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

ATTACHME[illegible]

CK 1108.00

MAY 17 1978

Docket Nos: STN 50-491
STN 50-492
STN 50-493

Duke Power Company
ATTN: Mr. W. H. Owen, Vice President
Design Engineering
P. O. Box 2178
Charlotte, North Carolina 28242

Gentlemen:

SUBJECT: MODIFICATION OF GEOLOGIC MAPPING PROGRAM - CHEROKEE NUCLEAR SERVICE WATER POND DAM

On May 4, 1978 representatives of the Duke Power Company met with the Nuclear Regulatory Staff to discuss proposed modification to the geologic mapping program in the Cherokee Nuclear Service Water Pond Dam Foundation. As was indicated in your letter dated May 5, 1978, an agreement was reached on an acceptable mapping program. We have reviewed the description in your letter of May 5, 1978 and hereby confirm our conclusion that the proposed modification is acceptable.

Sincerely,

Steven A. Varga, Chief
Light Water Reactors Branch No. 4
Division of Project Management

cc: See Page 2

8407230318

CK 1108.00

MAY 17 1978

ccs:
William L. Porter, Esq.
Associate General Counsel
Duke Power Company
Charlotte, North Carolina 28242

J. Michael McGarry, III, Esq.
Debevoise & Liberman
700 Shoreham Building
806 Fifteenth Street, N. W.
Washington, D. C. 20005

William A. Raney, Jr.
Special Deputy Attorney General
Attorney for the State of
North Carolina
Department of Justice
P. O. Box 629
Raleigh, North Carolina 27602

Mary Apperson Davis, Chairman
Yadkin River Committee
Route 4, Box 261
Mocksville, North Carolina 27028

Thomas S. Erwin, Esq.
P. O. Box 928
Raleigh, North Carolina 27602

David Springer
The Point Farm
Route 4
Mocksville, North Carolina 27028

William G. Pfefferkorn, Esq.
2124 Wachovia Building
Winston-Salem, North Carolina 27101

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

MAY 11 1978

ATTACHMENT

Docket Nos: STN 50-491
STN 50-492
STN 50-493

APPLICANT: Duke Power Company

CK 1108.00

FACILITY: Cherokee Nuclear Station, Units 1, 2 and 3

SUBJECT: MEETING OF MAY 4, 1978 TO DISCUSS THE GEOLOGIC MAPPING PROGRAM FOR THE NUCLEAR SERVICE WATER DAM EXCAVATION

Representatives of Duke Power Company (applicant) met with members of the Nuclear Regulatory Staff in Bethesda, Maryland on May 4, 1978, to review the results already available and plans for the remainder of the geologic mapping program for the nuclear service water dam excavation. In the central section mapping has been completed over all the areas from the upstream to the downstream edges of the excavation. In this section the features identified trend in a downstream-upstream direction perpendicular to the length of the core trench. Because of this excavation, most features would have been identified with mapping in the core trench excavation without mapping in the large areas upstream and downstream of the core trench. The same trends occur in other sections of the core trench. The staff generally agreed with the applicant's conclusion that the available information provided a sufficient basis for limiting the area of mapping upstream and downstream of the core trench in the remaining sections to be mapped.

The staff suggested several actions and procedures that should be considered in establishing a limited area program. The applicant will consider these suggestions in formulating a revised program. He plans to describe that proposed program in a letter that will request staff review and comment.

Calvin J. Moon

C. Moon, Project Manager
Light Water Reactors Branch No. 4
Division of Project Management

Enclosure:
Attendance List

cc: See Page 2

ATTACHMENT

MAY 11 1978

CK 1108.00

Duke Power Company

ccs:
William L. Porter, Esq.
Associate General Counsel
Duke Power Company
Charlotte, North Carolina 28242

J. Michael McGarry, III, Esq.
Debevoise & Liberman
700 Shoreham Building
806 Fifteenth Street, N. W.
Washington, D. C. 20005

William A. Raney, Jr.
Special Deputy Attorney General
Attorney for the State of
North Carolina
Department of Justice
P. O. Box 629
Raleigh, North Carolina 27602

Mary Apperson Davis, Chairman
Yadkin River Committee
Route 4, Box 261
Mocksville, North Carolina 27028

Thomas S. Erwin, Esq.
P. O. Box 928
Raleigh, North Carolina 27602

David Springer
The Point Farm
Route 4
Mocksville, North Carolina 27028

William G. Pfefferkorn, Esq.
2124 Wachovia Building
Winston-Salem, North Carolina 27101

0 3 1 8 4 0 7 3 2

ATTACHMENT
MAY 11 1978

CK 1108·00

ENCLOSURE

ATTENDANCE LIST

FOR

MAY 4, 1978

MEETING WITH

DUKE POWER COMPANY

Nuclear Regulatory Commission

C. Moon
J. Kane
R. Jackson

Duke Power Company

I. Pearce
M. Schaeffer
W. Lindsay

CK 1108.00 .11

5/25

ATTACHMENT

May 5, 1978

Director of Nuclear Reactor Regulation
ATTENTION: S. A. Varga, Chief
Light Water Reactors, Branch 4
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

RE: Project 81
Cherokee Nuclear Station
Docket Nos: STN 50-491, -492, -493
Duke File: P81-1412.01

Dear Mr. Varga:

On May 4, 1978 our representatives met with C. W. Hoon, R. E. Jackson, and J. F. Kane of the NRC Staff to discuss the extent of geologic mapping required in the Cherokee Nuclear Service Water Pond Dam foundation. An agreement was reached and a copy of the program is hereby submitted.

As indicated at the meeting, we intend to implement this revised geologic mapping program on May 8, 1978.

Respectfully submitted,

L. C. Dail
Vice President
Design Engineering

JEB/gc

Enclosure

ATTACHMENT

CHEROKEE NUCLEAR STATION
Geologic Mapping of the Nuclear Service Water Pond Dam Foundation

CK 1108·00

Geologic mapping at Cherokee Nuclear Station in the Nuclear Service Water (NSW) Pond Dam foundation is presently being done in accordance with Duke Power Company's commitment as stated in the Cherokee PSAR, Section 2.5.1.2(9).

The proposed mapping program includes detailed 1"=10' maps of the NSW Pond Dam excavation and photographic and laboratory documentation of significant exposed features as well as interpretation of the mode of origin of these features.

Areas to be mapped will include the following:

1) Full length of the cutoff trench floor and up to a height of approximately 10 feet on the trench walls.

2) The central portion of the dam from toe to toe where the prepared foundation is weathered and partially weathered rock.

3) Limited strip areas, approximately 10 feet by 30 feet in size, near the upstream and downstream toes when significant geological features are observed in the cutoff trench to verify the extent and nature of the feature.

4) Any areas in addition to those described in 1), 2) and 3) where the geologist feels it is necessary to trace large fault or shear features to determine amount of offset or age of last movement.

Additionally, the geologist will provide reconnaissance observations of the entire foundation during foundation preparation to identify and study, as necessary, any anomalous feature encountered. Also the foundation for the ogee spillway section will be mapped to the extent necessary to identify significant geologic features.

Since all major shear zones mapped to date at the NSW Pond Dam trend north to northeast, all other shear zones that may affect the performance of the NSW Pond Dam foundation should be exposed and identified by the above described program. The geologic data and information gathered from this mapping program will be adequate to interpret the mode of origin of the local geologic structure.

The attached sketch dated May 3, 1978, illustrates the approximate extent of the program described above.

May 4, 1978

File

June 1, 1978

Memo to File

RE: Cherokee Nuclear Station
Geologic Mapping
File No: CK-1108.00

Meeting with E. O. Porter, NRC - Atlanta on Wednesday, May 31, 1978, and Thursday, June 1, 1978, to discuss geologic investigations at the Cherokee site. Mr. Porter inquired about Zone 12 which is located in the West abutment of the NSW Pond Dam. I described our procedure for investigating fault features and described the steps being taken to study Zones 12, in particular, the preparation of thin sections and the cleaning of a window near the up-stream toe of the dam to determine the extent of faulting and the degree of deformation.

Melvin F. Schaeffer

M. F. Schaeffer, Engineer-Associate
Civil/Environmental Division

MFS/gc

cc: I. W. Pearce
C. Q. Reeves
D. R. Privett

June 6, 1978

S. B. Hager

RE: Cherokee Nuclear Station
Geologic Mapping
Monthly Report - May, 1978
File Nos: CK-1108.00, ~~CS-C-01~~

Approximately 21,000 square feet was mapped in the Unit 1 Final Foundation, Reactor, Auxiliary, and Turbine Buildings. About 330 linear feet of wall was mapped in the Auxiliary Building. At the NSW Pond Dam approximately 60,000 square feet was mapped during May. Of this total, about 28,400 square feet was mapped in saprolite on the upstream side of the West abutment.

A meeting was held at the NRC offices in Bethesda, Maryland, on Thursday, May 4, 1978 to discuss a revised mapping program for the Nuclear Service Water Pond Dam excavation. (Ref: Memo to File dated May 5, 1978).

Study of thin-sections from Zone 11 indicates that the shear is similar to features previously described at the Cherokee site and does not have to be reported to the NRC. A report on Zone 11 will be prepared.

Zone 12 was discovered during final foundation mapping at the NSW Pond Dam and reported to I. W. Pearce on May 22, 1978. Samples were taken for thin-section analysis.

At the end of the month seven geologists were working full-time at the site. During June, six geologists will be needed.

Work by D. R. Privett during May consisted of checking geologic maps and preparation of thin-section reports for Cherokee.

M. F. Schaeffer, Engineer-Associate
Civil/Environmental Division

MFS/gc

cc: I. W. Pearce
C. Q. Reeves
D. R. Privett

June 19, 1978

Memo to File

RE: Cherokee Nuclear Station
Geologic Mapping
File No: CK-1108.00

Meeting with Jack Harris, NRC - Atlanta, on Tuesday, June 13, 1978, to discuss geologic investigations at the Cherokee site.

Progress of geologic mapping in the Powerhouse Area and the NSW Pond Dam was reviewed. In addition, Zone 12, located in the west abutment of the NSW Pond Dam excavation, was discussed in detail. Mr. Harris also examined some of the drafted maps for the Unit 1 excavation.

Malcolm F. Schaeffer

M. F. Schaeffer
Engineer-Associate
Civil/Environmental Division

MFS/gc

cc: I. W. Pearce
C. Q. Reeves
D. R. Privett

0 7 4 3 0 2 1 8 4 0 7

July 5, 1978

File

S. B. Hager

RE: Cherokee Nuclear Station
Geologic Mapping
Monthly Report - June, 1978
File Nos: CK-1106.00, ~~GS-C-01~~

Approximately 48,000 square feet was mapped in the Unit 1 Final Foundation, principally in the Turbine Building. About 675 linear feet of wall was mapped in the Turbine Building. In the NSW Pond Dam excavation approximately 11,200 square feet was mapped during June. Also during June, 57 core holes were logged. These include holes drilled for the preliminary investigation, fault investigation, and grout verification.

Study of thin-sections from Zone 12 indicates that the shear is similar to features previously described at the Cherokee site and does not have to be reported to the NRC. A report on Zone 12 will be prepared.

On Tuesday, June 13, 1978, I met with Jack Harris, NRC - Atlanta to discuss the progress of geologic investigations at the Cherokee site. (Ref. - Memo to File dated June 19, 1978).

At the end of the month five geologists were working full-time at the site. No additional geologists will be needed during July.

Work by D. R. Privett during June consisted of reviewing the Catawba FSAR geology, work on McGuire licensing questions and mapping and checking geologic maps and preparation of thin-section reports for Cherokee.

M. F. Sehaeffer
Engineer-Associate
Civil/Environmental Division

MFS/gc

cc: I. W. Pearce
C. Q. Reeves
D. R. Privett

File

July 31, 1978

Memo to File

RE: Cherokee Nuclear Station
Geology
File No: CK-1108.00

On Tuesday, July 18, 1978, the following U. S. Geological Survey geologists visited the Cherokee site: John W. Hosferman, Jesse W. Whitlow, John D'Agostino, and Patricia J. Loferski. They are presently working on a mineral resources may for the Charlotte 1 by 2 degree sheet. Hosferman was interested in the red clays that are present in rock fractures in the region. They have been found in rock fractures at the NSW Dam and in the Powerhouse area. Some work on these clays has been done by Charles E. Weaver at Georgia Tech for Duke Power.

Their visit had nothing to do with any of the Regulatory Agencies.

M. F. Schaeffer/gc
M. F. Schaeffer
Engineer-Associate
Civil/Environmental Division

MFS/gc

cc: I. W. Pearce

March 2, 1979

Memo to File

RE: Cherokee Nuclear Station
Geologic Mapping
File No: CK-1108.00

Meetings with Jack Harris, NRC - Atlanta Office, were held on Wednesday, February 28, 1979, and Thursday, March 1, 1979, at the Cherokee site to discuss progress of geologic investigations.

On Wednesday we examined Zone 13, located in the Nuclear Service Water Pond Dam Spillway excavation, Ogee section. The following items were discussed: 1) why the faults have been designated a zone, 2) why the northwest-and northeast-trending faults are considered as one zone, 3) the field relationships between the various faults, and 4) a brief description of the geologic history as determined from field observations and thin-section study.

On Thursday various aspects of the geologic program were discussed. The mapping procedure and in particular the procedure for investigating and documenting geologic fault features was reviewed including the relevant portions of the Safety Evaluation Report for Cherokee Nuclear Station (Sections 2.5, 2.5.1, 2.5.2 and Appendix F). The criteria for studying faults or shear zones described in a Memo to File dated May 4, 1977, was discussed and related to the designation of the faults in the spillway excavation as a zone (Zone 13).

The following materials related to Zone 13 were examined by Mr. Harris: 1) original field map, 2) drawing CK-0018-18, Geologic Map of the NSW Spillway excavation, 3) thin-section reports and photomicrographs of samples from the various faults, 4) core logs for SCH-1 and SCH-2 drilled through the northwest-trending fault, and 5) point-plots of shear planes and joints.

Computer printouts of data from the NSW Pond Dam excavation and Unit 1, Final Foundation, were examined and explained.

Drawings CK-0017-02 and CK-0017-03, Unit 1 - Final Foundation and CK-0018-03, CK-0018-06, CK-0019-03, and CK-0019-06, NSW Pond Dam excavation were reviewed by Mr. Harris.

The following progress was reported to Mr. Harris: 1) Top of Rock, Units 1 and 2, 100% complete, Unit 3 not started, 2) Unit 1, Final Foundation, 99% complete, Unit 2, Final Foundation, 25% complete and 3) Nuclear Service Water Pond Dam excavation and spillway, 100% complete.

Malcolm F. Schaeffer

M. F. Schaeffer, Engineer Associate
Civil/Environmental Division

MFS/gc

cc: I. W. Pearce C. Q. Reeves D. R. Privett J. M. Hart

CENTRAL RECORDS

FORM # 01200-9

CK 1108.00

April 12, 1979

ATTACHMENT

S. B. Hager

RE: Cherokee Nuclear Station
Geologic Mapping
Monthly Report - March, 1979
File Nos: CK-1108.00, GS-C-81

No mapping was done at the Cherokee site during March due to lakk of equipment and utility crews for cleanup work.

Meetings with Jack Harris, NRC - Atlanta Office, were held on February 28 and March 1, 1979, at the Cherokee site to discuss progress of geologic investigations (Ref: Memo to File dated March 2, 1979).

The geologic report on Zone 13 was sent to Law Engineering Testing Company for review on March 14, 1979. The report was returned by Law on March 26, 1979. A revised draft of the report has been finished and sent to H. S. Brown for review.

At the end of the month one geologist was working part-time at the site. Three geologists will be needed on the site by about mid-April.

Work by D. R. Privett included checking of drafted maps for Unit 1 and Unit 2, final foundation grade and examination of core log for Transmission Engineering.

M. F. Schaeffer
Engineer Associate
Civil/Environmental Division

MFS/gc

cc: I. W. Pearce
C. Q. Reeves
D. R. Privett
J. M. Hart

CENTRAL RECORDS

SIARI

DUKE POWER COMPANY
CORPORATE RECORDS DEPARTMENT
CHARLOTTE, N. C. 28242

CERTIFICATE OF AUTHENTICITY

THIS IS TO CERTIFY THAT THE MICROGRAPHIC IMAGES APPEARING ON THIS ROLL OF MICROFILM ARE DIRECT REPRODUCTIONS OF ORIGINAL DOCUMENTS

STARTING WITH: Cherokee Construction
120.00 NSSS - General
Primary Loop

AND WERE MICROFILMED IN ACCORDANCE WITH AND PURSUANT TO ESTABLISHED PROCEDURES FOR DOCUMENT CONTROL.

IT IS FURTHER CERTIFIED THAT THE MICROFILM PROCESSES AND MATERIALS USED FOR FILMING THE ABOVE RECORDS WERE IN ACCORDANCE WITH THE RECOMMENDED REQUIREMENTS OF THE NATIONAL BUREAU OF STANDARDS AND THE AMERICAN NATIONAL STANDARDS INSTITUTE.

DATE MICROFILMED 4/15/81

Fred L VanCannon
SUPERVISOR, CORPORATE RECORDS

MICROFILMER Debbie Mullis

0 1 3 0 0 0 0 0 3

Received November 14, 1977
XC and handcarried to:
W S Lee
R L Dick
J R Wells
T A Mathews
P81-1412.11-1
PK of C/C

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
230 PEACHTREE STREET, N.W. SUITE 1217
ATLANTA, GEORGIA 30303

NOV 8 1977

In Reply Refer To:
RII:LEF
50-491/77-3 Cherokee
50-492/77-3 Cherokee
50-493/77-3 Cherokee

Duke Power Company
Attn: Mr. W. H. Owen, Vice President
Design Engineering
Power Building
422 South Church Street
Charlotte, North Carolina 28242

Gentlemen:

This refers to the inspection conducted bv Mr. L. E. Foster of this office on October 4-7, 1977, of activities associated with your application for an NRC Construction Permit for the Cherokee Nuclear Station Unit Nos. 1, 2 and 3 and to the discussion of our findings held with Mr. J. T. Moore at the conclusion of the inspection.

Areas examined during the inspection and our findings are discussed in the enclosed inspection report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations by the inspector.

Within the scope of this inspection we identified no significant deviations from the requirements of 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants," of the NRC regulations.

In accordance with Section 2.790 of the NRC's "Rules of Practice", Part 2, Title 10, Code of Federal Regulations, a copy of this letter and the enclosed inspection report will be placed in the NRC's Public Document Room. If this report contains any information that you (or your contractor) believe to be proprietary, it is necessary that you make a written application within 20 days to this office to withhold such information from public disclosure. Any such application must include a full statement of the reasons on the basis of which it is claimed that the information is proprietary, and should be prepared so that proprietary information identified in the application is contained in a separate part of the document. If we do not hear from you in this regard within the specified period, the report will be placed in the Public Document Room.

NOV 8 1977

Should you have any questions concerning this letter, we will be glad to discuss them with you.

Very truly yours,

C. E. Murphy, Chief
Reactor Construction and Engineering
Support Branch

Enclosures:
RII Inspection Report Nos.
50-491/77-3
50-492/77-3
50-493/77-3

cc: Mr. J. T. Moore, Project Manager
Cherokee Nuclear Station
P. O. Box 422
Gaffney, South Carolina 29340

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
230 PEACHTREE STREET, N.W. SUITE 1217
ATLANTA, GEORGIA 30303

Reports Nos.: 50-491/77-3, 50-492/77-3 and 50-493/77-3

Docket Nos.: 50-491, 50-492 and 50-493

License Nos.: Not issued

Categories: A1, A1 and A1

Applicant: Duke Power Company
Power Building
422 South Church Street
Charlotte, North Carolina 28242

Facility Name: Cherokee Nuclear Station, Units 1, 2 and 3

Inspection at: Gaffney, South Carolina and Charlotte, North Carolina

Inspection conducted: October 4-7, 1977

Inspectors: L. E. Foster
J. R. Harris

Reviewed by: J. C. Bryant 11/8/77
J. C. Bryant, Chief Date
Projects Section
Reactor Construction and Engineering Support Branch

Inspection Summary

Inspection on October 4-7, 1977 (Report Nos. 50-491/77-3, 50-492/77-3 and 50-493/77-3)
Areas Inspected: Procedures, work and records associated with site preparation, lakes, dams and containment foundations; concrete batch plant; concrete and soils laboratory; QA/QC staff; project status; QA manual; design and procurement; QA records; vendor audits and training. The inspection involved 47 inspector hours onsite and at DPC's corporate office by two NRC inspectors.
Results: Within the areas inspected, no deviations were identified.

RII Rpt. Nos. 50-491/77-3, 50-492/77-3 and 50-493/77-3

I-1

DETAILS I

Prepared by: L. E. Foster 11/8/77
L. E. Foster, Reactor Inspector Date
Projects Section
Reactor Construction and Engineering
Support Branch

Dates of Inspection: October 4-7, 1977

Reviewed by: J. E. Bryant 11/8/77
J. E. Bryant, Chief Date
Projects Section
Reactor Construction and Engineering
Support Branch

1. Persons Contacted

a. Duke Power Company

*J. R. Wells, Corporate QA Manager
*W. H. Bradley, Manager, Engineering and Services Division
*C. W. Brankis, QA Specialist
J. M. Curtis, Manager, Vendors Division
*J. T. Moore, Project Manager, Construction
*C. B. Aycock, Project Engineer, Construction
*R. A. Morgan, Site QA Engineer
*H. D. Mason, Acting Senior QA Engineer
L. R. Barnes, Corporate Construction QA Manager
I. W. Pierce, Project Civil Engineer
M. F. Schaeffer, Project Geologist
C. Reeves, Senior Engineer, Civil Projects

b. Contractor Organizations

Law Engineering Testing Company

C. Sams, Project Manager and Geotechnical Consultant
N. Gilbert, Project Geologist
G. Weekley, Resident Geotechnical Engineer

*Denotes those present at exit interview on October 6 and 7, 1977.

2. Applicant Action on Previous Inspection Findings

This area was not inspected.

3. Unresolved Items

No unresolved items were disclosed.

4. Independent Inspection Effort

The inspector observed the grading and excavation work being done under the Limited Work Authorization (LWA-2) and the storage of rock and fill dirt to be used for permanant structure fill. He participated in inspection of the excavations for Units 1, 2 and 3 and geologic mapping of the nuclear service water (NSW) dam foundation with NRR personnel.

No deviations were identified.

5. Project Status

a. Site

Excavating and grading work is continuing for Units 1, 2 and 3. Unit 1 excavation is approximately 75 percent complete, Unit 2 excavation is 25 percent complete and Unit 3 is 5 percent complete. Excavation and mapping of NSW Dam is approximately 90% complete. The concrete batch plant has been erected and is being tested. Two steel warehouses (200 feet by 400 feet), nine construction (craftsmen) buildings and the engineering and administrative offices have been erected and are in use. NSW piping is being delivered and a coating facility has been erected. Site procedures are still being developed.

One permanent QA engineer (civil) and an Acting Senior Engineer are on site and the construction project manager is beginning to fill slots in his QC organization.

b. Corporate Office, Design and Procurement

The Engineering and Services Division (QA) has nineteen personnel and are recruiting for more. The Vendor QA Group has seventeen people. Personnel in these two divisions are being assigned to Cherokee work as required by construction, design and procurement schedules.

Purchase orders for major nuclear equipment and systems have been placed and vendors are being audited on a regular basis.

Some purchase orders have been placed for Balance of Plant Equipment. The first set of steam generators is in fabrication, material is being received by CE for the reactor vessel fabrication and the applicant anticipates that fabrication of the containment (forming of sections) will start in March, 1978.

6. Review of QA Manual

Amendment 3 to the Duke Topical Report was reviewed to determine if organizational/functional changes had been incorporated. Amendment No. 3 dated December 9, 1976 provides a detailed organization description of the groups and individuals involved in carrying out the QA activities. Procedures developed for the design, procurement and construction activities were reviewed and appear to be compatible with the QA Topical Report.

No deviations were identified.

7. Construction Procedure Review

The inspector examined the Cherokee construction procedure manual to determine if procedures associated with the work being performed under the LWA-2 have been developed and approved. Results of review showed that procedures have been developed and approved. Procedures covered all areas including testing of soils, testing of compaction equipment, erosion, foundation preparation and grouting, concrete batch plant and laboratory, calibration of instruments, fabrication and erection of NSW piping, welder qualifications and nondestructive examinations. Based on review of these procedures, it appears that procedures are adequate for work being performed under the LWA-2.

No deviations were identified.

8. Design and Procurement

The inspector discussed design and procurement status and progress with corporate office personnel and reviewed associated documents. These documents included vendor qualification records, purchase orders, specifications, vendor audits and QA records. Based on review of documentation, discussions with personnel and examination of records, it appears that the applicant is implementing his QA program as described in Section 17.1 "QA During Design and Procurement" of the Topical Report.

9. Audits

Audits performed by the applicant on vendors and other Duke organizations were examined by the inspector to determine if audits were being planned and performed and if corrective action was being implemented as specified in Section 17.1.18 "Audits" of the Topical Report. Selected reports covering level I, II and III audits, "Audits of Corporate Activities", plus vendor audits were examined.

No deviations were identified.

10. Training

Section 200 of the Applicants's QAM and Section 17.1.2 of the Topical Report specify that training will be provided for personnel performing quality assurance activities. The responsibility of providing training and keeping QA personnel training records has been assigned to the Quality Assurance Engineering and Services Division. The inspector discussed training plans with the Division Manager, reviewed training recordkeeping and examined the training record of the QA personnel who are presently performing QA functions at the Cherokee Site.

