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Mr. George Muller
Supervisor - Licensing
Illinois Power Company
500 South 27th Street
Decatur, Illinois 62525

Dear Mr. Muller:

Subject: Request for Further Clarification on the Soil Amplification Issue - Clinton Power Station, Units 1 and 2

Reference: IPC Letter U-0533, August 26, 1982 G. E. Muller to H. Bernard, NRC

The material provided with the above letter was intended to serve as verification of the method used to assess the soil amplification effects to be considered for Category I structures not founded on bedrock. As noted, the results were obtained by using the "SHAKE" program and the input parameters listed in Table 1 of Enclosure 1.

The staff has reviewed this material and has compared amplification factors obtained by using the SHAKE program (Sargent & Lundy calculations for IPC) to those factors reported in the Weston Geophysical report of May 1982, Revision 1 (Vanmarcke's calculations). Based on this review, the staff has concluded that although the SHAKE runs predict a somewhat higher amplification, there is good agreement between the predicted amplifications as a function of frequency between the two methods (Figures 1 and 2 of Enclosure 1). The annotations "upper bound" and "lower bound" in these figures pertain to the predicted range of soil properties for the Clinton site as delineated in your (IPC) letter U-0374, dated December 3, 1981, in reply to NRC's question 220.21. In your analysis, you elected to define a resultant set of amplification factors by weighting the "upper bound", "main", and "lower bound" amplification factors by 0.25, 0.50 and 0.25 respectively. The "weighted average" amplification curve for the Weston Geophysical study is shown in Figure 1.

The staff has constructed a similar curve for the amplification factor curves obtained by using the SHAKE Program and the results show that the differences between the "weighted average" obtained by Sargent & Lundy (SHAKE) and Weston Geophysical (Vanmarcke) are negligible (Figure 3 of Enclosure 1).

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However, the staff has noted that the "weighted average" amplification peaks are considerably lower than the peaks on the "mean soil property" amplification curve (Figure 1). In the case of the amplification factors obtained from the SHAKE program, the "weighted average" peaks fall outside (below) the range of peaks predicted by the range of soil properties (upper/lower bound) assumed for the site (Figure 2). In past safety reviews the NRC has recommended a conservative approach of enveloping the effects of soil amplification if uncertainties existed.

Therefore, we request that you discuss the resulting fluctuations in the theoretical soil design response spectrum caused by assuming a range of soil properties. Subsequently you should justify, statistically or otherwise, the use of the weighting procedure referred to earlier in this letter in light of past NRC positions. Any questions concerning this information request should be directed to Dr. Harvey Abelson, the Clinton Project Manager, at (301) 492-9774.

Sincerely,

A. Schwencer, Chief
Licensing Branch No. 2
Division of Licensing

Enclosures:
As stated

cc: See next page

Office ▶	DL:LB#2/PM	DL:LB#2/BC					
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Date ▶	1/11/83	1/12/83					

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Clinton

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ENCLOSURE 1

TABLE - I DYNAMIC SOIL PROPERTIES USED FOR SSI ANALYSIS

SOIL LAYER No.	LAYER DEPTH (FT)	WEIGHT DENSITY (K/FT^3)	POISSON'S RATIO	UPPER BOUND SOIL		MEAN VALUE SOIL		LOWER BOUND SOIL	
				SHEAR MODULUS (K/FT^2)	DAMPING RATIO	SHEAR MODULUS (K/FT^2)	DAMPING RATIO	SHEAR MODULUS (K/FT^2)	DAMPING RATIO
1	20.0	0.132	0.40	6063.0	0.084	4547.0	0.084	3032.0	0.084
2	105.0	0.150	0.35	7000.0	0.101	5250.0	0.101	3500.0	0.101
3	10.0	0.134	0.35	5500.0	0.053	4125.0	0.059	2750.0	0.059
4	75.0	0.145	0.40	5500.0	0.089	4125.0	0.089	2750.0	0.089
5	HALF-SPACE	0.159	0.29	300000.0	0	300,000.0	0	300000.0	0

