

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of)
GENERAL ELECTRIC COMPANY)
(Vallecitos Nuclear Center -) Operating License No. TR-1
General Electric Test)
Reactor))

ORDER TO SHOW CAUSE

I.

The General Electric Company (GE or licensee), Pleasanton, California, is the holder of Operating License No. TR-1, issued on January 7, 1959, which authorizes the operation of the General Electric Test Reactor (GETR), at GE's Vallecitos Nuclear Center (VNC) located near Pleasanton, California. Renewal of Operating License No. TR-1 has been applied for by GE and a notice of consideration of the application for renewal was published in the Federal Register on September 15, 1977 (42 FR 46427). A hearing in this matter has been requested and an Atomic Safety and Licensing Board has been designated to rule on petitions for leave to intervene.

II.

GETR is a 50 MW thermal test reactor primarily used in the production of radioisotopes for medical diagnosis and therapy and for industrial purposes. Additionally, boiling water reactor fuel element development testing is conducted in this facility.

III.

NEW INFORMATION

In mid-July 1977, the HRC staff initiated a review of the geology and seismology of the Vallecitos site in connection with the application for license renewal of GETR. A brief review of the updated information provided in support of the application indicated that difficult seismologic and geologic questions existed at the site and that there was insufficient information concerning the seismic and geologic characteristics of the area at VHC. The HRC staff's concerns were discussed with the licensee in August 1977 and the HRC staff indicated that additional geological and seismological information would be required. At that time, the HRC staff learned of a recently completed U.S. Geological Survey investigation of the region which includes VHC.

Subsequently, on August 22, 1977, the HRC staff received an advance copy of the USGS open-file report, Number 77-609, which contained an interpretation of the geology of Livermore Valley, California. A new geologic map which accompanied this report indicated that the Verona fault, previously mapped approximately 1/2 mile north of GETR, came within about 200 feet of GETR.

To obtain more information regarding the nature of the Verona fault, a trench was dug by the licensee and inspected the week of October 10, 1977. Members of the HRC staff, accompanied by a member of the USGS, inspected the

trench on October 13, 1977. Although direct evidence of faulting could not be observed at that time, the possibility of thrust faulting could not be discounted. Accordingly, the NRC staff requested that the trench be allowed to dry out, that it be deepened at one end, and that the walls be cleaned up and thoroughly mapped to confirm that there was no evidence of the existence of the fault. This work, and completion of a second trench, was carried out by the licensee. On October 20, a representative of the licensee, in a telephone conversation with the NRC staff, reported that its geological consultants had identified evidence of faulting in both trenches. A staff geologist and seismologist and a representative of USGS visited the site on October 22 to observe and evaluate the geologic characteristics in the trenches. Existence of the fault and evidence that it might be "capable", as that term is used in 10 CFR Part 100, were confirmed during our October 22 investigation. The significance of this new information is presented below.

GEOLOGICAL AND SEISMOLOGICAL SIGNIFICANCE

The GETR site is located in the Livermore Valley. Geologically the site is within the Livermore Syncline and is approximately 7500 feet from the nearest splay of the Calaveras fault. The site is within the trace of the Verona fault as postulated by the USGS (USGS Open-File Report Number 77-689). The Las Positas fault, if projected to the southwest, passes within about 10,000 feet of the site.

The Livermore Syncline, the Verona fault and the Las Positas fault must, on the basis of current information, be considered to be genetically related to movement on the Calaveras fault. The Calaveras fault is a major strand of the San Andreas fault system. Movement on the San Andreas and associated faults is occurring at about 6 cm per year.

The tectonic setting of the site must be considered to be active. The Calaveras fault is known to be moving in a right lateral strike slip direction which results in the rock mass west of the fault being moved northward relative to the rock mass on the east side of the fault. The rate of movement across this fault zone can be measured in millimeters per year. The Verona fault trends approximately northwest-southeast and at an angle to the north west trending Calaveras fault. The fault dips (apparently to the north) at a low angle. Movement on the Verona fault is of a thrust nature with the northern block being relatively thrust over the block to the south. On the basis of current information, this fault must be considered to be genetically related to the Calaveras fault. The genetic relationship of the Verona Fault to the known active Calaveras fault, the close proximity of the Verona fault to the Calaveras fault, and the evidence revealed by the October 20-22 investigations, lead us to conclude that the Verona fault should be considered to be capable.