No deviations were identified.

11. Exit Interview

An exit interview was held with the applicant's corporate office representatives (denoted in paragraph 1) at Charlotte, N.C. on October 6, 1977 and another exit interview was held with the applicant's site representatives (denoted in paragraph 1) at the Cherokee Site on October 7, 1977.

During the interview on October 6 the applicant was informed that the inspector had examined Amendment 3 to the Topical Report, procedures, documentation and records associated with organization/functional aligmment, plant status, audits, design, procurement and training.

At the site interview on October 7 the applicant was apprised that the inspector reviewed construction procedures and records, observed site excavating, grading, storage of permanant structure fill, mapping of the NSW Dam foundation and the overall site construction activities.

The applicant was advised that no deviations or unresolved items were identified.

RII Rpt. Nos. 50-491/77-3, 50-492/77-3 and 50-493/77-3

DETAILS II

Prepared by: John R. Harris 11/7/77
J. R. Harris, Civil Engineer/Geologist Date
Engineering Support Section No. 1
Reactor Construction and Engineering
Support Branch

Dates of Inspection: October 4-7, 1977

Reviewed by: T E Conlon 11/8/77
T. E. Conlon, Chief Date
Engineering Support Section No. 1
Reactor Construction and Engineering
Support Branch

1. Persons Contacted

a. Duke Power Company

*J. T. Moore, Project Manager, Construction
*C. B. Aycock, Project Engineer, Construction
L. C. Arnold, Quality Control Engineer, Construction
*H. D. Mason, QA Engineer, Civil
M. Schaeffer, Project Geologist
I. Pierce, Project Civil Engineer Design
D. S. Mason, Supervisor Technician (Civil)
J. L. Moore, Construction Engineer, Civil
J. Hayes, Batch Plant Inspector
*R. A. Morgan, Senior QA Engineer, Catawba

b. Law Engineering Testing Company (LETCO)

D. McLemore, Geologist
C. Weekley, Geotechnical Engineer
E. Bartoli, Geologist
C. Sams, Civil Engineer
N. Gilbert, Geologist

*Denotes those attending exit interview.

2. Licensee Action on Previous Inspection Findings

This area was not inspected.

3. Unresolved Items

No unresolved items were disclosed.

4. Independent Inspection Effort

The inspector examined the concrete batch plant and testing laboratory and observed excavation and mapping activities in Units 1 and 2. Top of rock mapping is finished in Unit 1 and 30 percent completed in Unit 2.

No mapping or excavation has been started in Unit 3. Eight million yards out of an estimated total of 12 million yards of earth and rock have been excavated to date. All of the overburden and 75 percent of the rock have been removed from Unit 1. Eighty five percent of the overburden has been removed from Unit 2. Earth and rock removal in the powerhouse block area are being done under the terms of an LWA-1 issued May 28, 1976. Excavations and mapping are being done in accordance with specification CKS-114.00-00-0001 and Section 2.5 of the PSAR.

No deviations or deficiencies were disclosed.

5. Containment (Structure Concrete) - Review of Quality Assurance Implementing Procedures, Units 1, 2, 3

The inspector held discussions with engineering and QA personnel and examined the following documents concerning control of concrete operations.

a. Topical Report, Duke 1-A, Amendment 3,

b. PSAR Section 3.8.1.6.1,

c. P815-1109.00-00-001, Concrete for Category I, Structures,

d. CKS-1162.00-00-0001, Reinforcing Steel,

e. M-2, Inspection of Design Concrete,

f. M-14, Cadweld Splcice Inspection,

g. CKK-11, Calibration of Concrete Plant Scales,

h. CKK-12, Calibration of Concrete Plant Water Meter,

i. CKK-13, (draft) Verification of Admixture Dispenser,

j. O-1, Calibration of Concrete Air Meters,

k. P-1, Materials and Equipment Receiving and Storage,

l. Q-1, Control of Nonconforming items,

m. R-2, Corrective Action,

n. R-4, Reporting of Deficiencies.

Based on the above discussions with engineering and QA personnel and examination of documents concerning concrete operations, it appears that established QA-QC controls are in accordance with NRC and PSAR requirements.

No deviations were disclosed in the areas examined.

6. Lakes Dams and Canals - Review of Quality Assurance Implementing Procedures, Units 1, 2, 3

The inspector held discussions with engineering and QA personnel and examined documents concerning control of the Nuclear Service Water (NSW) facilities. Documents examined in addition to those listed in paragraph 5 are:

a. PSAR Section 2.5, Appendices 2A through D,

b. SER Section 2.5,

c. CKS - 114.00-00-0001, Rev. 1, General Grading Work,

d. M-1, Inspection of Compacted Earth Fills,

e. M-26, Laboratory Soil Testing,

f. CKB-4, Foundation Preparation, Verification for Nuclear Safety Related Structures,

g. CKB-3, Foundation Grouting,

h. CKD-3, Administrative Control of Preassembly and Installation of Nuclear Safety Related Piping Systems, Classes A, B, C,

i. CKB-2, Group 1 Density, Strength and Compressibility Test for

j. Compaction Equipment,

k. CKK-4, Calibration of Thin Walled Cylinders for Use in

l. Compaction Testing,

m. CKK-5, Calibration of Soil and Concrete Laboratory Scales,

n. CKK-6, Calibration of Laboratory Ovens,

o. Geologic Mapping Procedure,

p. Blasting Report by Clement Brothers and Atlas Power Company.

Based on the above discussions with engineering and QA personnel and examination of documents concerning the NSW facilities, it appears that established QA-QC controls are in accordance with NRC and PSAR requirements.

No deviations were disclosed in the areas examined.

7. Lakes Dams and Canals - Observation of Work and Work Activities, Units 1, 2, 3

The inspector observed dewatering, excavation, foundation cleaning and mapping for the NSW dam core trench between dam centerline stations 15+90 and 21+80 and the east valley foundation from the dam centerline to 380 feet upstream. Work is being done under the terms of the LWA-2 issued July 28, 1977.

In addition to those acceptance criteria listed in paragraph 6, work is guided by the following drawings examined by the inspector:

a. CK-0002-01 General Plan,

b. CK-0002-07 NSW Pipe Excavation Plan,

c. CK-0022-08 NSW Pipe Excavation, Profiles, Sections, Details,

d. CK-0025-01 NSW Pond Overflow Spillway Excavation Plan, Sections, Details,

e. CK-0025-02 NSW Pond Overflow Spillway Backfill and Discharge Channel Plan, Sections, Details,

f. CK-0026-01 NSW Pond, Dam Area, Foundation Excavation and Coffer, Dams, Plan and Sections,

g. CK-0026-02, NSW Pond, Dam Areas, Excavation Section and Details,

h. CK-0026-03 thru 06, Earthwork and Drainage, Plans Sections and Details.

Excavation, dewatering and cleaning of the foundation were being controlled by applicable drawings, specifications and procedures. Mapping was being done by Law Engineering Testing Company personnel under the supervision of a DPC project geologist. Observation of mapping and completed maps indicated foundation mapping was being done as specified by Section 2.5.1.2(9) of the PSAR and the Geologic Mapping Procedure.

No items of noncompliance or deficiency were disclosed.

8. Site Preparation - Review of Quality Assurance Implementing Procedures, Units 1, 2, 3

The inspector held discussions with engineering, geological and QA personnel, examined documents concerning control of site preparation and observed site preparation activities in Units 1 and 2. Documents listed in paragraph 6 which are also used for control of site preparation are summarized as follows:

a. PSAR, Section 2.5 with Appendices 2D and 2C

b. CKS - 114.00-00-0001, Revision 1

c. Blasting Report

d. Procedures M-1, M-27, M-26, CKB-4, Geologic Mapping.

Other documents examined by the inspector are drawings CK-0022-01 thru 06, Powerhouse Excavation Plan, Sections and Details.

Based on the above observed work activities, discussions with geologic and engineering personnel and examination of documents concerning site preparation, it appears that established QA-QC controls are in accordance with NRC and PSAR requirements.

No deviations were disclosed in the areas examined.

9. Foundations - Review of Quality Assurance Implementing Procedures, Units 1, 2. 3

Quality assurance controls for foundations examined by the inspector are the same as some of those listed in paragraphs 5, 6 and 8. Acceptance criteria are in Section 2.5 and Appendices 2A and D of the PSAR.

Grouting of foundations will be guided by specification CKS-114.00-00-001 and procedure CKB4. Concrete activities will be guided by specification P815-1109.00-001 and procedures listed under paragraph 5.

Discussions with engineering and QA personnel and examination of applicable specifications and procedures indicate that QA-QC controls are in accordance with NRC and PSAR requirements.

No deviations were disclosed in the areas examined.

10. Licensing (NRR) Site Inspection

On October 7, 1977, Region II inspectors Foster and Harris accompanied Messrs. White and Jackson of licensing (NRR) on an announced inspection of foundation conditions in the NSW dam. Prior to the inspection, licensee representatives presented a short dissertation on the status of geologic mapping, excavations completed and proposed foundations preparation. Excavated areas examined were the east valley dam foundation and core trench between station 15+90 and 21+80. On the inspection a discussion concerning a viod occuring at core trench station 21+60 was presented by LETCO consultants.

The eliptical shaped viod extends 3 feet in a horizontal direction and 7 inches at its maximum vertical opening. This matter and results of NRR's inspection will be addressed in a separate report.

11. Exit Interview

The inspector met with licensee representatives at the conclusion of the inspection on Ocotber 7, 1977. The inspector summarized the scope and findings of his examination of QA-QC controls for structural concrete, foundations, site preparation, NSW facilities and observation of work activities in Units 1 and 2 and the NSW dam.

No items of noncompliance, deficiency or deviation were disclosed in the areas examined.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30303

R L Dick
R F Wardell
J R Wells

LCD/ File:CK-1412.11-1

SEP 0 8 1978

RECEIVED
DPCO-GO
SEP 14 '78
CONST. DEPT.

RLD	✓	
WSL		
MGR		
TFG		
I INFORMATION		
A ACTION		
C COPY		
R RETAIN		

In Reply Refer To:
RII:EOP
50-491/78-7 Cherokee
50-492/78-7 Cherokee
50-493/78-7 Cherokee

Duke Power Company
ATTN: Mr. L.C. Dail, Vice President
Design Engineering
P. O. Box 2178
Charlotte, North Carolina 28242

Gentlemen:

This refers to the inspection conducted by Mr. Ellis O. Porter of this office on August 3, 1978, of activities authorized by NRC Construction Permit Nos. CPPR-167, CPPR-168 and CPPR-169 for the Cherokee Nuclear Station facility, and to the discussion of our findings held with Mr. C. B. Aycock at the conclusion of the inspection.

Areas examined during the inspection and our findings are discussed in the enclosed inspection report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations by the inspector.

Within the scope of this inspection, no items of noncompliance were disclosed.

We have examined actions you have taken with regard to previously identified enforcement matters. These are discussed in the enclosed inspection report.

In accordance with Section 2.790 of the NRC's "Rules of Practice", Part 2, Title 10, Code of Federal Regulations, a copy of this letter and the enclosed inspection report will be placed in the NRC's Public Document Room. If this report contains any information that you (or your contractor) believe to be proprietary, it is necessary that you make a written application within 20 days to this office to withhold such information from public disclosure. Any such application must include a full statement of the reasons on the basis of which it is claimed that the information is proprietary, and should be prepared so that proprietary information identified in the application is contained in a separate part of the document. If we do not hear from you in this regard within the specified period, the report will be placed in the Public Document Room.

SEP 0 8 1978

Should you have any questions concerning this letter, we will be glad to discuss them with you.

Sincerely,

C. E. Murphy, Chief
Reactor Construction and
Engineering Support Branch

Enclosures:
Inspection Report Nos.
50-491, 492, 493/78-07

cc w/encl:
Mr. J. T. Moore, Project Manager
Cherokee Nuclear Station
P. O. Box 422
Gaffney, South Carolina 29340

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30303

Report Nos.: 50-491/78-7, 50-492/78-7 and 50-493/78-7

Docket Nos.: 50-491, 50-492 and 50-493

License Nos.: CPPR-167, CPPR-168 and CPPR-169

Categories: A2, A2 and A2

Licensee: Duke Power Company

Facility Name: Cherokee Nuclear Station

Inspection at: Cherokee County, South Carolina

Inspection Conducted: August 3, 1978

Inspector: E. O. Porter

Other Accompanying Personnel: M. Thomas

Reviewed by: C. M. Taylor for 9-7-78
A. R. Herdt, Chief Date
Projects Section
Reactor Construction and Engineering
Support Branch

Inspection Summary

Inspection on August 3, 1978 (Report Nos. 50-491/78-7, 50-492/78-7 and 493/78-7)
Areas Inspected: Routine unannounced inspection; site construction activities; project status; warehouse storage; laydown areas; construction procedures; site QA organization; welding electrode issue control; nuclear service water piping; IE bulletins and circulars. The inspection involved 8 man-hours on site by one NRC inspector.
Results: No items of noncompliance or deviation were noted in the areas inspected.

RII Report Nos. 50-491/78-7,
50-492/78-7 and 50-493/78-7

DETAILS I

Prepared by: W. G. Rouse for 9-7-78
E. O. Porter, Principal Inspector Date
Projects Section
Reactor Construction and
Engineering Support Branch

Date of Inspection: August 3, 1978

Reviewed by: C. M. McFarland for 9-7-78
A. R. Herdt, Chief Date
Projects Section
Reactor Construction and
Engineering Support Branch

1. Persons Contacted

Duke Power Company (DPC)

*C. B. Aycock, Project Engineer, Construction
*H. D. Mason, QA Engineer
*K. W. Schmidt, QA Engineer
*B. W. Childers, QA Specialist
L. A. Vincent, Senior Planning and Facilities Engineer
J. E. Beall, Engineering Specialist - DPC Charlotte Office
T. M. Reynolds, Welding Specialist

*Denotes those present at the exit interview.

2. Licensee Action on Previous Inspection Findings

a. (Open) Deficiency Item 50-491/78-05-01: Failure to Document Concrete Pour Correctly

The licensee has completed his actions on this item and has submitted his response to RII in a letter dated August 1, 1978. This item remains open pending RII's receipt and evaluation of the licensees response.

b. (Open) Infraction Item 50-491/78-05-02: Failure to cure field test cylinders properly

The licensee has completed his actions on this item and has submitted his response to RII in a letter dated August 1, 1978. This item remains open pending RII's receipt and evaluation of the licensees response.

3. Unresolved Items

There were no new unresolved items generated during this inspection.

4. Independent Inspection Effort

The inspector observed progress made and construction activities on the nuclear service water (NSW) dam, pump structure, cable tunnels and piping, the concrete placement for reactor building Unit 1 and the auxiliary building. One welding electrode issue station was inspected, and a walk thru inspection of the warehouse storage area was made. During the inspection of the warehouse, the inspector noted that several cans of low hydrogen welding electrode had been dented and asked how the licensee assured that the cans were still leak proof. The licensee stated that they had visually examined each can, had discussed it with their supplier (Lincoln) and had returned questionable damaged containers. The inspector reviewed the purchase order to assure that packaging was in conformance with requirements. To further assure that cans were leak proof, the licensee issued instructions to the electrode issue stations for additional inspection of the cans prior to issuance of the electrodes. The inspector had no further questions.

No items of noncompliance or deviations were noted in the areas examined.

5. IE Bulletin (Status)

(Closed) IEB 78-05 Malfunctioning of Circuit Breaker Auxiliary Contact Mechanism - General Electric Model CR105X. RII has received DPC's letter of response to this bulletin, dated June 1, 1978. The licensee states that they have reviewed their design and find that the equipment is not in use or planned for use in safety-related equipment for the Cherokee Nuclear Station. This item is closed.

6. IE Circulars (Status)

Discussions with licensee personnel show that they have received copies of the following circulars and have distributed them to management and cognizant personnel for their information and or necessary action:

IEC 78-04, IEC 78-06, IEC 78-07, IEC 78-08, IEC 78-09, IEC 78-13 and IEC 78-15.

7. Project Status

Excavation and grouting of both the east and west core trenches of the NSW dam has been completed and fill has been initiated. Pouring of NSW cable tunnels has been initiated. Concrete placement of the interior and exterior walls at the 37 foot elevation of Unit 1 is continuing. Fill concrete is being placed for the auxiliary building.

It was also noted that the onsite QA staff had been increased from two to five people commensurate with increased QA activities. Prior to this time additional help had been obtained from other DPC sites as needed.

8. Exit Interview

The inspectors met with licensee representatives (denoted in paragraph 1) at the conclusion of the inspection on August 3, 1978. The inspectors summarized the purpose and scope of the inspection and the findings. There were no unanswered questions or dissenting comments.

8/28/78 Received and Hand-carried:

W H Owen
R F Wardell
J R Wells
R L Dick
LCD/File CK-1412.11-1

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30303

In Reply Refer To:
RII:JCB
50-491/78-6 Cherokee
50-492/78-6 Cherokee
50-493/78-6 Cherokee

AUG 23 1978

Duke Power Company
Attn: Mr. L. C. Dail, Vice President
Design Engineering
Charlotte, North Carolina 28242

Gentlemen:

This refers to the inspection conducted by Mr. W. B. Swan of this office on July 19-21, 1978, of activities authorized by NRC Construction Permit Nos. CPPR-167, CPPR-168 and CPPR-169 for the Cherokee Nuclear Station Unit 1, 2 and 3 facilities, and to the discussion of our findings held with Mr. A. R. Hollins at the conclusion of the inspection.

Areas examined during the inspection and our findings are discussed in the enclosed inspection report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations by the inspector.

Within the scope of this inspection, no items of noncompliance were disclosed.

In accordance with Section 2.790 of the NRC's "Rules of Practice", Part 2, Title 10, Code of Federal Regulations, a copy of this letter and the enclosed inspection report will be placed in the NRC's Public Document Room. If this report contains any information that you (or your contractor) believe to be proprietary, it is necessary that you make a written application within 20 days to this office to withhold such information from public disclosure. Any such application must include a full statement of the reasons on the basis of which it is claimed that the information is proprietary, and should be prepared so that proprietary information identified in the application is contained in a separate part of the document. If we do not hear from you in this regard within the specified period, the report will be placed in the Public Document Room.

Should you have any questions concerning this letter, we will be glad to discuss them with you.

Sincerely,

C. E. Murphy, Chief
Reactor Construction and
Engineering Support Branch

Enclosure:
Inspection Report Nos.
50-491/78-6
50-492/78-6
50-493/78-6

cc w/encl:
Mr. J. T. Moore, Project Manager
Cherokee Nuclear Station
P. O. Box 422
Gaffney, South Carolina 29340

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30303

Report Nos.: 50-491/78-6, 50-492/78-6 and 50-493/78-6

Docket Nos.: 50-491, 50-492 and 50-493

License Nos.: CPPR-167, CPPR-168 and CPPR-169

Categories: A2, A2, A2

Licensee: Duke Power Company
422 South Church Street
Charlotte, North Carolina 28242

Facility Name: Cherokee Nuclear Station, Units 1, 2 and 3

Inspection at: Cherokee County, South Carolina

Inspection conducted: July 19-21, 1978

Inspector: W. B. Swan

Reviewed by: [signature] 8/22/78
J. C. Bryant, Chief Date
Engineering Support Section No. 1
Reactor Construction and Engineering Support Branch

Inspection Summary

Inspection on July 19-21, 1978 (Report Nos. 50-491/78-6, 50-492/78-6 and 50-493/78-6)
Areas Inspected: Site preparation, NSW and alternate NSW dams; structural concrete for Unit 1 containment. The inspection involved 20 inspector-hours on site by one NRC inspector.
Results: In the three areas inspected, no items of noncompliance or deviations were identified.

Report Nos. 50-491/78-6, 50-492/78-6
and 50-493/78-6 I-1

DETAILS I

Prepared by: R. M. Compton for 8/22/78
W. B. Swan, Civil Engineer Date
Engineering Support Section No. 1
Reactor Construction and Engineering
Support Branch

Dates of Inspection: July 19-21, 1978

Reviewed by: R. M. Compton for 8/22/78
J. C. Bryant, Chief Date
Engineering Support Section No. 1
Reactor Construction and Engineering
Support Branch

1. Persons Contacted

Duke Power Company

J. T. Moore, Project Manager, Construction
C. B. Aycock, Project Engineer, Construction
*H. D. Mason, Associate Field Engineer, Civil QA
W. Lindsay, Geotechnical Engineer
D. S. Mason, Supervising Technician, Civil
L. C. Arnold, Quality Control Engineer, Civil
J. L. Peterson, Design Engineer, Civil
*A. R. Hollins, Senior Quality Control Engineer
*Denotes persons attending exit interview.

2. Licensee Action on Previous Inspection Findings

This area was not inspected.

3. Unresolved Items

No unresolved items were disclosed within the areas inspected.

4. Independent Inspection Effort

The inspector observed placement of a sand filter (drain) pad at the base of the alternate NSW (C.T.) Make-up Pump Structure and Intake Structure. The status of general site work and excavations in the power block area was also noted.

No noncompliances or deviations were identified in these areas.

5. Site Preparation - Review of Quality Records, Units 1, 2 and 3

Soil Boring and Testing: In addition to the extensive boring and testing data recorded in Appendix D of the PSAR, the data obtained by continued explor ations at the base of the NSW dam and in the trenches of the NSW piping system have been plotted by the geotechnical engineer according to the geologic mapping procedure and recorded on the forms assigned to Procedure M-27 "Soil Sampling, Core Drilling and Testing," and Construction Procedure CK B-4 "Foundation Preparation, Verification for Nuclear and Safety-Related Structures." The most recent records and mapping were reviewed and appeared to meet acceptance criteria of the PSAR, specification and procedures.

Fill Placement: Records for soil compaction under the NSW Lines and the conduit tunnels paralleling these Lines were adequate.

No items of noncompliance or deviations were disclosed within the areas examined.

6. Lakes, Dams and Canals - Observation of Work and Work Activities

Acceptance criteria and construction guidance were found in the following documents:

a. PSAR Vol. III NSW POND DAM, Appendix 2 thru Amendment No. 23.

b. Duke Topical Report, Quality Assurance Program: Duke - 1-A thru Amendment 4, June 1978.

c. Specification CKS-1114.00-00-0001, Revision 2, 10/7/77, General Grading Work.

d. Drawing CK-0026-01, Revision 8, 6/23/78, Earthwork and Drainage; NSW Pond Dam Area; Foundation Excavation and Coffer Dams; Plan and Sections.

e. Construction Procedure CK B-4, RI, 1/27/78, Foundation Preparation, Verification for Nuclear Safety Related Structures.

f. Drawing CK-0022-07 Earthwork and Drainage, NSW Pipe-Excavation Plan.

g. ANSI/ASTM D 2937-71 Standard Method for Density of Soil In Place By the Drive-Cylinder Method (formerly called "Shelby Tube" method).

h. Procedure M-1, Rev. 6, 4/27/78, Inspection of Compacted Earth Fills.

During this follow-on inspection of the NSW Pond Dam and contiguous structures, two principal areas of work were inspected: Fill placement in the upstream (southerly) embankment of the dam and structural concrete under and along the NSW pipes between the pond intake and the pumping station. Fill placement: placement, inspection, changes, compaction, testing, and material location verification activities were observed and judged to meet requirements.

Structural Concrete: The inspector observed concrete placed under the NSW pipes and construction by slip forming of the concrete conduit tunnels along both sides of the pipe complex.

In addition, the inspector observed (1) cleaning and geologic mapping of foundation rock under the downstream (northerly) slope of the dam; (2) removal of a conglomerate rock and soil outcropping the west shoulder foundation; (3) verification work on the grout curtain along the dam centerline and forming for the base of the NSW Pump Station.

In the areas inspected, no noncompliances with or deviations from the requirements of approved controlling documents were disclosed.

7. Lakes, Dams and Canals-Review of Quality Records, Units 1, 2 and 3

Quality record requirements are detailed in the controlling documents noted in the previous paragraph. The inspector reviewed a sampling of the records generated for dam foundation grout curtain and verification drilling, compaction of earth fill in the upstream (southerly) dam embankment, and structural concrete for the NSW pumphouse and along the NSW pipelines.

The foundation geologic map and grout curtain verification drilling records were discussed with the geotechnical engineer. Verification holes at Station 22 and 31 indicated a need to drill five other holes and grout a separation plane. This work was in progress.

Fill plotting along NSW piping was reviewed on a print of drawing CK-0022-07, "Earthwork and Drainage, NSW Pipe-Excavation Plan". Two other sheets of this drawing were reviewed:

a. CK-0026-01, Rev. 8, 6/23/78, Foundation Excavation and Cofferdams-Plan and Sections. The latest notes gave additional grouting instructions.

b. CK-0026-02, Rev. 9, Details.

Form M-1C, Rev. 3, Field Density Tests, for Test No. 38 on 7/19/78 was reviewed. The records generated to date appeared to be acceptable and compatible with progress of the work on the dam and conti guous structures.

In the records reviewed no noncompliances or deviations were identified.

8. Containment (Structural Concrete I) - Observation of Work and Work Activities - Unit 1

During this follow-on inspection of structural concrete between elevations 37'-0" and 51'-0", the inspector observed work activities and inspection activities prior to and during pour W-2 (CK-123), a 125 CU. YD. placement in RB Area 2 sump area around the sump and pipe chases. Preplacement activities and placement of initial deliveries of concrete for a similar wall placement in the RB 1 Area 1 sump and pipe chase structure were also observed.

