61 Forest Ave.
Ambler, Pa.

April 12, 1979

Director of Office Inspection and Enforcement
Nuclear Regulatory Commission
c/o Region I
631 Park Ave.
King of Prussia, Pa. 19406

Dear Sir:

The United States Nuclear Regulatory Commission's release #1-79-39 of March 13, 1979, subject "NRC STAFF ORDERS FIVE NUCLEAR PLANTS SHUT DOWN TO RESOLVE PIPING QUESTIONS" ordered the shut down of five nuclear reactors within 48 hours until it is determined that any needed modifications are made "relative to accident potential resulting from earthquake shock". Because the method used by the architect engineers, to combine seismic forces in a computer code resulted in the prediction of lower stresses than currently accepted technologies, the NRC ordered the Beaver Valley reactor (one of five involved) closed down because of threat of piping failure. Because of variations in methods, and validity of methods, used to include or calculate stresses at reactor sites, or factors which I believe were incorrectly evaluated, or possibly altoghther omitted, as to seismic consideration, I feel an accident ranging in severity from safety related piping, to a rupture to the reactor vessel, itself, could result in a reactor meltdown at the Philadelphia Electric Montgomery County Limerick reactor.

A very important but totally ignored seismic factor is the vibratory motion and the possible deleterious effect relative to ground movement caused by the on-going blasting. While this vibrating motion could be sufficient to shake the Limerick site, it was not at all considered.

As early as the summer of 1974, during ground preparation, fracture zones and deep wide cracks were found at Philadelphia Electric's nuclear reactor site which overlays a huge friable red-shale rock at Limerick, Montgomery County, Pennsylvania. I question whether proper evaluation of the seismic factors or

sufficient attention was paid to fractures, cracks and general morphology, as well as the entire geology of that location, as it relates to ground movement.

I am concerned that the choice of the location may have resulted from expediency rather than safety, inasmuch as Philadelphia Electric admitted during licensing hearings before the AEC that the power lines already going through that site contributed heavily to the choice of the Limerick location for the nuclear reactor plant. I repeat, was it expediency rather than careful, necessary consideration of safety of the public that was paramount in the selection of that site?

The full report relative to those fracture zones, prepared by the Bechtel Power Corporation, "Report on the Treatment of Fracture Zones at Limerick Generationg Station for Philadelphia Electric Company", dated Sept 3, 1974 which you have on file did not consider effects of on-going blasting which in red shale rock is known to readily cause shattering.

This report, as stated above, has been prepared in accordance with the commitment made in response to PSAR question 2.29 that documentation be made of the conditions and the method of treatment of fracture zones which exist in the foundation rock at the site of the Limerick Generating Station. A summary of the events leading up to this report follows:

"During the excavation for the principal plant structures at the site, two steeply-dipping zones of high fractured and jointed weathered rock were exposed, (See Geologic map(Figure I). The fracture zone in Unit 1, hereafter refered to as Zone A, was over 10 feet wide near top of the rock and contained closely fractured to crushed, weathered to decomposed rock, and some clay.(All underlining is by F. R.). The other fracture zone, in the southeast corner of the excavation for Unit 2 (hereafter refered to as Zone B) was only about a foot wide but it contained similar material". Further, a "clay seam" essentially parallel to bedding (dip about 12 to 15 degrees to the northwest) was noted in the south slope of the excavation for Unit 1. This seam contains plastic clay and some angular, sheared, rock fragments. The compressible material in this seam had a maximum thickness of about ten inches near top of rock south of the

structures but the thickness decreased rapidly down-dip, toward the structures (nuclear buildings--FR). It was recognized that the fracture zones and the clay seam would probably require some treatment under foundations to prevent differential settlement due to the relatively more compressible clayey material and weathered rock which they contain."

The above portion of the report refers to fracture zones, but does not refer to deep, generally vertical cracks in the rock. Also the full depth of the cracks which now are hidden beneath the structures, was not determined. (See photograph #7 which shows attention to fracture zone, but no mention is made of the apparently wide and deep crack at the left of the Fracture Zone A, Photograph #7.)