Vibratory ground motion at the site will likely be controlled by movement on either the Verona fault, on the Calaveras fault or on both. Our assessment of the earthquake potential of the Calaveras fault, based on currently available data, leads us to conclude that the most severe earthquake associated with the fault would be in the magnitude range of 7 to 7.5. An earthquake of lesser magnitude, perhaps 6 to 6.5, would be associated with the Verona fault. Based on these considerations, either the Calaveras or the Verona fault would be capable of producing ground motions at the site with accelerations of sustained duration in excess of .75g if the earthquake were to be centered along the sectors of the fault nearest the GETR site.

Of particular significance in this situation is the fact that an earthquake of this magnitude would be expected to produce offsets of the ground surface, or surface faulting, of several feet. Given the close proximity of the Verona fault to the Calaveras fault, movement on the Verona fault simultaneous with movement on the Calaveras fault would be expected to occur.

Based on the highly active nature of the Calaveras fault, the high ground accelerations and, more importantly, the vertical displacement or surface faulting now associated with the Verona fault, which have not been considered previously, we have concluded that a potentially hazardous condition may exist at VHC with respect to the continued operation of GETR for an extended period of time, in that this facility has not been designed to withstand these severe earthquake effects.

For these reasons, operation of the facility should not be continued for an extended period until such new information is completely assessed. Accordingly, in the absence of further information the staff concludes that such facility operation be suspended until all relevant information has been fully evaluated and unless resumption of operation is approved by the staff.

IV.

GETR is primarily used in the production of radioisotopes for medical diagnosis and therapy and for industrial purposes. We have given careful consideration to the potential adverse impact on the availability of radioisotopes for the medical community which may result from cessation of operation of GETR. Of particular concern is the availability of technetium 99m for use in the diagnosis of pulmonary embolisms. A critical situation would result if the material presently in process were not made available at the end of the present cycle on Thursday, October 27, 1977. Extended discussion with the HRC's medical consultants and other representatives of the medical community indicate that immediate disruption of the supply of technetium 99m would have a significant impact on the life saving uses of this material. Indications are, however, that other suppliers may be able to make up most of the deficit after the present batch is processed. Steps are being taken to arrange alternate sources of supply.

V.

There are a number of other facilities at the VNC site. These include the NTR, a 100 kw light water cooled and moderated graphite

reflected research reactor which provides neutrons for experimental studies, for neutron radiography, and for the production of microfilter membranes. Operation is authorized by License No. R-33.

While NTR, like GETR, has not been evaluated taking into consideration design bases appropriate for the above seismological conditions, preliminary assessments suggest that failure of NTR structures and its related safety systems would not result in consequences in excess of guidelines set forth in Commission regulations. However, the staff is considering in greater detail the need for further action, if any, with respect to NTR.

Also located at the VHC site are the Vallecitos Boiling Water Reactor (VBWR) a deactivated (in 1963) facility from which all fuel has been removed, and the ESADA-Vallecitos Experimental Superheat Reactor (EVESR), a deactivated (in 1967) reactor from which all fuel has also been removed. Neither of these facilities can be operated without prior NRC approval.

There are also several buildings in which material subject to Special Nuclear Material and Byproduct Material licenses are stored and used. The need for action, if any, on these licenses, is also under consideration by the NRC staff. Certain of these activities are governed by licenses issued by the State of California, and we are in consultation with California concerning this matter.

GE has agreed that by Friday, October 28, 1977, it will provide to the NRC staff an assessment of all NRC-licensed activities at the VHC site.

V.

For the reasons set forth in Section III above, and giving due consideration to the factors in Section IV above, the staff has concluded that public health, safety and interest requires that the facility be placed in a cold shutdown condition upon completion of the present cycle on October 27, 1977, pending further Order of the Commission.

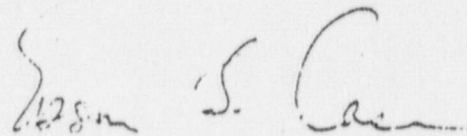
In view of the foregoing and pursuant to the Atomic Energy Act of 1954, as amended, and the Commission's regulations in 10 CFR Parts 2 and 50, IT IS HEREBY ORDERED THAT:

1. Pending further order by the Director, Office of Nuclear Reactor Regulation, the GETR shall, upon completion of the present cycle on Thursday, October 27, 1977, be placed and maintained safely in a cold shutdown condition.
2. GE show cause, in the manner hereinafter provided, why the suspension of activities under Operating License No. TR-1 should not be continued.

The licensee may, within twenty days of the date of this order, file a written answer to this order under oath or affirmation. Within the same time, the licensee or any interested person may request a hearing. Upon failure of the licensee to file an answer within the time specified, the Director, Office of Nuclear Reactor Regulation will, without further notice, issue an order suspending any further activities under Operating License No. TR-1 pending conclusion of the proceeding before the Atomic Safety and Licensing Board in connection with renewal of this license.