Activities observed for pour W-2 included: forming; rebar and embedments; preplacement inspection and signoff; construction joint verification; delivery and placement of the designated concrete mix (C-21), mixed and transported and placed in specified time limits, moved from trucks to forms by crane buckets with tremies, placed by an adequate crew with proper equipment, and inspected and tested at specified locations and frequencies.

The quality controlling and implementing documents for the placements included:

a. Specification P815-1109.00-00-0001, Rev. 4, 6/27/78 "Specification for Concrete for Category 1 Structures".

b. Procedure M-2, Inspection of Design Concrete.

c. Topical Report, Duke-1-A, Amendment 3

d. PSAR Section 3.8.1.6.1

e. Drawings: P81-1080-1 R.B. Plan, Elev. 37'-0"
P81-1041-11 R.B. General Arrangement Elev. 37'-0"
P81-1080-01 Concrete Area 1, Elev. 37'-0"
P81-1080-05, R7 Concrete Area 2, Details

In the areas of work and inspection activities detailed above, no non-compliances or deviations were identified.

9. Containment (Structural Concrete 1) - Review of Quality Records

The quality assurance record requirements for structural concrete in Category 1 structures are detailed in the documents listed in the preceding paragraph and in their attached record forms.

During this inspection, a review was made of quality records generated for Pour RB-1 (CK-73) and Pour RB-3 (CK-80). These placements had been made with MIX H-7, 5000 Psi concrete at 28 days.

The quality records reviewed included preplacement inspection (Form M-2A) of forms, reinforcement and embedments; record of concrete placed (Form M-2D) and field test (Form M-2R). For placement RB-1, the 28 day cylinder break records showed an average compressive strength of 6736 psi or 35% above the required 5000 psi. For Pour RB-3, the average 28 day compressive strength of 6736 psi or 35% above the requirements.

For both placements the 7 day strengths average above the 5000 psi required at 28 days.

The inspector also reviewed Surveillance Checklist C-1-6-78 - Form QA-300A, R2 dated 6/26/78 entitled, "Concrete: Receipt, Storage and Mixing of Materials; Field and Laboratory Testing."

The areas covered in this audit included: receipt, unloading, segregation and sprinkling of aggregates; sampling of aggregates; sieve analysis of sand and stone; monitoring of batch plant inspector; observation of cable tunnel invert pour CK-90; mix design currency; mixer performance certifications; scale calibration; slump and air entainment test records two pours, CK-91 and RB-; observation of cylinder casting, field curing, capping; and observation of calibration of an air meter. The records review and test results indicate that controls are being imposed and adequate records kept.

In the documents reviewed no noncompliances or deviations were identified.

10. Exit Interview

An exit interview was held with Mr. A. R. Hollins, Senior Quality Control Engineer and Mr. H. D. Mason, Civil QA Unit representative. The scope of the inspection was described in the areas of dams, structural concrete, site preparation, and review of audit C-1, procedures, and geologic mapping incidental to the major areas.

The licensee representatives were told that no unresolved items had been disclosed and that no noncompliances or deviations had been identified.

Received March 17, 1978
XC and handcarried to: W S Lee
R L Dick
J R Wells
R F Wardell
P81-1412.11-1

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
230 PEACHTREE STREET, N.W. SUITE 1217
ATLANTA, GEORGIA 30303

MAR 14 1978

In Reply Refer To:
RII:EOP
50-491/78-3 Cherokee
50-492/78-3 Cherokee
50-493/78-3 Cherokee

Duke Power Company
Attn: Mr. W. H. Owen, Vice President
Design Engineering
Power Building
422 South Church Street
Charlotte, North Carolina 28242

Gentlemen:

This refers to the inspection conducted by Mr. E. O. Porter of this office on February 14-16, 1978, of activities authorized by NRC Construction Permit Nos. CPPR-167, CPPR-168 and CPPR-169 for the Cherokee Nuclear Station Units 1, 2 and 3 facilities, and to the discussion of our findings held with Mr. C. B. Aycock at the conclusion of the inspection.

Areas examined during the inspection and our findings are discussed in the enclosed inspection report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations by the inspector.

During the inspection it was found that certain activities under your license appear to be in noncompliance with NRC requirements. This item and references to pertinent requirements are listed in the Notice of Violation enclosed herewith as Appendix A. Corrective actions to prevent recurrence were completed prior to the conclusion of this inspection; therefore, a reply is not requested.

In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter and the enclosed inspection report will be placed in the NRC's Public Document Room. If this report contains any information that you (or your contractor) believe to be proprietary, it is necessary that you make a written application within 20 days to this office to withhold such information from public disclosure. Any such application must include a full statement of the reasons on the basis of which it is claimed that the information is proprietary, and should be prepared so that proprietary information identified in the application is contained in a separate part of the document. If we do not hear from you in this regard within the specified period, the report will be placed in the Public Document Room.

MAR 14 1978

Should you have any questions concerning this letter, we will be glad to discuss them with you.

Sincerely,

C. E. Murphy, Chief
Reactor Construction and Engineering
Support Branch

Enclosures:
1. Appendix A, Notice of Violation
2. RII Inspection Report Nos.
   50-491/78-3
   50-492/78-3
   50-493/78-3

cc w/encl:
Mr. J. T. Moore, Project Manager
Cherokee Nuclear Station
P. O. Box 422
Gaffney, South Carolina 29340

APPENDIX A

NOTICE OF VIOLATION

Duke Power Company

License Nos.: CPPR-167
CPPR-168
CPPR-169

Based on the results of the NRC inspection conducted on February 14-16, 1978, it appears that certain of your activities were not conducted in full compliance with NRC regulations and License conditions as indicated below. This item has been categorized as described in our correspondence to you dated December 31, 1974.

A. 10 CFR 21.31 states that, "Each individual, corporation, partnership or other entity subject to the regulation in this part shall assure that each procurement document for a facility, or a basic component issued by him, her or it on or after January 6, 1978 specifies, when applicable, that the provisions of 10 CFR Part 21 apply." DPC QA Manual Procedure E3 requires that all requisitions for safety-related items shall contain a statement that the provisions of Title 10 CFR 21 apply.

Contrary to the above, site welding material requisitions for safety-related items did not contain, in at least three instances, the requirement that the provisions of 10 CFR Part 21 apply.

This is an infraction.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
230 PEACHTREE STREET, N.W. SUITE 1217
ATLANTA, GEORGIA 30303

Report Nos.: 50-491/78-3, 50-492/78-3 and 50-493/78-3

Docket Nos.: 50-491, 50-492 and 50-493

License Nos.: CPPR-167, CPPR-168 and CPPR-169

Categories: A2, A2, A2

Licensee: Duke Power Company
Power Building
422 South Church Street
Charlotte, North Carolina 28242

Facility Name: Cherokee Nuclear Station

Inspection at: Cherokee County, South Carolina

Inspection conducted: February 14-16, 1978

Inspector: E. O. Porter

Reviewed by: A. R. Herdt, Chief — 3/9/78 Date
Projects Section
Reactor Construction and Engineering Support Branch

Inspection Summary

Inspection on February 14-16, 1978 (Report Nos. 50-491/78-3, 50-492/78-3 and 50-493/78-3)

Areas Inspected: Site excavations; storage yard; warehouses; concrete batch plant; concrete test laboratory; QA Construction Manual; site procurement activities. The inspection involved 22 inspector-hours on site by one NRC inspector.

Results: Of the eight areas inspected, no apparent items of noncompliance or deviations were identified in seven areas; one apparent item of noncompliance (infraction - failure to follow procedures for preparation of procurement requisitions - Paragraph 9) was identified in one area.

RII Rpt. Nos. 50-491/78-3,
50-492/78-3 and 50-493/78-3

I-1

DETAILS I

Prepared by: A R Herdt
E. O. Porter, Principal Inspector
Projects Section
Reactor Construction and Engineering
Support Branch

3/9/78
Date

Dates of Inspection: February 14-16, 1978

Reviewed by: A R Herdt
A. R. Herdt, Chief
Projects Section
Reactor Construction and Engineering
Support Branch

3/9/78
Date

1. Persons Contacted

Duke Power Company (DPC)

*C. B. Aycock, Project Engineer, Construction
*A. R. Hollins, Senior Quality Control Engineer
J. T. Moore, Project Manager
L. R. Barnes, QA Manager, Construction
*H. D. Mason, QA Engineer
T. M. Reynolds, Welding Specialist
L. A. Vincent, Senior Planning and Facilities Engineer
W. H. Lindsay, Geotechnical Engineer, QC
*J. W. Davis, Senior Construction Engineer

*Denotes those present at the exit interview.

2. Licensee Action on Previous Inspection Findings

There were no outstanding previous inspection findings to review.

3. Unresolved Items

No unresolved items were identified during this inspection.

4. Independent Inspection Effort

The inspector made a tour of the site facilities and observed work being done on the grading of Units 1 and 2 sites. The first design placement of fill concrete in the east pit of Unit 1 reactor cavity was observed on February 16, 1978. Operation of the main batch plant was observed. Yard storage facilities and warehouse receiving, inspection and storage areas were inspected.

No items of noncompliance or deviations were noted in the areas examined.

5. Project Status

Excavation and grading work is continuing for Units 1, 2 and 3. Excavation and mapping is essentially complete for Unit 1 reactor building east pit. The west pit excavation is essentially complete and cleaning for mapping is in progress. Excavation for Unit 2 is approximately 75% complete. Top of rock geologic mapping is continuing. No work is being done on Unit 3 at present. Work on the Nuclear Service Water (NSW) dam has been curtailed during the winter months but will resume in March. NSW intake and pump structures will be built concurrently with the dam. Work on the main concrete batch plant is complete.

The licensee expects to start work on installation of NSW piping in March. Some NSW piping has been received and is being cleaned and coated.

Reactor building base mat work will be initiated in March.

6. IEB 77-04 "Calculational Error Affecting the Design Performance of a System For Controlling pH of Containment Sump Water Following a LOCA"

RII has received DPC's letter of response dated January 4, 1978. The licensee states that "the amount of sump pH control agent required is conservatively calculated considering a maximum boron concentration as allowed by the technical specifications. These calculations are controlled by the Duke Power Company Quality Assurance Program." This policy would seem to negate the occurrance of the problem experienced at the Calvert Cliffs facility. RII has no further questions regarding this matter.

7. IEB 77-05 and 05A, Potential Problems with Containment Electrical Penetration Assemblies; Electrical Connector Assemblies"

RII has received DPC's letter of response of January 6, 1978. The licensee stated that the electrical connectors for safety systems had not been purchased. They also stated that all connectors in safety-related systems would be qualified to the required environmental conditions as committed to in the PSAR. RII has no further questions regarding this matter.

8. IEB 77-07, "Containment Electrical Penetration Assemblies at Nuclear Power Plants Under Construction"

RII has received DPC's letter of response dated January 18, 1978. The licensee stated that electrical containment penetations have not been purchased. They further stated that all electrical penetrations in safety-related systems will be qualified as committed to in the PSAR. RII has no further questions regarding this matter.

9. Review of QA Manual - Quality Requirements - Procurement Documents

Welding materials are procurred by "Mill Power" a wholly owned subsidiary of DPC. Requisitions for welding material are prepared on site and sent to "Mill Power" for procurement. Requisitions are prepared in accordance with DPC QA Manual Procedure Section E3. The inspector examined Requisition Numbers 1619, 1607 and 1618, all for nuclear safety-related welding materials issued after January 6, 1978. Mill Power Supply Company puchase order No. E-18325-13 for requisition Number 1607 was also examined. DPC QA Manual Procedure Section E3, paragraph E-3.4.1(i) states that; "All requisitions for safety-related items shall contain the following in the body of the requisition. The provisions of Title 10 Code of Federal Regulations, Part 21 apply to this purchase ....." The inspector noted that this paragraph was not contained in the requisitions, nor was it contained in the Mill Power purchase order. The licensee was informed that this was considered to be in noncompliance with the requirements of 10 CFR Part 21.

The licensee stated that failure to put this requirement on requisitions was caused by their system for putting revised procedures in the procedure manual. One man is assigned the responsibility for putting all revisions in the manuals. Hence, if the owner is out, the change can be made without the owner's knowledge, which apparently happened in this case. The licensee stated that henceforth, when a change or revision is placed in a manual a notice of the change shall be left with the owner of the Manual. In addition, the site QA representative will review the change/revision and schedule training for QC personnel and recommend whether or not there is need for construction personnel training in its use. During additional review of Mill Power P.O.'s it was noted that on later P.O.'s, Mill Power has picked up the ommission on the requisitions and included the Part 21 statement on the P.O.'s. Since these actions appear to be adequate to correct and prevent recurrence of the problem, and inspection shows it to be an isolated occurrence, the inspector informed the licensee that the infraction was considered closed and no written response was required. This infraction is identified as 78-03-01 "Insufficient Procurement Document Information".

10. Exit Interview

The inspector met with licensee representatives (denoted in paragraph 1) at the conclusion of the inspection on February 16, 1978. The inspector summarized the purpose and scope of the inspection and the findings. The inspector informed management of the finding of the noncompliance discussed in paragraph 9. There were no questions or dissenting comments.

Received February 6, 1978
XC & Handcarried to:

W S Lee
R L Dick
J R Wells
R F Wardell
P81-1412.11-1

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
230 PEACHTREE STREET, N.W. SUITE 818
ATLANTA, GEORGIA 30303

FEB 3 1978

In Reply Refer To:
RII:JRH
50-491/78-1 Cherokee
50-492/78-1 Cherokee
50-493/78-1 Cherokee

1412.12

Duke Power Company
Attn: Mr. W. H. Owen, Vice President
Design Engineering
Power Building
422 South Church Street
Charlotte, North Carolina 28242

Gentlemen:

This refers to the inspection conducted by Mr. J. R. Harris of this office on January 10-13, 1978, of activities authorized by NRC Construction Permit Nos. CPPR-167, CPPR-168 and CPPR-169 for the Cherokee 1, 2 and 3 facilities, and to the discussion of our findings held with Mr. C. B. Aycock at the conclusion of the inspection.

Areas examined during the inspection and our findings are discussed in the enclosed inspection report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations by the inspector.

Within the scope of this inspection, no items of noncompliance were disclosed.

In accordance with Section 2.790 of the NRC's "Rules of Practice", Part 2, Title 10, Code of Federal Regulations, a copy of this letter and the enclosed inspection report will be placed in the NRC's Public Document Room. If this report contains any information that you (or your contractor) believe to be proprietary, it is necessary that you make a written application within 20 days to this office to withhold such information from public disclosure. Any such application must include a full statement of the reasons on the basis of which it is claimed that the information is proprietary, and should be prepared so that proprietary information identified in the application is contained in a separate part of the document. If we do not hear from you in this regard within the specified period, the report will be placed in the Public Document Room.

FEB 1978

Should you have any questions concerning this letter, we will be glad to discuss them with you.

Sincerely,

for C. E. Murphy, Chief
Reactor Construction and
Engineering Support Branch

Enclosure:
Inspection Report Nos. 50-491/78-1
50-492/78-1, and 50-493/78-1

cc w/encl:
Mr. J. T. Moore, Project Manager
Cherokee Nuclear Station
P. O. Box 422
Gaffney, South Carolina 29340

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
230 PEACHTREE STREET, N.W. SUITE 818
ATLANTA, GEORGIA 30303

Report Nos.: 50-491/78-01, 50-492/78-01 and 50-493/78-01

Docket Nos.: 50-491, 50-492 and 50-493

License Nos.: CPPR-167, CPPR-168 and CPPR-169

Categories: A2, A2 and A2

Licensee: Duke Power Company
Power Building
422 South Church Street
Charlotte, North Carolina 28242

Facility Name: Cherokee Nuclear Station, Units 1, 2 and 3

Inspection at: Cherokee County, South Carolina

Inspection conducted: January 10 - January 13, 1978

Inspector: J. R. Harris

Reviewed by: N D Verrelli for 2/2/78
J. C. Bryant, Chief Date
Engineering Support Section No. 1
Reactor Construction and Engineering Support Branch

Inspection Summary

Inspection on January 10-13, 1978 (Report Nos. 50-491/78-01, 50-492/78-01 50-493/78-01)

Areas Inspected: Work performance, QA program implementation and associated quality records concerning site preparation of the powerhouse block and nuclear service water facilities. The inspection involved 28 inspector-hours on site by one NRC inspector.

Results: No items of noncompliance or deviation were disclosed.

RII Rpt. Nos. 50-491/78-1, I-1
50-492/78-1 and 50-493/78-1

DETAILS I

Prepared by: J R Harris 2/2/78
J. R. Harris, Civil Engineer/Geologist Date
Engineer Support Section No. 1
Reactor Construction and Engineering
Support Branch

Dates of Inspection: January 10-13, 1978

Reviewed by: M D Hunt for 2/2/78
J. C. Bryant, Chief Date
Engineering Support Section No. 1
Reactor Construction and Engineering
Support Branch

1. Persons Contacted

Duke Power Company (DPC)

*C. B. Aycock, Project Engineer, Construction
J. W. Davis, Senior Construction Engineer
L. C. Arnold, Quality Control Engineer, Construction
*H. D. Mason, QA Engineer, Civil
*B. E. Taylor, Construction Engineer, Civil
M. Schaeffer, Project Geologist
J. W. Hayes, QC Batch Plant Inspector
W. Lindsey, Project Geotechnical Engineer
*R. Hollins, Senior QC Engineer

*Denotes persons attending exit interview.

2. Licensee Action on Previous Inspection Findings

This area was not inspected.

3. Unresolved Items

No unresolved items were disclosed within the areas inspected.

4. Independent Inspection Effort

The inspector examined the concrete batch plant, testing laboratory, warehouse facilities and laydown storage area. Receiving and inspection records were examined for concrete materials and rebar received during November and December of 1977.

No items of noncompliance or deviations were disclosed within the areas examined.

5. Site Preparation - Observation of Work and Work Activities (Units 1, 2 and 3)

The inspector observed blast number 143 in reactor unit 1, results of blasting and excavations in reactor units 1 and 2, top of rock mapping in reactor unit 2, dewatering system for units 1, 2 and 3, groundwater observation wells, rock cores and compared site topography with that presented in the SAR. Acceptance criteria examined by the inspector are presented in the following documents:

a. PSAR, Section 2.5 and Appendices 2B, 2C and 2D,

b. CKS-114.00-00-001, General Grading Work,

c. CK-0022-01, Powerhouse Excavation Plan,

d. Blasting Report,

e. Geologic Mapping Procedure,

f. M-27, Soil Sampling, Core Drilling and Testing,

g. CKB-4, Foundation Preparation, Verification for Nuclear Safety-Related Structures,

h. CKB-8, Blasting Control of Rock Excavation.

Based on the above observed work activities and results of work activities, discussions with geologic and engineering personnel and examination of documents concerning site preparation, it appears that site preparation is being conducted in accordance with NRC and PSAR requirements.

No items of noncompliance or deviation were disclosed within the areas examined.

6. Site Preparation - Review of Quality Records - Units 1, 2 and 3

The inspector examined records on blasting and geologic mapping for units 1 and 2 and dewatering and subsurface data on foundations for units 1, 2 and 3. Acceptance criteria examined by the inspector are listed in paragraph 5.

Records examined included: top of rock mapping for units 1 and 2, blasting records for shot numbers 16 to 143 on units 1 and 2, subsurface data on units 1, 2 and 3 in appendix 2D of the SAR, and groundwater data for observation and pumped wells.

No items of noncompliance or deviation were disclosed within the areas examined.

7. Lakes, Dams and Canals - Observation of Work and Work Activities Units 1, 2 and 3

The inspector observed results of dewatering excavation, grouting and fill placement on the nuclear service water dam (NSW). Excavated, dewatered and grouted areas were examined between dam centerline stations 15+60 and 19+40. Placed fill was examined on the east abutment from 240 feet south of the dam centerline to the upstream toe.

In addition to those acceptance criteria listed in paragraph 5, work was guided by the following documents examined by the inspector:

a. CK-0026-01 to 06, Earthwork and Drainage NSW Pond Dam Sections and Details,

b. M-1, Inspection of Compacted Earthfills,

c. CKB-3, Foundation Grouting,

Based on examination of the above completed work, discussion with geologic and engineering personnel and examination of controlling documents, it appears that work and work activities on the NSW facility are being accomplished in accordance with NRC and SAR requirements.

No items of noncompliance or deviation were disclosed within the areas examined.

8. Lakes, Dams and Canals - Review of Quality Records, Units 1, 2 and 3

The inspector examined quality records on grouting, fill placement, geologic mapping and quality control inspector qualifications on the nuclear service water dam. Acceptance criteria examined by the inspector are listed in paragraphs 5 and 7.

Records examined included:

a. Daily inspection of compacted earthfills on November 18-22, 1977,

b. Foundation verification reports on November 3, 9, 16, 17 and 18, 1977,

c. Preplacement inspection of compacted earthfill, 240 feet east of centerline to upstream toe,

d. Field density and proctor test data for November 21 and 22,

e. Following test data on material placed 240 feet right of centerline to upstream toe,

(1) Grain size analysis
(2) Atteberg limits
(3) Specific gravity
(4) Triaxial shear
(5) Foundation photographs

f. Qualification records for all quality control inspectors as of January, 1978.

No items of noncompliance or deviation were disclosed within the areas examined.

9. Exit Interview

The inspector met with the licensee representatives denoted in paragraph 1 at the conclusion of the inspection on January 13, 1978. The licensee was apprised of the scope of the inspection which included quality records, QA implementation and work performance on site preparation and the nuclear service water facility.

No items of noncompliance or deviation were disclosed within the areas examined.

Received December 27, 1977
XC and handcarried to: W S Lee
R L Dick
J R Wells
T A Mathews
P81-1412.11-1

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
230 PEACHTREE STREET, N.W. SUITE 1217
ATLANTA, GEORGIA 30303

DEC 21 1977

In Reply Refer To:
RII:LEF
50-491/77-5 Cherokee
50-492/77-5 Cherokee
50-493/77-5 Cherokee

RECEIVED
DPCO-GO
DEC 27 '77
CONST. DEPT.
RLD
WSL
MGM
TFG
A ACTION
C COPY
R RETAIN

Duke Power Company
Attn: Mr. W. H. Owen, Vice President
Design Engineering
Power Building
422 South Church Street
Charlotte, North Carolina 28242

Gentlemen:

This refers to the inspection conducted by Mr. L. E. Foster of this office on November 20-21, 1977, of activities associated with your application for an NRC Construction Permit for the Cherokee Nuclear Station Unit Nos. 1, 2 and 3 and to the discussion of our findings held with Mr. J. T. Moore at the conclusion of the inspection.

Areas examined during the inspection and our findings are discussed in the enclosed inspection report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations by the inspectors.

During this inspection, certain activities of your quality assurance program appeared to deviate from the requirements of 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants," of the NRC regulations. This item and references to pertinent requirements are identified in the Notice of Deviation enclosed herewith as Appendix A. Corrective action was implemented prior to the conclusion of this inspection; therefore, a reply to this deviation is not required.

In accordance with Section 2.790 of the NRC's "Rules of Practice", Part 2, Title 10, Code of Federal Regulations, a copy of this letter and the enclosed inspection report will be placed in the NRC's Public Document Room. If this report contains any information that you (or your contractor) believe to be proprietary, it is necessary that you make a written application within 20 days to this office to withhold such information from public disclosure. Any such application must include a full statement of the reasons on the basis of which it is

DEC 2 1 1977

claimed that the information is proprietary, and should be prepared so that proprietary information identified in the application is contained in a separate part of the document. If we do not hear from you in this regard within the specified period, the report will be placed in the Public Document Room.

Should you have any questions concerning this letter, we will be glad to discuss them with you.

Sincerely,

J. E. Bryant for

C. E. Murphy, Chief
Reactor Construction and Engineering
Support Branch

Enclosures:
1. Appendix A, Notice of Deviation
2. RII Inspection Report Nos.
   50-491/77-5
   50-492/77-5
   50-493/77-5

cc w/encl: Mr. J. T. Moore
Project Manager
Cherokee Nuclear Station
P. O. Box 422
Gaffney, South Carolina 29340

APPENDIX A

NOTICE OF DEVIATION

Duke Power Company

Docket Nos.: 50-491
50-492
50-493

Based on the results of the NRC inspection conducted on November 20-21, 1977, certain of your activities appear to deviate from your commitments to the Commission and your construction procedure as indicated below:

Section 17.1.5 of the applicant's Quality Assurance Topical Report specifies that work performed on safety-related items will be accomplished in accordance with procedures. Cherokee Construction Procedure No. CKB3 requires that grouting pipes for holes readied for insertion of grout shall be kept covered prior to connection of the grouting hose.

Contrary to these commitments, the inspectors found on November 20, 1977, five readied pipes uncovered. Three of these pipes were in depressions from which mud and debris could enter the pipe. This is a deviation.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
230 PEACHTREE STREET, N.W. SUITE 1217
ATLANTA, GEORGIA 30303

Report Nos.: 50-491/77-5, 50-492/77-5 and 50-493/77-5

Docket Nos.: 50-491, 50-492 and 50-493

License Nos.: Not issued

Categories: A1, A1 and A1

Applicant: Duke Power Company
Power Building
422 South Church Street
Charlotte, North Carolina 28242

Facility Name: Cherokee Nuclear Station, Units 1, 2 and 3

Inspection at: Gaffney, South Carolina

Inspection conducted: November 20-21, 1977

Inspectors: L. E. Foster
W. B. Swan

Reviewed by: A. R. Herdt 12/20/77
Date

A. R. Herdt, Chief
Projects Section
Reactor Construction and Engineering Support Branch

Inspection Summary

Inspection on November 20-21, 1977 (Report Nos. 50-491/77-5, 50-492/77-5 and 50-493/77-5)

Areas Inspected: Procedures, work and records associated with the nuclear service water pond dam foundation surface preparation; drilling; grouting; concrete batch plant and geologic mapping. The inspection involved 24 inspector-hours onsite by two NRC inspectors.

