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SCHWENCER,A. Licensing Branch 2

SUBJECT: Forwards Revision 1 to "Procedure for Soil Backfill Testing Program", and provides info re Quality Class II backfill program purpose & scope, in response to NRC request for addl info made during 811007 meeting. Boring location plan encl.

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November 12, 1981
G02-81-462

Docket No. 50-397

Mr. A. Schwencer, Chief
Licensing Branch No. 2
Division of Licensing
Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Schwencer:

Subject: SUPPLY SYSTEM NUCLEAR PROJECT NO. 2
QUALITY CLASS I SOIL BACKFILL TEST PROGRAM

On October 7, 1981, representatives of Washington Public Power Supply System and Burns and Roe met with the NRC to discuss the program underway at WNP-2 to determine insitu densities of Quality Class I backfill in isolated areas where specification requirements for compaction and gradation may not have been met. The Quality Class I soil in question is confined to backfill for the standby service water system piping and electrical conduit, and the remote air intake piping and structures. At the October 7th meeting, the NRC requested additional information on various aspects of the test program. Following is a summary of the purpose and scope of the program, as well as a response to the NRC request for specified additional information:

A. Statement of Problem

The Quality Class I backfill at the WNP-2 site placed prior to May 1976 was installed in accordance with FSAR requirements to approximate elevation 438 (see report by Shannon and Wilson confirming the acceptability of backfill placed prior to May 1976, FSAR Reference 2.5-127, and NRC Question 362.1). Subsequent to May 1976, excavations were made in this backfill for placement of the remote air intake piping, the remote air intake structures, and the standby service water pipeline with parallel duct banks. Backfill used in these excavations was found not to conform to Quality Class I specifications with respect to gradation and compaction. These nonconforming items resulted in the writing of 10CFR50.55(e) Condition No. 146. (See Figure 1 and Section 1 & 2 for locations of the backfill in question). It is significant to note that none of the fill in question is used for support of Category I buildings. In fact, five years of settlement monitoring of Category I buildings has shown, without exception, that structural settlements are very small and well within the range previously predicted from elastic analysis.

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B. Objective of Test Program

To obtain information for resolution of this nonconforming condition, a testing program was undertaken to determine insitu fill properties by relating indirect testing method results (standard penetration testing, pressure meter testing and downhole nuclear density testing) to relative densities and to fill properties previously used in design.

The results of this testing program and the resolution of the 10CFR50.55(e) Condition No. 146 will be furnished in a separate report scheduled to be submitted by December 15, 1981.

C. Response to NRC Request for Information

Following are the questions asked by the NRC at the October 7th meeting, and our responses. For some of the questions, the complete response must await the final report scheduled to be submitted by December 15, 1981.

1. "Extent of areas and depth of backfill in areas of concern as identified by 10CFR50.55(e) Condition No. 146"?

   The horizontal extent of these areas in relation to other plant components are shown on the accompanying Boring Location Plan, Figure 1. Except as described below, the lowest extent of any of the backfill for these safety related systems is elevation 430 feet. The maximum rise in ground water that may occur if the Ben Franklin Dam is constructed is 420 feet, above which liquefaction is not a problem. However, some of the backfill placed under these systems was to a minimum elevation of 413 feet where the Class II circulating water and storm sewer systems cross under the safety related utility. (See section 3.1.12 of the "Procedure for Soil Backfill Testing Program", attached, for discussion of boring depth).

2. "Procedure used to identify the above concern"?

   Earlier in an attempt to respond to a Supply System generated Corrective Action Report (CAR No. 1490), five test areas were selected for retesting of previously placed Class I backfill around the service air intake structures.

   The purpose of the retesting was to verify acceptability of previous testing equipment and technique (subject of CAR 1490), and ultimately to close CAR No. 1490. However, while attempting to obtain this verification it was discovered that this backfill produced unsatisfactory compaction and gradation tests which resulted in the writing of 10CFR50.55(e) Condition No. 146.

The concerns of CAR 1490 were limited to Class I soils work performed after May 11, 1976, since prior to that date all Class I fill had been found acceptable in a separate report by Shannon and Wilson (FSAR Reference 2.5-127). As discussed, the present soils investigation program has been limited to only Class I fill that contains Class I systems. Those areas are the remote air intake structures and piping, and the service water pipe line with its associated Class I duct banks.

3. "Proposed types of tests, number, and location of tests"?

