



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 10, 1993

Docket Nos. 50-390

MEMORANDUM FOR: Docket Files

FROM: Peter S. Tam, Senior Project Manager
Project Directorate II-4
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

SUBJECT: WATTS BAR NUCLEAR PLANT - PROVIDING TVA'S WRITTEN RESPONSE TO
VERBAL QUESTIONS ON THE CIVIL CALCULATION PROGRAM AUDIT
(TAC R00514)

TVA telecopied the attached four-page document to the staff on November 9, 1993. The document provides written answers to questions asked verbally by the staff (Ramon Pichumani) in a telephone conversation. By this memorandum, the TVA document is docketed and made publicly available.

A handwritten signature in cursive script that reads "Peter S. Tam".

Peter S. Tam, Senior Project Manager
Project Directorate II-4
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Distribution:

PDR
Local PDR
R. Pichumani, 7-H-15

9311170376 931110
PDR ADOCK 05000390
P PDR

NRC FILE CENTER COPY

Memo 4

DFO1

QUESTION 1

Discuss the applicability of "SHAKE" program for determination of frequency dependent shear stresses in the backfill contained within the sheet pile walls at the intake pumping station.

RESPONSE

The plan and section of the intake pumping station and sheet pile walls are attached. The distance between the sheet pile walls is 133 feet. The length of the sheet piles wall is 125 feet. The maximum backfill depth is 31 feet and reduces to zero along the sheet pile wall length. Natural earth surrounds the sheet piles over much of the area, thus providing confining pressure. The sheet piles themselves are tied to each other by tie rods and deadmen. This information is available in WCG-1-1369 Revision 2.

Since natural earth surrounds the sheet piles over most of the area and the sheet piles are tied to each other with tie rods and deadmen and contain compacted backfill, the complete system adequately models a soil system that extends indefinitely in the horizontal direction which is implied in the "SHAKE" program. As such, the "SHAKE" program is appropriate for the analysis.

1/1/80

QUESTION 2

The shear wave velocity assumed appears too low for bedrock.

RESPONSE

The analysis utilized the following values:

Shear wave velocity in backfill = 1200 feet per second
Shear wave velocity in weathered rock = 1800 feet per second
Unit weight in backfill = 0.12 kips per cubic-foot
Unit weight in weathered rock = 0.13 kips per cubic-foot

Enclosed is Table 0-5 from Bechtel's report titled "Seismic Assessment Report" (B26 890629 100), Revision 1, dated June 29, 1989. Class A backfill has the following recommended values:

γ total = 120 pcf
G Max = 4500 ksf
 $G = \rho Vs^2$

$$Vs = \frac{G}{\rho}$$

$$= \frac{4500 \times 1000 \times 32.2}{120} = 1100 \text{ fps}$$

The value used was 1200 feet per second to be consistent with the previous calculation by TVA (CEB 82 0604 002).

The weathered shale has the following recommended values in Table 0-5.

Unit weight = 127 pcf
 $Vs = 1800 \text{ fps}$

Please refer to calculation WCG-1-1368 Revision 0, page 6 of 12, section 11.1. The "bedrock" mentioned in the parametric study should be changed to "backfill." The calculation is being revised to make this change.

rrrlucko

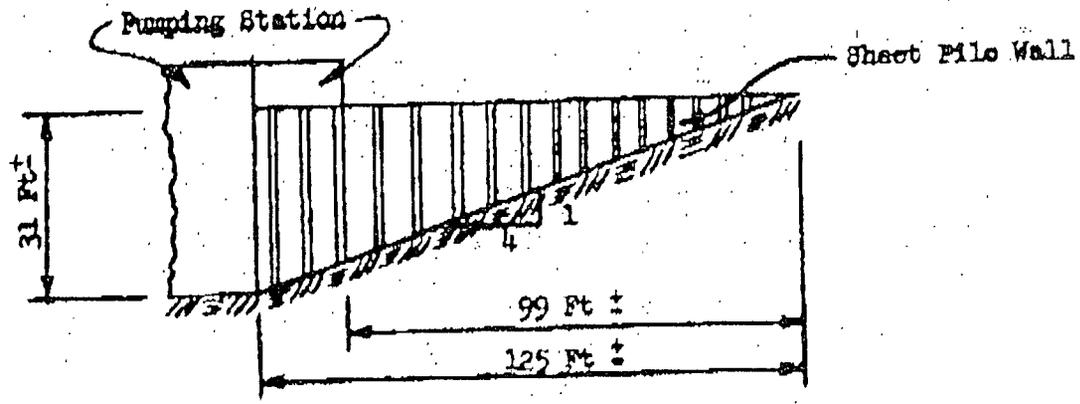
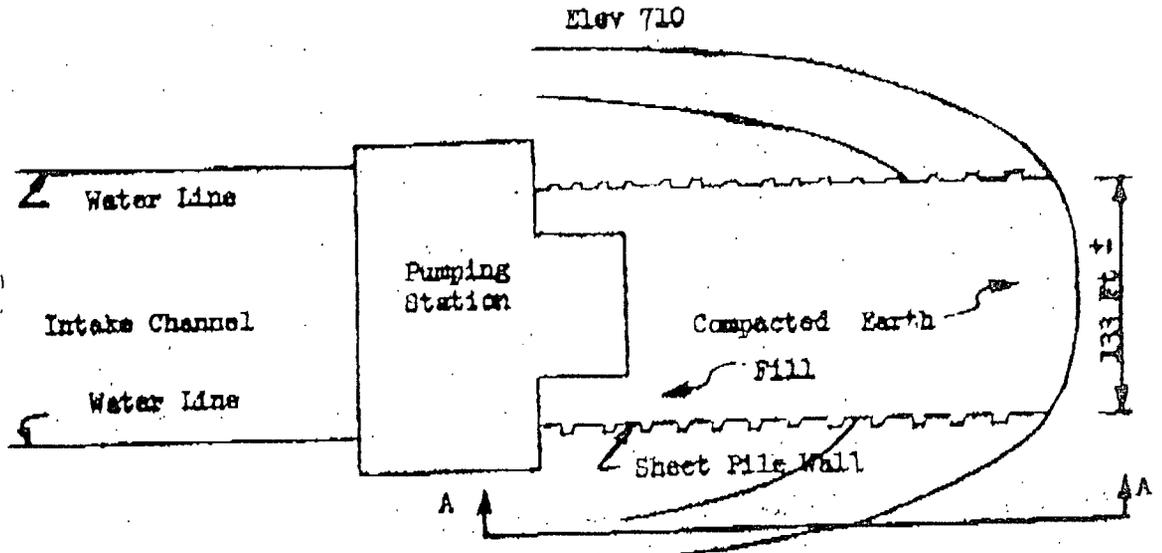
QUESTION 3

Page 10 of 12, The acceleration 0.125g appears wrong.

RESPONSE

This is a typographical error. The computer input shows the correct acceleration as 0.215 g (as indicated correctly on page 7 of 12). The calculation revision will correct this typographical error.

///shkto



SECTION A-A

Figure 1. General Layout