Results: Of the five areas inspected, no deviations were found in four areas; one apparent deviation was found in one area (deviation - failure to cap grout holes - paragraph 6).

RII Rpt. Nos. 50-491/77-5,
50-492/77-5 and 50-493/77-5

I-1

DETAILS I

Prepared by: L. E. Foster 12/20/77
L. E. Foster, Reactor Inspector Date
Projects Section
Reactor Construction and Engineering
Support Branch

12/20/77
W. B. Swan, Civil Engineer Date
Engineering Support Section No. 1
Reactor Construction and Engineering
Support Branch

Dates of Inspection: November 20-21, 1977

Reviewed by: A R Herdt 12/20/77
A. R. Herdt, Chief Date
Projects Section
Reactor Construction and Engineering
Support Branch

1. Persons Contacted

a. Duke Power Company (DPC)

*J. T. Moore, Project Manager, Construction
C. B. Aycock, Project Engineer, Construction
*L. C. Arnold, Civil Engineer, Senior QC Engineer
J. W. Davis, Jr., Construction Engineer
*H. D. Mason, Supervisor, QC Technicians
R. Jennings, Engineer, Technical Support, Concrete

b. Contractor Organizations

Law Engineering Testing Company (LAW)

G. Weekley, Resident Geotechnical Engineer

Rockhill Concrete Company

E. R. Hughes, Batch Plant Supervisor

*Denotes those present at exit interview on November 21, 1977.

2. Applicant Action on Previous Inspection Findings

(Closed) Licensee Identified Item No. 77-05-01 Underground Nuclear Service Water Pipe Wall Thickness Deficiency (50.55(e) Item)

The applicant notified RII on October 27, 1977 that some defects were found in the 36 inch diameter nuclear service piping supplied by Richmond Engineering Company. The defects were rounded pits (0.25 inch in diameter and 0.06 inch deep) in the pipe wall. The applicant's response dated November 21, 1977 has been received and evaluated. Based on the applicant's corrective actions this item is closed.

3. Unresolved Items

No unresolved items were disclosed.

4. Independent Inspection Effort

The inspectors examined the 200 cy principal batch plant and the 100 cy backup batch plant. The scales for both plants were found to have been calibrated on September 15-16, 1977, by Southern Scale Works of Charlotte, N.C.

Installation and identification of storage vessels for cement, fly ash and additives were in the final stages. The unit boiler for heating water for cold weather placements was undergoing operational checkout. Prior to production of Category I concrete, the batch plants will undergo proof testing and be certified by a professional engineer.

The inspectors discussed the REX Control Console of the main batch plant with the plant supervisor. In particular, the use of an ammeter, which measures the slump of the mix being produced by reference to the current required to operate the mixer, was discussed. The Rockhill representative stated that slump can be measured to 1/4 inch, plus or minus by the meter.

No deviations were identified during the inspection of the batching facilities.

5. Lakes, Dams & Canals - Review of Implementing Procedures
Nuclear Service Water Pond Dam

Acceptance criteria for installation and quality control of the nuclear service water pond dam are specified in PSAR Appendix 2-A "Nuclear Service Water Dam Geotechnical Design;" Amendment 30 to

the PSAR, NRR letter of June 16, 1977; LWAs 1 and 2, NRR and DPC memos and letters pertaining to foundation exploration and treatment and geologic mapping; DPC Specification 1114.00-000, Rev. 1, "Foundation Grouting"; DPC Construction Specifications CKB3R1, "Foundation Grouting, Nuclear Safety Related" and CKB4, dated August 31, 1977, "Foundation Preparation Verification for Safety Related Structures"; notes on DPC Drawing CK-0026-01 "NSW Pond Dam - Grading"; DPC procedures M-5, Rev. 4, "Structural Grouting" and M-1, Rev. 5, "Inspection of Compacted Earth Fills."

The inspectors reviewed sections of the above documents pertinent to the foundation preparation, drilling operations, grouting, earth fill and compaction being performed during the inspection. This review gave assurance that the implementing procedures are adequate and are applicable to the work in progress.

During the review, no deviations from requirements were identified.

6. Lakes, Dams & Canals - Observation of Work and Work Activities
Nuclear Service Water Pond Dam

The inspectors observed drilling and grouting operations in the foundation rock along and adjacent to the dam core centerline. The placement and compaction of earth at the southerly toe of the dam and dental concrete placement on rock outcroppings were also inspected.

The inspectors observed the drilling of additional grout holes and it was noted that DPC QC inspectors were logging the drilling progress. The inspectors verified the calibration and use of gauges during the grout insertion.

The work in progress was compared with the requirements of the documents listed in paragraph 5 above.

One procedural deviation was noted. Paragraph 43 of Construction Procedure CKB3, Revision 1, "Foundation Grouting, Nuclear Safety Related" requires that grout holes readied for grout insertion shall be capped or otherwise protected against contamination. Contrary to this provision, the inspectors on November 20, 1977 found five uncapped holes, three of which were in depressions through which mud from storm water could enter the holes. This deviation is identified as devation No. 77-05-02. The applicant initiated corrective action prior to the conclusion of the inspection; therefore, no response is required.

In the other areas examined, no other deviations were identified.

7. Lakes, Dams & Canals - Review of Quality Records
Nuclear Service Water Pond Dam

The construction procedures described in paragraph 5 above have attachment forms for quality control records. Those required by work underway during this inspection or completed prior to the inspection were reviewed by the inspectors.

The records reviewed are as follows:

(a) Field Density Checks by Shelby Tube Method.

(b) Standard Proctor Curves for samples of borrow soils for earth fill.

(c) Grout hole drilling records for November 10 and November 18 to 21, 1977.

(d) Water test results for four grout holes.

(e) Grout take records indicating that the foundation rock is tight.

No deviations were identified during the record review.

8. Management Interviews

An initial management meeting was held with Mr. C. B. Aycock, Project Construction Engineer, during which the scope of the inspection was outlined and work status discussed.

The exit management meeting was held with Mr. J. T. Moore, Project Construction Manager, and quality control representatives at the conclusion of the inspection. The applicant was apprised that the inspectors examined the batch plants, reviewed implementing procedures, examined work activities and records pertaining to surface preparation, grouting and earth fill for the nuclear service water pond dam.

The Duke representatives were advised that one procedural deviation, failure to keep grout holes capped, had been identified, but that corrective action had been accomplished prior to the conclusion of the inspection; therefore, the deviation would be noted as opened and closed by the inspection report. No other deviations were identified.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
230 PEACHTREE STREET, N.W. SUITE 1217
ATLANTA, GEORGIA 30303

JUL 19 1977

Received 7/21/77
XC - W S Lee
R L Dick
J R Wells
T A Matthews
File P81-1412.11-1

In Reply Refer To:
IE:II:JRH
50-491/77-2
50-492/77-2
50-493/77-2

Cherokee 1412.12

Duke Power Company
Attn: Mr. W. H. Owen, Vice President
Design Engineering
Power Building
422 South Church Street
Charlotte, North Carolina 28242

Gentlemen:

This refers to the inspection conducted by Mr. J. R. Harris of this office on July 1-3, 1977, of activities authorized by NRC for the Cherokee 1, 2 and 3 facilities, and to the discussion of our findings held with Mr. J. T. Moore at the conclusion of the inspection.

Areas examined during the inspection and our findings are discussed in the attached inspection report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations by the inspector.

Within the scope of this inspection, no items of noncompliance were disclosed.

In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter and the attached inspection report will be placed in the NRC's Public Document Room. If this report contains any information that you believe to be proprietary, it is necessary that you submit a written application to this office requesting that such information be withheld from public disclosure. If no proprietary information is identified, a written statement to that effect should be submitted. If an application is submitted, it must fully identify the bases for which information is claimed to be proprietary. The application should be prepared so that information sought to be withheld is incorporated in a separate paper and referenced in the application since the application will be placed in the Public Document Room. Your application, or written statement, should be submitted to us within 20 days. If we are not contacted as specified, the attached report and this letter may then be placed in the Public Document Room.

JUL 1 8 1977

Should you have any questions concerning this letter, we will be glad to discuss them with you.

Very truly yours,

C. E. Murphy, Chief
Reactor Construction and
Engineering Support Branch

Attachment:
RII Inspection Report Nos.
50-491/77-2, 50-492/77-2
and 50-493/77-2

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
230 PEACHTREE STREET, N.W. SUITE 1217
ATLANTA, GEORGIA 30303

Report Nos.: 50-491/77-2, 50-492/77-2 and 50-493/77-2

Docket Nos.: 50-491, 50-492 and 50-493 License Nos.: Not issued

Categories: A1, A1, A1

Licensee: Duke Power Company
Power Building
422 South Church Street
Charlotte, North Carolina 28242

Facility Name: Cherokee Nuclear Station, Units 1, 2 and 3

Inspection at: Cherokee County, South Carolina

Inspection conducted: June 29 - July 1, 1977

Inspector: J. R. Harris

Reviewed by: C. E. Murphy 7/18/77
C. E. Murphy, Chief Date
Reactor Construction and Engineering Support Branch

Inspection Summary

Inspection on June 29 - July 1, 1977 (Report Nos. 50-491/77-2, 50-492/77-2 and 50-493/77-2)

Areas Inspected: Routine unannounced inspection of QA/QC staff, procedures and facilities relative to LWA-2 work request for Nuclear Service Water Pond, Dam, Spillway, Intake Structure and Piping. The inspection involved 20 inspector-hours onsite by one NRC inspector.

Results: Within the five areas inspected, no deviations were inspected.

RII Rpt. Nos. 50-491/77-2,
50-492/77-2 and 50-493/77-2 I-1

DETAILS I

Prepared by: J. E. Conlon for 7/15/77
J. R. Harris, Civil Engineer/
Geologist
Engineering Support Section No. 1
Reactor Construction and Engineering
Branch
Date

Dates of Inspection: June 29 - July 1, 1977

Reviewed by: J. E. Conlon 7/15/77
T. E. Conlon, Chief
Engineering Support Section No. 1
Reactor Construction and Engineering
Support Branch
Date

1. Persons Contacted

Duke Power Company (DPC)

*J. T. Moore, Project Manager, Construction
*C. B. Aycock, Project Engineer, Construction
*J. W. Davis, Senior Construction Engineer
*L. R. Barnes, Quality Assurance Manager, Construction
*J. W. Willis, Quality Assurance Engineer, Construction, Catawba
*L. C. Arnold, Quality Control Engineer, Construction

*Denotes those attending the exit interview on July 1, 1977.

2. Licensee Action on Previous Inspection Findings

This area was not inspected.

3. Unresolved Items

No unresolved items were disclosed.

4. Independent Inspection Effort

The inspector observed general grading and excavation work being done under the Limited Work Authorization (LWA-1). The work is being done by Clement Brothers Company, Hickory, North Carolina, in accordance with DPC Specification No. CKS-1114-00-00-0001, "General Grading Work." Control for work under the LWA-1 is being guided by DPC's corporate QA and construction procedures. Areas examined were excavation in Unit 1, coffer dams and dewatering in the

nuclear service water area, borrow areas, batch plant, soils and concrete laboratory, and plant facilities for construction engineering and quality assurance personnel.

No deviations from the LWA-1 issued May 28, 1976 were observed.

5. Adequacy of QA/QC Facilities, Staff and Procedures for LWA-2 Work Request

a. Pertinent procedures, drawings, specifications and organizational structure were reviewed and construction engineering and QA/QC personnel were interviewed to determine if DPC has procedures and qualified personnel to control the requested LWA-2 work. The work covers construction of the nuclear service water dam and pond, spillway, intake facility and piping. The LWA-2 work involves excavation; placement of fill, backfill and select materials; foundation preparation and verification; construction of concrete structures and installation of piping.

(1) QA/QC Staff and Facilities

There are 14 QC inspectors, and one QC civil engineer on site. The senior QC engineering position is vacant. No permanent QA personnel are on site. QA staff needs are covered by QA forces from the Catawba nuclear power site. The Catawba Senior QA Engineer, R. A. Morgan, assigns QA engineers on a 1-day per week basis. Plant facilities for construction engineering, QA and QC staffs are in the finishing stages. Construction of required fireproof record storage facilities has not begun but is scheduled for completion by September. Space for storage of LWA-2 work records is available in onsite fireproof files. The backup batch plant and the concrete and soils laboratory are completed and being used for LWA-1 work. Construction on the main batch plant has not started.

(2) Procedures Drawings and Specifications

Corporate Engineering QA and Construction Procedures applicable to all Duke sites will be used for basic QA/QC requirements. DPC upgrades these procedures on a continuing basis to meet latest engineering and code requirements. Inspection instructions, drawings and specifications are being generated to meet site requirements. Front end drawings have been revised by Design Engineering, Charlotte, and their release for construction is pending issue of

the LWA-2. Specific site controls and their status, on sought work areas examined by the NRC inspector are as follows:

(a) Excavation, Placement of Fill, Backfill and Select Materials

These items are currently controlled by Specification No. CWS-1114-00-00-0001, "General Grading Work" for LWA-1 work. Revisions are being made to cover nuclear service water work. A review of preliminary drawings indicated drawings covering this area are in the final stage of completion. A blasting program developed by Atlas Explosive Division will impose controls on blasting. Inspection and testing of work in this area will be by applicable DPC corporate construction procedures.

(b) Foundation Preparation and Verification

Preliminary site evaluation and testing done by DPC staff forces and Law Engineering of Atlanta are completed. Final evaluation and testing will be done during construction. Mapping will be done by a site Geotechnical engineer or geologist. Foundation preparation will be done in accordance with applicable drawings and the revised "General Grading Work" specification. Control will be by Cherokee procedure entitled, "Foundation Preparation and Verification for Nuclear Safety-Related Structures." The final draft of this procedure, prepared by DPC Design Engineering and Law Engineering is completed. Final review and approval is expected by August 1977. No procedure exists or is currently being drafted to control foundation grouting. DPC Construction and QA Staffs indicated a procedure for foundation grouting will be prepared.

(c) Concrete Structures

Concrete will be controlled by applicable drawings and Specification No. CK 1109-00-00-0001, "Specification for Concrete for Category I Structures." QA/QC controls will be by DPC Corporate procedures.

(d) Piping Installation

Draft procedures for site administrative and QA control for installation and welding of piping are being prepared. Work activities and performance will be controlled by the DPC Corporate welding program.

b. Within the areas examined it appears as though QA/QC procedures, specific site instructions, drawings, and specifications have been or are being developed on schedule for control of the requested LWA-2 work. The inspector informed DPC representatives that no work on any LWA-2 work item can begin without final approved drawings, specifications, procedures and sufficient permanent QA personnel. DPC representatives acknowledged and concurred with the NRC inspector's statement and indicated these matters would be completed prior to start of work.

6. Exit Interview

The inspector met with the licensee representatives (listed in paragraph 1) at the conclusion of the inspection on July 1, 1977. The inspector summarized the scope and findings of the inspection.

END

DUKE POWER COMPANY
CORPORATE RECORDS DEPARTMENT
CHARLOTTE, N. C. 28242

CERTIFICATE OF AUTHENTICITY

THIS IS TO CERTIFY THAT THE MICROGRAPHIC IMAGES APPEARING ON THIS ROLL OF MICROFILM ARE DIRECT REPRODUCTIONS OF ORIGINAL DOCUMENTS

ENDING WITH: Cherokee Construction
1421.03 Const. Dept, Work Sampling

AND WERE MICRTFILMED IN ACCORDANCE WITH AND PURSUANT TO ESTABLISHED PROCEDURES FOR DOCUMENT CONTROL.

IT IS FURTHER CERTIFIED THAT THE MICROFILM PROCESSES AND MATERIALS USED FOR FILMING THE ABOVE RECORDS WERE IN ACCORDANCE WITH THE RECOMMENDED REQUIREMENTS OF THE NATIONAL BUREAU OF STANDARDS AND THE AMERICAN NATIONAL STANDARDS INSTITUTE.

DATE MICROFILMED 4/16/81

Fred L VanCamp
SUPERVISOR, CORPORATE RECORDS

MICROFILMER Debbie Thulin

8001302361

CK1108.00
MEMOS O FILE

March 2, 1979

Memo to File

RE: Cherokee Nuclear Station
Geologic Mapping
File No: CK-1108.00

Meetings with Jack Harris, NRC - Atlanta Office, were held on Wednesday, February 28, 1979, and Thursday, March 1, 1979, at the Cherokee site to discuss progress of geologic investigations.

On Wednesday we examined Zone 13, located in the Nuclear Service Water Pond Dam Spillway excavation, Ogee section. The following items were discussed: 1) why the faults have been designated a zone, 2) why the northwest-and northeast-trending faults are considered as one zone, 3) the field relationships between the various faults, and 4) a brief description of the geologic history as determined from field observations and thin-section study.

On Thursday various aspects of the geologic program were discussed. The mapping procedure and in particular the procedure for investigating and documenting geologic fault features was reviewed including the relevant portions of the Safety Evaluation Report for Cherokee Nuclear Station (Sections 2.5, 2.5.1, 2.5.2 and Appendix F). The criteria for studying faults or shear zones described in a Memo to File dated May 4, 1977, was discussed and related to the designation of the faults in the spillway excavation as a zone (Zone 13).

The following materials related to Zone 13 were examined by Mr. Harris: 1) original field map, 2) drawing CK-0018-18, Geologic Map of the NSW Spillway excavation, 3) thin-section reports and photomicrographs of samples from the various faults, 4) core logs for SCH-1 and SCH-2 drilled through the northwest-trending fault, and 5) point-plots of shear planes and joints.

Computer printouts of data from the NSW Pond Dam excavation and Unit 1, Final Foundation, were examined and explained.

Drawings CK-0017-02 and CK-0017-03, Unit 1 - Final Foundation and CK-0018-03, CK-0018-06, CK-0019-03, and CK-0019-06, NSW Pond Dam excavation were reviewed by Mr. Harris.

The following progress was reported to Mr. Harris: 1) Top of Rock, Units 1 and 2, 100% complete, Unit 3 not started, 2) Unit 1, Final Foundation, 99% complete, Unit 2, Final Foundation, 25% complete and 3) Nuclear Service Water Pond Dam excavation and spillway, 100% complete.

Malcolm F. Schaeffer

M. F. Schaeffer, Engineer Associate
Civil/Environmental Division

MFS/gc

cc: I. W. Pearce C. Q. Reeves D. R. Privett J. M. Hart

July 31, 1978

Memo to File

RE: Cherokee Nuclear Station
Geology
File No: CK-1108.00

On Tuesday, July 18, 1978, the following U. S. Geological Survey geologists visited the Cherokee site: John W. Hosferman, Jesse W. Whitlow, John D'Agostino, and Patricia J. Loferski. They are presently working on a mineral resources map for the Charlotte 1 by 2 degree sheet. Hosferman was interested in the red clays that are present in rock fractures in the region. They have been found in rock fractures at the NSW Dam and in the Powerhouse area. Some work on these clays has been done by Charles E. Weaver at Georgia Tech for Duke Power.

Their visit had nothing to do with any of the Regulatory Agencies.

M F. Schaeffer/gc

M. F. Schaeffer
Engineer-Associate
Civil/Environmental Division

MFS/gc

cc: I. W. Pearce

June 19, 1978

Memo to File

RE: Cherokee Nuclear Station
Geologic Mapping
File No: CK-1108.00

Meeting with Jack Harris, NRC - Atlanta, on Tuesday, June 13, 1978, to discuss geologic investigations at the Cherokee site.

Progress of geologic mapping in the Powerhouse Area and the NSW Pond Dam was reviewed. In addition, Zone 12, located in the west abutment of the NSW Pond Dam excavation, was discussed in detail. Mr. Harris also examined some of the drafted maps for the Unit 1 excavation.

Malcolm F. Schaeffer

M. F. Schaeffer
Engineer-Associate
Civil/Environmental Division

MFS/gc

cc: I. W. Pearce
C. Q. Reeves
D. R. Privett

June 1, 1978

Memo to File

RE: Cherokee Nuclear Station
Geologic Mapping
File No: CK-1108.00

Meeting with E. O. Porter, NRC - Atlanta on Wednesday, May 31, 1978, and Thursday, June 1, 1978, to discuss geologic investigations at the Cherokee site. Mr. Porter inquired about Zone 12 which is located in the West abutment of the NSW Pond Dam. I described our procedure for investigating fault features and described the steps being taken to study Zones 12, in particular, the preparation of thin sections and the cleaning of a window near the up-stream toe of the dam to determine the extent of faulting and the degree of deformation.

Wilhelm F. Schaeffer

M. F. Schaeffer, Engineer-Associate
Civil/Environmental Division

MFS/gc

cc: I. W. Pearce
C. Q. Reeves
D. R. Privett

May 5, 1978

Memo to File

RE: Cherokee Nuclear Station
Geologic Mapping
File No: CK-1108.00

A meeting was held at the NRC offices in Bethesda, Maryland, on Thursday, May 4, 1978, to discuss a revised mapping program for the Nuclear Service Water Pond Dam excavation at Cherokee Nuclear Station. Cal Moon, NRC Project Manager, Bob Jackson, NRC Geologist, Joe Kane, NRC Foundation Engineer, Ira Pearce, Malcolm Schaeffer, Duke Power Design Engineering and Bill Lindsay, Duke Power Construction Department were present.

Bob Jackson reviewed 1"=10' geologic maps, structural data, photographs of excavation, and geologic history of shear zones studied to date at the NSW Dam. He had no major problems with the revised program, although several minor features he requested were incorporated into the mapping program. The original proposal and the revised mapping program agreed upon by both parties at the meeting are attached. Ira Pearce informed them that the program will be implemented immediately.

Several questions concerning seepage through shear zones and previously described openings in the foundation as related to grouting were answered by Bill Lindsay.

Malcolm F. Schaeffer

M. F. Schaeffer
Engineer-Associate
Civil/Environmental Division

MFS/gc

cc: I. W. Pearce
S. B. Hager
C. Q. Reeves
D. R. Privett

April 5, 1978

Memo to File

RE: Cherokee Nuclear Station
Geology
File No: CK-1108.00

On Wednesday, March 29, 1978, Dr. Philbrick, ACRS consultant for geology visited the Cherokee site to examine the exposed rock in the powerhouse area and the NSW Dam. Ben Taylor, Cherokee Construction, accompanied us in the field. In the Unit 1 Reactor and Auxiliary Building we examined the exposed rock and I pointed out Zone 6 which was reported to the NRC as a possible "nonsimilar" feature. I also mentioned to him that Bob Jackson has looked at portions of it. I also pointed out the more ductile north-south shear zones. His only comment about the faults was they are old. Next we examined rock exposed in the core trench at the NSW Dam. He noted that the dominant structural trend was approximately perpendicular to tha axis of the dam. I pointed out that very few fractures follow this trend and noted that a large number of grout holes did not take any grout. He was impressed with the detailed geologic maps of the dam and powerhouse.

A major comment by Dr. Philbrick concerned excavation in the powerhouse. He was concerned about the uneven surface in portions of the Auxiliary Building. Ben Taylor explained the blasting procedure to him.

Malcolm F. Schaeffer

M. F. Schaeffer
Engineer-Associate
Civil/Environmental Division

MFS/gc

cc: I. W. Pearce
D. R. Privett
C. Q. Reeves

January 17, 1978

Memo to File

RE: Cherokee Nuclear Station
Geologic Mapping
File No: CK-1108.00

Meeting with Jack Harris, NRC - Atlanta, on Wednesday, January 11, 1978, to discuss progress and documentation of geologic investigations at the Cherokee site.

Talk centered on documentation of geologic information and progress. The indexing system and procedure for storing information was reviewed. He was informed that Final Foundation mapping was approximately 30% complete in the NSW Dam. Top of rock mapping in Unit 1, 100% complete, and top of rock mapping in Unit 2 approximately 50% complete. Final foundation mapping in Unit 1 has not started.

Mr. Harris also examined field and drafted maps of the NSW Dam foundation and field maps of top of rock mapping in Unit 2.

Malcolm F. Schaeffer

M. F. Schaeffer
Engineer-Associate
Civil/Environmental Division

MFS/gc

cc: I. W. Pearce
C. Q. Reeves
D. R. Privett

October 11, 1977

Memo to File

RE: Cherokee Nuclear Station
Geologic Mapping
File No: CK-1108.00

Site visit by Bob Jackson, NRC geologist and Larry White, NRC foundation engineer on October 7, 1977, to review progress and examine portions of the prepared NSW Dam foundation.

At the NSW dam N. J. Gilbert, LETCo., discussed the criteria for fault investigation in the core trench and the upstream and downstream portion of the dam with Bob Jackson. Mr. Gilbert also discussed rock units and mapping details with Mr. Jackson.

In Unit 2, Mr. Jackson examined the rock surface that is being mapped and the exposure of Zone 6 and Zone 3. I discussed the criteria for fault investigation in the powerhouse with Mr. Jackson.

After the site investigation Mr. Jackson requested that a letter report of the major faults be made to the NRC for documentation purposes. He also requested that photographs of Zone 6 be included. He had no difficulty with the criteria for fault investigations in the Powerhouse Area or the NSW Dam.

Malcolm F. Schaeffer

M. F. Schaeffer
Engineer-Associate
Civil/Environmental Division

MFS/gc

cc: I. W. Pearce
C. Q. Reeves
D. R. Privett

October 11, 1977

Memo to File

RE: Cherokee Nuclear Station
Geologic Mapping
File No: CK-1108.00

Meeting with Jack Harris, NRC - Atlanta, on Thursday, October 6, 1977, to discuss documentation of geologic investigations at the Cherokee site.

