



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

17

JUL 26 1982

MEMORANDUM FOR: James P. Knight, Assistant Director  
for Components & Structures Engineering  
Division of Engineering

FROM: Robert E. Jackson, Chief  
Geosciences Branch  
Division of Engineering

SUBJECT: VOGTLE POST-CP FAULT INVESTIGATION

An Open File Report (82-156) released by the USGS in February this year postulated a fault seven miles south of the Vogtle plant, which is located near the Savannah River in Georgia.

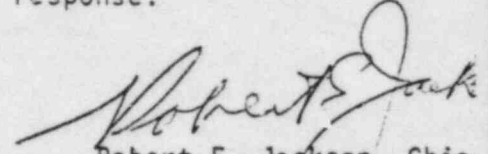
The basis for hypothesizing the existence of the fault is the identification of possible Triassic rocks from well cuttings at a level approximately 400 ft. higher than at a well four miles to the north, and some ground water information that suggests some differences in flow characteristics north and south of the postulated Millett fault.

In response to the suggestion that the inferred fault was Cenozoic in age, without a determination of an upper age limit, Georgia Power initiated a vigorous fault investigation including core borings, seismic reflection, ground water well monitoring, and remote sensing techniques to try to identify the fault, if present, and determine its age. They are at the last stages of the investigation, analyzing the data, and are requesting that we evaluate their program, review their final reports, and resolve the problems as expeditiously as possible. They are anxious to resolve the fault issue because they have many potential investors who can help fund the \$2 million per day being spent on construction and the total \$3 million to be spent on the fault investigation.

The OL-FSAR for the Vogtle site is due in September, 1983, and the OL-SER is presently scheduled for mid-1985. The applicant has asked the NRC's help to resolve the faulting issue prior to the OL-SER. The applicant is attempting to sell a part interest in the plant and may be unable to do so if there is serious reservation about the suitability of the site because of the possible capability of the Millet Fault.

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We have arranged to meet with Reubel Thomas, Vice-President of Company Services that manages the construction and licensing utility, next Wednesday, July 28, to discuss possible procedure reporting their findings and NRC response.



Robert E. Jackson, Chief  
Geosciences Branch  
Division of Engineering

cc: R. Vollmer  
D. Eisenhut  
S. Brocoum  
B. Youngblood  
J. Grant  
I. Alterman  
A. Ibrahim  
R. McMullen



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

AUG 02 1982

Docket Nos.: 50-424/427

MEMORANDUM FOR: Robert E. Jackson, Chief  
Geosciences Branch, DE

THRU: *SDG* Stephan J. Brocoum, Leader  
Geology Section  
Geosciences Branch, DE

FROM: Ina B. Alterman  
Geology Section  
Geosciences Branch, DE

SUBJECT: VISIT TO VOGTLE PLANT AREA JULY 13 AND 14, 1982

Plant Name: Vogtle Units 1 & 2  
Docket Nos.: 50-424/427  
Licensing Stage: Post CP  
Responsible Branch: LB-1; Jane Grant, PM

A visit to the Vogtle Plant area by myself and LPM, Jane Grant, was prompted by a request from the applicant as a post-CP fault investigation was approaching completion. The investigation was undertaken in response to a USGS Open File Report (82-156) that postulated a fault, the Millett Fault, seven miles south of the Vogtle plant.

The fault purportedly trends northeast-southwest, roughly parallel with the Coastal Plain strata, with the southeast side of the fault uplifted relative to the northwest. The fault is interpreted to offset the buried Triassic-Cretaceous contact approximately 700' on the southeast side, with progressively smaller offsets up-section.

The basis for postulating the fault is the identification of well-cuttings as possible Triassic-age rocks at a level 400 ft. higher than at a well 4 mi to the north, and some ground water information that suggests some differences in flow characteristics north and south of the postulated Millett fault.

The applicant undertook a vigorous investigation, including 12 core borings - 4 on the South Carolina side of the Savannah River and 8 on the Georgia side - straddling the postulated fault, down-hole geophysical logs of each borehole, seismic reflection profiles along the Savannah River crossing the fault,

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AUG 02 1982

Robert E. Jackson

- 2 -

monitoring of ground water levels from an array of wells covering up to 2500 mi<sup>2</sup> of the area, and a remote-sensing study of possible surface linears using Landsat and other aerial photography.

As the investigation is nearing completion, Southern Company Services (SCS), which manages the licensing for Georgia Power, thought it prudent to let NRC staff observe their work in progress and some of their preliminary results. Accompanying Jane Grant and myself for the day were J. Bailey, Licensing Manager for SCS, Gerald Grainger, SCS staff geologist, and Tom Crosby, Geologist for Bechtel.

