (E)
- 10.0 SAMPLES (E)
  - 10.1 Typical Quality Verification Documents
  - 10.2 Typical Material Used
- 11.0 MATERIAL DESCRIPTION (E)
- 12.0 WELDING PROCEDURES AND QUALIFICATIONS (E), AND VERIFICATION REPORTS (V)
- 13.0 WELD ROD CONTROL PROCEDURES (E), AND VERIFICATION REPORTS (V)
- 14.0 REPAIR PROCEDURES (E), AND MAJOR REPAIR VERIFICATION REPORTS (V)
- 15.0 CLEANING AND COATING PROCEDURES (E), AND VERIFICATION REPORTS (V)
- 16.0 HEAT TREATMENT PROCEDURES (E), AND VERIFICATION REPORTS (V)
- 17.0 CERTIFIED MATERIAL PROPERTY REPORTS (V)
  - 17.1 MTR (Certified Material Test Reports)
  - 17.2 Impact Test Data
  - 17.3 Ferrite Data
  - 17.4 Material Certificate of Compliance
  - 17.5 Electrical Property Reports
- 18.0 CODE COMPLIANCE (V)
- 19.0 UT - ULTRASONIC EXAMINATION PROCEDURES (E), AND VERIFICATION REPORTS (V)
- 20.0 RT - RADIOGRAPHIC EXAMINATION PROCEDURES (E), AND VERIFICATION REPORTS (V)
- 21.0 MT - MAGNETIC PARTICLE EXAMINATION PROCEDURES (E), AND VERIFICATION REPORTS (V)
- 22.0 PT - LIQUID PENETRANT EXAMINATION PROCEDURES (E), AND VERIFICATION REPORTS (V)
- 23.0 EDDY CURRENT EXAMINATION PROCEDURES (E), AND VERIFICATION REPORTS (V)
- 24.0 PRESSURE TEST - HYDRO, AIR LEAK, BUBBLE OR VACUUM TEST PROCEDURE (E), AND VERIFICATION REPORTS (V)
- 25.0 INSPECTION PROCEDURE (E), AND VERIFICATION REPORTS (V)
- 26.0 PERFORMANCE TEST PROCEDURES (E), AND VERIFICATION REPORTS (V)
  - 26.1 Mechanical Tests
  - 26.2 Electrical Tests
- 27.0 PROTOTYPE TEST REPORT (E & V)
- 28.0 SUPPLIER SHIPPING PREPARATION PROCEDURE (E)

DOCUMENT CATEGORY DEFINITIONS

(E) - Engineering Documents. This term comprises procedures, drawings, specifications, QA plans, prototype qualification test procedures, reports, other similar documents that require Bechtel permission to proceed prior to fabrication, or prior to use of the document in the design, fabrication, installation, or other work process unless otherwise indicated. The term is also applied to price lists, and instructional documents for handling, storage, maintenance, etc., that are of informational interest only to project engineering.

(V) - Quality Verification Documents. This term comprises material test reports, heat treatment charts, welding records, NDE results, performance test reports, etc., which demonstrate or certify conformance to the technical or inspection requirements of the procurement documents.

1.0 DRAWINGS (E)

1.1 Outline Dimensions, Services and Foundation Mounting Details - Drawings providing external envelope, including lugs, center line(s), location and size for electrical cable, conduit, fluid, and other service connections, isometrics, and details related to foundations and mountings.

1.2 Assembly Drawings - Detailed drawings indicating sufficient information to facilitate assembly of the component parts of an equipment item.

1.3 Shop Detail Drawings - Drawings which provide sufficient detail to facilitate the fabrication or manufacture of the equipment item. This includes but is not limited to, spool drawings, heat exchanger internal details, internal piping and wiring, cross section details and architectural details.

1.4 Wiring Diagrams - Drawings which show the schematic wiring and connection information for electrical items.

1.5 Control Logic Diagrams - Drawings which show the paths which input signals must follow to accomplish the required responses.

1.6 P&IDs - Piping and Instrumentation Diagrams which show piping system details and the basic control elements.

2.0 PARTS LIST AND COST (E) - Exploded view with identified parts and recommended spare parts for one year's operation with unit cost.

3.0 COMPLETED BECHTEL DATA SHEETS (E) - Information provided by a supplier on data sheets furnished by Bechtel which states serial numbers, operating ranges, etc., of equipment that the supplier intends to deliver to satisfy the specification requirements.

4.0 INSTRUCTIONS (E)

4.1 Erection Installation - Detailed written procedures, instructions, and drawings required to erect or install material or equipment.

4.2 Operating - Detailed written instructions describing how an item or system should be operated.

4.3 Maintenance - Detailed written instructions required to disassemble, reassemble and maintain items or systems in an operating condition.

4.4 Site Storage and Handling - Detailed written instructions which define the requirements and time period, for lubrication, rotation, heating, lifting or other handling requirements to prevent damage or deterioration during storage and handling at jobsite. This includes return shipping instructions.

5.0 SCHEDULES, ENGINEERING AND FABRICATION/ERECTION (E) - Bar charts, critical path methods, etc., which chronologically detail the sequence of activities.

6.0 QUALITY ASSURANCE MANUAL/PROCEDURES (E) - The document(s) which describe(s) the planned and systematic measures that are used to assure that structures, systems, and components will meet the requirements of the procurement documents.

7.0 SEISMIC DATA REPORT (E) - The analytical or test data which provides physical response information on an item, material, component or system in relation to the conditions imposed by the stated seismic criteria.

8.0 ANALYSIS AND DESIGN REPORT (E) - The analytical data, (stress, electrical loading, fluid dynamics, etc.), which assures that an item satisfies specified requirements.

9.0 ACOUSTIC DATA REPORT (E) - The noise, sound and other vibration data required by specification which is in the audible range and above the seismic frequency.

10.0 SAMPLES (E)

10.1 A representative data package which will be submitted for the items purchased as required in the specification.

10.2 A representative example of the material to be used.

11.0 MATERIAL DESCRIPTION (E) - The technical data describing a material which a supplier proposes to use for a specific order. This usually applies to architectural items, e.g., metal siding, decking, doors, paints, coatings.

.0 WELDING PROCEDURES AND QUALIFICATIONS (E), AND VERIFICATION REPORTS (V) - The welding procedures, specification and supporting qualification records required for welding, hard facing, overlay, brazing and soldering. A verification report of welds performed including the identification of the qualified welder(s), and the procedure(s) used, and certification that the welder(s) were qualified.

15.0 MATERIAL CONTROL PROCEDURES (E) - The procedures for controlling issuance, handling, storage, and traceability of material such as weld rod.

14.0 REPAIR PROCEDURES (E), AND MAJOR REPAIR VERIFICATION REPORTS (V) - The procedures for controlling material removal and replacement by welding, brazing, etc., subsequent thermal treatments and final acceptance inspection. Verification reports may include weld repair locations (maps), material test reports for filler metal, pre-and post-weld heat treatment records, NDE records, etc. The resolution of whether a repair is major or not is a Bechtel responsibility.

.0 CLEANING AND COATING PROCEDURES (E), AND VERIFICATION REPORTS (V) - The procedures for removal of dirt, grease or other surface contamination and includes application of protective coatings. Verification reports include certification of visual examination for surface preparation, surface profile, materials, etc., humidity data, temperature data and coating thickness data as required by the procurement documents.