Talk centered on documentation of geologic information. The indexing system and procedure for documenting fault features at Cherokee was explained. He looked at 1"=20' top of rock maps for Unit 1 and preliminary 1"=5' maps of Zone 6 along with a copy of the preliminary report on Zone 6.

Mr. Harris and I visited Unit 2 and examined the exposed portion of Zone 6. The geologic history of Zone 6 was explained to Mr. Harris. After this we examined portions of the NSW Dam foundation that was being mapped and I explained the mapping procedure to him.

Malcolm F. Schaeffer

M. F. Schaeffer, Engineer-Associate
Civil/Environmental Division

MFS/gc

cc: I. W. Pearce
C. Q. Reeves
D. R. Privett

May 25, 1977

Memo to File

Ref: Cherokee 1-3
NRC Inspection of Test Excavation
in Rock
Files CK-1114.00, CK-1412.06

Mr. L. A. White of the NRC staff visited the Cherokee Site today for the purpose of inspecting the test area excavated in the Unit 1 AB/TB area to satisfy the NRC requirement to demonstrate that blasting controls are adequate to assure that rock excavation can be performed without unnecessary and unacceptable damage to the rock foundations.

Mr. White reviewed the plan for conducting the test and the evaluation of its results. He also inspected the test pit and the stockpiled material removed from the test excavation. Mr. White stated that he was satisfied with what he had observed in the test pit and the evaluation of the results and told Mr. Moore he could proceed with the excavation. He would advise Cal Moon of the results of his visit and ask him to confirm this to us in a letter.

Mr. White requested a copy of the test plan and evaluation and we agreed to send a copy to him thru Cal Moon next week.

Those present during the meeting were:
I. W. Pearce, Duke Power Company, Design Engineering
M. F. Schaeffer, Duke Power Company, Design Enginerring
J. T. Moore, Duke Power Company, Construction Department
C. B. Aycock, Duke Power Company, Construction Department
Jesse Via, Duke Power Company, Construction Department
C. E. Sams, Law Engineering Testing Company
Richard Goodwin, Project Manager, Clement Brothers Company
Don Waugaman, Atlas Powder Company

I. W. Pearce
Civil/Environmental Division

IWP/sn

cc: L. C. Dail
T. A. Mathews
C. Q. Reeves
R. B. Priory
M. F. Schaeffer

April 29, 1977

Memo to File

RE: Cherokee Nuclear Station
Geologic Mapping
File No: CK-1108.00

Telephone conversation with Bob Jackson, NRC geologist, on April 27, 1977, concerning geologic mapping of two test areas as agreed on March 30, 1977 (Ref. April 5, 1977, Memo to File). I. W. Pearce, M. F. Schaeffer, and Jim Beall were present.

The results of the evaluation were described to Mr. Jackson including the difficulties encountered in mapping the saprolite test area. He agreed that it is a less workable method and we should proceed with mapping the high areas. Mr. Jackson suggested a reconnaissance type study instead of the mapping and wanted to know if fault features could be detected. I stated that what we are doing now is about the least we can do and still pick up faults. Mr. Jackson was informed about the faults now being studied and the criteria established by Neil Gilbert - LETCO, Bob Hatcher - geologic consultant, and myself to limit the number of similar features studied. This criteria is based on magnitude of offset and length of the fault. Jackson had no problem with the limitations that we have established.

Mr. Jackson saw no reason to visit the site until the test blasting is complete. We informed him that we are proceeding with the test area.

M. F. Schaeffer
Engineer-Associate

MFS/gc

cc: I. W. Pearce
L. C. Dail
C. Q. Reeves
D. R. Privett

April 26, 1977

Memo to File

RE: Cherokee Nuclear Station
Geologic Mapping
File No: CK-1108.00

Saprolite test area was examined for comparison with high areas on top of rock (Ref. April 5, 1977, Memo to File). The surface cleaned by a motor grader was not suitable for mapping. With hand cleaning the area can be mapped, but in comparison to the top of rock mapping, geologic data obtained in the saprolite area would be less meaningful. Specifically, quartz veins may be confused with quartz filled shear zones. Thin layers of different rock types may be overlooked. Problems may arise during preparation of saprolite surfaces due to differences in hardness between various rock types. Saprolite is subject to degradation by exposure whereas the top of rock is not.

Dr. Bob Hatcher during a telephone conversation April 25, 1977, concurs with the opinion of Neil J. Gilbert, Law Engineering Testing Co., and me. Dr. Hatcher will examine the saprolite exposure during a visit to the site April 28, 1977.

Malcolm F. Schaeffer

Malcolm F. Schaeffer
Engineer-Associate

MFS/gc

cc: I. W. Pearce
L. C. Dail
C. Q. Reeves
D. R. Privett

April 5, 1977

Memo to File

RE: Cherokee Nuclear Station
Geologic Mapping
File No: CK-1108.00

Meeting on March 30, 1977, with Bob Jackson, NRC geologist, at Cherokee Site to discuss top of rock mapping. Present at meeting were I. W. Pearce, D. R. Privett, J. T. Moore, and C. B. Aycock of Duke Power Company and N. J. Gilbert of Law Engineering Testing Company.

Discussion centered on mapping the area cleaned by earth-moving methods as per agreement with NRC. The area cleaned consisted of scattered exposures of residual material with large quantities of dirt covering the largest part of the area. Duke and Law geologists were concerned with the lack of information that could be gathered from this preparation. Bob Jackson was asked for his suggestions in order to obtain a workable amount of geologic data to satisfy the NRC request for top of rock mapping. Jackson agreed the surface was not as he expected and that some other arrangements had to be made. N. J. Gilbert and myself suggested mapping in saprolite a few feet short of top of rock. Jackson believed there may be problems with the number of joints and other features present when mapping in the saprolite. He believes this idea is a workable method. For the area already cleaned he suggested washing high areas and selected low areas and comparing the results to a test saprolite area.

Duke agreed to clean and map the high areas and low areas as determined by the Duke geologist, paying special attention to possible fault features. Another area would be cleaned by pans until the top of rocks were clipped. Then the area is to be scraped clean and then mapped. These two test areas are to be compared for cost, delay, and geologic information obtained. Jackson is to be notified when test areas are completed so that he may visit the site and compare the two areas and review our evaluation with us. Jackson also requested that Bob Hatcher, geologic consultant to project, look at the test areas so that his observations and opinions can be obtained and utilized in our evaluation.

M. F. Schaeffer/gc

M. F. Schaeffer, Engineer-Associate
Civil/Environmental Division

MFS/gc
cc: I. W. Pearce
L. C. Dail
D. R. Privett
C. Q. Reeves

October 25, 1976

Memo to File

RE: Cherokee and Perkins
Site Visit by ACRS Subcommittee Members
File Nos: PK-1108.00, PK-1412.09
CK-1108.00, CK-1412.09

On October 22, 1976, ACRS Subcommittee members Arnold and Etherington and ACRS geological consultant, Dr. S. S. Philbrick visited the Perkins and Cherokee sites. The following were points of discussion or questions by Dr. Philbrick.

At Perkins site:

1) Stopped on road near site of NSW pond dam, observed location of dam and its abutments. Dr. Philbrick was interested in certain features of the dam, asked specifically whether the dam was on rock, about cutoff trenches, about vertical drains, and source of borrow materials for the dam.

2) At core storage shed, inspected rock core from boring A126 located under unit 1 Reactor Building. Observed particularly section at about foundation level.

3) Examined rock exposures at river on the site of the raw water intake structure.

4) Asked about relative elevations of many site structures and other features.

At Cherokee site:

1) Asked about relative elevations of many site structures and other features.

2) Asked about foundation features for the NSW dam, was specifically interested in cutoff trenches (as at Perkins).

3) Inspected rock exposures in geologic test pit, GTP-9, and observed the exposed shear zones. The shear zones were compared with the PSAR Appendix 2C mapping. Dr. Philbrick noted while in the pit the "sharp" transition from saprolite to hard rock. He was informed that this was not the general case, that the zone of partially weathered rock was variable over the site, from a few feet to tens of feet.

4) Dr. Philbrick stated that "sharp" transitions may be a clue to and evidence of the stable nature of the ground surface and weathering profile.

5) Inspected rock cores from borings B-61 and B-141P from the locations of the units 1 and 3 Reactor Buildings, respectively. Observed

particularly the sections at about the foundation level.

6) Commented that rock looked good to him and expressed his belief in the antiquity of faults.

Conversation while in transit between sites:

1) Dr. Philbrock highly recommended that materials overlying the faulted bedrock be documented carefully to show lack of offset in grass, topsoil, "B" horizon saprolite, and alluvium.

In general, Dr. Philbrick did not indicate that he observed anything he didn't expect. His general conversation indicated that he believes these sites are in typical Piedmont geology where there are many very old fault features. Dr. Philbrick was accompanied by Dr. Privett, C. E. Sams and I. W. Pearce during his entire visit. Others, including L. C. Dail, accompanied Dr. Philbrick part-time.

I. W. Pearce, Principal Engineer
Civil/Environmental Division

IWP/gc

cc: J. D. Humber
D. R. Privett
S. B. Hager

m75

August 13, 1976

Memo to File

RE: Cherokee Nuclear Station
Geologic Mapping
Procedure for Investigating Fault Features
File No: CK-1108.00

Meeting with NRC PSAR review staff to discuss proposed procedure for investigating, documenting and reporting geologic fault features August 10, 1976.

Attendance:

Duke Power Company

L. C. Dail
I. W. Pearce
S. B. Hager
C. Q. Reeves
C. B. Aycock
D. A. Godfrey

NRC

Bob Jackson
H. E. Lefevre
Cal Moon

Law Engineering Testing Co.

C. E. Sams

S. B. Hager reviewed proposed procedure (attached) noting differences between this procedure proposed for Cherokee and that in effect at Catawba.

Jackson's only comments concerned whether or not only one consultant was adequate for the review function but was willing to try as written noting that the proposed procedure gives sufficient latitude to change if there are any problems. Jackson reaffirmed his understanding of our PSAR mapping commitment and indicated he had no problem with the commitment or the proposed procedure.

This procedure will be entered in the record by attaching copy to NRC's minutes of the meeting and no further submittal by Duke is necessary.

It was noted that "power block" area to be mapped included AB, RB and TB but excluded Service Building. Jackson also asked that we notify NRC when we exposed first major area to be mapped.

I. W. Pearce, Principal Engineer
Civil/Environmental Division

IWP/gc

Attachment (original)

cc: L. C. Dail (w/att)
S. B. Hager (w/att)
J. D. Humber (w/att)
C. Q. Reeves (w/att)
D. R. Privett (w/att)
M. F. Schaeffer (w/att)

CHEROKEE NUCLEAR STATION
Procedure for Investigating and Documenting
Geologic Fault Features

INTRODUCTION:

Extensive studies of fault features characteristic of the region and of the project site area have been made at the Catawba Nuclear Station (Docket Nos. 50-413 and -414) during geologic mapping and at the Cherokee project site in support of the Preliminary Safety Analysis Report for project licensing. These studies(1) establish that fault features occur numerously in a variety of forms and that the occurrence of numerous such features can be anticipated in any large excavation in the region.

PURPOSE:

The purpose of this procedure is to establish a means of utilizing data developed in previous studies to correlate significant characteristics of features occurring in new excavations for safety related structures at the Cherokee site without undue repetition of study if a valid analogy can be made. This procedure also establishes a method and the extent that other fault features with no similarity to previous features studied will be documented, studied, and, where necessary, reported.

SCOPE:

This procedure relates directly to those geologic fault features occurring in excavations required for safety related structure foundations. These features may include brecciated zones containing offsets and any other offset or displaced feature of tectonic origin.

PROCEDURE:

1. Geologic mapping will be conducted as stated in Cherokee PSAR Section 2.5.1.2(9).

2. In the event a feature as described in the scope is discovered, the (field) Geologist will notify the Project Civil Engineer as soon as the feature is discovered.

3. The Project Civil Engineer will hold any structure construction in that area until a determination can be made 1) that the feature is similar to features previously studied by observation and that its relevant characteristics can be determined by correlation to previously studied features or 2) that the feature is not similar to any previously studied feature and requires new investigation.

4. For similar features (described in item 3), the (field) Geologist will so notify the Project Civil Engineer who will release work in the area as soon as

---

(1) Reference: Catawba Nuclear Station - PSAR, Chapter 2, Section 2.5, Appendices 2C and 2E
- "Final Geological Report on Brecciated Zones"
Cherokee Nuclear Station - PSAR, Chapter 2, Section 2.5, Appendices 2C and 2E

the (field) Geologist has indexed the feature, documented it by detailed mapping and photographs, and established the feature's similarity to a previously established feature. This similarity will be documented by comparing relevant characteristics to features observed and studied at Catawba Nuclear Station during mapping or in any of the numerous test pits opened at the Cherokee site during subsurface investigative studies. Where this similarity can be established and documented, mapping and project work will continue routinely. A tabular summary will be prepared which indexes each occurrence of a feature and makes specific comparison to a previously studied feature. Documentation will be subject to audit during field inspections by NRC.

5. For features where similarity cannot be established by comparison to features previously studied at the Cherokee or Catawba sites, the Project Civil Engineer will continue to hold work in the area and notify the NRC Project Manager of the discovery. The geologic feature will then be left exposed for ten (10) days for NRC inspection.

5a. Duke with the assistance of Law Engineering Testing Company and/or other consultant will map the feature, develop data, and determine if the feature falls in the sequence of geologic events established and reported in the Cherokee PSAR.

5b. A third party independent geologic consultant will be engaged and will visit the site to examine the feature and examine the data developed by Duke and LETCo and/or other consultant. The (field) Geologist will notify the Project Civil Engineer (when geologic mapping, photography and field data gathering have been completed) that investigations have been completed and documented. The independent consultant will report his findings to the Project Civil Engineer.

5c. If the independent consultant concurs with Duke's conclusions, the Project Civil Engineer will then release the area for project construction activity upon completion of item 5b.

5d. For non-similar features a report will be prepared which shall consist of the following:

Description of the feature including the investigation and description of data obtained

Geologic history

Summary and conclusions

Geologic maps and photographs

Report of findings by Geologic Consultant

This report and other data will be available for NRC review whenever requested.

IWP/gc

June 10, 1976

Memo to File

Re: File No. CK-1108.00

As requested I have sent one copy of Appendix 2C-Geology-Cherokee Nuclear Station to Dr. Robert Hatcher, Department of Chemistry and Geology, Clemson University, Clemson, S. C. and Dr. Lynn Glover, Department of Geology Virginia Polyotechnical Institute and State University, Blacksburg, Virginia.

Donald R. Privett

By: D. R. Privett,
Assistant Design Engineer

DRP/ls

cc: S. B. Hager
I. W. Pearce
L. C. Dail

NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SEP 10 1976

DOCKET NOS: STN 50-491, STN 50-492 and STN 50-493

FACILITY: Cherokee Nuclear Station

APPLICANT: Duke Power Company

SUMMARY OF MEETING HELD ON AUGUST 10, 1976 TO DISCUSS PROCEDURE FOR INVESTIGATING AND DOCUMENTING GEOLOGIC FAULT FEATURES

On August 10, 1976 representatives of Duke Power Company met with the NRC staff to discuss their proposed procedures for investigating and documenting geologic fault features at the Cherokee Nuclear Station site.

A list of attendees is enclosed.

The enclosure is a copy of the procedure described by the applicant during the meeting. Significant points discussed are summarized below:

1. Third Party Independent Consultant

   The applicant utilized a panel of third party independent consultants for the Catawba Nuclear Station. For Cherokee he proposes to use one person as a primary third party consultant, but would utilize other consultants for specialized reviews if appropriate. The NRC staff finds this acceptable.

2. Applicability During Excavation

   The procedures, including provisions for holding construction activities during investigations, will be applicable during excavation of rock.

3. Exposure Time

   The NRC staff indicated that an allowance of ten (10) days for NRC inspection was adequate.

C. W. Moon, Project Manager
Light Water Reactors
Branch No. 4
Division of Project Management

William L. Porter, Esq.
Associate General Counsel
Duke Power Company
P. O. Box 2178
Charlotte, North Carolina 28242

Troy B. Conner, Jr. Esq.
Conner & Knotts
Suite 1050
1747 Pennsylvania Avenue, N. W.
Washington, D. C. 20006

John R. B. Matthis, Esq.
Assistant Attorney General
P. O. Box 629
Raleigh, North Carolina 27602

Mary Apperson Davis, Chairman
Yadkin River Committee
Route 4, Box 261
Mocksville, North Carolina 27028

Thomas S. Erwin, Esq.
P. O. Box 928
Raleigh, North Carolina 27602

David Springer
The Point Farm
Route 4
Mocksville, North Carolina 27028

William G. Pfefferkorn, Esq.
2124 Wachovia Building
Winston-Salem, North Carolina 27101

ENCLOSURE

Attendance List

NRC

R. E. Jackson
H. E. LeFevre
C. W. Moon

Duke Power Company

L. C. Dail
J. D. Humber
C. Q. Reeves
I. W. Pearce
D. A. Godfrey
C. B. Aycock
S. B. Hager

Law Engineering

C. E. Sams

INTRODUCTION:

Extensive studies of fault features characteristic of the region and of the project site area have been made at the Catawba Nuclear Station (Docket Nos. 50-413 and -414) during geologic mapping and at the Cherokee project site in support of the Preliminary Safety Analysis Report for project licensing. These studies(1) establish that fault features occur numerously in a variety of forms and that the occurrence of numerous such features can be anticipated in any large excavation in the region.

PURPOSE:

The purpose of this procedure is to establish a means of utilizing data developed in previous studies to correlate significant characteristics of features occurring in new excavations for safety related structures at the Cherokee site without undue repetition of study if a valid analogy can be made. This procedure also establishes a method and the extent that other fault features with no similarity to previous features studied will be documented, studied, and, where necessary, reported.

SCOPE:

This procedure relates directly to those geologic fault features occurring in excavations required for safety related structure foundations. These features may include brecciated zones containing offsets and any other offset or displaced feature of tectonic origin.

PROCEDURE:

1. Geologic mapping will be conducted as stated in Cherokee PSAR Section 2.5.1.2(9).

2. In the event a feature as described in the scope is discovered, the (field) Geologist will notify the Project Civil Engineer as soon as the feature is discovered.

3. The Project Civil Engineer will hold any structure construction in that area until a determination can be made 1) that the feature is similar to features previously studied by observation and that its relevant characteristics can be determined by correlation to previously studied features or 2) that the feature is not similar to any previously studied feature and requires new investigation.

4. For similar features (described in item 3), the (field) Geologist will so notify the Project Civil Engineer who will release work in the area as soon as

---

(1) Reference: Catawba Nuclear Station - PSAR, Chapter 2, Section 2.5, Appendices 2C and 2E
- "Final Geological Report on Brecciated Zon
Cherokee Nuclear Station - PSAR, Chapter 2, Section 2.5, Appendices 2C and 2E

the (field) Geologist has indexed the feature, documented it by detailed mapping and photographs, and established the feature's similarity to a previously established feature. This similarity will be documented by comparing relevant characteristics to features observed and studied at Catawba Nuclear Station during mapping or in any of the numerous test pits opened at the Cherokee site during subsurface investigative studies. Where this similarity can be established and documented, mapping and project work will continue routinely. A tabular summary will be prepared which indexeseach occurrence of a feature and makes specific comparison to a previously studied feature. Documentation will be subject to audit during field inspections by NRC.

5. For features where similarity cannot be established by comparison to features previously studied at the Cherokee or Catawba sites, the Project Civil Engineer will continue to hold work in the area and notify the NRC Project Manager of the discovery. The geologic feature will then be left exposed for ten (10) days for NRC inspection.

5a. Duke with the assistance of Law Engineering Testing Company and/or other consultant will map the feature, develop data, and determine if the feature falls in the sequence of geologic events established and reported in the Cherokee PSAR.

5b. A third party independent geologic consultant will be engaged and will visit the site to examine the feature and examine the data developed by Duke and LETCo and/or other consultant. The (field) Geologist will notify the Project Civil Engineer (when geologic mapping, photography and field data gathering have been completed) that investigations have been completed and documented. The independent consultant will report his findings to the Project Civil Engineer.

5c. If the independent consultant concurs with Duke's conclusions, the Project Civil Engineer will then release the area for project construction activity upon completion of item 5b.

5d. For non-similar features a report will be prepared which shall consist of the following:

Description of the feature including the investigation and description of data obtained

Geologic history

Summary and conclusions

Geologic maps and photographs

Report of findings by Geologic Consultant

This report and other data will be available for NRC review whenever requested.

IWP/gc

REVISED

March 6, 1975

Memo to File P81-1110.00

RE: Project 81
Mtg with NRC Staff 2/27/75
Afternoon - Geologic Mapping at Cherokee and Perkins

NRC - Starostecki
Budge
Jackson

Duke - I. W. Pearce
C. Q. Reeves
D. R. Privett
J. C. Rogers
R. A. Harris

LETCo - C. E. Sams
Don Miller

I. W. Pearce outlined the extent to which Duke proposed to map at Cherokee (see attached).

Jackson and Budge explained their desire to see us map at top of hard rock and gave their reasons. Primary reasons to have mapping at two or more levels for three-dimensional purposes were: 1) to add continuity to mapping and help explain features seen below and 2) to resolve matters at that point and save Duke later delays in construction. He explained that potential cost of delay due to surprises is high. At Sumner they estimated $150,000 per day for 40 days.

We explained Duke's schedule situation and that a good deal of time was available to do a good job of mapping in the final excavation before first concrete is placed.

Staff asked what additional cost would it be to Duke to map at top of hard rock. J. C. Rogers explained hardships; cost in excess of $3 million for labor at Cherokee alone, and 6 month advance start of site opening to allow for rock preparation and mapping. Staff, after considerable discussion, seemed to agree that uncovering and cleaning off top of rock was not really worth that much if we did a good job of mapping at the level where we would begin rock excavation.

We have agreed to do the following with regard to extent of mapping:

Cherokee: In response to Reg. Staff position question 32.3.15

1) Map all exposed geology at level where materials can no longer be removed by earthmoving equipment to be additionally documented by photography. Where geologic features of concern are revealed

REVISED

Memo to File P81-1110.00

feature will be pursued in local area by further excavation or whatever means is necessary to map and describe feature. Surface control should be maintained as excavation to this level progresses so that significant features encountered during earthmoving can be mapped, should require only nominal monitoring activity.

2) Map all exposed geology in final excavation of major powerhouse structures, walls and floor at 1" = 10' for maps, and 1" = 5' for details. Documentation will include photographic coverage.

Perkins: Staff stated that there were no particular geologic problems now known. Mapping would not be required to be as extensive as for Cherokee.

1) Map all exposed geology in final excavation of major powerhouse structures, walls and floor at 1"=20' and 1"=5' for details. Surface control should be maintained as excavation to this level progresses so that geology of concern can be mapped in the local area it occurs.

2) Staff will not give Duke formal question for Perkins mapping if we agreed to incorporate commitment in PSAR. I. W. Pearce will advise Starostecki if we need formal question.

Perkins and Cherokee

1) Duke was asked and agreed to mapping the prepared foundations for NSW dams (and saddle dike at Perkins.)

2) Some joint mapping or a joint rose figure should be included in mapping.

3) Review staff wants Duke to keep them informed on about 2 week basis of excavation progress. We will work out some method for doing this.

4) Staff expects to get mapping and reports on interim basis as mapping progresses. These interim reports are to be submitted in limited copies (3 or 4) to the staff. Eventually all interim reports will be incorporated in a final report for the project (Cherokee or Perkins) and submitted as a supplement to PSAR (limited copies also). Starostecki is not clear on logistics of submittals but will advise Duke when time comes.

C. Q. Reeves

C. Q. Reeves, Senior Engineer

CQR/gc

cc: Duke Attendees

Geologic Mapping

Extent of surfaces to be geologically mapped at Cherokee Nuclear Station (Reference Q. 32.3.15 Round 2, Set 3)

1) Map geology as exposed during excavation after "B" horizon soils are removed.

2) Map geology as exposed of features at level where materials can no longer be removed by earthmoving equipment. This will be documented additionally by controlled photography.

3) Map all geologic features of walls and floor of final excavation into rock. Documentation will include extensive photographic coverage. Map at 1"=20' scale.

PSAR commitment will include reference to all other items addressed in RSP.

IWP

2/26/75

February 10, 1975

Memo to File

RE: Cherokee Nuclear Station
Geologic Mapping
Meeting with NRC
File: CK-1108.00

Met briefly with Bob Jackson, NRC staff geologist, to discuss Question 32.3.15 regarding geologic mapping at Cherokee.

1) Millstone supplementary report not available to use as suggested in question. Use Watts Bar report as guide until Millstone is available.

2) To be submitted as supplemental report to PSAR with limited copies (to be worked out later with Starostecki). Interim reports will be required as local areas are mapped to consist of maps and partial reports.

3) Wants mapping at existing ground surface, top of rock, and bottom and sides of final rock excavation. I discussed difficulty of mapping top of rock if blasting was done before reaching that point. Jackson suggested we should discuss if mapping top of rock is a problem. I agreed to pursue and be back in touch if mapping top of rock was hardship for Duke.

4) "Laboratory documentation" referred to in question was intended to mean thin sections and petrographic analysis of the various rock types or zones of special significance.

