JAN 12 1978

MEMORANDUM FOR: Albert Schwencer, Chief, Operating Reactors Branch #1, DOR

FROM: J. Carl Stepp, Chief, Geosciences Branch, DSE

SUBJECT: SEISMICITY NEAR OCONEE NUCLEAR GENERATING STATION UNITS 1, 2 & 3

Enclosed is our recommended actions with respect to the ongoing earthquake swarm near the Oconee Nuclear Station. These recommendations were prepared by Drs. Jackson and J. Kelleher of my staff after conversations with your staff and the Licensee. The data upon which these recommendations are based are very limited. Thus our recommendations reflect an appropriate level of caution.

To date the activity has the characteristics of an earthquake swarm. Typically earthquake swarms have many events of near equal magnitude. The largest earthquake in this swarm to date has been magnitude 2.2. Our experience with earthquake swarm activity indicates that the largest event which should be expected will exceed by no more than about one magnitude unit the magnitude of the frequent activity. Since the frequent activity in this swarm to date is about magnitude 2.0, we can state conservatively that a maximum event larger than about 3.5 should not be expected unless there is an upward shift in the magnitude of the frequent events. Therefore, the activity to date does not indicate an immediate safety concern for the Oconee units, but continued monitoring and daily reporting is needed.

We anticipate that the investigations we have recommended will enable us to evaluate the tectonic cause of these earthquakes and the hazard that is implied.

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Original Signed by J. C. Stepp

J. Carl Stepp, Chief
Geosciences Branch
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Environmental Analysis

Enclosure:
As stated

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OCONEE NUCLEAR GENERATING
STATION UNITS 1-3
RECOMMENDED ACTIONS WITH RESPECT TO AN
EARTHQUAKE SWARM NEAR STAMP CREEK CHURCH

We consider the recent microearthquake activity in the vicinity of Stamp Creek Church, South Carolina to be a matter of concern because of the proximity of Oconee nuclear plant. The activity, at present, exhibits the character of an earthquake swarm in that many events occurred which were of about equal magnitude (near 2) without the occurrence of a single dominant earthquake. Should the activity persist without significant increase in earthquake magnitude, this activity will not pose a safety hazard to the Oconee units.

However, even though similar microearthquake sequences have occurred elsewhere without accompaniment by larger shocks, it is our judgment that this activity be treated with caution until the tectonic causes and implications are understood. Duke Power should aggressively develop the information required to assess the nature of this microearthquake activity and its relationship to tectonic structure.

We recommend that a program include as a minimum the following objectives:

a) A network of microearthquake instruments should be maintained in the area to determine hypocentral locations and when feasible magnitudes and composite focal plane solutions. This network should be continued in operation for at least some weeks after the apparent cessation of activity.

b) A major goal is to reveal any potential relationships between the microearthquake activity and significant geologic structures. For this purpose there must be developed both an adequate base of regional geologic data and a hypocentral catalog of reasonable quality.

c) Apart from geologic conditions the hypocentral catalog itself should be examined for indications of internal consistency. That is, geometrically planar groups of hypocenters or coherent focal plane solutions may provide evidence of a larger fault surface over which tectonic stress may have accumulated.

d) The spatial extent of hypocenters should be carefully monitored. Duke Power Company should carefully look for indications of significant increase in this spatial extent.

We regard the above as a minimum program to be followed by Duke Power Company. The NRC should be informed daily by telephone of the number of microearthquakes, the maximum magnitude and any significant changes in hypocentral locations. In addition Duke Power Company should provide as soon as reasonably possible a written report detailing: (1) whatever evidence exists for the presence or absence of geologic structures that may be associated with the microearthquake activity, (2) a discussion of the trends, dip and extent of any structures with which the earthquakes can be associated, and (3) a discussion and presentation of any data defining the tectonic structure at the site.

We also recommend that the Division of Inspection and Enforcement be informed of this activity and that they certify the strong motion instruments at the plant site are functioning.