16.0 HEAT TREATMENT PROCEDURES (E), AND VERIFICATION REPORTS (V) - The procedures for controlling temperature, time at temperature as a function of thickness, furnace atmosphere, cooling rate and method, etc. Verification reports normally include furnace charts or similar records which identify and certify the item(s) treated, the procedure used, furnace atmosphere, time at temperature, cooling rate, etc. Verification data may be in either narrative or tabular form.

17.0 CERTIFIED MATERIAL PROPERTY REPORTS (V)

17.1 MTR (Certified Material Test Reports) - These reports include all chemical, physical, mechanical and electrical property test data required by the material specification and applicable codes. This is applicable to cement, concrete, metals, cable jacket materials, rebar, rebar splices, etc. The certified MTR shall include a statement of conformance that the material meets the specification requirements.

17.2 Impact Test Data - Results of all Charpy or drop weight tests including specimen configuration, test temperature and fracture data.

17.3 Ferrite Data - Report of the ferrite percentage for stainless steel materials used, including castings & welding filler metals as deposited.

17.4 Material Certificate of Compliance - Verification document which certifies conformance to the requirements of the applicable material specification.

17.5 Electrical Property Reports - Report of electrical characteristics, e.g., dielectric, impedance, resistance, flame test, corona, etc.

18.0 CODE COMPLIANCE (V) - Verifying documents (such as data Forms U-1, N-2, State, etc.), which are prepared by the manufacturer or installer and certified by the Authorized Code Inspector.

19.0 UT - ULTRASONIC EXAMINATION PROCEDURES (E), AND VERIFICATION REPORTS (V) - Method of detection and examination results of presence and certain characteristics of discontinuities and inclusions in materials by the use of high frequency acoustic energy.

20.0 RT - RADIOGRAPHIC EXAMINATION PROCEDURES (E), AND VERIFICATION REPORTS (V) - Method of detection and examination results of presence and certain characteristics of discontinuities and inclusions in materials by x-ray or gamma-ray exposure of photographic film.

.0 MT - MAGNETIC PARTICLE EXAMINATION PROCEDURES (E), AND VERIFICATION REPORTS (V) - Method of detection and examination results of surface (or near surface) discontinuities in magnetic materials by distortion of an applied magnetic field.

22.0 PT - LIQUID PENETRANT EXAMINATION PROCEDURES (E), AND VERIFICATION REPORTS (V) - Method of detection and examination of surface discontinuities in materials by application of a penetrating liquid in conjunction with suitable development techniques.

23.0 EDDY CURRENT EXAMINATION PROCEDURES (E), AND VERIFICATION REPORTS (V) - Method for detection and examination results of discontinuities in material by distortion of an applied electromagnetic field.

24.0 PRESSURE TEST - HYDRO, AIR, LEAK, BUBBLE OR VACUUM TEST PROCEDURE (E), AND VERIFICATION REPORTS (V) - Method for evaluating the structural and mechanical adequacy or integrity by application of differential pressures, and report of the test results.

25.0 INSPECTION PROCEDURE (E), AND VERIFICATION REPORTS (V) - Organized process followed for the purpose of determining that specified requirements (dimensions, properties, performance results, etc.) are met. Documented findings resulting from an inspection are included in the verification report.

26.0 PERFORMANCE TEST PROCEDURES (E), AND VERIFICATION REPORTS (V) - Tests performed to demonstrate that functional design and operational parameters are met by each item produced and the report of the test results. Test results performed as verification of compliance to qualification requirements shall be submitted as engineering documents.

26.1 Mechanical Test, e.g., pump curves, valve stroking, load, temperature rise, calibration, environmental, etc.

26.2 Electrical Tests, e.g., load, impulse, overload, continuity, voltage, temperature rise, calibration, saturation, loss, etc.

27.0 PROTOTYPE QUALIFICATION TEST PROCEDURES AND TEST REPORTS (E) - Report of a test which is performed on a standard or typical example of equipment, material or item, and is not required for each item produced in order to substantiate the acceptability of equal items. This normally includes tests which may, or could be expected to, result in damage to the item(s) tested.

28.0 PERSONNEL QUALIFICATION PROCEDURES (E) - Procedures for qualifying welders, inspectors and other special process personnel.

29.0 SUPPLIER SHIPPING PREPARATION PROCEDURE (E) - The procedure used by a supplier to prepare finished materials or equipment for shipment from his facility to the jobsite.

0 (OPEN)
.0 (OPEN)
32.0 (OPEN)
33.0 (OPEN)
34.0 (OPEN)

Bechtel Associates Professional Corporation
Ann Arbor, Michigan

Appendix A
Attachment 2
Specification 7220 C-94(Q)
Rev. 0

GENERAL REQUIREMENTS

FOR

SUPPLIER QUALITY ASSURANCE PROGRAMS

FOR THE

MIDLAND PLANT

UNITS 1 AND 2

FOR

CONSUMERS POWER COMPANY

NO	DATE	REVISIONS	BY	CHK	APPD
7	5-14-78	Added Paragraph 1.4, corrected Rev. No. on Exhibit A Corrected Sheet ii-Rev. 6-Block-Added clarification in Paragraph 2.2, Exhibit B-revised	R.E.E.	ED	
6	6/23/77	Revised as noted to clarify and incorporate QA Reg. Guide Requirements Deleted APP. III	LAM		
5	[illegible]	Revised to Ref. Date Sheet 1 and Add Appendix III			
4	1-18-74	Revised to delete "Q" des. and add Appendix II			
3	4-15-74	Revised To Use Mandatory Form Per EDP 4.10 & to Clarify ANSI Ref.			

ORIGIN

GENERAL REQUIREMENTS FOR SUPPLIERS QUALITY ASSURANCE PROGRAMS

JOB No. 7220

SPEC DES GUIDE No	REV
Sheet 1 7220-C-23	7

SHEET	LATEST REV	SHEET	LATEST REV	SHEET	LATEST REV	SHEET	LATEST REV	SHEET	LATEST REV.	SHEET	LATEST REV	SHEET	LATEST REV
i	7												
ii	7												
iii	7												
1	7												
2	7												
3	7												
4	7												
5	7												
6	7												
7	7												
8	7												
App I	5												
App II													
1	6												
2	6												
Exh A	7												
Exh B													
1	7												
2	7												

NO.	DATE	REVISIONS	BY	CHK'D	APP'D	NO.	DATE	REVISIONS	BY	CHK'D	APP'D
6	6/[illegible]/77	Revised to clarify & incorp. Reg. Guides Delete APP III	LAM	R.E.L.	[illegible]						
5	9-7-74	Rev. to Ref. Data Sht and add Appendix III	[illegible]		[illegible]						
4	8-18-74	Rev. to delete "Q" des & add App. II	[illegible]	[illegible]	[illegible]						
3	3-29-74	Rev. to Change Form	[illegible]	[illegible]	[illegible]						
2	3-11-74	Rev. Per CPCo Comments	[illegible]	[illegible]	[illegible]						
1	1/18/74	Rev. Per CPCo comm.	[illegible]	[illegible]	[illegible]						
0	10/3/73	Initial Issue	[illegible]	[illegible]	[illegible]	7	5/1/[illegible]	Correct EXH A Rev. App III-Deleted Rev. 6	RSA	CD	[illegible]

FACING SHEET

GENERAL REQUIREMENTS FOR SUPPLIERS QUALITY

ASSURANCE PROGRAMS

JOB NO 7220

Specification 7220-G-23

REV. 7

Sheet ii

A-233-1C
3-11-58

GENERAL REQUIREMENTS

FOR

SUPPLIER QUALITY ASSURANCE PROGRAMS

FOR THE

MIDLAND PLANT

UNITS 1 & 2

FOR

CONSUMERS POWER COMPANY

TABLE OF CONTENTS

1.0 SCOPE

1.1 This specification provides the quality assurance requirements for the equipment, material, or services as specified in the purchase order, specifications, or material requisitions.