I. W. Pearce, Principal Engineer

IWP/gc

cc: J. D. Humber
C. Q. Reeves
D. R. Privett

File ~~1-20~~ ~~2-24~~ ~~2-12~~ ~~3-17~~

February 6, 1975

P81-1421.00
P81-1108.00

Mr. R. L. Dick

RE: Project 81
Geologic Mapping in Excavations of
Major Powerhouse Structures
File: P81-1421.00 and P81-1108.00

In recent discussions with NRC staff geologists we understand that detailed large scale geologic mapping will be required in the area of major structures at ground level, top of rock in excavations, and of the sides and bottom of the final excavation into rock. We have been asked formally to provide an appropriate commitment in the PSAR for performing this work at Cherokee and have been asked verbally to do similar work at Perkins.

It is our understanding that we want to excavate rock by drilling into rock from some point above rock where the overburden serves to confine missiles and control other effects of blasting before we excavate down to the top of rock. If this method is used, there will be no undisturbed top of rock surface to map when the overburden is removed. NRC staff has indicated that they want a rock surface prepared in the same manner and to the same extent it was cleaned off in the bottom of the test pits at Cherokee for mapping and photographing prior to further excavation into rock.

Please review the excavation methods you propose to meet current schedules and advise us of penalties and difficulties we might experience to provide the geologic mapping as the NRC staff requires in terms of schedule and cost. It will help us to have these penalties quantified and difficulties described as much as possible to approach the staff for other consideration if the problems are great enough to warrant such action.

If we can offer further explanation or any other information concerning this matter, please advise. We need your response as early as possible.

L. C. Dail, Chief Engineer
Civil/Environmental Division

By: I. W. Pearce, Principal Engineer

IWP/gc

cc: J. C. Rogers C.Q. Reeves
H. T. Moore D. B. Privett

Question discussed in mtg w/NRC 2/27/75 - Agreed to map only rock surface left after excavation by normal means is terminated. Must prepare item of interest. Map walls and floor of final excavation in detail. All this for Cherokee. Map final excavation only for Perkins. See memo

November 15, 1974

Memo to File

RE: Project 81
AEC Staff Site Visit
Perkins and Cherokee Foundations
File No: P81-1412.12, P81-1110.00

On Tuesday, November 12, 1974, personnel of Design Engineering and Law Engineering and Testing Co. accompanied AEC staff members on an inspection visit of both Project 81 sites. Those persons involved and their organizations were:

Duke Civil/Environmental

I. W. Pearce
C. Q. Reeves
D. R. Privett

Duke Mechanical/Nuclear

R. W. Harris

Law Engineering Testing Co.

C. E. Sams
D. G. Miller
D.H. McLemore

AEC Staff

R. Jackson - Geology
L. Heller - Foundations
D. Budge - Geology
R. Hoffman - Seismology

Purpose of the AEC staff visit was to discuss and review geology, seismology and foundation information and to observe available soil and rock samples and test pit excavations.

During the morning at the Cherokee site, representative rock cores from the reactor foundations and other areas of the site were displayed for the AEC staff members. The recently obtained, large diameter over-core rock samples were examined and the group made a detailed inspection of the large Geologic Test Pits No. 7 and 9 in the general area of the Unit 3 reactor building.

Mr. Heller discussed with Messrs. Sams and Reeves the proposed design and construction of the NSW Pond dam from the weathered saprolite materials exposed in the test pits. Mr. Jackson and Budge examined the variable nature of the exposed rock and discussed with Mr. Miller and Privett the need for detailed geologic mapping and photographed documentation of the excavation for all Category I safety-related structures during the construction phase of a project. The staff indicated that they would not need to see the locations of the NSW dam at this time.

During the afternoon at the Perkins site the general site geology was first discussed. The AEC staff members inspected several representative rock core boxes containing evidence of dike material, infrequent slickensides, and deeply weathered rock zones which had been noted on the foundation boring logs. The variability of the continuous rock elevation for each unit was considered

and the various blasting techniques to be used in excavation were discussed.

Mr. Heller examined samples of the borrow material for the NSW Pond dam and saddle dike with Mr. Sams. Mr. Jackson suggested to Mr. Privett that the actual extent and direction of the dikes mapped near the plant site could possibly be better determined by use of magnetometer techniques. A sample of the pink-colored moderately weathered rock from a deep boring beneath the proposed saddle dike was retained by Mr. Jackson for further examination. He also requested a set of aerial photo coverage be furnished if available so he could use stereoscopic study methods to investigate certain geologic features in the general site area.

After a brief visit to the site of the NSW Pond dam and inspection of the existing abutments and streambed, the AEC staff stated that they would have to leave to make their plane. They stated that they were pleased with their visit and did not need to visit any of the other site locations.

The following are the requests or recommendations resulting from the AEC staff members visit pertaining to their site inspections:

1) Emphasized need for detailed foundation mapping and photos for Category I structures during construction phase.

2) Requested aerial photo coverage of general site area for their use in geology studies.

3) Use of magnetometer at Perkins site to better trace extent of the dikes near the immediate plant site.

In summary, I feel that the meeting was very profitable from both Duke and the AEC standpoint in that they now are familiar with the physical condition of the site and foundation materials, and we have a better understanding of their concerns and the reason therefore.

Chester Q. Reeves

Chester Q. Reeves
Senior Engineer

CQR/gc

cc: I. W. Pearce
J. D. Humber

Attachment 4

Record Transmittals:

Proposed Additional Historical Record Qualification: Cherokee-era NRC Independent Review Activities, and Additional Geotechnical Zone Reports

Transmitted to FCL from Duke Energy (July 15, 2011)

Proposed Additional Historical Record Qualification: Additional Geotechnical Information

Transmitted to FCL from Duke Energy (July 22, 2011)

Proposed Additional Record Qualification: Final Foundation Level Petrographic Descriptions

Transmitted to FCL from Duke Energy (July 28, 2011)

Duke Energy
EC09D/ 526 South Church Street
Charlotte, NC 28201-1006

Mailing Address:
P.O. Box 1006 – EC09D
Charlotte, NC 28201-1006

704-382-7830

704-382-2038 fax

July 15, 2011

Mr. Tom Slavonic
Enercon Services
4490 Old William Penn Highway
Murrysville, PA 15668

Subject: Proposed Additional Historical Record Qualification: Cherokee-era NRC Independent Review Activities, and Additional Geotechnical Zone Reports

Dear Tom:

During development of our Cherokee foundation rock mapping report, and NRC's site visit to discuss those activities, we have identified a need for qualification of additional historical documents that survive from the Cherokee era. These documents address NRC's independent reviews of foundation mapping activities during the Cherokee era, as well as additional geologic zone reports and their supporting documentation. The attached CD contains these documents, as retrieved from several sources.

The files whose file name includes a Duke microfilm reel number were obtained from scans of microfilm records from Duke archives, and can be identified by the reel and frame number stenciled at the left of each page. The document whose name contains "MFS CK-1108" was retrieved from Malcolm Schaeffer's Cherokee correspondence files that are now maintained as part of the Lee project documentation.

Files containing the additional geologic zone reports and their supporting information were recently scanned from Malcolm Schaeffer's Cherokee zone report files that are now maintained as part of the Lee project documentation.

The files contained in the attached CD are shown in the listing shown on page 2.

Electronic files contained on the attached CD:

Directory of E:\

07/15/2011	04:08 PM	<DIR>	Historic NRC Mapping Interactions
07/15/2011	04:11 PM	<DIR>	New Proposed HRQs - Geologic Reports
0 File(s)	0 bytes		

Directory of E:\Historic NRC Mapping Interactions

07/15/2011	04:08 PM	<DIR>	.
07/15/2011	04:08 PM	<DIR>	..
03/15/2011	03:39 PM	9,323,911	Extract from 0017 (MF Reel 3184 CK-1108) 32 NRC Interfaces Bookmarked.pdf
03/15/2011	11:25 AM	2,630,611	Extract from 0327 (MF Reel 0018 CK-1412) 7 NRC Letters Bookmarked.pdf
03/15/2011	12:39 PM	8,781,311	Extract from MFS CK-1108 Memos (18 NRC Interactions Bookmarked).pdf
3 File(s)	20,735,833 bytes		

Directory of E:\New Proposed HRQs - Geologic Reports

07/15/2011	04:11 PM	<DIR>	.
07/15/2011	04:11 PM	<DIR>	..
07/11/2011	02:02 PM	19,652,236	Geologic Reports on Zones 1-5, 7-10 Mar 8, 78.pdf
07/11/2011	03:01 PM	10,211,237	Petrographic Descr for Zone 10 C31-C44 2-25-78.pdf
07/11/2011	03:36 PM	9,344,607	Petrographic Descr for Zone 14 C-45 to C-49 8-6-79 .pdf
07/11/2011	05:12 PM	3,809,401	Petrographic Description Zone 5 CS4-1 to C-18-1 8-16-77.pdf
07/11/2011	04:54 PM	25,865,949	Photomicrographs Zones 10 and 14.pdf
07/11/2011	05:08 PM	56,954,679	Weaver Report Fine-Grained Material 9-20-77.pdf
6 File(s)	125,838,109 bytes		

As you understand, transmittal of electronic scans of these documents is the first step in qualifying the information contained for use on the Lee project, and in creating a Lee record from these documents by applying established procedures for historical record qualifications. If you have questions, please call me at 704-382-7830.

Sincerely,

John M. McConaghy, Jr.
Engineering Consultant

Enclosure: 1 CD as described

cc: Mike Gray, FWLA (w/ enclosure)
Malcolm Schaeffer, HDR|DTA (w/ enclosure)
R.L. Morgan (w/o enclosure)
J.S. Thrasher (w/o enclosure)
J.R. Cassidy (w/o enclosure)
4000.01-09 (w/ enclosure)

Duke Energy
EC09D/ 526 South Church Street
Charlotte, NC 28201-1006

Mailing Address:
P.O. Box 1006 – EC09D
Charlotte, NC 28201-1006

704-382-7830

704-382-2038 fax

July 22, 2011

Mr. Tom Slavonic
Enercon Services
4490 Old William Penn Highway
Murrysville, PA 15668

Subject: Proposed Additional Historical Record Qualification: Additional Geotechnical Information

Dear Tom:

Following up on my letter of July 15, several additional Cherokee-era documents have been identified as candidates for qualification to support revision of the geologic mapping report. The attached CD contains these documents, as scanned from Malcolm Schaeffer's Cherokee zone report files that are now maintained as part of the Lee project documentation..

The first item is the stereograph associated with the Zone 6 Geologic Report. For some reason, these figures were omitted when that Geologic Report was qualified in 2007, though comparable figures from other zone reports were included. This appears to just be an omission. The second item is a series of petrographic descriptions associated with FC-1xx series samples. I believe these documents were excluded from the initial qualification effort since they seem to address Cherokee Unit 2. Nevertheless, the area they describe is a portion of Zone 6, which will underlie Lee Unit 1, and therefore is of interest to NRC in the evaluation of our mapping report. These documents seem to be of comparable quality to others that have been previously qualified. The final item is a set of handwritten sheets showing the exploration coordinates for the FC-1xx borings. This may prove more difficult to peer review in accordance with FCL PR-03, but I am including it for completeness to let the review committee perform that evaluation.

The files contained in the attached CD are shown in the listing shown on page 2.

Electronic files contained on the attached CD:

```
Volume in drive D is 20110722_CK_Geol

 Directory of D:\

07/22/2011  04:01 PM    <DIR>          Additional Geotechncial Items for Qualification
               0 File(s)              0 bytes

 Directory of D:\Additional Geotechncial Items for Qualification

07/22/2011  04:01 PM    <DIR>          .
07/22/2011  04:01 PM    <DIR>          ..
07/22/2011  03:50 PM           445,269 FC-1xx series Petrographic Descr.pdf
07/22/2011  03:50 PM         2,865,476 SKMBT_C25006100513201 Zone 6 Stereograph.pdf
07/22/2011  03:50 PM           542,766 Unit 2 FC-1xx Locations.pdf
               3 File(s)      3,853,511 bytes
```

As you understand, transmittal of electronic scans of these documents is the first step in qualifying the information contained for use on the Lee project, and in creating a Lee record from these documents by applying established procedures for historical record qualifications. If you have questions, please call me at 704-382-7830.

Sincerely,

John M. McConaghy, Jr.
Engineering Consultant

Enclosure: 1 CD as described

cc: Mike Gray, FWLA (w/ enclosure)
Malcolm Schaeffer, HDR|DTA (w/ enclosure)
R.L. Morgan (w/o enclosure)
J.S. Thrasher (w/o enclosure)
J.R. Cassidy (w/o enclosure)
4000.01-09 (w/ enclosure)

Duke Energy

Duke Energy
EC09D/ 526 South Church Street
Charlotte, NC 28201-1006

Mailing Address:
P.O. Box 1006 – EC09D
Charlotte, NC 28201-1006

704-382-7830

704-382-2038 fax

July 28, 2011

Mr. Tom Slavonic
Enercon Services
4490 Old William Penn Highway
Murrysville, PA 15668

Subject: Proposed Additional Historical Record Qualification: Final Foundation Level Petrographic Descriptions

Dear Tom:

Following up on my letters of July 15 and July 22, still more Cherokee-era documents have been identified as candidates for qualification to support revision of the geologic mapping report. These items item are the geologists' Petrographic Descriptions based on examination of samples from the Cherokee foundation level rock.

The attached CD contains these documents, as scanned from Malcolm Schaeffer's Cherokee zone report files that are now maintained as part of the Lee project documentation.

The files contained in the attached CD are shown in the listing shown on page 2.

Electronic files contained on the attached CD:

Volume in drive D is 2011-0728_CK_Geo

Directory of D:\

07/27/2011	04:03 PM	13,293,061	FC-1 to FC-14 Petrographic Descriptions.pdf
07/27/2011	04:03 PM	12,647,579	FC-101 to FC-113 Petrographic Descriptions.pdf
07/27/2011	04:03 PM	31,378,259	FCS-1 to FCS-37 Petrographic Descriptions.pdf
07/27/2011	04:03 PM	2,587,985	FCS-101 to FCS-103 Petrographic Descriptions.pdf
07/27/2011	04:03 PM	1,204,192	FX-1 Petrographic Description.pdf
5 File(s)		61,111,076 bytes	

As you understand, transmittal of electronic scans of these documents is the first step in qualifying the information contained for use on the Lee project, and in creating a Lee record from these documents by applying established procedures for historical record qualifications. If you have questions, please call me at 704-382-7830.

Sincerely,

John M. McConaghy, Jr.
Engineering Consultant

Enclosure: 1 CD as described

cc: Mike Gray, FWLA (w/ enclosure)
Malcolm Schaeffer, HDR|DTA (w/ enclosure)
R.L. Morgan (w/o enclosure)
J.S. Thrasher (w/o enclosure)
J.R. Cassidy (w/o enclosure)
WLG-4000.01-09 (w/ enclosure)

Data Verification Summary

Data Verification Title: CNS Petrographic Thin Section Sample Photomicrographs
ID Number: HRQ-FCL-004
Date of Qualification Review Team Meeting: September 19, 2011

Quality Review Team:

Name	Sign (Initials)	Organization	Qualifications
Jerry Standridge	JAS	Duke Energy	QA/QC Verification
John McConaghy	JMMC	Duke Energy	Engineering
Fred Redwanz		ENERCON Services Inc.	Engineering
Juan Vizcaya	JV	ENERCON Services Inc.	Engineering
Malcolm Schaeffer	MFS	HDR | DTA	Former Duke Power Project Geologist
Michael Gray	MGG	FCL	Project Principal Geologist
Robert Turner	RJT	FCL	Project Geologist

Data / Evidence Considered During the Reviews:

The contents of the files outlined in Attachment 2 were reviewed for applicability, completeness, and pedigree.

Critical Attributes Considered During the Reviews:

Files comprise contemporary photomicrographs taken of CNS-era petrographic thin section samples. Attributes considered include how the samples were originally created and labeled, storage of the samples, and procedures used to create the photomicrographs.

Basis for Qualification / Non-Qualification:

The data is qualified to use in WLS evaluations to document final foundation geology beneath former CNS Service Buildings 1, 2 and 3. The thin section samples were prepared by Duke Power personnel under the supervision of Project Geologist Malcolm Schaeffer. The photomicrographs were prepared by Randy Cumbest and Malcolm Schaeffer using approved FCL QA procedures. Chain of Custody was documented.

Is the data considered Nuclear Safety Related QA Qualified? Yes (Yes / No)

Recommendations for Additional Qualification Activities:

None

Dissenting conclusions or comments: If the team reaches concensus, enter "None" here. Otherwise, document the dissenting view as follows:

Reviewer Name and Organization: _____

Dissenting Statement: None

_____

Signature and Date: _____

I hereby certify this Data Verification Package is complete:

Quality Review Team Lead: Michael J Gray **(Sign)** **Date:** 9/22/2011

Michael Gray, FCL Project Manager

I approve this Data Verification Package for the usage identified above:

Approved By: R2 Mayer Jr **(Sign)** **Date:** 10/06/11

(Duke Project Manager or designee)

Data Verification Planning Form

Data Verification Title: CNS Petrographic Thin Section Sample Photomicrographs **ID Number:** HRQ-004

Scope of Historical Data Requiring Review:
Photomicrographs produced from existing petrographic thin section samples: CS-13A-1, CS-6A, DCH-1-1 (H), FC-8-1A, and FCS-103.

Purpose / Applicability of Data: Previously qualified zone reports and petrographic descriptions (as well as those currently proposed for qualification) report on Cherokee-era assessment of petrographic thin section samples obtained from CNS foundation rock. These samples were created by Duke Power lab personnel under the supervision of CNS Project Geologist, Malcolm Schaeffer. They consist of thinly-sliced layers of the rock material affixed to glass slides. The qualified documents refer to the samples by a unique identifier that was etched onto the sample, describe the attributes of the rock investigated, and draw conclusions about the foundation material.

The modern photomicrographs of these petrographic thin sections demonstrate the attributes previously described in these samples and can be used to illustrate the geologic structural relationships, mineralogic composition, alteration, and recrystallization that provide evidence that can be used to support interpretation of the geochronologic deformation history of the foundation rock at the WLS site.

Methods of Verification (X):

Peer Review X Data Corroboration X Confirmatory Testing ____

Rationale: Upon completion of the investigations described in the qualified (and proposed to be qualified) CNS petrographic descriptions and zone reports, the thin section rock samples themselves were returned to the Duke Power Engineering Geologist (Malcolm Schaeffer). Since project procedures did not prescribe an ultimate disposition for these samples, they were maintained in his project files. After cancellation of the Cherokee project, the samples were turned over to Duke Energy record storage activities, and were subsequently recovered when the Cherokee site was re-acquired for purposes of the Lee Nuclear Station. Because of the nature of the rock and glass material, these samples are not significantly affected by aging or by conditions of storage in the intervening years. In 2006, the samples were cataloged and indexed as part of data collection for the Lee project, and were then returned to the Duke Energy record vault for storage.

Some Cherokee-era photomicrograph images from these samples survive, and are included in the materials previously qualified or currently proposed for qualification. To more effectively illustrate the properties of the rock that was described in the qualified zone

reports and petrographic descriptions, we obtained current-day photomicrograph images of the surviving thin section samples that are specifically cited and identified (by etched sample number) in those qualified reports. These images were obtained using the procedure outlined in FCL QA Work Instruction DUK-001-WI-02 (Attachment 3). These current-day images of specifically identified historical samples would be qualified for the limited purpose of illustrating the types of material features described by the Cherokee-era geologists in their reports.

Need for Data Qualification Affirmed By: Michael Gray **Date:** 9/21/2011
FCL Project Manager (or designee)

Required Organizations for Verification:
FCL with support from Duke-Energy and ENERCON Services, Inc.

Duke Approval of Scope and Methods Used: R2 Mayer Jr **Date:** 09 22 11
Duke Project Manager (or designee)

Attachments:

Attachment 1 Listing of Photomicrographs to be Qualified
Attachment 2 Photomicrographs and
Attachment 3 FCL QA Work Instruction DUK-001-WI-02 Rev. 0

Attachment 1

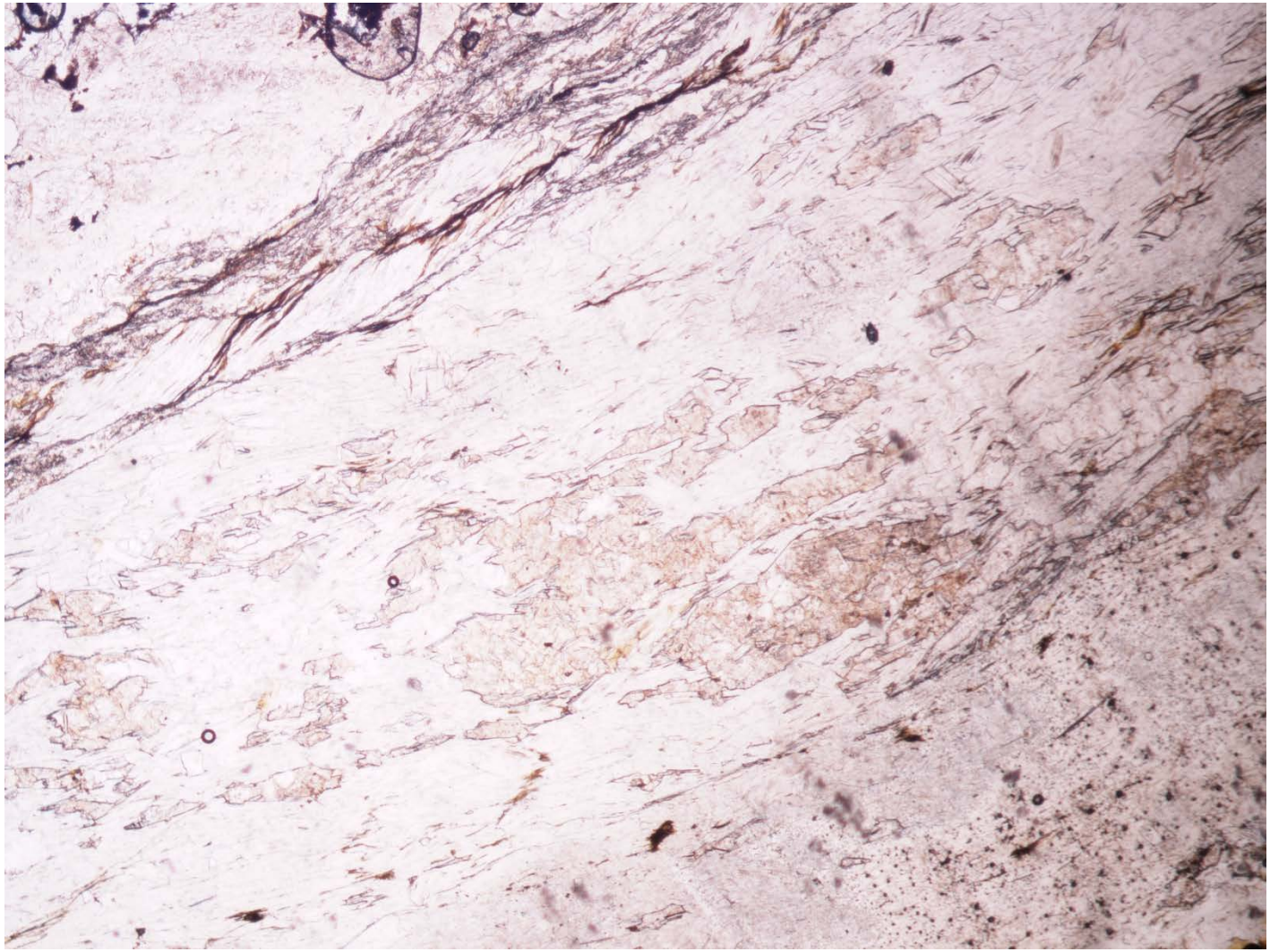
Listing of Photomicrographs to be Qualified

File Name	Sample Number[(1)(2)]	Relevant Petrographic Information Displayed
cns0001.tif	CNS-FC-8-1A-P	Post-kinematic mica
cns0002.tif	CNS-FC-8-1A-X	Post-kinematic mica
cns0003.tif	CNS-FCS-103-P	Late mica on breccia
cns0004.tif	CNS-FCS-103-X	Late mica on breccia
cns0005.tif	CNS-FCS-103-P	Low birefringence mineral in vein
cns0006.tif	CNS-FCS-103-X	Low birefringence mineral in vein
cns0007.tif	CNS-DCH-1-1(H)-P	Low birefringence mineral in vein; Epidote
cns0008.tif	CNS-DCH-1-1(H)-X	Low birefringence mineral in vein; Epidote
cns0009.tif	CNS-CS-13A-1-P	Low birefringence mineral in vein; Epidote
cns0010.tif	CNS-CS-13A-1-X	Low birefringence mineral in vein; Epidote
cns0011.tif	CNS-CS-6A-P	Muscovite overgrowth fabric with low birefringence veins
cns0012.tif	CNS-CS-6A-X	Muscovite overgrowth fabric with low birefringence veins

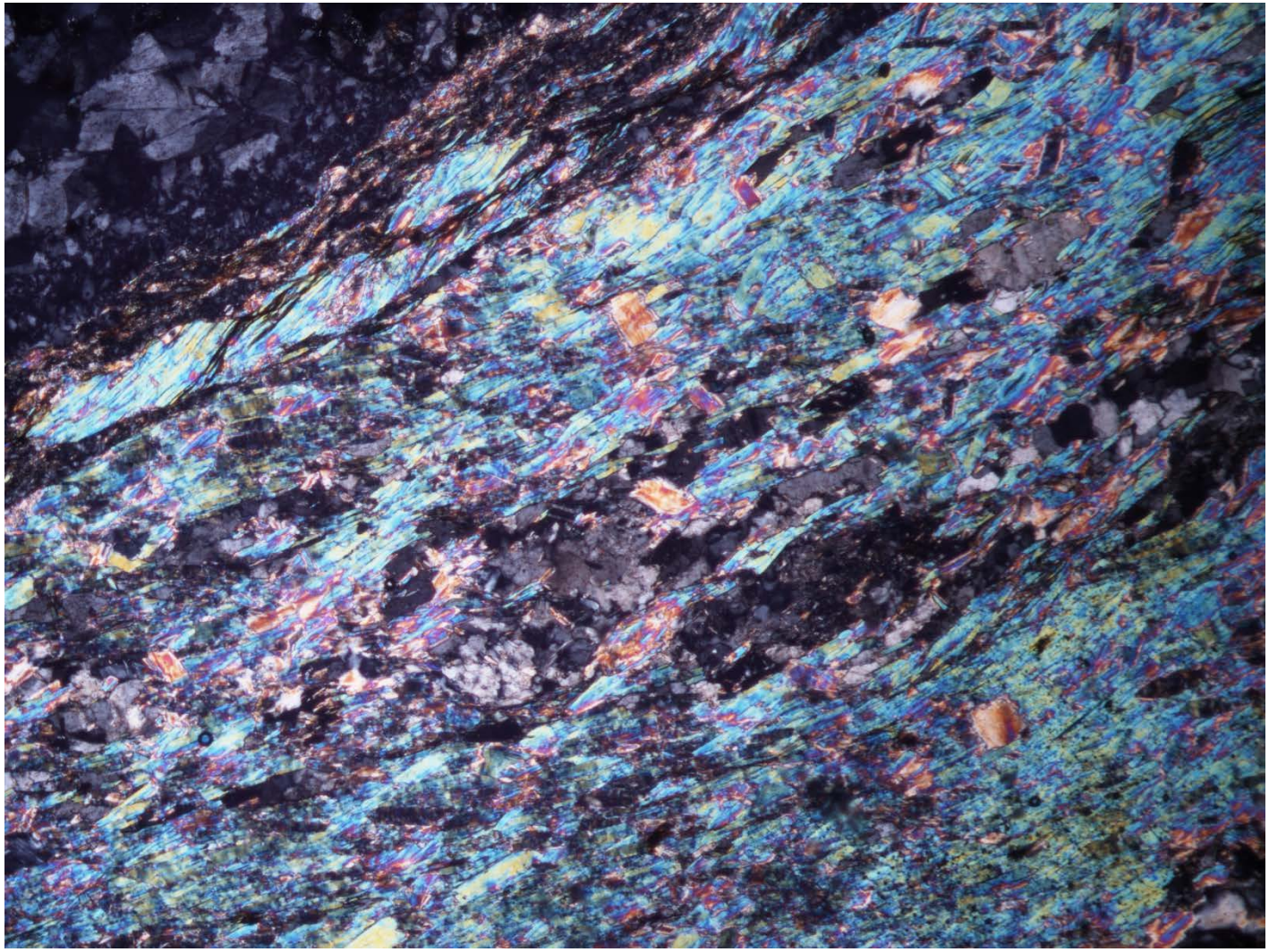
(1) The prefix of CNS- has been added to all sample numbers to identify them as Cherokee Nuclear Station era samples.
(2) The suffixes –P or –X have been added to all sample numbers. The –P suffix indicates the photomicrograph was taken under plain, non-polarized light and the –X suffix indicates that the photomicrograph was taken under cross-polarized light.