8 JUL 1981

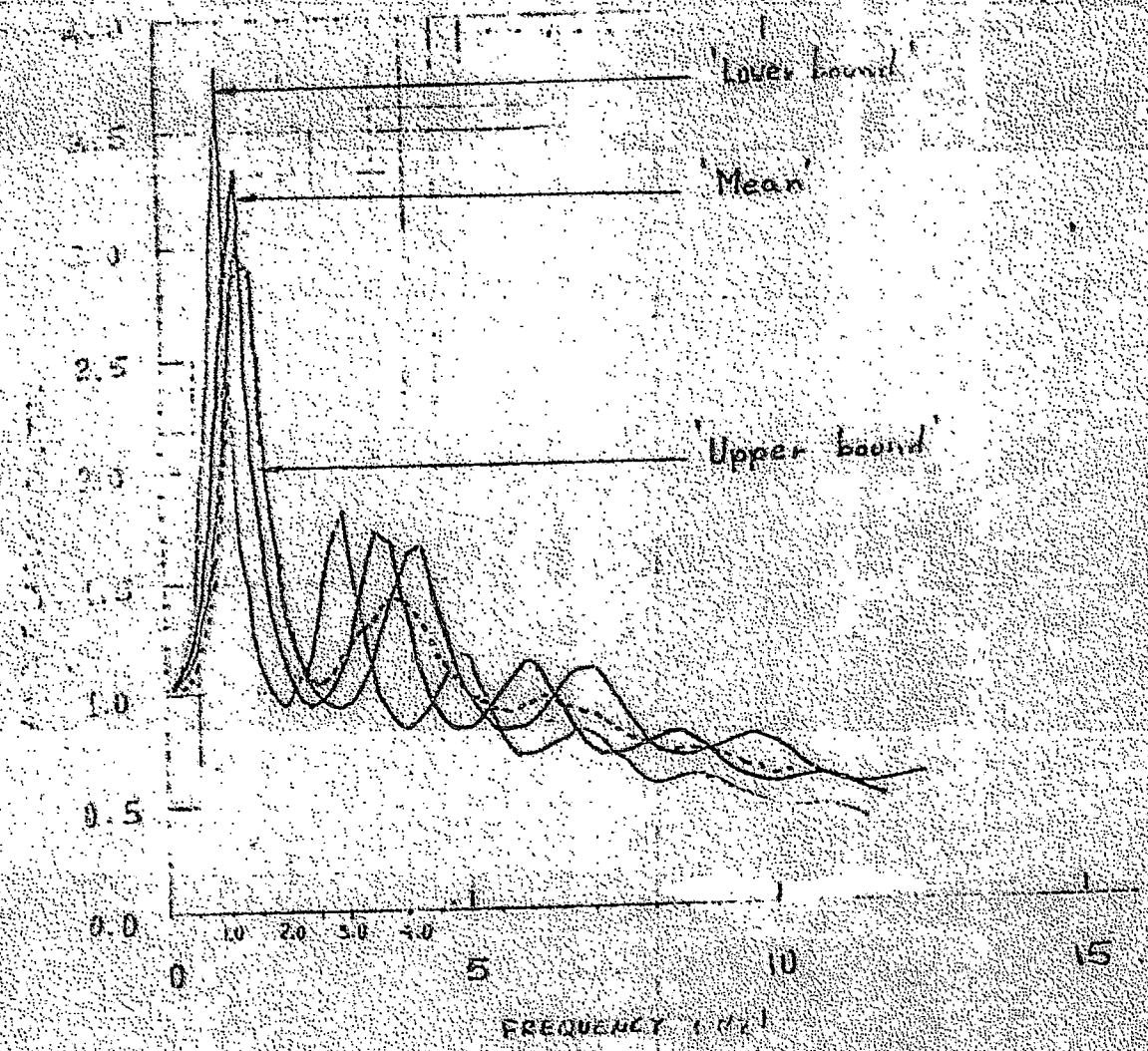