1.2 This specification does not delete or revise (but is in addition to) those requirements defined by the procurement documents. If a supplier believes that an inconsistency exists between this specification and the procurement documents and referenced codes and standards, he shall immediately notify Bechtel for resolution.

1.3 Definitions used herein are derived from ANSI N45.2.10-1973. If the supplier needs clarification, requests departure, or feels an inconsistency exists between this specification and the procurement documents, he shall immediately notify Bechtel for resolution.

1.4 For all activities within the scope of the ASME B&PV Code, the supplier shall maintain a quality program that is in compliance with current Code requirements. All revisions necessary to meet these requirements shall be submitted to the buyer within seven days after the supplier receives written acceptance by the authorized inspection agency. Evidence of Code acceptance shall accompany the submittal.

2.0 GENERAL PROGRAM REQUIREMENTS

2.1 The term supplier, as used herein, includes seller, vendor, contractor, and subcontractor.

2.2 The project quality assurance program is governed by NRC Regulation 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants." To satisfy this requirement, the supplier shall establish and implement a quality assurance program that conforms to the applicable provisions of ANSI N45.2-1971, "Quality Assurance Program Requirements for Nuclear Power Plants" as delineated on Data Sheet 1 (Exhibit A) and to the other codes and standards as cited in the contract documents. For commodities within the scope of the ASME

B&PV Code, the Code shall govern; for those items not within the scope of the Code, ANSI N45.2-1971 QA program requirements shall be applicable. These quality assurance requirements shall apply to all aspects of the work necessary for carrying out this contract, including design, procurement, fabrication, inspection, installation, and testing. (Data Sheet 1 is attached to this specification for reference only. This completed form is attached to the material requisition package.)

2.3 In the event a supplier does have a quality assurance program in accordance with Paragraph 2.2 and if the supplier's function is limited to placing the order with the actual manufacturer, the supplier shall be responsible for providing a controlled copy of the manufacturer's quality assurance program documents to Bechtel within 30 days after the award. The manufacturer's and supplier's quality assurance program documents must meet the requirements as outlined in this specification that pertain to the activities he performs. In no case will the supplier start activities without prior approval of the portions of the program applicable to the respective operation.

2.4 When audits are required the supplier shall implement a system of internal and external audits consistent with the requirements of ANSI N45.2.12, Draft 4, Rev. 1, dated November 1, 1974, "Requirements for Auditing of Quality Assurance Programs for Nuclear Power Plants."

2.5 When it becomes necessary for the supplier to procure materials, components, or services from a subsupplier(s), it is the suppliers responsibility to establish and implement a procurement control process consistent with the requirements and guidelines of ANSI N45.2.13, Draft 3 Rev. 3 dated June 1975, "Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants."

2.6 Definitions utilized in the Supplier's Quality Assurance Program shall be consistent with ANSI N45.2.10-1973.

3.0 ADDITIONAL REQUIREMENTS

3.1 Within 30 days after award of contract and prior to starting any activities relating to the applicable contract, the supplier shall submit a controlled copy of his quality assurance program documents which defines the program that he will follow to meet this specification. With his quality assurance program documents, the supplier may be required to submit a facsimile of data sheet 1, on which he shall complete the "Supplier Document and Paragraph References" column by listing document identity numbers and applicable paragraphs which satisfy the criteria imposed on him (as delineated in the lefthand column of the data sheet). Such a requirement would be invoked at the time of submittal of the controlled copy of the quality assurance program documents.

3.2 Bechtel may approve, approve with comments, or disapprove the supplier quality assurance program documents. Upon Bechtel's approval, activities may proceed. If approved with comments, the Supplier may proceed, provided that he incorporates Bechtel's comments in the quality assurance program documents (i.e. revisions, addenda, or amendments) and resubmits them for final approval within 30 days. In no case will the supplier start activities without prior approval of the portions of the program applicable to the respective operation. Changes to the Bechtel approved program shall be submitted by the supplier for approval in the same manner as original submittals.

NOTES: Approval does not relieve the supplier of the obligation to comply with the requirements of the procurement documents, including this specification. If the program is subsequently found to be ineffective or inadequate in providing for acceptable control, Bechtel reserves the right to require necessary revisions. All proposed program modifications shall be submitted to Bechtel for review and acceptance in accordance with the requirements for initial program submittals.

3.3 In order to comply with Subsection 50.55(e) of 10 CFR 50 Appendix B, the supplier, in less than 12 hours after detection, shall report to Bechtel Project Engineering each deficiency found in design, manufacturing, and/or construction, which, were it to have remained uncorrected, could have affected adversely the safety of operations of the nuclear power plant at any time throughout the expected lifetime of the plant, and which represents:

a. A significant breakdown in any portion of the quality assurance program conducted in accordance with the requirements of ANSI N45.2

b. A significant deficiency in final design as approved and released for manufacturing and/or construction such that the design does not conform to the criteria and bases stated in the specifications

c. A significant deficiency in manufacturing and/or construction of/or significant damage to a structure, system, or component which will require extensive evaluation, extensive redesign, or extensive repair to meet the criteria and bases stated in this specification or to otherwise establish the adequacy of the structure, system, or component to perform its intended safety functions

d. A significant deviation from performance specifications which will require extensive evaluation, extensive redesign, or extensive repair to establish the adequacy of a structure, system, or component to meet the criteria and bases stated in the specifications or to otherwise establish the adequacy of the structure, system, or component to perform its intended safety function.

e. Notification of reportable deficiencies as delineated above shall be by telephone or TWX, followed up by a completed SDDR form per instructions in Appendix II.

3.4 Any departure from the requirements of the procuring documents or Bechtel approved supplier technical documents which the supplier intends to incorporate in the completed item or service provided must be documented on a Supplier Deviation Disposition Request (SDDR). Deviation requests shall be submitted to the Bechtel project engineer with a copy to the Bechtel supplier quality representative if one is assigned within five working days after detection. Specific instructions are contained in Appendix II. The signature of the suppliers authorized representative in block number 17 of the SDDR form, signifies compliance with Paragraph 3.3. In addition, the supplier shall also maintain a status list of all nonconformances.

3.4.1 Definitions

a) Rework is defined as the process by which a nonconforming item is made to conform to a prior specified requirement by completion, remachining, reassembling, or other corrective means. Items classified as rework do not require submittal of the SDDR.

b) See sheet 2 of SDDR for difinition of repair.