Attachment 2

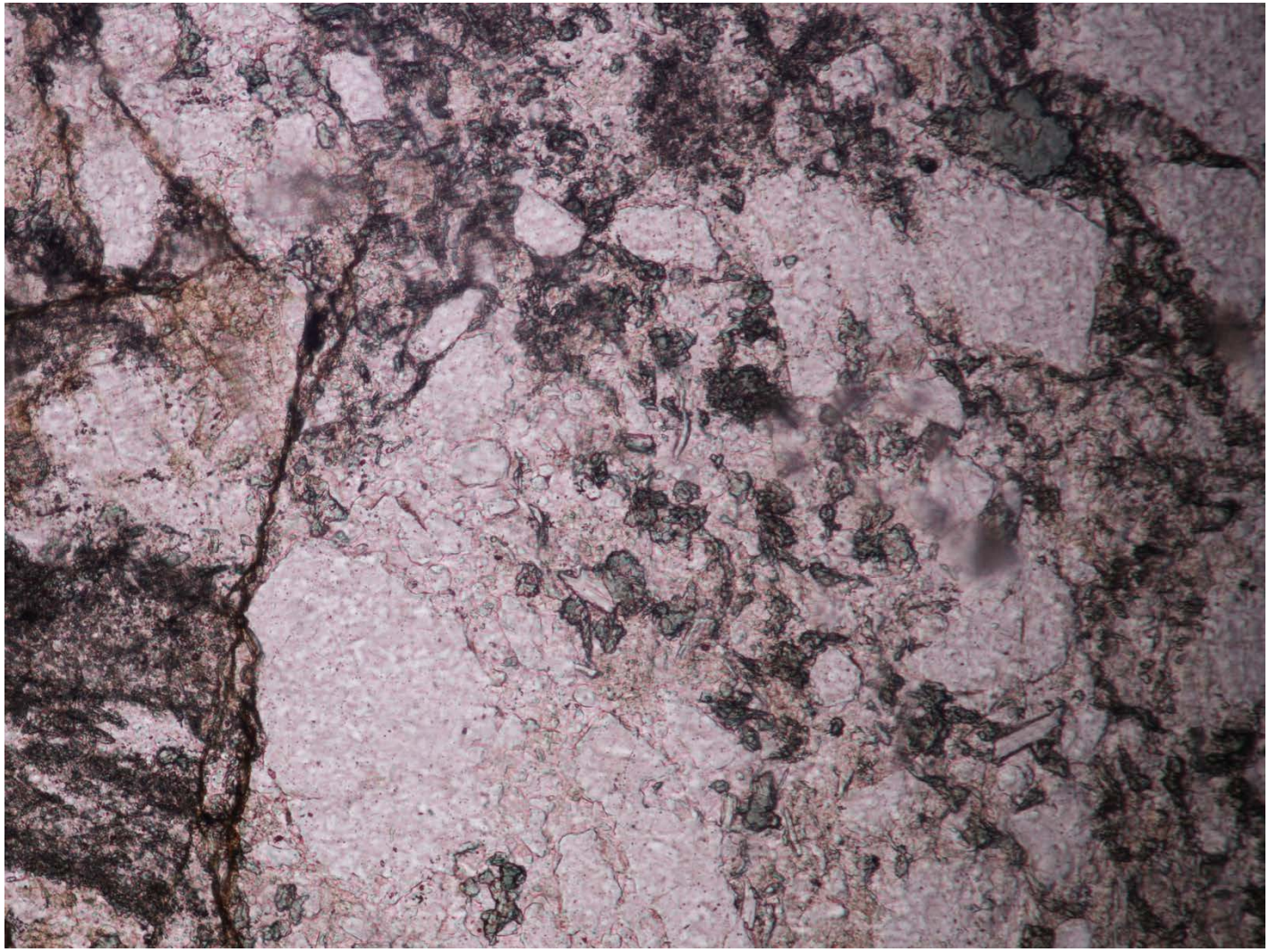
Photomicrographs



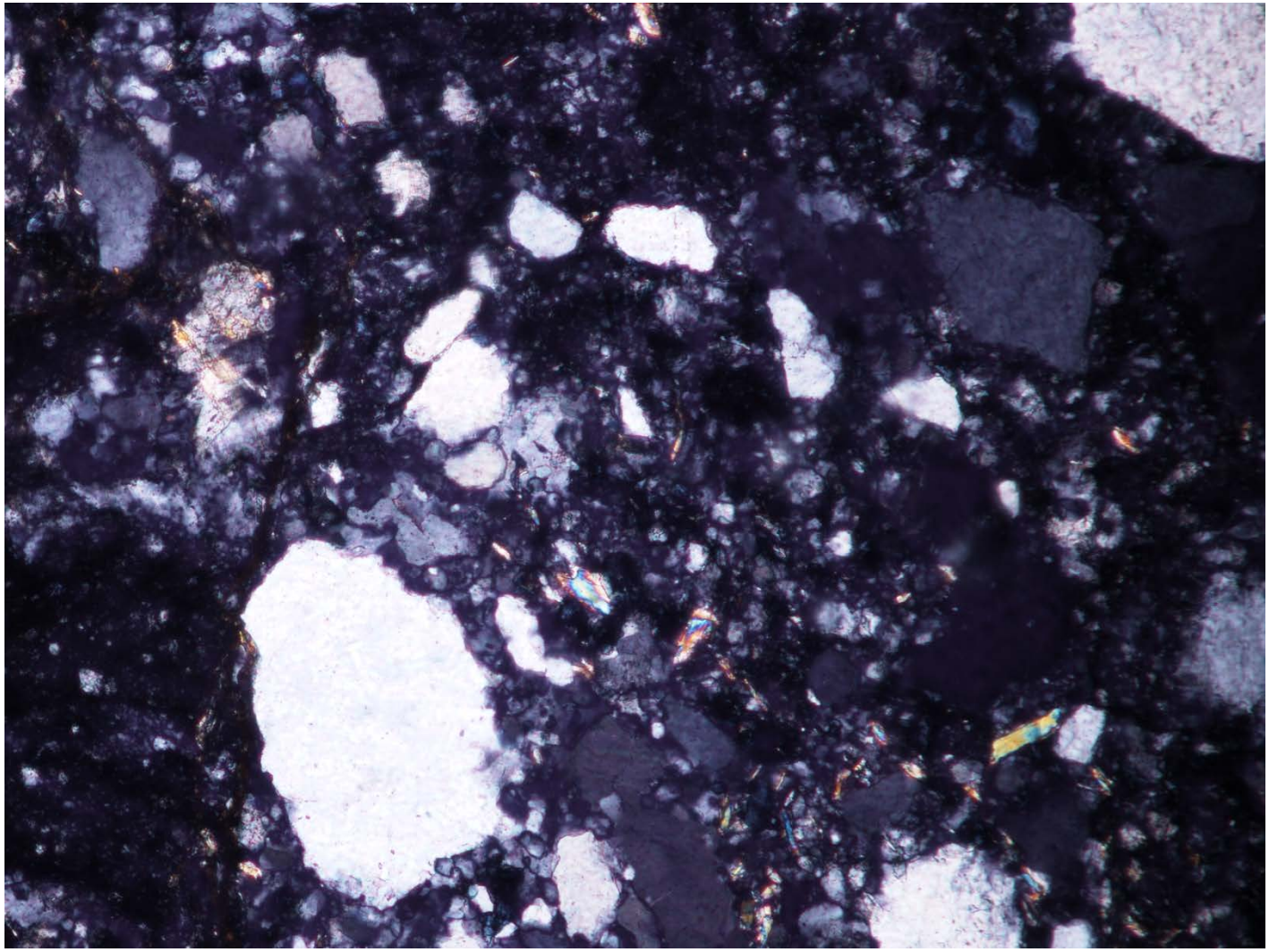
Filename: cns0001.tif
Sample: CNS-FC-8-1A-P



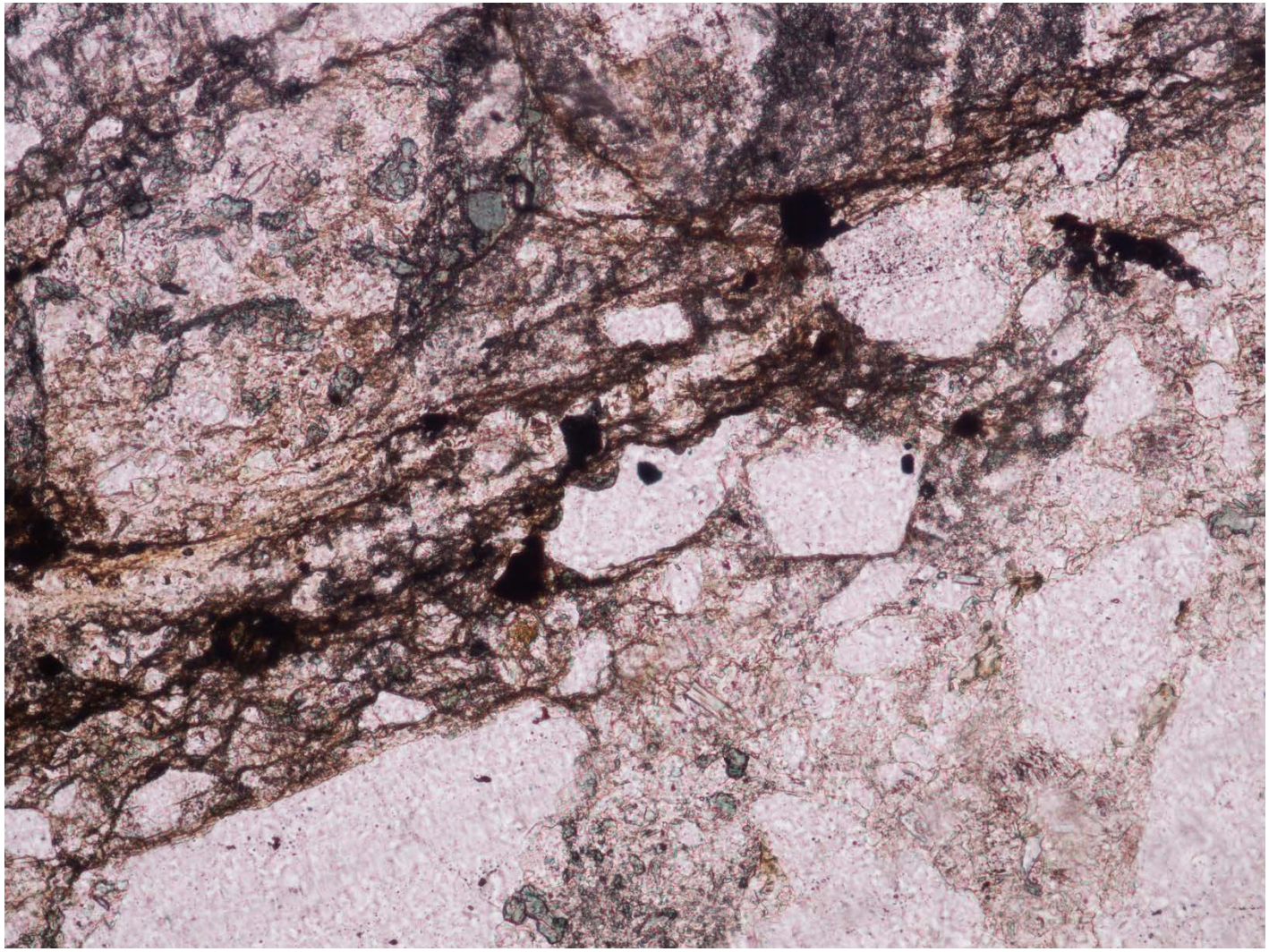
Filename: cns0002.tif
Sample: CNS-FC-8-1A-X



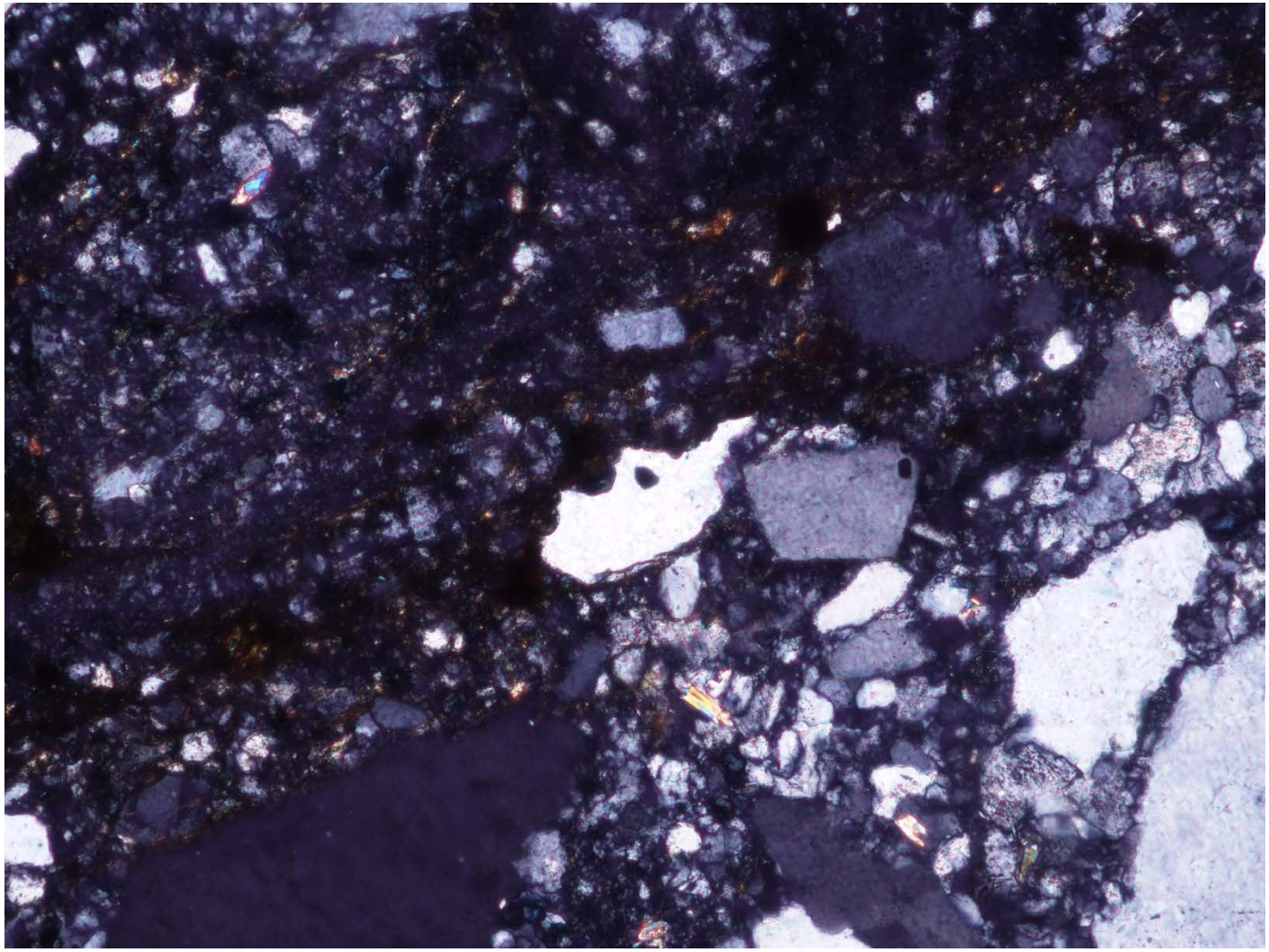
Filename: cns0003.tif
Sample: CNS-FCS-103-P



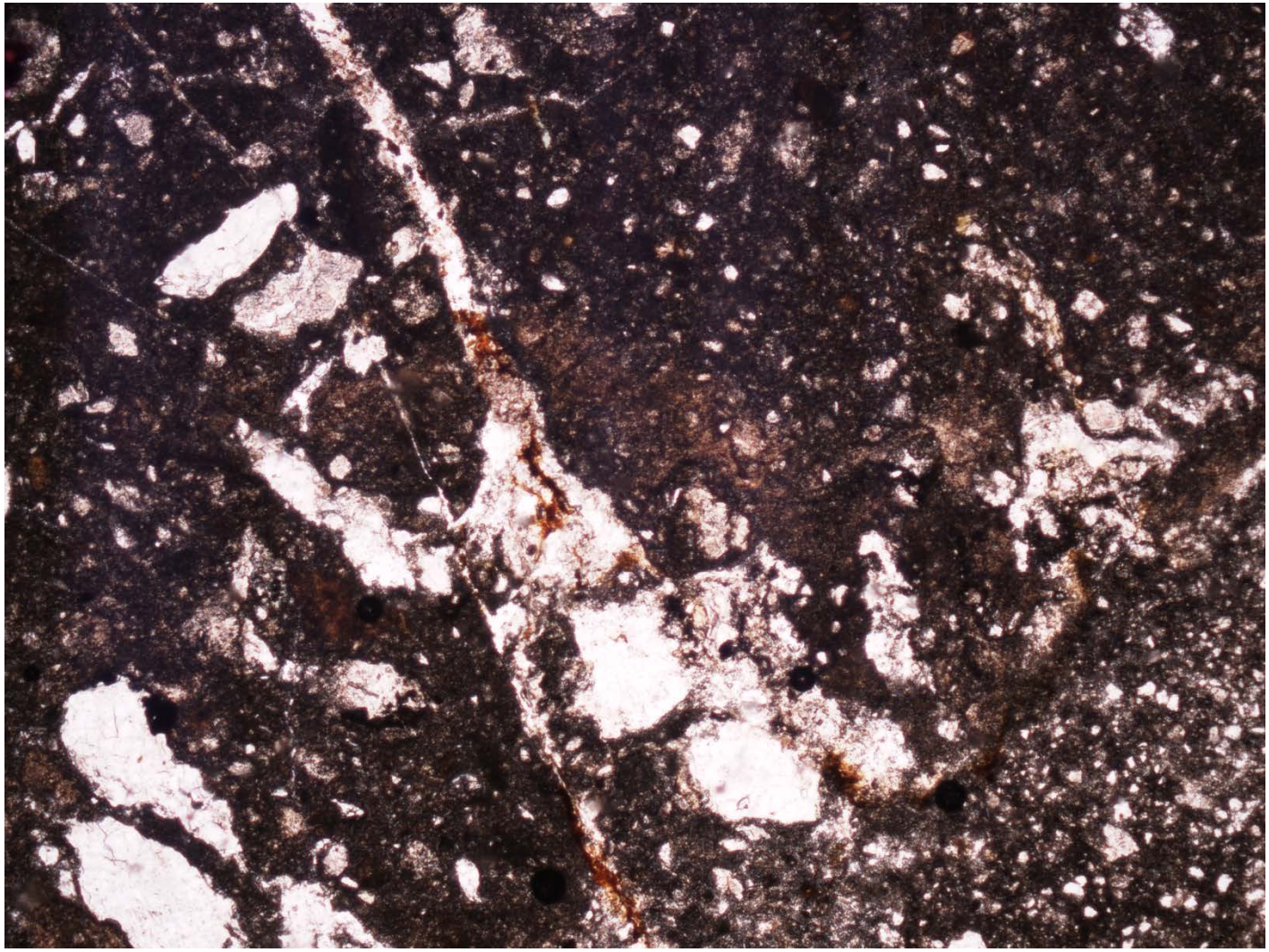
Filename: cns0004.tif
Sample: CNS-FCS-103-X



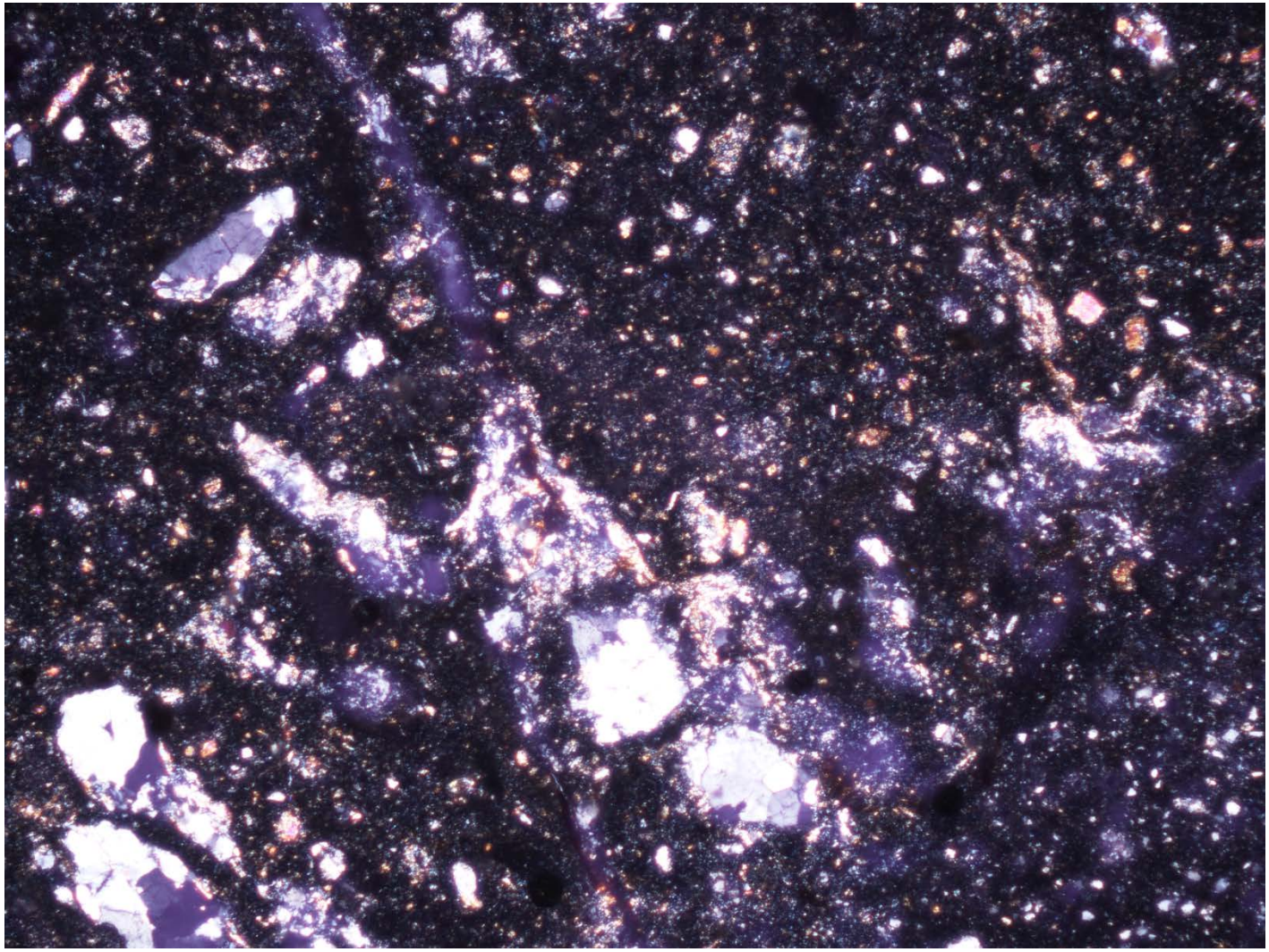
Filename: cns0005.tif
Sample: CNS-FCS-103-P