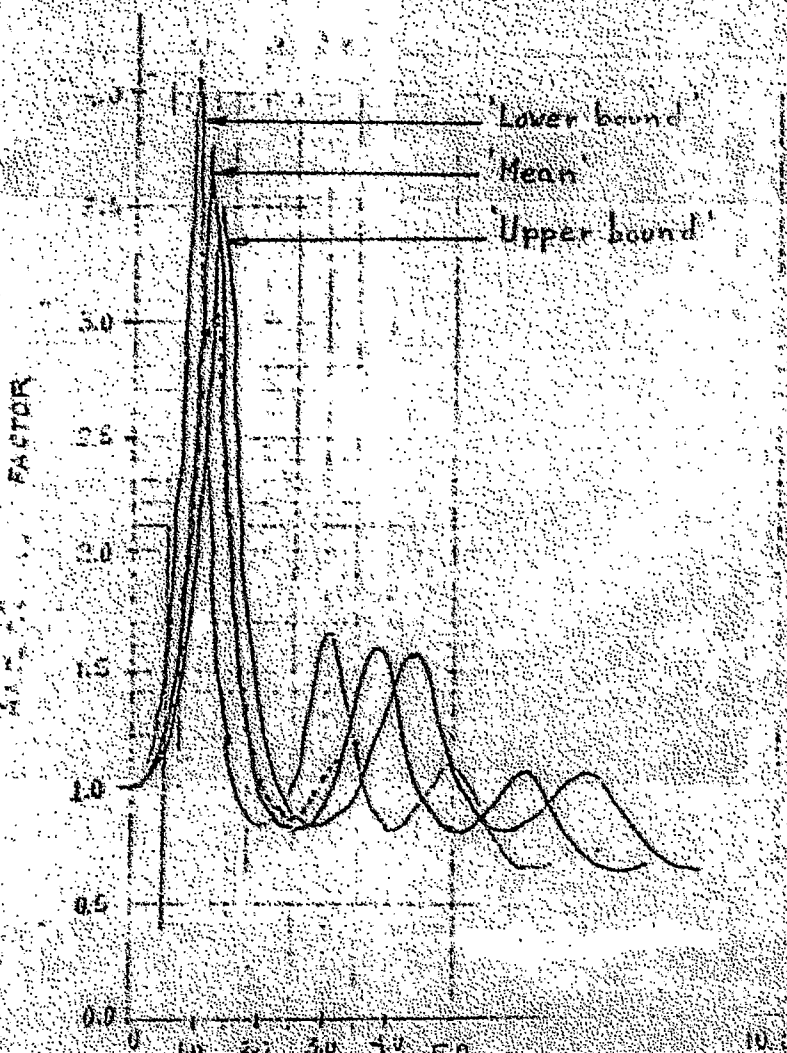