   The boring location plan shown in Figure 1 shows the location of the various test sites. Table 1 shows the number and types of tests taken at various depth intervals for each boring in the areas of concern (i.e. safety related backfill placed since May 1976). A detailed description of the type of tests can be found in the attached "Procedure for Soil Backfill Testing".

4. "Correlation procedure for determining densities based on these field tests"?

   Methods used for correlation testing can be found in the attached "Procedure for Soil Backfill Testing". Detailed descriptions and results of these correlations will be found in the final report scheduled to be submitted by December 15, 1981.

5. "Criteria for interpreting these test data and acceptance/rejection criteria"?

   Acceptance and rejection criteria for soil backfill will be established later, and will be based on evaluation of test results and their significance relative to previous design parameters.

6. "Procedure for identifying the limits of undesirable areas, if any"?

   Limits of "loose zones" will be determined as discussed in Section 4.5 of the attached "Procedure for Soil Backfill Testing". Final definition of "undesirable areas" must await completion of evaluation of the test data obtained, as well as a design review of the significance of any nonconforming insitu soil conditions relative to the behavior of the pipe, conduit, or structure. This will be addressed in the final report, scheduled to be issued by December 15, 1981.

7. "Evaluation of the potential effects of undesirable soil properties, if any"?

   See the response to questions 5 and 6 above.

8. "Remedial measures for area under item 6"?

   Soil backfill which is determined to be unacceptable, based on 5, 6, and 7 above, will be removed and replaced with properly graded and compacted Quality Class I backfill. If such remedial measures are required, this will be addressed in the final report scheduled to be submitted by December 15, 1981.

Very truly yours,

G D Bouchey

G. D. Bouchey
Deputy Director,
Safety and Security

EAF:kjf

Attachments: (a) Figure 1, Boring Location Plan
(b) Section 1 and Section 2
(c) Procedure for Soil Backfill Testing Program

cc: JA Forrest - B&R RO
RE Snaith - B&R
JJ Verderber - B&R
AI Cygelman - B&R RO
FA MacLean - General Electric
S. Smith - General Electric
ND Lewis - EFSEC, Olympia
WS Chin - BPA
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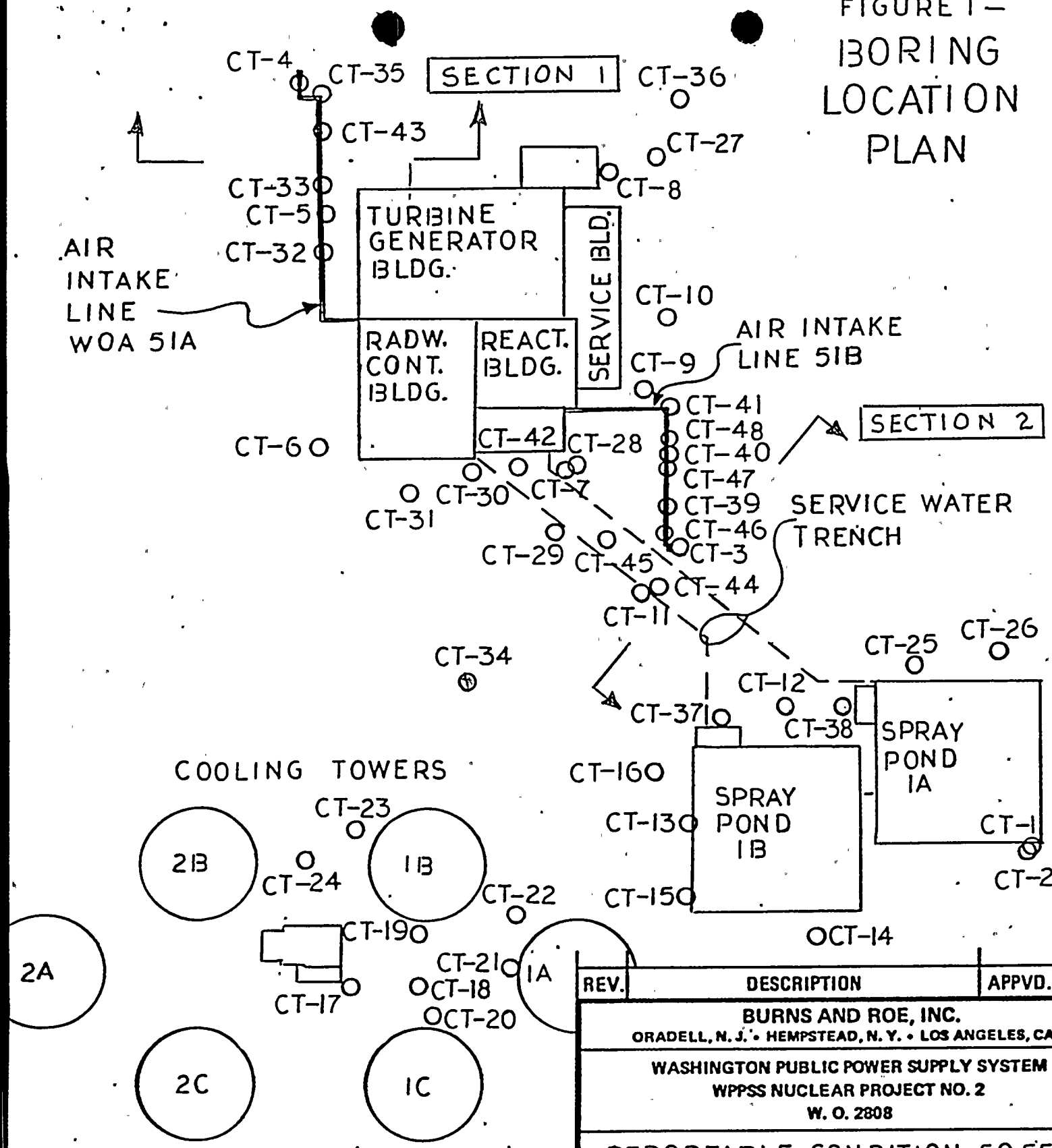
WNP-2 Files