In the event that a hearing is requested, the issues to be considered at such a hearing shall be:

- (1) What the proper seismic and geologic design bases for the GETR facility should be;
- (2) Whether the design of GETR structures, systems and components important to safety can be modified so as to remain functional considering the seismic design bases determined in issue (1) above;
- (3) Whether activities under Operating License No. TR-1 should be suspended pending evaluation of the foregoing.



Edson G. Case, Acting Director
Office of Nuclear Reactor Regulation

Dated this 24th day of
October 1977

COMMENTS FOR GETR MEETING
12/2/77

Purpose: Evaluate Potential for Surface faulting at the GETR site

- ~~Pass~~ concerns on to GE
- ~~Express~~ Problems
- Express Investigations needed to aid in resolving problem

Problems

A. As expressed in show cause order

1. Mapped location of the Verona fault
2. Thrust offset observed in trenches
3. Structural relationship of the Verona to the Calaveras fault
4. Regional tectonic setting

Entire response to show cause order in surface faulting area is based on the premise that the Verona fault as postulated does not exist. Investigations to date have shed new light on our understanding of the site geology - but present evidence is not conclusive.

At this point in our review we are not in a position to support conclusion that denies the existence of a Verona fault. Sufficient investigations have not been accomplished to date to show that such a fault does not exist.

LANDSLIDES

1. Evidence for the existence of large, old landslides includes:
 - a. photointerpretation of landforms
 - b. shear planes and low angle thrust features observed in trenches and borings near base (toe?) of proposed slide
 - c. jumbled nature of subsurface materials and shears observed in trench 2.

2. Evidence for landsliding is not conclusive because:

- a. headscarp boundaries have not been supported by trenching
- b. lateral shear zones have not been observed in trenches to define the limits of the slide
- c. the primary slip surface has not been sufficiently located
- d. units of stable bedrock have not been shown to be discontinuous across slide boundaries
- e. units (beds) of stable bedrock have not been correlated with units in slide mass - sequences would be the same
- f. rotation of beds has not been demonstrated
- g. the mechanism for mass movement has not been conclusively established, i.e. stream erosion of toe, more humid paleo-climate, breached resistant cap exposing materials susceptible to sliding
- h. observed shear zones have not been correlated with primary and secondary slide masses
- i. the age of soils offset in trench one has not been established, nor has the age of the landslide.
- j. other geomorphic explanations of arcuate escarpments have not been addressed or evaluated, i.e. stream meanders, terraces, faulting w/secondary sliding, etc.

VERONA FAULT

1. Evidence for the existence of the Verona Fault includes:

- a. prominent south-facing scarp
- b. generally linear, sharp break in topography
- c. unexplained linear features in site area
- d. seeps and ponds along linear feature

- e. thrust offset along shear planes exposed in trenches
 - f. difference in elevation (~450') between Livermore gravels on either side of sharp break in topography
 - g. active local and regional tectonic setting and possible association of linears with Calaveras, Williams and/or Las Positas Faults
 - h. existing geologic maps and texts of Vickerey, Hall, Herd, Cal. Dept Water Resources, GETR
 - i. stratigraphic relationships on either side of proposed fault (Texas Company's Foley No. 1 well)
2. At the present time we cannot conclude that the Verona fault as postulated does not exist because:
- a. thrust offsets observed in trenches may or may not be due to landsliding. Trenches have not been dug along the proposed fault trace in areas where landsliding definitely does not exist (i.e. to the northwest under Qt alluvium)
 - b. local geology has not been mapped in detail
 - c. subsurface geology is complex and poorly understood at present
 - d. structural and stratigraphic relationships of geologic units are poorly understood in site area
 - e. geomorphology of area is poorly understood - origin of anomalous landforms have not been evaluated
 - f. photo-linears have not been trenched or explained
 - g. origin of seeps and ponds have not been explained
 - h. soils offset in trench 1 have not been dated
 - i. thrust offset has not been dated
 - j. resistant gravel unit east of the site has not been dated or stratigraphically related to the Livermore gravels

Summary

In our view, at the stage of our review, the situation is one of conflicting hypotheses. One hypothesis proposes faulting as the primary genetic cause of the features observed in the site area. This hypothesis has been forwarded by a number of geologists who have worked in the site region and the NRC staff. Alternate hypotheses have been offered which, in essence, ascribe to erosion and mass wasting as the primary genetic cause of the features observed in the site area. This hypothesis is supported by data acquired and evaluations made by General Electric Company consultants during the past two months.

At the present time we do not feel that sufficient data has been provided which will allow us to conclude that the latter hypothesis is valid.