3.5 Engineering and quality verification documents shall be submitted to Bechtel in accordance with the provisions of Form G-321-D. While in the supplier's facilities these and other records required by applicable codes and standards which are necessary to verify activities affecting quality, shall be maintained in facilities to protect contents from possible destruction by causes such as fire, flooding, tornadoes, insects, rodents, and from possible deterioration by a combination of extreme variations in temperature and humidity conditions. Storage systems shall provide for the accurate retrieval of information without undue delay. (Compliance to ANSI N45.2.9-1974, "Requirements for Collection, Storage, and Maintenance of Quality Assurance Records for Nuclear Power Plants" fulfills these requirements.) Quality assurance records are those records which

furnish documentary evidence of the quality of items and of activities affecting quality. Records become quality assurance records upon issuance for use.

3.5.1 Records shall not be stored loosely. They shall be firmly attached in binders or placed in folders or envelopes for storage on shelving in containers. Steel file cabinets are preferred.

3.5.2 An audit system shall be established to assure that the quality assurance records' storage system is effective. The following shall be performed as a minimum:

a. Periodic surveys to assure that records logged in are available and have been placed in their proper location within the files and to assure that the control system is adequate 6

b. Periodic audits to assure that the facilities are in good condition and that the temperature/humidity controls and protective devices are functioning properly

c. Periodic audits of the records to assure that the documents are not deteriorating due to improper storage practices or rough handling

d. The frequency of surveys and audits delineated above shall be determined by the supplier and addressed in the quality assurance program documents

3.6 All quality related records, procedures, and qualifications shall be available for examination by Bechtel or Bechtel's authorized agents.

3.7 The applicable quality assurance records shall be considered valid only if stamped, initialed, signed, or otherwise authenticated and dated by authorized personnel. These may be either the original or a high quality reproducible copy. 6

3.8 No quality related record shall be destroyed or otherwise disposed of without written permission of Bechtel (or their designee).

3.9 QUALIFICATIONS OF INSPECTION, EXAMINATION, AND TESTING PERSONNEL

3.9.1 The supplier's quality assurance program shall provide measures to assure that personnel performing safety-related inspections, examinations, and tests are qualified to perform these activities. Such measures include procedures for qualifications of personnel describing the minimum experience, training, and proficiency testing required for qualification. The measures shall also include requirements for records documenting qualifications for each of the suppliers' inspection, examination, and testing personnel. (Compliance to ANSI N45.2.6, "Qualifications of Inspection, Examination, and Testing Personnel for the Construction Phase of Nuclear Power Plants" fulfills these requirements.)

3.9.2 Nondestructive examination performed according to the quality requirements of Section III of the ASME Boiler and Pressure Vessel Code shall be performed by supplier personnel certified to SNT-TC-1A

3.9.3 Personnel qualification procedures will be reviewed by Bechtel prior to initiation of inspections, examinations, or tests.

4.0 QUALITY SURVEILLANCE

4.1 All designing, procuring, manufacturing, processing, assembling, testing, examination, and inspection operations performed by the supplier and his lower-tier suppliers are subject to surveillance by Bechtel or Bechtel's authorized agents. This surveillance shall in no way relieve the supplier of any contractual responsibilities.

NOTE: The term surveillance, here, may include inspection, survey, and/or audit.

4.2 The Bechtel supplier quality representative shall be given free access to the supplier's and his subsupplier's facilities to perform the necessary surveillance and report on the work in all phases of design, manufacturing, and testing. 6 6

4.3 The supplier shall give the Bechtel supplier quality representative at least five working days prior notice of all tests, and other check points in the manufacturing program specifically requested by the representative, after a joint review of supplier's work plan(s) and this specification. 2 5 4

4.4 If the requirements of this specification have not been fulfilled, the Bechtel supplier quality representative has the authority to refuse release for shipment. 5

APPENDIX I

PROPOSAL

(This sheet applies to the bid stage)

With his proposal, each bidder shall submit a summary description of the quality assurance program to be implemented in the performance of the work, or an uncontrolled copy of his quality assurance manual or procedure. This shall include information on the organization of the bidder, including the authority and responsibility of personnel performing QA/QC functions. It shall also explain administrative policies and procedures to be used in carrying out the program.

The bidder shall provide an adequate statement of justification if his quality assurance program does not need to contain all of the elements or portions thereof called for in Data Sheet 1 (Exhibit A). Any modifications agreed to by Bechtel will be identified in the procurement documents.

Bechtel will evaluate the description of the quality assurance program to determine its acceptability. An acceptable quality assurance program is a mandatory requirement for placing an order.

If a bidder is currently performing to or has completed a Bechtel order which invokes the requirements of this specification, he may, in lieu of submitting a copy of his manual, submit a letter listing the date of Bechtel acceptance, the controlled manual to be used and the revision that is currently in effect or was in effect, and a statement that it will apply for this proposed effort.

Bechtel reserves the right to survey/audit the bidder/supplier to determine the adequacy of his quality program as he proposed or is executing.

APPENDIX II

SDDR INSTRUCTIONS

DEVIATION - any departure from the requirements of the procuring documents, which the supplier intends to incorporate in the completed item or service provided.

1.0 The supplier shall be required to submit deviation requests to the Bechtel project engineer with a copy to the Bechtel supplier quality representative within five working days after detection. When this time limit cannot be met, notification by telephone, TWX, etc is acceptable; at that time, a revised submittal date shall be established. Any deviation is considered unacceptable until approval from Bechtel in writing is obtained.

2.0 SDDRs must be supported by technically valid information that is sufficient for project engineering evaluation. When necessary, the supplier shall attach supporting technical documents (of reproducible quality) to the SDDR. One copy of each attachment must also be supplied to the Bechtel (supplier quality representative), if assigned.

3.0 Detailed instructions for completion of the SDDR are shown on the attached form and instruction sheet, Exhibit B. It is required that all portions of the SDDR applicable to the supplier be completed prior to submittal to Bechtel including Block No. 10. If the entries are not completed, the SDDR will be returned to the supplier for inclusion of the pertinent information.

4.0 A copy of the SDDR, with the applicable attachment(s), is returned to the supplier after completion of Bechtel engineering actions.

5.0 For approved SDDRs, suppliers may be required by project engineering to change their engineering documents to reflect the "as-built" condition without extra cost to the Buyer.

A copy of the completed SDDR (including attachments) shall be included by the supplier in the QC data package for the item(s) to which it applies. The SDDR is considered complete when all entries are made including the appropriate verification signatures by the supplier and Bechtel supplier quality representative. If no representative is assigned for the order,

arrangements will be made by Bechtel engineering for verification of implementation.

6.0 A copy of the SDDR form shall be maintained as a QA record by the supplier after all entries have been completed.

QUALITY ASSURANCE PROGRAM ELEMENTS

(DATA SHEET 1)

EXHIBIT A TO
7220-G-23
Rev. 7 ⚠7

THE FOLLOWING ANSI N45.2 - 1971 QUALITY ASSURANCE PROGRAM ELEMENTS APPLY TO THIS SPECIFICATION.

