



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, DC 20555 – 0001**

October 20, 2010

MEMORANDUM TO: ACRS Members

FROM: Weidong Wang, Senior Staff Engineer */RA/*
Reactor Safety Branch B, ACRS

SUBJECT: CERTIFICATION OF THE MINUTES OF THE ACRS
SUBCOMMITTEE ON THE AP1000 REACTOR,
JULY 21-22, 2010, ROCKVILLE, MARYLAND

The minutes of the subject meeting were certified on October 7, 2010, as the official record of the proceedings of that meeting. A copy of the certified minutes is attached.

Attachment: As Stated

Cc w/o Attachment: E. Hackett
A. Dias



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, DC 20555 – 0001**

October 7, 2010

MEMORANDUM TO: Said Abdel-Khalik, Chairman
ACRS

FROM: Harold B. Ray, Chairman
AP1000 Subcommittee

SUBJECT: CERTIFICATION OF THE MINUTES OF THE ACRS
SUBCOMMITTEE ON THE AP1000 REACTOR,
JULY 21-22, 2010, ROCKVILLE, MARYLAND

I hereby certify, to the best of my knowledge and belief, that the minutes of the subject meeting held on July 21-22, 2010, are an accurate record of the proceedings.

/RA/

10/07/2010

Harold B. Ray, Chairman
AP1000 Subcommittee

Date

Certified: October 7, 2010
Certified by: Harold Ray

**REVISION 17 TO AP1000 DESIGN CONTROL DOCUMENT
And
VOGTLE ELECTRIC GENERATING PLANT COMBINED OPERATING LICENSE
APPLICATIONS**

July 21-22, 2010
ROCKVILLE, MARYLAND

INTRODUCTION

The Advisory Committee on Reactor Safeguards (ACRS) Subcommittee on the Westinghouse Electrical Company's AP1000 advanced pressurized water reactor (PWR) design met in Room T-2B1 at the Headquarters of the U.S. Nuclear Regulatory Commission (NRC), located at 11545 Rockville Pike, Rockville, Maryland, on July 21-22, 2010. The purposes of this meeting were to review (1) select chapters of the Revision 17 to AP1000 DCD and its associated Advanced Final Safety Evaluation Report (FSER), (2) select chapters of the Vogtle AP1000 Reference Combined License (RCOL) and its associated Advanced FSER, and (3) select sections of the Summer Subsequent COL (SCOL) application and its associated Advanced FSER. The Subcommittee was briefed by and held discussions with representatives of Westinghouse Electric Company (WEC) on the AP1000 DCD Amendment, Southern Nuclear Operating Company (SNC) supported by the NuStart Energy Development on the Vogtle RCOL application, South Carolina Electric & Gas (SCE&G) on the Virgil C. Summer (VCS) Subsequent COL (SCOL) application, and the U.S. Nuclear Regulatory Commission (NRC) on the Advanced Final Safety Evaluation Reports (selected chapters). As part of the respective review processes, NRC's regulations under 10 CFR Part 52 direct the staff to consult with the ACRS on safety issues before any reactor design can be certified or any NRC operating license can be approved.

The staff's SER review was organized based on the various chapters found in NUREG-0800 – NRC's "Standard Review Plan (SRP) for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition." To this end, the Subcommittee planned to gather information, analyze relevant issues and facts, and formulate proposed positions and actions, as appropriate, for deliberation by the full Committee of the ACRS at a later date. This was the Seventh Subcommittee meeting on the proposed amended DCD, the fifth Subcommittee meeting on the Vogtle RCOLA, and the first Subcommittee meeting on the Summer SCOL.

The Chairman for this ACRS Subcommittee was Mr. Harold Ray. Mr. Weidong Wang was the cognizant ACRS staff engineer for this topic and served as the Designated Federal Official for this meeting. Peter Wen, an ACRS staff engineer, supported this two-day meeting as well. The meeting was open to public attendance for most of time except the one action item on the AP1000 RCS flow uncertainties was closed.

ATTENDEES

ACRS

| | | |
|------------------------------------|-----------------------------------|-----------------------------------|
| H. Ray, Subcommittee Chairman | S. Banerjee, Member | D. Bley, Member |
| C. Brown, Member | M. BONACA, Member | S. ARMIJO, Member |
| M. RYAN, Member | B. HINZE, Invited ACRS Consultant | T. Kress, Invited ACRS Consultant |
| G. Wallis, Invited ACRS Consultant | P. Wen, ACRS Staff | W. Wang, ACRS Staff |

The other Individuals and their affiliations attending this meeting are listed in the sign-in sheets in Attachment 2.