I refer the Commission to Page 3, in the Bechtel Report referred to above, in particular, under the description of the treatment of Fracture Zone A: "Some displacement has occurred along Zone A simultaneously with slight movement on underlying bedding planes. The total amount of movement was not determined but "it appears to be small", said the Bechtel geologist. I question why such an important fact as rock movement was not determined fully. This is the essence of concern. It is not the earthquake that is the concern, it is the possible shift, vibratory motion, or ground movement of underlying rock that is the real concern. It is apparent that insufficient attention was paid to the purpose of the concern regarding earthquakes and possible piping and foundation movement, since there has been on-going quarry blasting on the very same rock upon which the reactor buildings are now in place.

And because blasting has continued, and the reactor buildings are now over the suspect rock area, further displacement or even greater movement of bedding planes, together with subsequent earth movement deserves serious attention.

Further, on Page 4, in the second paragraph it states" "Weathering processes operating during the millions of years since the joints and fractures were formed extended from ground surface downward". The report states these old fractures went downward, but I want to ask, was any attempt made to determine how far down the fracturing went?

Nuclear Regulatory Commission--Seismic Factor--contd.

It is important to concentrate on the fact that it is on the principle of "weathering effects" that the Bechtel Report concludes that the fractures and joints (cracks) were "millions of years" old. Cracks, therefore, without weathering characteristics, might be considered of relatively recent origin. For example, further down the same page: "and many of the fractures within the Zone (A) are nothing more than clean separations in hard, unweathered rock". On the basis that the fractures were millions of years old because of the weathered characteristics of material in and on the face of joints and cracks, it seems, therefore, that the "clean separations" in hard "unweathered rock", referred to above, indicates recent cracking in the rock, upon which supports and footings for the reactor vessel buildings have been placed.

At this writing, buildings and reactor vessels are in place over these cracks and faults, (as per Geologic Map Location of Fracture Zones--Fig. 1) of the Bechtel Report referred to above. Then as per code of Federal Regulations (CFR) 10, Energy, revised Jan. 1, 1978, Page 497 (b), "Required Investigation for Surface Faulting", a "capable" fault is defined as one in which movement at or near the ground surface, has been on-going even as the reactor buildings were being constructed.

Apart from the above, but related to discussions of faults and ground motion, as per 10 CFR part 100, app. A IV, (b) (2), "Required Investigations", included are possible effects caused by man's activities such as "withdrawl of fluids from or addition of fluids to the subsurface, extraction of minerals, or the loading effects of dams or reservoirs. No mention, however, is made of the blasting concussion on the very same rock on which the reactor is sited. Further, according to 10 CFR, part 100, app. A, IV (a) headed "Determination of Design Bases or Vibratory Ground Motion", it is stated that the design of each nuclear power plant shall take into account the potential effects of vibratory ground motion. But it incorrectly concerns itself only with vibratory ground motion "caused by earthquakes".

Again, danger of reactor accident results from the error of omission in the

requirements not having considered here, or under IV (b) (2) referred to earlier, the vibrating effect caused by repeated blasting within certain distances from the reactor. More particularly, no consideration was made when the blasting takes place on the one and the same contiguous rock upon which the nuclear reactor is constructed, as shown in picture marked MH-1.

The foregoing fact is important as it relates to the possible shift or increased splitting of already present fractures and cracks that could result in shifting of footings, as well as the reactor buildings themselves.

In summation, prevention of any shifts or earth movement whatsoever is really the total purpose of the concern of 10 CFR, part 100, app. A. IV (b) (2) and V (a), however, it incorrectly concerns itself only with the shift or vibratory motion due only to earthquakes. 10 CFR, part 100 relative to reactor sit criteria, App. A (Seisonic and Geologic Siteing Criteria, for nuclear Power Plants), therefore, has not even considered the vibratory effects on ground shifts, cracks, or surface displacement, as it relates to effect on movement of piping as well as structures, including the reactor vessel itself.

To illustrate the reality of the effect of the continuing blasting at the adjacent quarry, members of the Curlin household situated across the street from the perimeter of the reactor site, and practically the same distance from the quarry as is the reactor building, have stated that "the blasting shakes the whole house".

This vibratory movement and shaking referrred to by the Curlin household certainly must be expected to affect the so-called cosmetic "dental work" underlaying the already constructed reactor buildings containing the reactor vessels.

A full investigation is demanded forthwith.