FIGURE 1 — BORING LOCATION PLAN



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WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WPPSS NUCLEAR PROJECT NO. 2
W. O. 2808

REPORTABLE CONDITION 50.55e
#146 BACKFILL and COMPACTION

DRWN. R.D.S.	CHKD.	APPVD.
DATE: 10-27	DATE:	DATE:
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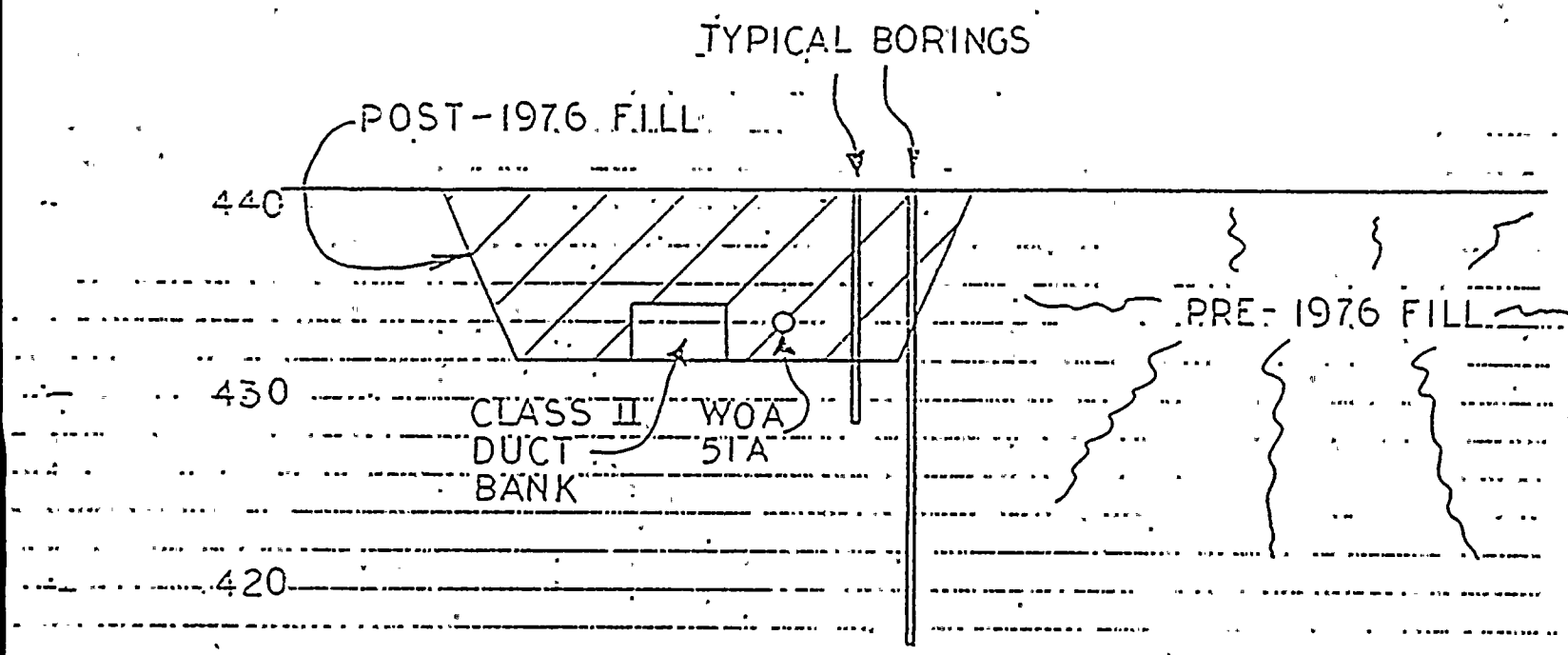
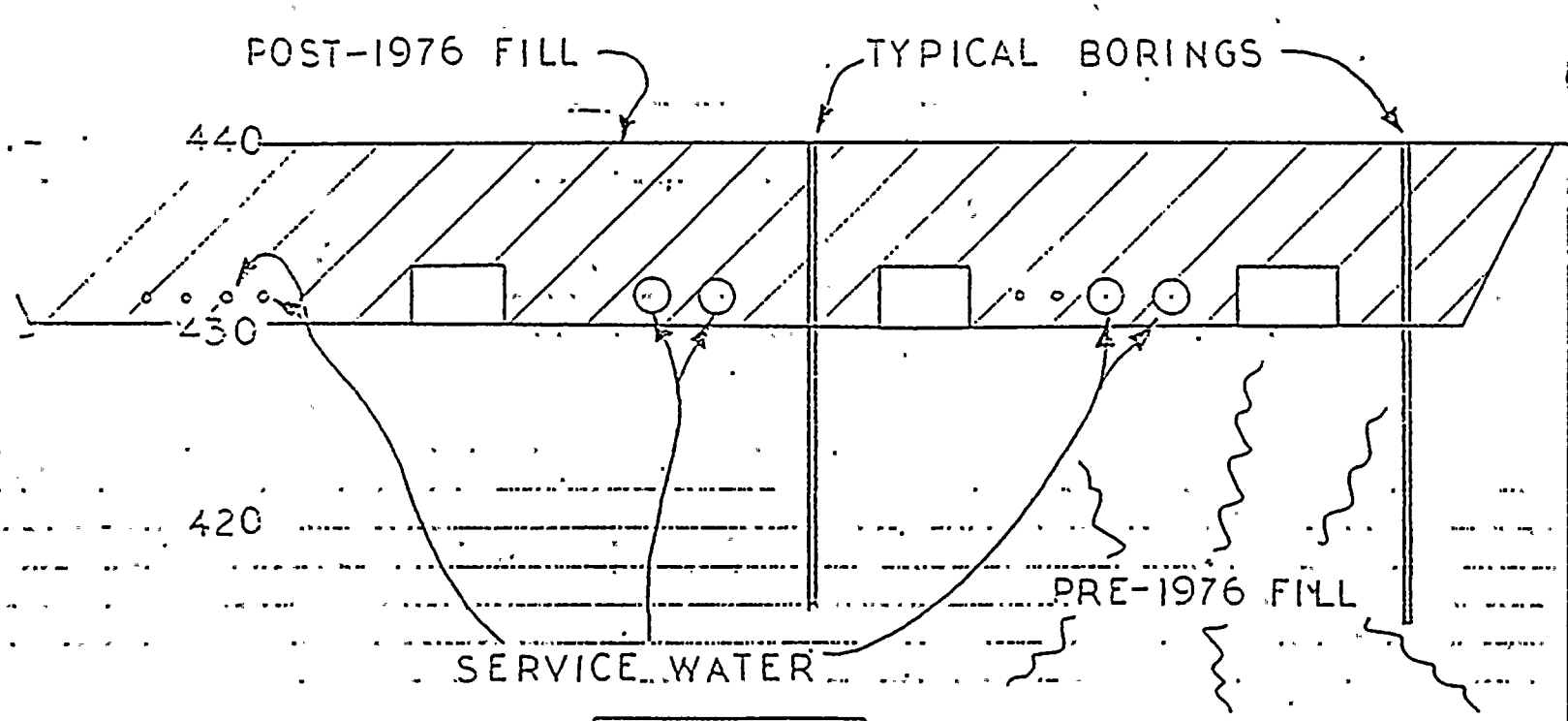
E.C.N. No.	



SECTION 1



SECTION 2