APPLICABLE		TO BE COMPLETED BY BECHTEL	TO BE COMPLETED BY THE SUPPLIER: SUPPLIER DOCUMENT AND PARAGRAPH REFERENCES
☐	QUALITY ASSURANCE PROGRAM		
☐	ORGANIZATION		
☐	DESIGN CONTROL		
☐	PROCUREMENT DOCUMENT CONTROL		
☐	INSTRUCTIONS, PROCEDURES, AND DRAWINGS		
☐	DOCUMENT CONTROL		
☐	CONTROL OF PURCHASED MATL., EQUIP., & SERVICES		
☐	IDENTIFICATION & CONTROL OF MATLS., PARTS, COMPONENTS		
☐	CONTROL OF SPECIAL PROCESSES		
☐	INSPECTION		
☐	TEST CONTROL		
☐	CONTROL OF MEASURING AND TEST EQUIPMENT		
☐	HANDLING, STORAGE AND SHIPPING		
☐	INSPECTION, TEST AND OPERATING STATUS		
☐	NONCONFORMING ITEMS		
☐	CORRECTIVE ACTION		
☐	QUALITY ASSURANCE RECORDS		
☐	AUDITS		
☐	OTHERS		

NO.	DATE	REVISIONS	BY	CHECKED	APPROVED

7220-G-23 DATA SHEET 1	BECHTEL		JOB NO.	
			DOCUMENT NO.	REV.

EXHIBIT B
7220-G-23
Rev. 7

Supplier Deviation Disposition Request

FOR SUPPLIER USE	
Supplier SDDR No.	Date Submitted

NOTE: The reverse side of this form contains the instructions for its preparation and use. Items marked with an asterisk (•) are for Bechtel entries only.

FOR BECHTEL USE	
•Bechtel SDDR No.	•Date Received

Supplier shall complete all blocks 1 through 18 in ink or typewriter. Use N/A for Not Applicable.

1. Supplier Name: _____ Address _____ City & State _____ Zip _____

2. Supplier's Order No.	3. Supplier's Part No.	4. Supplier's Part Name	5. Date Deviation Determined	6. Previous SDDR (No. & Date)
7. Bechtel P. O. No.	**8. Bechtel Part No.**	**9. Bechtel Part Name**	**10. Bechtel Inspector Notified**	**11. Bechtel Eng. Notified**

12. Qty or Serial No.	13. Deviation Description (Attach extra sheets, photographs, sketches, etc. as necessary)

14. Supplier's Disposition Classification: ☐ Use As Is ☐ Repair ☐ Modify Bechtel Requirement

15. Proposed Disposition and Technical Justification: (Attach extra sheets, sketches, etc. as necessary)

16. Associated Supplier Document Change (s):

17. Cost Effects:

18. Suppliers Authorized Representative

Signature: _____ Title: _____

Name: _____ Date: _____

•19. Bechtel Engrg. Action:

☐ Proposed Disposition Accepted ☐ Proposed Disposition Rejected

Engrg. Follow-up: ☐ Dwg Change ☐ Spec/Req. Change ☐ Other Suppliers Affected ☐ Other

•20. Bechtel Disposition Statement Including Justification (Attach extra sheets, sketches, etc. as necessary)

•21. Bechtel Acceptance	Date	Verification Signatures	Date
GS _____			
PE _____		22. Supplier _____	
PQE _____		•23. Bechtel Supplier Quality Representative _____	

INSTRUCTIONS FOR COMPLETING SDDR FORM

(Use Black Ink or Typewriter)

This form is used by a supplier to:

a) Notify Bechtel of deviations from approved technical requirements and document the supplier's proposed disposition, and with their technical justification
b) Record Bechtel's disposition of the SDDR.

A deviation is any departure from the technical requirements of the procuring documents which the supplier proposes to incorporate in the completed item or service provided. Deviation disposition can be classified as Repair, Use-As-Is, or Modify Requirement.

Repair is defined as the process of restoring a nonconforming characteristic to a condition such that the capability of an item to function reliably and safely is unimpaired, even though that item still may not conform to the original requirement. Repair includes alterations to the properties of the material through heat-treating, welding, metal deposition, chemical processing, etc. This form is not to be used for cases where Bechtel has previously provided authorization to proceed using an accepted repair procedure covering a specific type of repair; however, records must be maintained for each specific repair.

Bechtel's engineering action and disposition statement does not relieve the Supplier from responsibility for the accuracy, adequacy, or suitability of the item or service being provided as defined in the procuring documents, nor does it constitute waiver of the right to renegotiate the terms of the procuring documents.

NOTE: Items marked by an asterisk (*) are for Bechtel use only.

Block No.	Entry Information
1.	Supplier's name and address. List lower-tier Supplier's name and location (City and State) if applicable.
2.	Enter the Supplier's order number if one has been assigned.
3.	Enter Supplier's Part No. as applicable from the drawing, catalog, internal specification, etc. If the Deviation Request applies to all parts and additional space is needed, a list of parts to which the request applies may be attached.
4.	Enter Supplier's Part Name.
5.	Enter the date and the method (Spec. review, NDE, dielectric test, etc.) used to disclose the deviation.
6.	List any previous SDDR's and their dates that have been submitted for deviations requested on this Purchase Order.
7.	Enter the Bechtel Purchase Order Number.
8.	Enter the Bechtel Requisition Item, part, tag or code number as it appears in the requisition. If additional space is needed, a separate sheet may be attached.
9.	Enter the Bechtel Part Name if one has been assigned.
10.	Enter the date and the method (TWX, letter, etc.) used to notify the Bechtel Supplier Quality Representative.
11.	Enter the date and the method (TWX, letter, etc.) used to notify Bechtel Engineering.
12.	As applicable, enter quantities or serial numbers of the items to which the deviation applies. If not serialized, record lot, batch, heat or other applicable identifying information.
13.	Describe the deviating characteristics and define the extent of the out-of-specification condition for each identified piece affected. Identify the location of the deviating characteristic by print coordinates or specific location, as applicable. Attach extra sheets, photographs, sketches, etc., as necessary.
14.	Identify disposition classification.
15.	Describe the proposed disposition and provide technical justification for Bechtel's evaluation. If the deviation is correctable by repair, submit a detailed repair procedure or reference the procedure previously accepted (Level 1) by Bechtel for use in similar situations. Provide Bechtel control number, supplier's control number and procedure title.
16.	Identify the nature of changes that may result on associated supplier documents (drawings, specs., procedures, installation instructions, etc.).
17.	Enter the cost impact of the subject deviation.
18.	Enter the name (typed or printed), signature and title of the supplier representative authorizing the disposition request and date signed.
*19.	Enter an X in the applicable boxes.
*20.	Provide appropriate justification for the Bechtel action(s) indicated in Block 19. When changes to drawings, specifications, requisitions, or other Bechtel documents are involved, each document should be identified and the associated change briefly described. If other suppliers are affected, indicate who they are and the document that initiated resolution of that involvement. "Other" follow-up action (e.g., the need for additional Bechtel calculations, additional drawings or sketches, inspection by a Project Engineering representative, etc.) should also be identified here.
*21.	GS – Signature of the responsible Discipline Group Supervisor accepting the Engineering action and the date signed. PE – Signature of the Bechtel Project Engineer and the date signed.
22.	Signature of the supplier's inspector or other representative authorized to verify that the accepted disposition was correctly accomplished.
*23.	Signature of the Bechtel Supplier Quality Representative or other representative verifying that the accepted disposition was correctly accomplished.

NOTE: A copy of the completed SDDR form shall be included by the supplier in the QC data package for each item to which it applies.