Figure 1 – Weston Geoph. (Vanmarcke's) calculations

..... Weighted average
(.25% 25% 50%)



..... Weighted average
25% + 25% + 50%

Figure 2 - Illinois Power Co. (Sal.) calculations
(SHAKE runs)

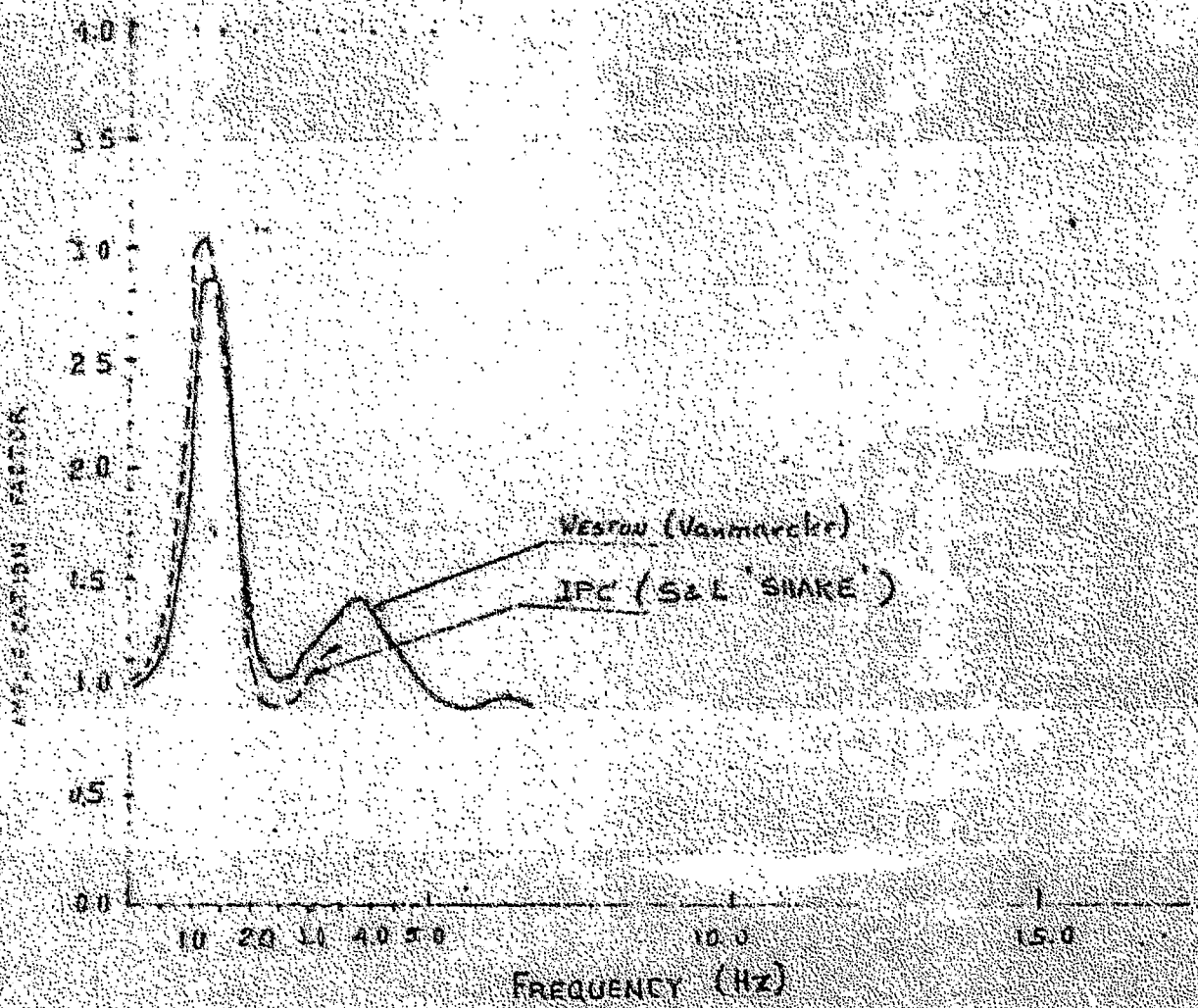


FIGURE 3 - "WEIGHTED AVERAGE" FOR CLINTON SOIL PROPERTIES

Illinois Power Company

U-0630
1.30-82(04-05)-1.

500 S. 27th Street, P.O. Box 511, Decatur, Illinois 62525-1805

Docket No. 50-461

April 3, 1983

Director of Nuclear Reactor Regulation
Attention: Mr. A. Schwencer, Chief
Licensing Branch No. 1
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Schwencer:

Subject: Clinton Power Station Unit #1
Safe Shutdown Analysis

References: 1) Clinton Power Station Unit #1 meeting on site (7/13/82) participants: Mr. Nick Fioravante and Illinois Power representatives.

2) Clinton Power Station Unit #1 Safe Shutdown Analysis Report, U-0366 12/16/82.

3) Joint telephone conversation among Mr. Nick Fioravante of NRC and Illinois Power representatives.

In accordance with conversations held with Mr. Nick Fioravante of NRC (references 1 and 3), Illinois Power is providing supplemental information to its Safe Shutdown Analysis Report, reference (2).

Page 2: A revised Table of Contents including section 1.6, "High Pressure/Low Pressure Interface Valves," (HP/LP) is attached.

Pages 10 and 10a: The attached new section 1.6 describes the HP/LP interface valves of concern. The Clinton Plant's operation staff has agreed to develop procedures in accommodating the section 1.6 actions.

8P-1

Page 13: A recent analysis was conducted to determine if the RCIC equipment in fire zone A.1.4 is qualified for 72 hours following a fire in zone A.1.1. That analysis was confirming and is reflected in the revised page 13 (attached).

Page 47: A footnote was added to page 47 indicating that a dedicated spool of control wire (about 1300' minimum) will be stored on site in a specific location strictly for the replacement of Division II control wiring in the event of a fire in zone A.4.6. The Clinton plant's maintenance staff has agreed to this action and to the development of its required procedures.