SCHEDULED PRESENTATIONS

The detailed agenda identifying the specific presentation topics comprising this meeting can be found in Attachment 1. Both during and following the scheduled presentations, the speakers responded to specific questions and comments from the ACRS Subcommittee members. The scope of the questions, comments, and the speaker's responses had been captured in the verbatim meeting transcript. As a result of questions and comments from the Members and responses from the speakers, follow-up actions were identified for further discussion at subsequent Subcommittee meetings. These follow-up actions are tracked by the ACRS staff.

ACRS Subcommittee meeting transcripts can be found at the following NRC Internet website location: <http://www.nrc.gov/reading-rm/doc-collections/acrs/tr/subcommittee/>.

Opening Remarks

Subcommittee Chairman Ray made the opening remarks. He stated that this July AP1000 Subcommittee meeting continues to review the safety evaluation reports on the Revision 17 to the AP1000 DCD and the Vogtle AP1000 reference combined license application. In addition, the Subcommittee would start to review the Virgil C. Summer SCOL application. The presentations included Chapters or Sections 2, 3.7, 3.8, 16, and 17 of the Revision 17 to the AP1000 DCD, Chapters 2, 16, and 17 of the Vogtle AP1000 Reference COLA, Chapter 2, except for Section 2.4 of the Subsequent COLA, and finally, the action items from past AP1000 Subcommittee meetings. ACRS received no written comments or requests for time to make oral statements from members of the public regarding this meeting. For the agenda item on resolution of ACRS action items on the second day, presentation of reactor coolant system flow measurement would be closed in order to discuss information that is proprietary to the applicants and its contractors, pursuant to 5 USC 552(b),(c)3 and 4.

Followed with the opening statement by Subcommittee chairman, applicants and NRC staff made presentations. The briefing slides with non-proprietary information can be found in Attachment 3.

Key points and Follow-Up Actions

Action Item 10 from the previous AP1000 subcommittee meeting has the following questions:

- What are the accuracy needs for RCS flow measurements?
- What are the uncertainties in measuring RCS flow?
- How will the differences in the various measures of RCS flow be reconciled?
- How will a final RCS flow value be established?

Westinghouse addressed this action item in a closed session. As a follow-up action, Dr. Banerjee requested a reference for the statistical methods used for combining diverse measurements.

Action Item 31 is a general action item for tracking the Chapter 2 geotechnical information. The July meeting reviewed Chapter 2 and part of Chapter 3 regarding to the AP1000 geotechnical design and therefore, this item is closed. A new specific follow up question, numbered as 62, on seismic hazard analysis was produced.

Action Item 26 is about Waste management and the SNC addressed the question raised by the Subcommittee member from the past meeting. They pointed out that the FSAR Section 11.4.2.4.3 provided options available for disposition of Class B and C waste. One of the options includes a plan to build a new facility on site if it is needed. The Subcommittee was satisfied with the answer and Action Item 26 was closed.

This July meeting produced five new follow-up action items and they were listed as Items 59 to 64 in Attachment 4. The key points of the new items are:

- Request a copy of WCAP report on setpoint control methodology.
- Numerous questions about containment coatings application and inspection and water management around containment.
- Review ISG-1 pertaining to coherency function and ISG-18 - Reliability Assurance Program.
- Consultant Bill Hinze suggested that Summer FSAR Section 2.5.2.2.1 should be revised and the results of the U.S. Geological Survey model for the V.C. Summer site should be compared with seismic hazard analysis prepared by the applicant. He committed to document his other comments in a report after the meeting.
- South Carolina Electric and Gas provides the detailed calculation associated with: 1) train car release of toxic gas and its effects on control room habitability and 2) offsite explosive hazards analysis that was done to support the conclusion that such a hazard does not pose a threat to the proposed VC Summer Units 2 and 3. 3) Staff's confirmatory calculations.
- Question on additional hazard as far as the amount of hydrogen when the hydrogen is replenished.