QUALITY ASSURANCE PROGRAM ELEMENTS

(DATA SHEET 1)

THE FOLLOWING ANSI N45.2-1971 QUALITY ASSURANCE PROGRAM ELEMENTS APPLY TO THIS SPECIFICATION.

APPLICABLE		TO BE COMPLETED BY BECHTEL	TO BE COMPLETED BY THE SUPPLIER: SUPPLIER DOCUMENT AND PARAGRAPH REFERENCES
[X]	QUALITY ASSURANCE PROGRAM		
[X]	ORGANIZATION		
[ ]	DESIGN CONTROL		
[X]	PROCUREMENT DOCUMENT CONTROL		
[X]	INSTRUCTIONS, PROCEDURES AND DRAWINGS		
[X]	DOCUMENT CONTROL		
[X]	CONTROL OF PURCHASED MATL, EQUIP, & SERVICES		
[X]	IDENT. & CONTROL OF MATLS, PARTS, COMPONENTS		
[ ]	CONTROL OF SPECIAL PROCESSES		
[X]	INSPECTION		
[X]	TEST CONTROL		
[X]	CONTROL OF MEASURING AND TEST EQUIPMENT		
[X]	HANDLING, STORAGE AND SHIPPING		
[ ]	INSPECTION, TEST AND OPERATING STATUS		
[X]	NONCONFORMING ITEMS		
[X]	CORRECTIVE ACTION		
[X]	QUALITY ASSURANCE RECORDS		
[X]	AUDITS		
[X]	OTHERS ANSI N45.2.1; N45.2.2; N45.2.10; N45.2.12; N45.2.13; (As defined in the procurement documents)		

NO	DATE	REVISIONS	BY	CHECKED	APPROVED
0	10-2-79	ISSUED FOR FIELD USE	[illegible]	[illegible]	LHC/[illegible]

BAPC	BECHTEL	CONSUMERS POWER COMPANY MIDLAND POWER PLANT UNITS 1&2 MIDLAND, MICHIGAN	JOB NO 7220 DOCUMENT NO C-94(Q) REV 0

APPENDIX B

to

Specification 7220 C-94(Q) Rev. 0

CONVEYING AND PLACING

Conveying and depositing of concrete shall be in accordance with ACI 301, ACI 318, ACI Committee 304 Report "Placing Concrete by Pumping Methods", ACI 614, ASTM C-94 and as follows: An adequate communication system will be provided. No aluminum pipe or other conveying equipment containing aluminum, that will be in contact with the fresh concrete, shall be used for conveying concrete to point of placement. Steel pipe shall be used for concrete pumps or pneumatic placers. A piping arrangement utilizing a "Y" will be permitted provided a valve is installed at the branch point which will direct the flow into only one branch at any one time. The equipment shall be cleaned at the end of each operation.

11.1 Clean-up Preparation

Before depositing concrete, all placing equipment shall be cleaned. Debris, mud, snow, standing puddles of water, and ice shall be removed from spaces to receive concrete, and the reinforcement and other metal to be embedded shall be thoroughly cleaned of all coatings which might impair the bond. All compacted soil, rock or concrete surfaces to receive concrete shall be thoroughly saturated before placement.

11.2 Deposition

Critical structural concrete as designated on the drawings, shall be deposited in accordance with an approved schedule showing the number, size and sequence of concrete placements. Slabs shall be placed in a checkerboard pattern unless otherwise approved. A concrete placement checkout card shall be completed prior to concrete deposition. See Section 11.9 for procedures for large placements.

11.3 Time Between Adjacent Placements

Unless shown on the drawings or directed by Project Engineering, a minimum of 3 days shall elapse between the placing of concrete of adjacent horizontal sections of mass pours greater than 2- 1/2 feet in the least dimension.

11.4 Adequate provisions shall be made to protect the concrete from rain or snow during placement, and the exposed surfaces of fresh concrete after placement.

11.5 Segregation

Concrete shall not be dropped through dense reinforcing steel which might cause segregation of the coarse aggregate. In such cases spouts, flexible drop chutes, or other suitable means shall be used. In any event, concrete shall not be dropped free through a height of more than 6 feet, except as otherwise approved by Engineering.

On the bottom of formed beams and slabs, where the congestion of steel near the form makes placing difficult, a layer of mortar, not to exceed one inch in depth shall be first deposited. The mortar shall have, as a minimum, the same cement-sand ratio as used in the concrete. Mortars of higher cement-sand ratios approved by Project Engineering may be used.

11.6 Placing Limitations

Concrete shall be deposited in horizontal layers of not greater depth than 24 inches so that satisfactory consolidation can be achieved with vibrators. Concrete shall not be allowed or caused to flow a distance within the mass of more than 5 feet from point of deposition.

11.7 Substitution of Mixes

With the exception of the containment exterior, non-pozzolan mixes may be substituted for mixes containing pozzolans, provided the concrete is 3 feet or less in the least dimension.

11.8 Additional Water

Concrete for Class I structures shall be rejected when the established water/cement ratio is exceeded. Water shall not be added to the concrete after it has been discharged from the batch plant.

11.9 Requirements for Planning Procedures for Large Placements (single item exceeding 600 cubic yards).

The proposed procedure shall be submitted to the Project Engineer at least two weeks in advance of the placement, and shall contain consideration of the following items:

11.9.1 The anticipated size and duration of the placement including both the maximum and average placing rates.

11.9.2 The proposed staffing over the anticipated duration of the placement, including curing, including a breakdown of the number of supervisory personnel, vibrator operators, finishers and laborers planned per shift.

11.9.3 The proposed conveyance system (i.e. the number of transit-mix trucks, the conveyor system, pumpcrete system and/or crane and bucket assemblies, chutes, and tremies) planned to accomplish the pour at the anticipated placing rate.

11.9.4 The planned sequence of the pour to achieve a monolithic slab and to insure against cold joints and the planned movements of the conveyance system (s) to accomplish this.

11.9.5 The checklist for approval of the pour including embedments.

11.9.6 The weather protection facilities proposed to prevent damage in the event of the inclement weather and in the case of planned cold weather placements the enclosure to accomplish the heating requirements for the necessary 7 days. Include the specifics on the heaters.

11.9.7 The procedures to follow in the case of emergencies (i.e. batch plant breakdown with a resultant requirement for an unplanned construction joint).

12.0 CONSOLIDATION OF CONCRETE

Methods for consolidating concrete shall conform with the recommended practices of ACI 309. Concrete shall be consolidated, thoroughly worked around the reinforcement and embedded fixtures, and into corners of the forms by mechanical vibrating equipment. The vibrating equipment shall be of the internal type and shall at all times be adequate in number of units and power of each unit to properly consolidate all concrete. The frequency vibration shall be not less than 7000 cycles per minute. The duration of vibration shall be limited to the necessary time to produce satisfactory consolidation without causing objectionable segregation. In consolidating each layer of concrete, the vibrator shall be operated in a near vertical position, and the vibrating head shall be allowed to penetrate under the action of its own weight and revibrate the concrete in the upper portion of the underlying layer. Surface vibrators shall not be used unless specifically approved by Project Engineering.