Very truly yours,

Frank R. Romano

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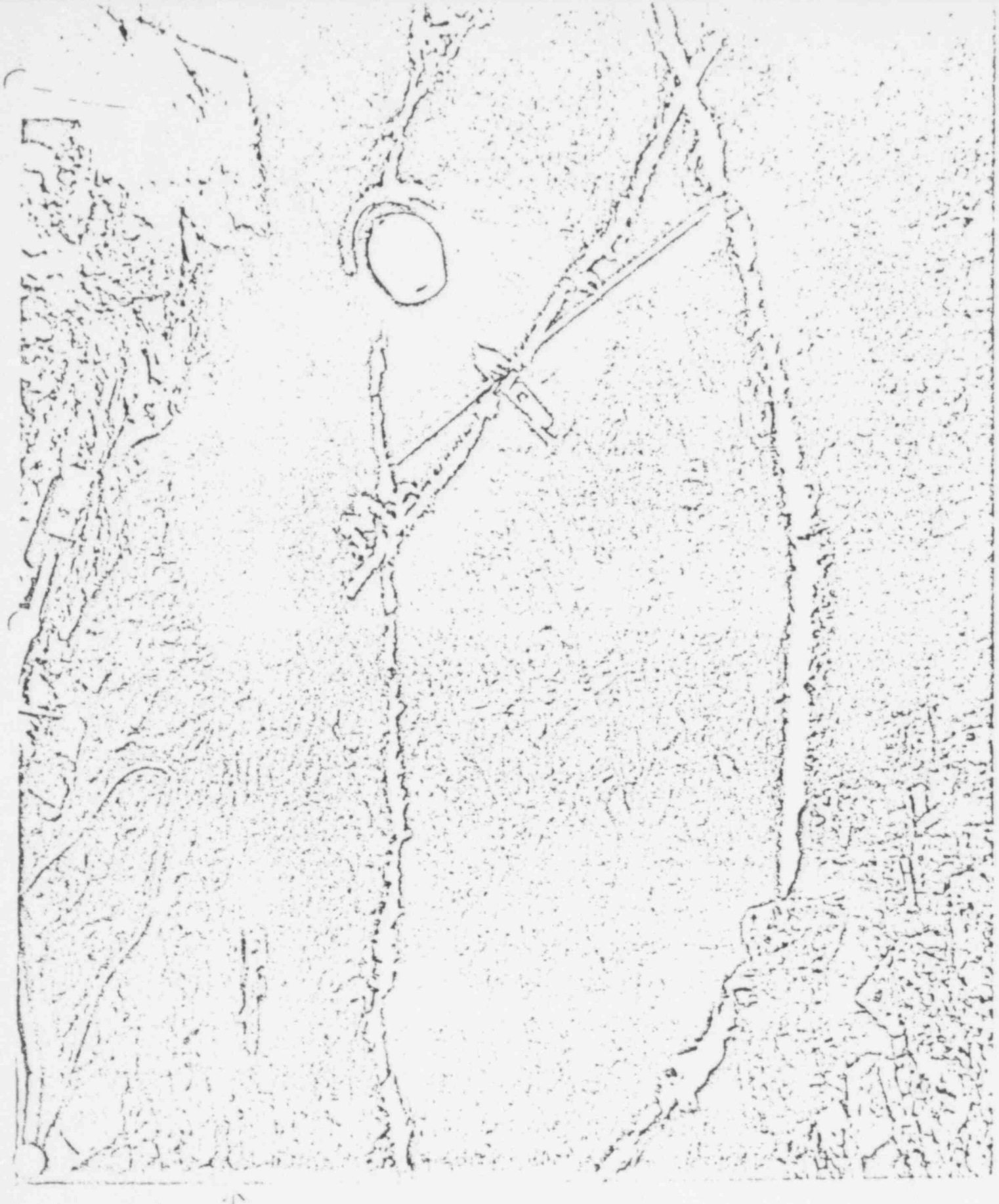

PHOTO 7. - Fracture Zone A at Mh and N lines
Looking down on the zone. SW is to the left of the photo. The paint outlines the area to be excavated for dental treatment. Note the numerous through-going joints at an acute angle to the frac ure zone.

PHOTO 13. - Fracture Zone A at Rh and N Lines
Looking northeast at zone after being filled with dental concrete.