Attachments

1. Meeting Agenda
2. Sign-In Sheets
3. Presentation Materials
4. ACRS AP1000 Subcommittee Action Items Table

**Advisory Committee on Reactor Safeguards
Meeting of the Subcommittee on the
Westinghouse AP1000 DCD and AP1000 RCOL
Rockville, MD
July 21-22, 2010**

- Agenda -

Cognizant Staff Engineers: Weidong Wang (301-415-6279, Weidong.Wang@nrc.gov)
Peter C Wen (301-415-2832, Peter.Wen@nrc.gov)

July 21, 2010

| Item | Topic | Presenter(s) | Time |
|------|---|--|-------------------|
| 1 | Opening Remarks and Objectives | Harold B. Ray, ACRS | 8:30 – 8:45 am |
| 2 | DCD Chapter 2 – applicant | Westinghouse – Don Lindgren | 8:45 – 9:15 am. |
| 3 | DCD Chapter 2 – staff | NRC – Dr. Weijun Wang, Seshagiri Tammara | 9:15 – 9:45 am. |
| 4 | DCD Chapter 16 – applicant | Westinghouse – Matt Evans, Thom Ray | 9:45 – 10:00 am. |
| 5 | DCD Chapter 16 – staff | NRC – Bob Tjader | 10:00 – 10:15 am. |
| | Break | | 10:15 – 10:30 am. |
| 6 | DCD Chapter 17 – applicant | Westinghouse – Paul Loza | 10:30 – 10:45 am |
| 7 | DCD Chapter 17 – staff | NRC – Terri Spicher, Suzanne Schroer | 10:45 – 11:00 am |
| 8 | Vogtle COL Chapter 16- applicant | SNC – Wes Sparkman; NuStart – Eddie Grant | 11:00-11:15 am |
| 9 | Vogtle COL Chapter 16-staff | NRC – Travis Chapman | 11:15 11:30 am |
| 10 | Vogtle COL Chapter 17 – applicant | SNC – Wes Sparkman, John Giddens | 11:30 – 11:45 pm |
| 11 | Vogtle COL Chapter 17 – staff | NRC – Terri Spicher, Suzanne Schroer | 11:45 – 12:00 pm |
| | Lunch | | 12:00-1:00 pm |
| 12 | Discussion of Containment Corrosion/Coating Issue-COL | SNC – Amy Aughtman; NuStart – Eddie Grant | 1:00-1:15 pm |
| 13 | Vogtle COL Sections 2.0-2.2 – applicant | SNC – Amy Aughtman | 1:15 – 1:30 pm |
| 14 | Vogtle COL Sections 2.0-2.2 – staff | NRC –Seshagiri Tammara | 1:30 – 1:45 pm |
| 15 | Vogtle COL Section 2.3 – Applicant | SNC – Amy Aughtman | 1:45 – 2:00 pm |
| 16 | Vogtle COL Section 2.3 – staff | NRC – Brad Harvey | 2:00 – 2:15 pm |
| | Break | | 2:15 – 2:30 pm |

Attachment 1

| Item | Topic | Presenter(s) | Time |
|------|-----------------------------------|------------------------------------|----------------|
| 17 | Vogle COL Section 2.4 – applicant | SNC – Wes Sparkman | 2:30 – 3:00 pm |
| 18 | Vogle COL Section 2.4 –Staff | NRC – Hosung Ahn, Jill Caverly | 3:00-3:30 pm |
| 19 | Vogle COL Section 2.5 – applicant | SNC – Wes Sparkman, Don Moore | 3:30 -4:00 pm |
| 20 | Vogle COL Section 2.5 – Staff | NRC – Sarah Tabatabai, Weijun Wang | 4:00-4:30 pm |
| 21 | Committee Discussion | Harold B. Ray, ACRS | 4:30– 5:00 pm |

Notes:

Presentation time should not exceed 50% of the total time allocated for a specific item.

Number of copies of presentation materials to be provided to the ACRS - 35.

CLOSED Sessions for the purpose of discussing proprietary information.