We trust that these latest revisions to our Safe Shutdown Analysis meet with NRC approval.

Sincerely,

G. E. Wuller
Supervisor - Licensing
Nuclear Station Engineering

EMW/lr

cc: Dr. H. Abelson, NRC Clinton Project Manager
Mr. J. E. Stang, Jr., NRC CEB
Mr. H. H. Livermore, NRC Resident Inspector
Illinois Department of Nuclear Safety

TABLE OF CONTENTS

LIST OF TABLES

all cables are IEEE 383 rated cables and will not allow significant propagation beyond the compartment of the fire origin.

1.6 High Pressure/Low Pressure Interface Valves

There are only 4 valves that could be opened by a fire alarm in the control circuitry in the event of a fire. They are:

1E12-F008 1E12-F032A 1E12-F087A
1E12-F009 1E12-F032B 1E12-F087B

1.6.1 Valves 1E12-F008 and 1E12-F009 are installed in series. In order to prevent the spurious operation of valve 1E12-F008 in the event of a short, the breaker to valve 1E12-F008 will be locked open.

1.6.2 To prevent a short from opening valves 1E12-F032A and B, the power to these control circuits will be controlled by two switches (Section 2.4.4) in the main control room. Each division switch will be in the OFF position so long as the RCIC system is not in the steam condensing mode. When a valve (1E12-F032A or B) needs to be opened, the circuit will be activated by placing the position of the division switch ON then, subsequently, the control switch for that valve will be positioned for the desired valve action. Because the circuit is not

1.6.2 (Continued)

actuated, inadvertent valve opening will not be possible.

1.6.3 Hot shorts might occur in the control circuits for valves 1E12-F037A and B in the event of a fire; however, each valve is in series with valves 1E12-F053A and B, respectively.

qualified to function for 72 hours following the loss of the RCIC room (fire zone A.1.4) HVAC system and in the environment that will be present following a fire in zone A.1.1. (It should be noted that the parameters for equipment qualification in zone A.1.4 are more severe for the high energy line break.) Therefore, even with the loss of the supply fan, cold shutdown could be achieved using the Division 1 systems.

Also present in this zone are Division 1 and 2 cable trays. These trays are separated by a 3-hour fire barrier (see the Fire Protection Report figure FP-2). The fire barrier is a concrete cantilever (a horizontal barrier). The Division 1 trays have been installed so that the outer edge of the tray is flush with the outer edge of the cantilever. Therefore, in the unlikely event of a fire in this zone at least one method to bring the reactor to cold shutdown would be available.

The performance goals for safe shutdown functions (Appendix R, Section III.L) are assured by the systems listed below.

Performance Goal	System Which Meets Goal
1. Reactor coolant makeup	RCIC (Div. 1) or LPCI (Div. 2)
2. Reactor pressure control	SRV (Div. 1) or ADS (Div. 2)
3. Suppression pool cooling	RHR A (Div. 1) or RHR (Div. 2)
4. Process variable indication	Division 1 or 2 instrumentation for:

c. Conclusions

Division 2 RHR system cables service valves necessary for safe shutdown by method #2. A fire in this zone would result in the loss of shutdown method #1 systems and the RHR B system of method #2. Also, routed through this zone are the intake and exhaust ducts that provide cool air to the Division 2 switchgear room. A fire could result in a loss of cool air flow to the switchgear room making it difficult to shutdown the reactor via method #2 (see section 1.3).

For a description of modifications necessary to satisfy the requirements of Appendix R see part d below and Section 3.

d. Modifications

The Division 2 RHR valves need to be operated to bring the plant to cold shutdown only. Therefore, after hot shutdown has been achieved repairs* can be made to the Division 2 cables to allow proceeding to cold shutdown. Division 2 ventilation ducts will be surrounded with a fibrous insulating material produced by [illegible], Inc., which will provide a 3-hour fire barrier. Also all of the ductwork hangers and associated structural steel will be fireproof to withstand a 3-hour fire. Therefore, all of the Division 2 systems necessary to bring the plant to cold shutdown will function.

ASTM fire tests with air flowing inside the ducts will

*A spool of control wire (about 1300 ft. minimum) will be labeled and stored specifically for Division II control wire replacement in this zone.