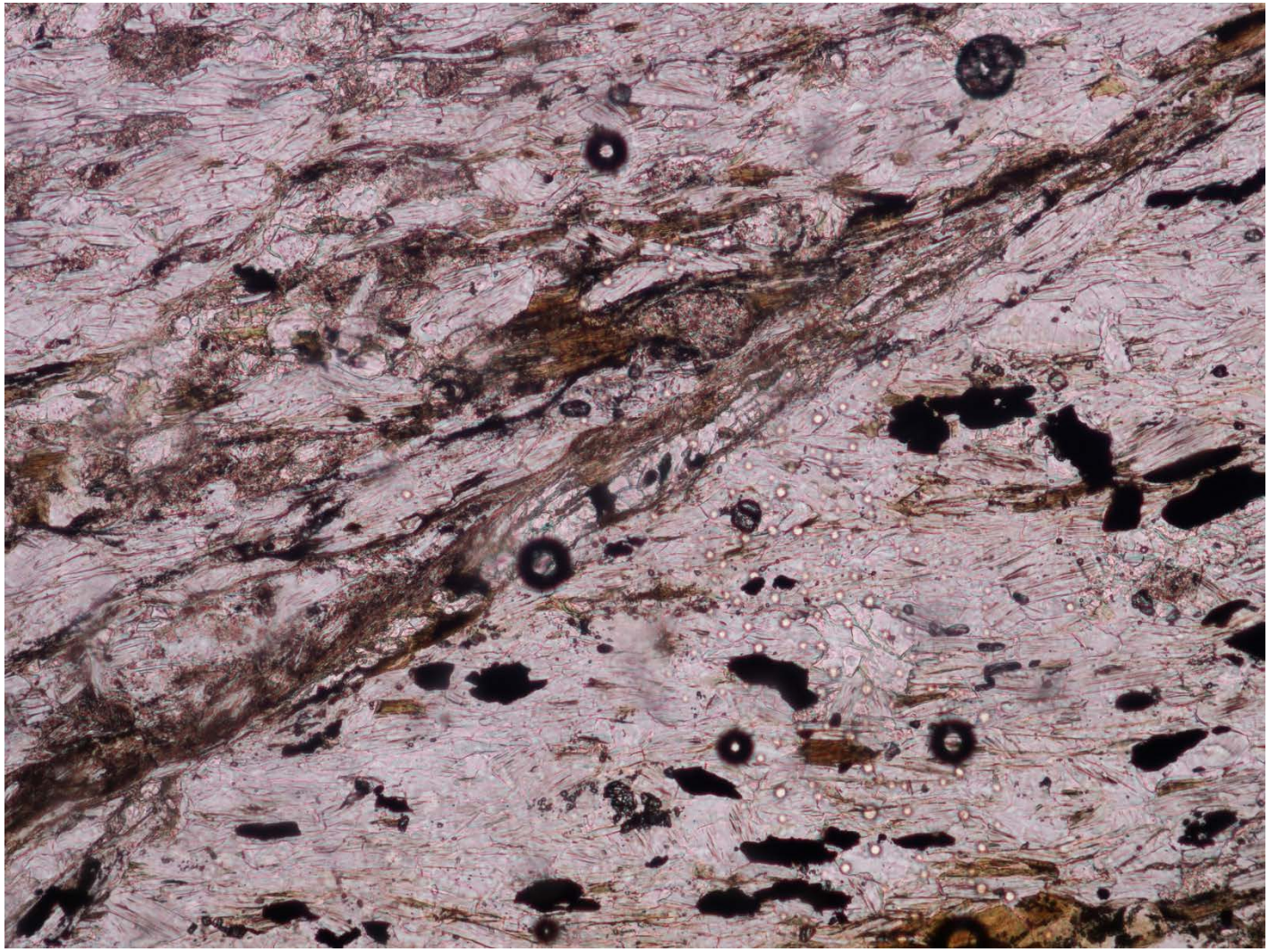
Filename: cns0006.tif
Sample: CNS-FCS-103-X



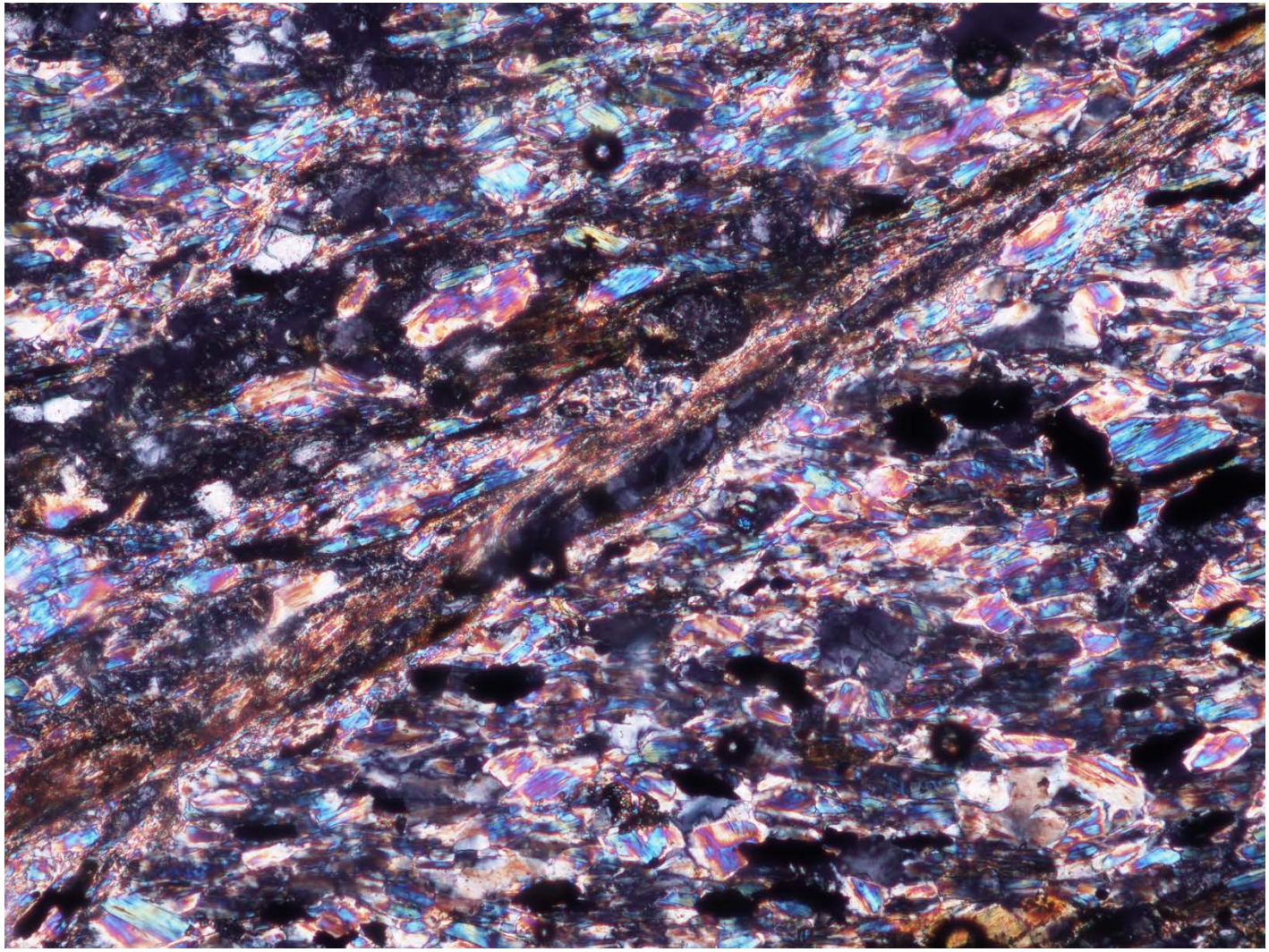
Filename: cns0007.tif
Sample: CNS-DCH-1-1(H)-P



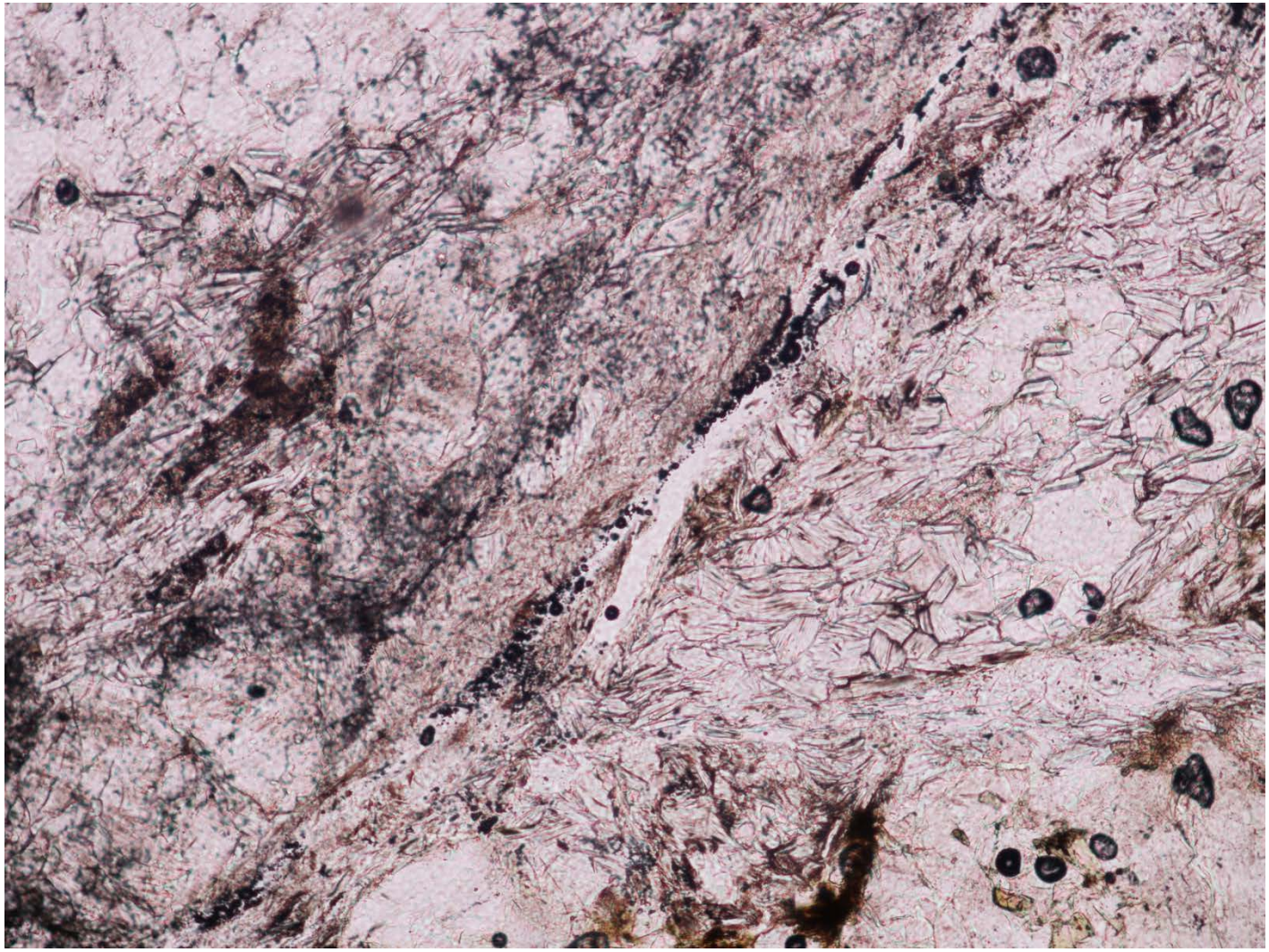
Filename: cns0008.tif
Sample: CNS-DCH-1-1(H)-X



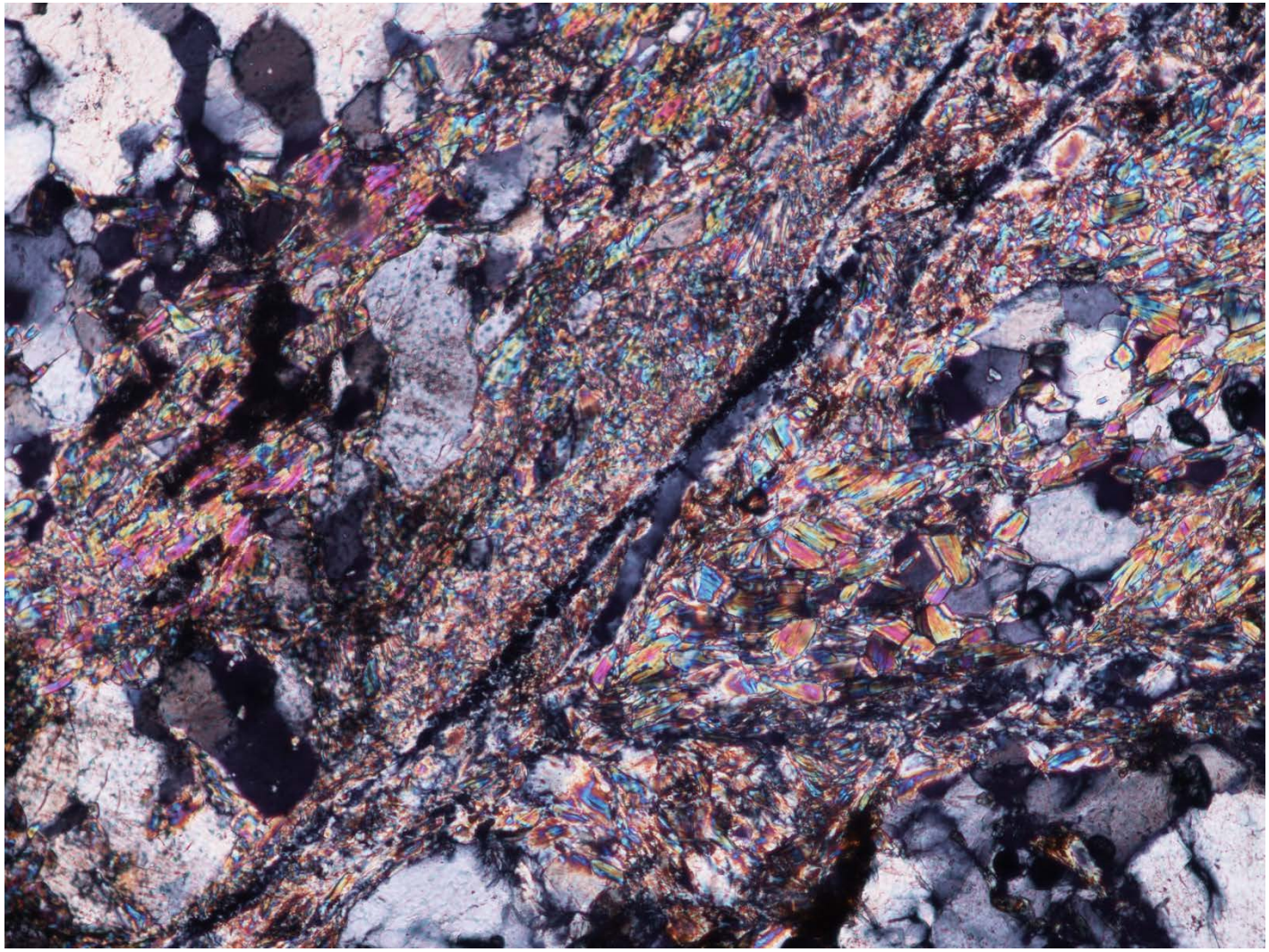
Filename: cns0009.tif
Sample: CNS-CS-13A-1-P



Filename: cns0010.tif
Sample: CNS-CS-13A-1-X



Filename: cns0011.tif
Sample: CNS-CS-6A-P



Filename: cns0012.tif
Sample: CNS-CS-6A-X

Attachment 3

FCL QA Work Instruction DUK-001-WI-02 Rev. 0

FUGRO	FUGRO CONSULTANTS, INC. WORK INSTRUCTION	Page 1 of 3

WORK INSTRUCTIONS – DUK-001 WI No. 01 02
Photographic Documentation of Selected CNS Thin Sections
Duke Energy COLA Program
Duke Energy William States Lee III Nuclear Energy Station

MGG 9/21/2011

Issued To: Randy Cumbest (FCL) and Malcolm Schaeffer (HDR|DTA) **Rev. No.:** 0

Issued By: Mike Gray, FCL Project Manager **Date:** 8/25/2011

Valid From: **8/25/11** **to** **12/31/11**

Task Description: Perform digital photography on selected CNS petrographic thin sections prepared for Duke Power Company during construction of the Cherokee Nuclear Station. CNS petrographic thin sections (18 in total) are listed on Chain of Custody provided as Attachment 1. Photographic documentation shall be performed using Log of CNS Thin Sections Examined and Photographed using Petrographic Microscope (Attachment 2)

The activity described in this work instruction shall be performed by Randy Cumbest, FCL Principal Geologist, and Malcolm Schaeffer, FCL Consultant.

Applicable Technical Procedures or Plans, or other reference:

1) Project Planning Document DUK-001-PPD (current revision), Duke Energy COLA Program
2) DUK-001-PI-01 (current revision), Geoscience Database Compilation

Purpose

The purpose of this work instruction is to describe the process that will be followed during the digital photographic documentation of CNS petrographic thin sections that may be used to support geologic interpretations for the Duke Energy William States Lee III COLA project. The resulting photomicrographs may be used to illustrate important geologic features described in Cherokee-era zone reports (previously qualified and/or proposed for qualification).

The objective of this process is to create current-day photomicrograph image from the surviving CNS thin section samples identified (e.g., etched sample number) and listed in Attachment 1.

Possession of the CNS thin sections is controlled Duke Energy with temporary custody provided to Randy Cumbest, FCL Principal Geologist and/or Malcolm Schaeffer, FCL Consultant.

DUK-001- WI No. 02 MGG 9/21/2011

To confirm proper thin section documentation including digital photographic number, thin section identification, and feature description, the evaluation process will require agreement between two FCL personnel (FCL Principal Geologist and FCL consultant). One individual shall perform data entry and the other shall perform a confirming check of all relevant information. Upon agreement, each person will initial and date the entry in the appropriate space provided on the Log of CNS Thin Sections Examined and Photographed using Petrographic Microscope (Attachment 2).

FCL consultant, Malcolm Schaeffer, will receive the thin sections including associated chain of custody form prepared by Duke Energy. The thin sections will be transported to the University of Auburn for evaluation. Malcom Schaeffer (FCL Consultant) working with Randy Cumbest (FCL Principal Geologist) will review each thin section and confirm presence or absence of the geologic/petrographic feature described in associated petrographic report (not included as part of this work instruction).

Specific Instructions (note attachments where necessary):
Using a petrographic microscope with integrated digital camera/computer perform review of petrographic evaluation of CNS thin section in both plane and cross polarized light. Confirm the presence or absence of the feature described in the zone report.

Thin section microphotographs should each be assigned a unique sample identification number as follows: CNS-XXXX-P or -X. CNS indicates Cherokee Nuclear Station, XXXX indicates the thin section number etched on the glass slide, P indicates plane polarized light, X indicates cross polarized light. Digital filename shall be numbered sequentially by order of thin section evaluation. Each digital image shall include a stamp indicating the CNS thin section number.

FUGRO	FUGRO CONSULTANTS, INC. WORK INSTRUCTION	Page 3 of 3

MGG 9/21/2011

Specific Quality Assurance Procedures Applicable: None.

Contact FCL project manager upon completion of thin section digital photography including photographic documentation and records, and Chain of Custody documentation. Prepare a complete and separate copy of all records all records at completion of work. The copy should be maintained in FCL Augusta, GA office and will serve as a back up record.

Records: All records generated shall be considered QA records. The original records, excluding CNS thin sections and Chain of Custody record, shall be returned to the FCL Project Manager. The CNS thin sections including completed Chain of Custody record shall be returned to the Duke Energy representative.

Reviewed and Approved By:

Signature:	Michael J Gray	Date:	8/25/2011
Print Name:	Michael Gray	Title:	Project Manager
Field Coordinator:	N/A	Date:	N/A
Print Name:	N/A		
QA Specialist:	N/A	Date:	N/A
Print Name:	N/A		
Work Completed by:	R.J. Cumbest / Malcolm Schaeffer	Date:	8/29/2011
Print Name:	Randy Cumbest and Malcolm Schaeffer		
Completeness Review Completed By:	N/A	Date:	N/A
Print Name:	N/A		

ATTACHMENT 1
DUK-001-WI No. 2

MGG
9/21/2011

Property Custody Document

Project / Task:	Document Identifier
Lee Nuclear Station COLA Project; Evaluation of Geologic Samples Surviving from Cherokee Nuclear Station Construction Project; FCL PPD DUK-001; FCL Project 2093	WLS-CK-TS-004
	Page Number: 1
Location From Which Obtained: Duke Energy Offices, Lee Nuclear Station Project, ECII-09, Cherokee Materials Storage Cabinet	**Purpose:** Evaluation of Geologic Samples for Potential Use in Preparation of Project Report

Item No.	Qty.	Description of Articles
1	18	Eighteen geologic thin section samples surviving from Cherokee-era geologic activities. The eighteen samples are labeled as indicated below, with the designations shown written on the sample's protective envelope and/or etched on the samples (slides) themselves. Samples with the designation (*2TS) consist of two thin section slides in the protective envelope.

✓ FC-105-A ✓	✓ FC-8-1A ✓	✓ FCS-103 ✓	✓ DC-4-1C ✓	✓ DCH-1-1 (H) (thick) ✓
✓ DCH-2-1 (H) ✓	✓ DCH-2-4 (H) duplicate ✓	✓ DCH-2-5 (HT) ✓	✓ C-31-1A ✓	✓ C-36 ✓
✓ C-45 ✓	✓ C-49 (1) ✓	✓ C-9-4 ✓	✓ CS-13A-1 ✓	✓ CS-6 (*2TS) ✓
✓ CS-6A (*2TS) ✓	✓ CS-6B (*2TS) ✓	✓ B-236 72.0 ft. (*2TS) ✓		

Chain of Custody

Item No.	Date	Released By	Received By	Purpose
1	26 Aug 2011	Signature: [signature] Printed Name / Org: J. M. McConaghy / Duke Energy	Signature: [signature] Printed Name / Org: M. F. Schaeffer / HDR | DTA	Review and create photomicrographs
1	30 Aug 2011	Signature: [signature] Printed Name / Org: Malcolm F. Schaeffer HDR/DTA	Signature: [signature] Printed Name / Org: JOHN McCONAGHY	Return to storage
		Signature Printed Name / Org	Signature Printed Name / Org	
		Signature Printed Name / Org	Signature Printed Name / Org	
		Signature Printed Name / Org	Signature Printed Name / Org	
		Signature Printed Name / Org	Signature Printed Name / Org	
		Signature Printed Name / Org	Signature Printed Name / Org	

Final Disposition

- [x] Returned to Originator
- [ ] Continued on Page ____
- [ ] Other:

08/30/2011

DUK-001-WI-02 Rev. 0
MGG 9/21/2011
2X = 6mm Field of View.

~~DUK-001-WI-01, Rev. 0~~

Attachment 2

Log of CNS Thin Sections Examined and Photographed using Petrographic Microscope

Digital Photo Filename	Sample No.	Notes	Entry Confirmed by R. Cumbest	Entry Confirmed by M. Schaeffer
CNS000X.jp2	Insert thin section number etched on slide	Insert relevant petrographic information including mineralogical description and relationship		
4X CNS0001	CNS-EC-8-1A-N	Post Kinematic Mafic	RMC	MFS
4X CNS0002	CNS-EC-8-1A-X	" " "	RMC	MFS
10X CNS0003	CNS-ECC-103-P	Late Mica & brown	RMC	MFS
10X CNS0004	CNS-ECS-102-X	" " " "	RMC	MFS
10X CNS0005	CNS-FCS-102-P	Low Bif inclusions	RMC	MFS
10X CNS0006	CNS-FCS-102-X	" " "	RMC	MFS
4X CNS0007	CNS-DCH-1(11)-P	Low Bif inclusion Epidote	RMC	MFS
4X CNS0008	CNS-DCH-1(11)-X	" " "	RMC	MFS
PP 10X 4X CNS0009	CNS-CS13A-7-P	" "	RMC	MFS
10X CNS0010	CNS-CS13A-1-X	" "	RMC	MFS
10X CNS0011	CNS-CS-6A-P	Mus cont overgrowing inclusions	RMC	MFS
10X CNS0012	CNS-CS-6A-X	W/ Low birefringence	RMC	MFS