July 22, 2010

| Item | Topic | Presenter(s) | Time |
|------|---|--|---------------------|
| 1 | Opening Remarks and Objectives | Harold B. Ray, ACRS | 8:30 – 8:35 am |
| 2 | DCD Section 3.7-Applicant | Westinghouse – Richard Orr, William LaPay, Don Lindgren | 8:30 – 9:15 am |
| 3 | DCD Section 3.7 – staff | NRC – John Ma, Joe Braverman | 9:15 – 10:00 am |
| | Break | | 10:00 – 10:15 am |
| 4 | DCD Section 3.8-Applicant | Westinghouse – Richard Orr, William LaPay, Don Lindgren | 10:15 – 11:00 am |
| 5 | DCD Section 3.8– staff | NRC – Bret Tegeler, Pravin Patel, Rich Morante, Brian Thomas | 11:00 – 11:45 am |
| | Lunch | | 11:45 am – 12:45 pm |
| 6 | Resolution of ACRS Action Items | ACRS/Westinghouse/Vogtle/Staff (Closed for RCS Flow Measurement presentation) | 12:45 – 1:15 pm |
| 7 | Summer COL Sections 2.0-2.2 – applicant | SCE&G – Al Paglia, Amy Monroe | 1:15 – 1:35 pm |
| 8 | Summer COL Sections 2.0-2.2 – staff | NRC – Joe Sebrosky, David Sisk | 1:35 – 1:55 pm |
| 9 | Summer COL Section 2.3 – applicant | SCE&G – Steve Summer | 1:55 – 2:15 pm |
| 10 | Summer COL Section 2.3 – staff | NRC – Kevin Quinlan | 2:15 – 2:35 pm |
| | Break | | 2:35 – 3:00 pm |
| 11 | Summer COL Section 2.5 – applicant | SCE&G – Bob Whorton | 3:00 – 3:50 pm |
| 12 | Summer COL Section 2.5 – staff | NRC – Dr. Gerry L. Stirewalt, Sarah Tabatabai, Dr. Weijun Wang | 3:50 – 4:40 pm |
| 13 | Upcoming ACRS Interactions | NRC – Ravi Joshi | 4:40 – 4:50 pm |
| 14 | Committee Discussion | Harold B. Ray, ACRS | 4:50 – 5:15 pm |
| | Adjourn | | 5:15 p.m. |

Notes:

Presentation time should not exceed 50% of the total time allocated for a specific item.

Number of copies of presentation materials to be provided to the ACRS - 35.

CLOSED Sessions for the purpose of discussing security-related information.

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

SUBCOMMITTEE MEETING ON AP1000

July 21-22, 2010

Date

NRC STAFF SIGN IN FOR ACRS MEETING

PLEASE PRINT

| <u>NAME</u> | <u>NRC ORGANIZATION-</u> |
|------------------------|--------------------------|
| 1 Michael Wentzel | NRO/DNRL |
| 2 Billy Gleaves | NRO/DNRL |
| 3 Eileen McKenna | NRO/DNRL |
| 4 Pravin Patel | NRO/DE |
| 5 Don Habib | NRO/DNRL |
| 6 Pei-Ying Chen | NRO/DE/EMB |
| 7 Lanya Simms | NRO/DNRL |
| 8 Gordon Baydo | NRO/DSEI |
| 9 Sunwoo Park | NRO/DE |
| 10 Zuhair Xi | NRO/DSEI |
| 11 Anthony Minarik | NRO/DNRL |
| 12 Brian Thomas | NRO/DE/SEBI |
| 13 Milton Valentin | NRO/DE/SEBI |
| 14 Steve Schaffer | NRO/DCIP/CHPB |
| 15 Kevin Quinlan | NRO/DSEI/RSAC |
| 16 Brad Harvey | NRO/DSEI/RSAC |
| 17 Jody Martin | NRL/DGC |
| 18 STEPH DEVLIN | NRC/DSEI/RGS2 |
| 19 FRANKIE G. VEGA | NRL/DSEI/RGS1 |
| 20 Zuhair Xi | NRO/DSEI/RGS1 |
| 21 Rebecca Koss | NRO/DSEI/RGS1 |
| 22 Alice Stieve | NRO/DSEI/RGS2 |
| 23 Lissette Candelario | NRO/DSEI/RGS2 |
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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

