

NRC PDR



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

50-352/353

FEB 21 1980

The Honorable Richard S. Schweiker  
United States Senate  
Washington, D. C. 20510

Dear Senator Schweiker:

This letter is in response to your January 9, 1980 request regarding a letter you received from Mr. Frank Romano. In part, Mr. Romano's letter comments on the conduct of the Nuclear Regulatory Commission's (NRC) investigation of the effects of blasting in a quarry adjacent to the Limerick Generating Station (Limerick facility). We have responded to these comments in a letter dated January 28, 1980 to Mr. Romano (Enclosure No. 1).

Mr. Romano's letter to you also raises two other points that he had not previously brought up in his previous correspondence to the NRC. These points are (1) uncured concrete at the Limerick facility has been adversely affected by blasting at the quarry and (2) the recent errors in seismic analyses at two different nuclear stations also exist in the design of the Limerick facility. In order to give you a complete report on all of these matters, I have enclosed a copy of our January 28, 1980 response to Mr. Romano and I have provided below (1) the background and current status on our investigation of the quarry blasting and (2) possible relevance to the Limerick facility of the recently discovered errors in the seismic analyses at two other nuclear plants.

The geology of the Limerick site was initially investigated as part of the Atomic Energy Commission (AEC) Regulatory Staff's (NRC's predecessor) review of Philadelphia Electric Company's (PECO) construction permit application for the Limerick facility. The geology and seismology portion of this review briefly considered quarry blasting but concentrated on a more severe condition, that of defining a postulated earthquake to serve as the design basis for safety structures, systems, and components in the Limerick facility. During the construction permit review, PECO stated that it had monitored a blast in the quarry and found the peak particle velocity at 4000 feet from the blast to be 0.03 inches per second. This velocity is much lower than the peak ground velocities assumed for the safe shutdown and operating basis earthquakes. (The location of the reactor buildings is about 3600 feet from the closest edge of the quarry at this time.) A Safety Evaluation Report was issued in November 1971 and recommended issuance of a construction permit.

Later, during excavation for the reactor buildings, old geologic faults were discovered in the rock foundations. A geologic investigation was performed and was concluded in late 1974. The geological investigation included (1) field

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work performed by PECO's geotechnical consultants, (2) an independent review of these results by a committee of collegiate geologists who were familiar with the geological formations that contained the faults, and (3) a review of these two efforts by the AEC Regulatory Staff. This investigation concluded that differential movement along the fault zones had ceased 150 to 200 million years ago. It is important to note that operation of the quarry had been underway for about 40 years when this review was conducted.

In April 1979, Mr. Romano sent the NRC a letter questioning whether the quarry blasting would adversely affect the structures at the Limerick facility. In particular he stressed that the blasting could cause new differential movement along the faults under the reactor building foundations. In addition to the past evaluations on the faults and on the blasting it was concluded in a "Director's Decision Under 10 CFR 2.206" that further investigation should be done. A copy of this Director's Decision was forwarded to you on October 12, 1979 in response to an earlier inquiry.

Since the "Director's Decision" was issued, we and our consultant, the U.S. Geological Survey have reviewed the documents related to the geology of the Limerick site and the faults in the excavation. In addition, separate meetings were held with the operators of the Pottstown Trap-Rock Quarry and PECO on December 18, 1979. With the excellent cooperation of the operators of the quarry, we obtained important information on the blasting methods being used. Blasts are performed in the quarry approximately 10 times per year. Monitoring records taken by the quarry's seismological consultants during previous blasts at the quarry were available for our inspection. These records indicated peak particle velocities well below the levels imposed by the State of Pennsylvania and the Occupational Safety and Health Administration that assure protection against damage from blasting.

In the afternoon meeting with PECO, PECO presented seismograph recordings that it had taken of quarry blasts. These measurements were taken on PECO property at much greater distances from the blasting than the quarry's recordings. These measurements also supported the conclusion that velocities at the Limerick facility were very low and not damaging. We also asked PECO what monitoring records were available on blasting during rock excavation operations at the Limerick facility. This led to a discussion of the precautions PECO had taken to protect uncured concrete from blast vibrations. PECO stated that it used a procedure which considered concrete curing time, size of the blast, and distance between the blast and the concrete. The maximum velocity acceptable for fresh concrete was conservatively chosen to be 0.1 inches per second and increased with increasing age of concrete.

This construction control is checked by NRC's Office of Inspection and Enforcement and similar precautionary procedures to protect recently placed concrete have been found acceptable at other plant sites. Therefore we conclude that Mr. Romano's concern on the effects of blasting on uncured concrete does not have any merit.

During the meeting we asked PECO to provide us with (1) copies of the records of quarry blasts that it had recorded and presented in the meeting, (2) a map showing the locations of all seismic Category I structures relative to quarry property lines, (3) records from several blasts performed during rock excavation at the site, and (4) a comparison of the response spectra from the postulated operating basis earthquake used in the design of the Limerick facility with a response spectra developed from blast monitoring records.

The first three items were provided by PECO in a letter dated January 15, 1980; PECO stated that the last item would be provided in March, 1980. The balance of our investigation on the effects of quarry blasting will concentrate on reviewing this information and the data collected from the Pottstown Trap-Rock Quarry.

With regard to the errors in seismic analyses discovered in December 1979, these were found in design documents for the North Anna Nuclear Plant and the Seabrook Nuclear Station. The architect engineering firms for these facilities are not involved with the Limerick facility. The nature of the errors involves the design of supports for seismic Category I components. In the design of supports, the seismic analyses uses, as an input, the motion (called the amplified response spectra) of the wall of structures to which the supports are attached. In the cases cited above, the persons performing the seismic analyses for a component had used the incorrect amplified response spectra in the design analyses; the correct amplified response spectra had been calculated, but it was not used.

Shortly after the errors had been found and reported to the NRC, NRC's Office of Inspection and Enforcement issued an Information Notice 79-31, "Use of Incorrect Amplified Response Spectra (ARS)" to all holders of construction permits and operating licenses. A copy of this Information Notice is provided as Enclosure No. 2. Although an immediate response was not requested, it is expected that all utilities, including PECO, will review the Information Notice for possible applicability to their plants. If any deficiencies are identified in the design or construction of the Limerick Generating Station, they will be required to be corrected prior to license issuance.

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We trust that the information that has been provided is responsive to your inquiry.

Sincerely,

William J. Dircks  
Acting Executive Director for Operations

Enclosures:

1. Letter dated 1/28/80 to  
Mr. F. R. Romano
2. IE Information Notice No. 79-31