Form vibrators may be used in areas of extreme congestion as approved by the Field Engineer. The form vibration shall conform with the recommended practice of ACI-309. .ibrators shall not be used to move or spread concrete. Sufficient spare vibrators shall be kept available for immediate use at the point of desposition . (Recommend one spare vibrator for each three in use.) Provisions shall be made for auxiliary power to provide continuity of vibration in case of power failure from the principal source. Experienced and competent operators shall be provided for each vibrator being used, and shall have received instructions in proper vibration procedures

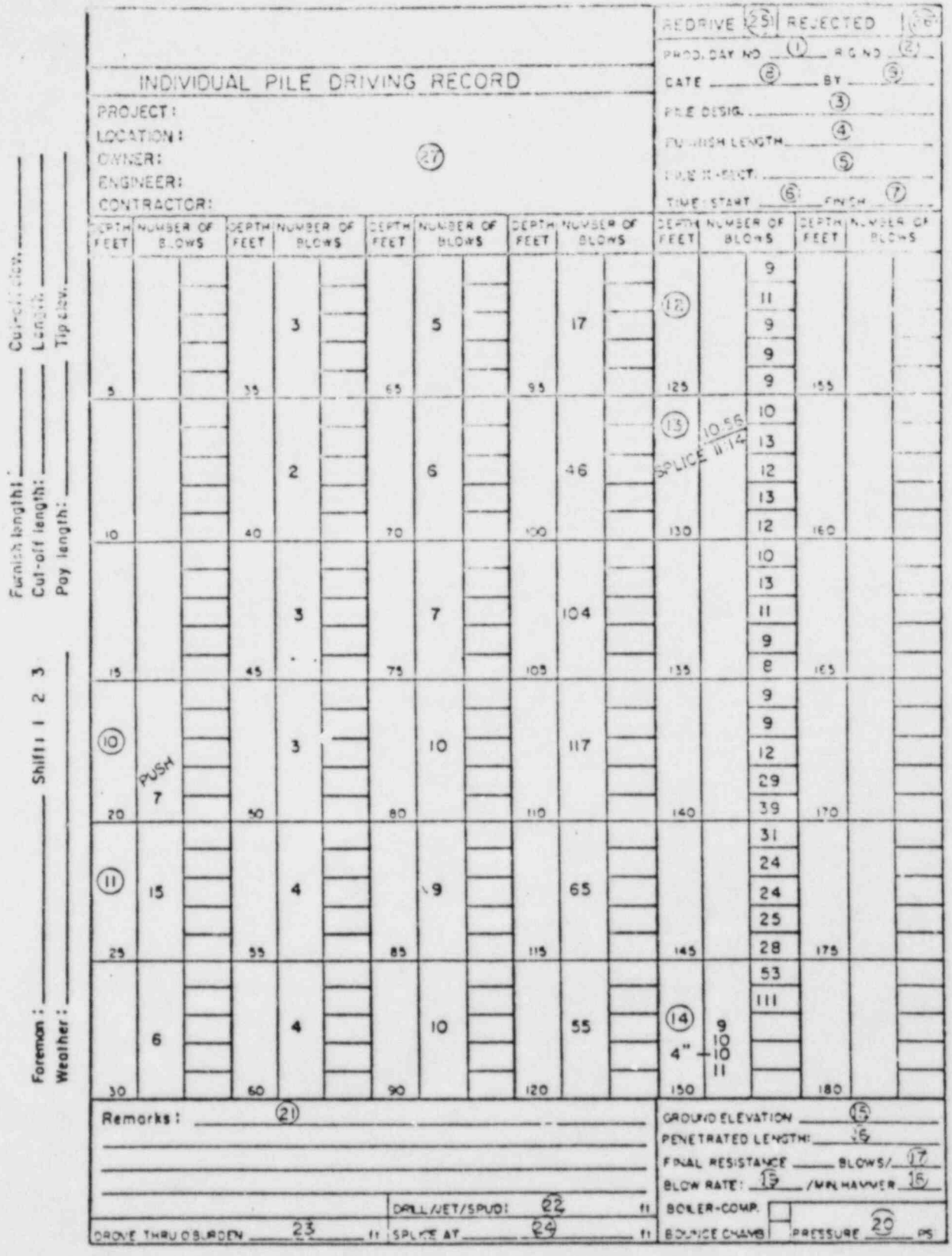
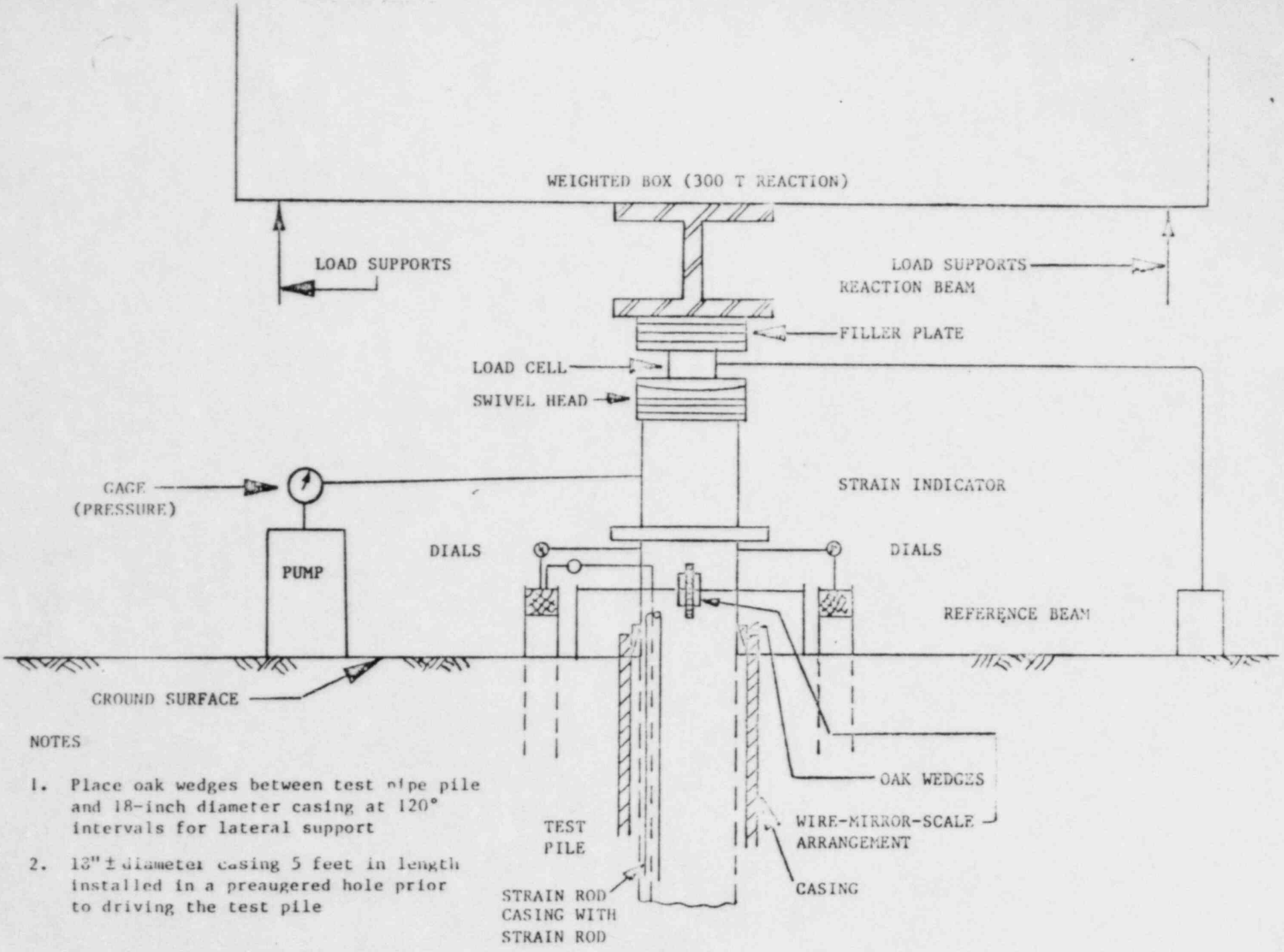