In the morning we were briefed on the background of the investigation, the geology of the area, and the details of the various aspects of their investigation. We then examined three complete cores, VSC-2 and -4, from South Carolina, and VG-6, from Georgia. Several more cores were open and available for examination but time did not permit more than a cursory look.

In the cores examined, a distinctive lithic unit, a Middle Eocene gray marl showed little difference in elevation in cores from either side of the postulated fault. Gamma logs of these and other holes showed a distinctive signature for the marl and no offset on either side of the inferred fault. Thus both cores and gamma logs showed that the marl, dated by fossils, was not offset. None of the cores showed any suggestion of systematic fracturing indicative of tectonic deformation. Some units had characteristic fractures, some parallel with core axis (vertical) and some at varying angles to the core over short intervals at depth, with hundreds of feet of unfractured strata above and below.

A brief look at a reflection profile showed two distinctive reflectors at some depth with no anomalies indicative of the inferred fault. The resolution of the reflection data, according to the applicant's consultant, is such that an offset of 50 ft or more should be recognized on the profile. The postulated Millett fault offset of the Triassic-Cretaceous contact is estimated to be 700 ft by the USGS. This was not observed on the record.

In the afternoon we drove through the area, viewing some of the drill holes being monitored for water levels, examined an exposure of the fossiliferous marl, and observed outcrops of a resistant chert-or chalcedony-deposit formed from secondary mineralization along the contact between two stratigraphic units, the Barnwell and Hawthorn Formations. This ridge-forming deposit produces a short linear trend on Landsat and other photo imagery.

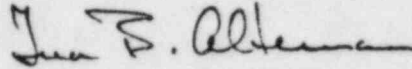
While no conclusion can be drawn based on the observations during a single day's visit, the data seen indicate that if a fault is present it is not likely to be younger than Middle Eocene (50 million yrs old), and therefore would be considered non-capable. Final determination of the presence and capability of the fault will be made after the staff has carefully reviewed the final report of the investigation.

AUG 02 1982

Robert E. Jackson

- 3 -

The applicant has expressed a desire to make a technical presentation at NRC headquarters to summarize in detail the data and the conclusions after submitting a draft report. The purpose of the presentation and draft is to get staff input on the completeness of the study, or if, in the staff's judgement, more work is necessary to support their conclusions.



Ina B. Alterman, Geologist  
Geosciences Branch  
Division of Engineering

cc: S. Brocoum  
L. Reiter  
B. J. Youngblood  
J. Grant  
P. Sobel  
A. Ibrahim



Southern Company Services

The Southern Electric System

August 9, 1982

Mr. Jeffery Armbruster  
District Chief  
U.S. Geological Survey  
6481 Peachtree Industrial Boulevard  
Suite B  
Doraville, GA 30360

NSL-NS-432

Dear Mr. Armbruster:

Enclosed is the final group of downhole geophysical logs for this investigation. They are for VSC-4 and VSC-4A. VSC-4 is a nuclear log run through the drill stem. The logs for VSC-4A are for the 8" diameter observation well hole which was drilled adjacent to VSC-4. Hole 4A was only drilled to 475 feet to penetrate the lower aquifer. Please treat as proprietary until official transmittal to the NRC or unless specific written permission is granted for release.

Yours truly,

J. A. Bailey  
Project Licensing Manager

JAB/ssb  
Enclosure

xc: R. A. Jackson (w/attachment)  
I. W. Marine (w/attachment)  
M. Hawkins (w/attachment)  
W. V. Conn (w/attachment)  
R. Morris (w/o attachment)  
D. O. Foster (w/o attachment)  
D. E. Dutton (w/o attachment)  
O. Batum (w/o attachment)  
R. A. Thomas (w/o attachment)  
C. R. McClure (w/o attachment)  
J. M. Grant (w/o attachment)

9/10/82

20

memo  
from **BOB BLODNIKAR**



TO: Buck Ibrihim

Per the request of Cole McClure, enclosed  
is a memo to Cole from Carl H. Savit on  
his analysis of the Uniboom records.

Regards,

*Robert H. Blodnikar*

Enclosure

*Buck - seismic reflection  
physics  
? draft report  
Vogele TIC no. 1413*

MEMORANDUM

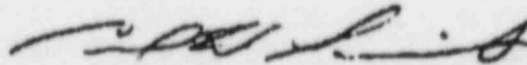
September 9, 1982

TO: C. R. McClure

FROM: Carl H. Savit

I have examined the original Vibrocor record, line 1, with particular attention to the feature at a time between 11 and 14 milliseconds between fix 13 and fix 14 that appears to represent a fault or fault-like characteristic. The character of the reflection on both the up-thrown and down-thrown segments of that reflection appears to be substantially the same. The implication is that both segments are lithologically identical and with approximately the same thickness relative to the wave-length of the received reflections. There appear to be no obvious diffraction patterns from this reflecting horizon. A reflection immediately below is continuous across the fault or fault-like feature. A reflection several milliseconds above is also clearly continuous.

The etiology of the feature would appear, therefore, to be associated with material deposited on a karst surface rather than arising from a karst surface. Reflections from a karst surface tend to be different in character, depending upon whether the reflection is from the surface or from a depression, and the sharp edges characteristic of karst surfaces tend to produce numerous diffractions. The fact that the fault-like feature is not present on a reflector immediately below the displaced horizon is consistent with the karst interpretation and inconsistent with tectonic causative factors. Movement subsequent to the deposition on the karst surface is ruled out by the continuity of the shallower reflector.



Carl H. Savit

CHS:rl

memo  
from

T. W. CROSBY



TO: \_\_\_\_\_

Deliver this to Buck  
Ibrahim in the  
HRC Bethesda office  
Monday AM.

10a

September 10, 1982

MEMORANDUM

TO: Thomas W. Crosby, Bechtel Civil & Minerals

FROM: Vernon J. Henry, Consultant

SUBJECT: Re-examination of Seismic Survey Records along the Savannah River for the Study of the Postulated Millett Fault

As requested, I have re-examined the seismic records as presented in the Harding-Lawson Associates report. Specifically, two segments of each of the three records were examined:

1. The section from fix 13 halfway to fix 14 and
2. The section from fix 13 to mile marker 144.

In segment 1 the subject feature appears to be associated with an irregular series of reflectors displaying topographic relief of a blocky character. In my opinion, the feature is the result of erosion, collapse, and/or solution of the strata as represented by the seismic reflectors. I discern continuous, relatively flat-lying reflectors beneath the feature. I can not detect the presence of a fault structure in this record segment on any of the three figures shown in the report.

In segment 2, the subject feature occurs approximately 1/3 of the distance from fix 13 toward mile marker 144. On the high resolution Uniboom record (figure 3), this area shows a very similar signature to that portion of the reflectors in segment 1. In my opinion, no structure is present that could not be attributed to erosion, collapse or solution. I do not detect a fault structure. On figure 4 the subject feature appears to show several feet of offset in the primary set of reflectors and a somewhat similar offset in a set of reflectors approximately .02 seconds directly below. While the offset in the two reflector sets appear to suggest displacement within the upper .05 seconds of the record, the deeper reflector set, in my opinion, is not unequivocally a real reflector. In this and several other areas of the record, it appears more to be a multiple of the primary set of reflectors; in other parts of the record, the relationship is unclear. In any case, the reflectors beneath these reflectors and below the bubble pulse in this section of the record do not show this offset nor do they indicate a fault structure.

The 20 cubic inch record shown in figure 5 doesn't provide the resolution necessary to identify the subject feature. However, the larger scale reflectors are shown to be relatively flat-lying and uniform in character and, in my opinion, do not show a fault structure.

In summary, it is my opinion that the subject features resulted from processes of erosion, collapse and/or solution but not due to faulting.

Vernon J. Henry



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

SEP 23 1982

Docket Nos.: 50-424  
and 50-425

APPLICANT: GEORGIA POWER COMPANY  
FACILITY: ALVIN W. VOGTLE NUCLEAR PLANT, UNITS 1 AND 2  
SUBJECT: MEETING SUMMARY - MILLETT FAULT STUDY

A meeting was held at the NRC headquarters in Bethesda, Maryland on September 14, 1982. The applicant was represented by Georgia Power Company, Southern Company Services, Inc. and Bechtel Civil and Minerals, Inc. The NRC was represented by the Division of Engineering (GSB, HGEB) and Licensing (LB-1), NRR. A list of attendees is enclosed.

Georgia Power Company requested this meeting to present its findings and conclusions in the Millett Fault Study, which is an extensive investigation program undertaken by the applicant in response to a U. S. Geological Survey Open File Report (82-156) that suggested the existence of a fault approximately seven miles southeast of the Vogtle facility near Waynesboro, Georgia.

During introductory remarks, the applicant emphasized that the purpose of the Millett Fault Study was to address the NRC's concern of whether or not a capable fault (one that has moved once within the last 35,000 years or has had multiple movements within the last 500,000 years) does indeed exist, not whether a fault does or does not exist. As an overview of the study, the applicant summarized its investigative program, followed by more detailed presentations and discussions of acquisition of data, drilling, field geological exploration, geophysical studies, groundwater evaluation, groundwater modeling, surface water hydrology and seismicity. The applicant concluded that none of its data and/or evaluations supported the existence of a capable fault. The final report will be submitted to the NRC in mid-October.