INDIVIDUAL PILE DRIVING RECORD
PROJECT:
LOCATION:
OWNER:
ENGINEER:
CONTRACTOR:
(27)
REDRIVE (25) REJECTED (26)
PROD. DAY NO (1) R.G.N.O. (2)
DATE (2) BY (3)
PILE DESIG. (3)
FURNISH LENGTH (4)
TIME REJECT (5)
TIME: START (6) FINISH (7)
Furnish length: Cut-off elev.
Cut-off length: Length:
Pay length: Tip elev.
Foreman: Shift: 1 2 3
Weather:
DEPTH FEET
NUMBER OF BLOWS
5 3 5 17 (12) 9 11 9 9 9
10 2 6 46 (13) 10 55 SPLICE 11 14 10 13 12 13 12
15 3 7 104 10 13 11 9 8
(10) 20 PUSH 7 3 10 117 9 9 12 29 39
(11) 25 15 4 9 65 31 24 24 25 28
30 6 4 10 55 (14) 4" 9 10 10 11 53 111
Remarks: (21)
GROUND ELEVATION (15)
PENETRATED LENGTH: (16)
FINAL RESISTANCE ____ BLOWS/ (17)
BLOW RATE: (18) /MIN. HAMMER (19)
DRILL/JET/SPUD: (22) ft
BOILER-COMP.
BOUNCE CHAMB. PRESSURE (20) PS
DROVE THRU OBSTRUCTION (23) ft
SPLICE AT (24) ft

FIGURE 1



NOTES

1. Place oak wedges between test pipe pile and 18-inch diameter casing at 120° intervals for lateral support
2. 13" ± diameter casing 5 feet in length installed in a preaugered hole prior to driving the test pile

FIGURE 2 LOAD TEST

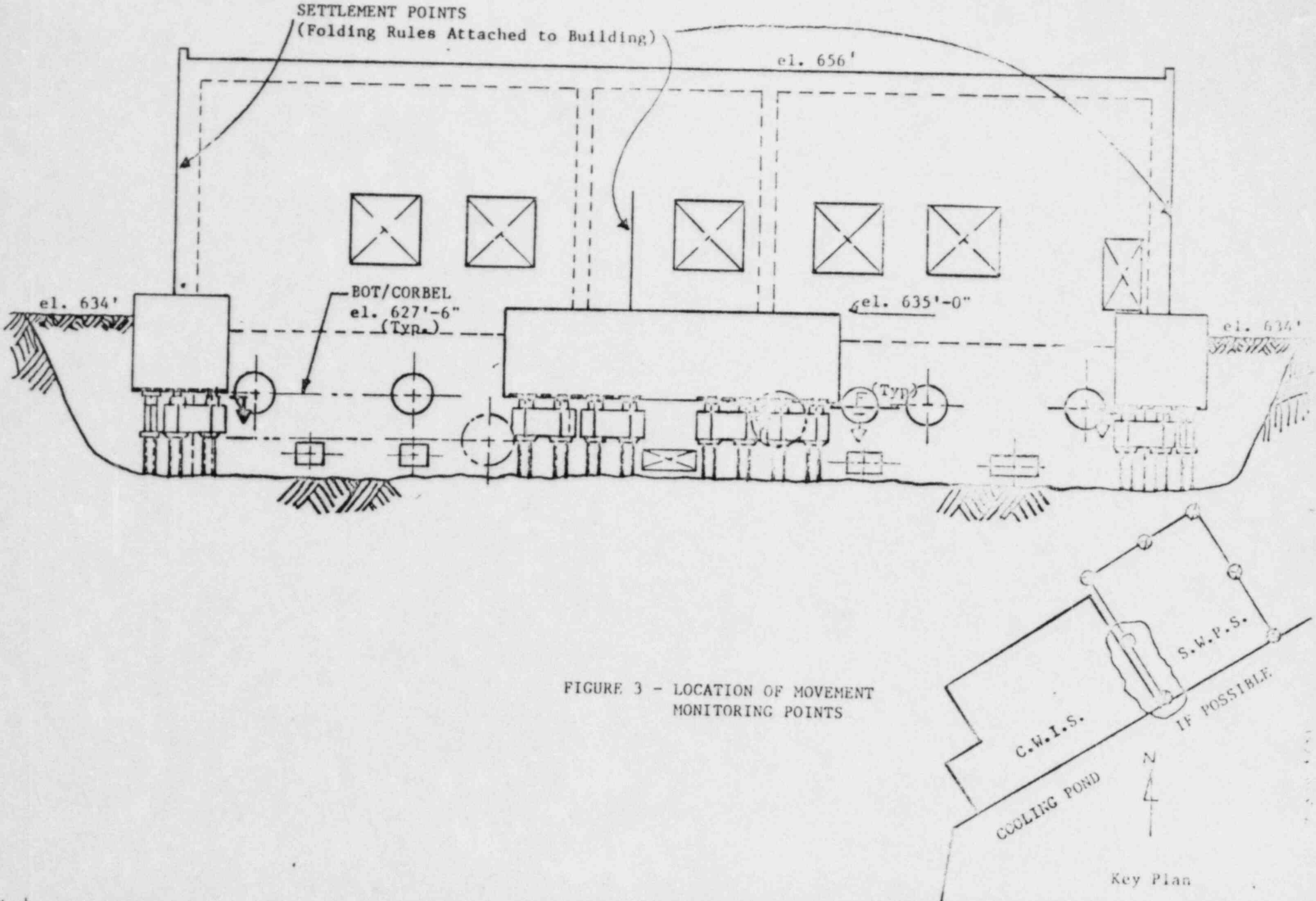


FIGURE 3 - LOCATION OF MOVEMENT MONITORING POINTS

EXHIBIT 12 B

M. T. DAVISSON

FOUNDATION ENGINEER

11a

2217 Civil Engineering Building
Urbana, Illinois 61801
Area 217: 333-2544

Reply to:
14 Lake Park Road
Champaign, Illinois 61820
Area 217:359-5206

15 April 1980

Dep X 7
Davisson (9-17 80)

Dr. S.S. Afifi
Bechtel
P.O. Box 1000
Ann Arbor, Michigan 48106

Re: Midland - Pile Specification
Service Water Pump Structure

Dear Sherif:

I have your letter of 2 April 1980 enclosing Appendix B - Concrete Specification. Please note that we cannot reasonably meet Section 11.5 (limit of 6 ft drop) and Section 11.6 (vibration). This should be clarified.

Yours very truly,

M.T. Davisson

M.T. Davisson

MTD:lal

Dep X 8
Davisson (1-14-81)