Following the applicant's presentation, the staff commented that the overall program was excellent in scope and detail. The staff agreed that the geological information, especially the stratigraphy as determined from core borings and down-hole geophysical logging, appeared to support the absence of a capable fault. However, the staff suggested the applicant discuss in greater detail the anomaly near Fix 13 found in the seismic reflection records for the shallow reflector and review the evidence for the continuity of the deeper reflectors.

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The staff further requested that GPC: (1) provide the seismic reflection lines from the Savannah River Project, (2) use overlays of simulated with measured data on the pieziometric contour maps, and (3) compare the the USGS's measured pieziometric contour maps for both aquifers with that produced by the applicant.

The staff noted that upon receipt of the final report to the Millett Fault Study it would undertake a very rigorous, independent review, including appropriate contacts with local experts. During and/or following this review, a site visit and meeting would be held to discuss further details of the study.

If you have any questions concerning the above, please call J. Grant, Project Manager, at 301-492-7793.

A handwritten signature in cursive script, appearing to read "Jane M. Grant for".

Jane M. Grant, Project Manager  
Licensing Branch No. 1  
Division of Licensing

Enclosure:  
List of Attendees

cc w/encl.: See next page

Mr. Doug Dutton  
Vice President - Project  
Management  
Georgia Power Company  
P. O. Box 4545  
Atlanta, Georgia 30302

cc: Mr. L. T. Gucwa  
Chief Nuclear Engineer  
Georgia Power Company  
P. O. Box 4545  
Atlanta, Georgia 30302

Mr. Ruble A. Thomas  
Vice President  
Southern Services, Inc.  
P. O. Box 2625  
Birmingham, Alabama 35202

Mr. J. A. Bailey  
Project Licensing Manager  
Southern Company Services, Inc.  
P. O. Box 2625  
Birmingham, Alabama 35202

George F. Trowbridge, Esq.  
Shaw, Pittman, Potts and Trowbridge  
1800 M Street, N. W.  
Washington, D. C. 20036

Mr. D. O. Foster  
Georgia Power Company  
P. O. Box 4545  
Atlanta, Georgia 30302

Mr. James P. O'Reilly  
Nuclear Regulatory Commission  
Region II  
101 Marietta Street, Suite 3100  
Atlanta, Georgia 30303

Mr. William S. Sanders  
Resident Inspector/Nuclear Regulatory Commission  
Post Office Box 572  
Waynesboro, Georgia 30830

Mr. Thomas W. Crosby  
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San Francisco, CA 94119

Mr. C. R. McClure  
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Post Office Box 3965  
San Francisco, CA 94119

Mr. M. Wolff  
Bechtel Civil & Minerals, Inc.  
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San Francisco, CA 94119

Mr. Jack Harris  
Nuclear Regulatory Commission  
Region II  
101 Marietta Street, Suite 3100  
Atlanta, Georgia 30303

Mr. Gerald S. Grainger  
Southern Company Services, Inc.  
Post Office Box 2625  
Birmingham, Alabama 35202

Mr. Jeffrey Armbruster  
District Chief  
U. S. Geological Survey  
- 6481 Peachtree Industrial Boulevard  
Suite B  
Doraville, Georgia 30360

Mr. Robert Morris  
Engineering Geology  
U. S. Geological Survey  
MS-908  
Reston, Virginia 22092

Dr. Walter Hayes  
Deputy for Research Applications  
U. S. Geological Survey  
Office of Earthquake Studies  
905 National Center  
Reston, Virginia 22092

Enclosure 1

Attendees  
Meeting - Millett Fault Study  
September 14, 1982

NRC

I. Alterman  
J. Hopkins  
A. Ibrahim  
S. Brocoum  
R. Jackson  
D. Chery  
R. McMullen  
J. Grant

USGS

R. Morris

Georgia Power Company

D. Foster

Southern Company Services, Inc.

R. Thomas  
J. Bailey

Bechtel

J. Litehiser  
M. Wolff  
C. Farrell  
R. Blodmikan  
G. Segol  
C. Michniuk  
J. Cassidy  
T. Crosby  
K. Blom (Harding Lawson Assoc.)  
L. Wood (S. S. Papadopoulos & Assoc.)

MEETING SUMMARY

SEP 23 1982

21

Document Control (50-424/425)

NRC PDR

L PDR

TERA

NSIC

LB#1 Rdg.

MRushbrook

Project Manager JGrant

Attorney, OELD

OIE

Regional Administrator, Region II

PARTICIPANTS (NRC):

IAlterman

JHopkins

Albrahim

SBrocoum

RJackson

DChery

RMcMullen

JGrant