SUBCOMMITTEE MEETING ON AP1000

July 21-22, 2010

Date

NRC STAFF SIGN IN FOR ACRS MEETING

PLEASE PRINT

| | <u>NAME</u> | <u>NRC ORGANIZATION-</u> |
|----|---------------------|--------------------------|
| 1 | DON HABIB | NRO/DNRL/NWE1 |
| 2 | Eileen McKenna | NRO/DNRL/NWE2 |
| 3 | Michael Wentzel | NRO/DNRL/NWE1 |
| 4 | Ravi Joshi | NRO/DNRL/NWE1 |
| 5 | Ann Hodgdon | NRC/OGC |
| 6 | TRAVIS CHAPMAN | NRC/DCIP/CTSB |
| 7 | THEODORE TADDER | NRC/NRO/DCIP/CTSB |
| 8 | Rico E. Rely | NRC |
| 9 | Christopher Cole | NRC |
| 10 | Perry Budeben | NRC |
| 11 | Kenneth See | NRC |
| 12 | Brad Harvey | NRC/DSER/RSAC |
| 13 | Seshagini Tammaru | NRC/DSER/RSAC |
| 14 | Dan Sisk | IL IL IL |
| 15 | Thomas Galletta | NRO/DNRL/NWE1 |
| 16 | Joe Sebrosky | NRC |
| 17 | Tanya Simms | DNRL/NWE1 |
| 18 | Greg Makar | NRO/DE/CIB1 |
| 19 | David Terdo | NRO/DE/CIB1 |
| 20 | Gontam Bagdu | NRO/DSER |
| 21 | STEPHANIE DEVLIN | NRO/DSER/RG52 |
| 22 | Meralis Para-Talodu | NRO/DSER/RG59 |
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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

SUBCOMMITTEE MEETING ON AP1000

July 21-22, 2010

Date

PLEASE PRINT

| | <u>NAME</u> | <u>AFFILIATION</u> |
|----|--------------------------|--------------------------|
| 1 | DONALD LINDGREN | WESTINGHOUSE ELECTRIC |
| 2 | Julie Giles | SCE&G |
| 3 | Stephen Summer | SCE&G |
| 4 | April Rice | SCE&G |
| 5 | Gary Moffatt | SCE&G |
| 6 | Tim Schmidt | SCE&G |
| 7 | BOB WHORTON | SCE&G |
| 8 | JOHN TODD | SCE&G |
| 9 | Eddie R Grant | NuStart / EXCEL Services |
| 10 | JOHN GIDDENS | SOUTHERN NUCLEAR - QA |
| 11 | Rob Sisk | WEC |
| 12 | Don Moore | SNC |
| 13 | Bob Pruntig | Bechtel (SNC) |
| 14 | Bob Hirmanpour | NuStart |
| 15 | Amy M. Monroe | SCE&G |
| 16 | JASON REDD | SOUTHERN NUCLEAR |
| 17 | Wes Sporkman | SNC |
| 18 | Amy Aughtman | SNC |
| 19 | Kevin Piss | SNC |
| 20 | ROLF ZIESING | WEC |
| 21 | MATT EVANS | WEC |
| 22 | Pam Loza | WEC |
| 23 | Ann Hodgdon | NRC |
| 24 | ANTHONY JAMES | ODS |
| 25 | Richard Reddy | NRC |
| 26 | JOHN PREBUA | BECHTEL (SNC) |
| 27 | Dan Patton | Bechtel |
| 28 | Mary Richmond | Bechtel |

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

SUBCOMMITTEE MEETING ON AP1000

July 21-22, 2010

Date

PLEASE PRINT

| <u>NAME</u> | <u>AFFILIATION</u> |
|---------------------------------|------------------------|
| 1 <u>MIKE LEWIS</u> | <u>BECHTEL (SNC)</u> |
| 2 XXXXXXXXXXXXXXXXXX | |
| 3 <u>Tony Pilo</u> | <u>Progress Energy</u> |
| 4 <u>WILLIAM LAPAY</u> | <u>W</u> |
| 5 <u>RICHARD ORR</u> | <u>W</u> |
| 6 <u>John Hamm</u> | <u>Bechtel</u> |
| 7 <u>AL PAGLIA</u> | <u>SCE&G</u> |
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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

SUBCOMMITTEE MEETING ON AP1000

July 21-22, 2010

Date

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| <u>NAME</u> | <u>AFFILIATION</u> |
|---------------------|--------------------------|
| 1 Gary Moffatt | SCE & G |
| 2 Don Moore | SNC |
| 3 TIM SCHMIDT | SCE & G |
| 4 JOHN TODD | SCE & G |
| 5 Steve Sumner | SCE & G |
| 6 DONALD LINDGREN | WESTINGHOUSE ELECTRICAL |
| 7 Rob Sisk | " " (WEC) |
| 8 Eddie Grant | NuStart / EXCEL Services |
| 9 BO CUMMINS | (W) |
| 10 April Rice | SCANA |
| 11 R. S. ORR | (W) |
| 12 W-S. LABAY | (W) |
| 13 Amy Aughtman | SNC |
| 14 Kevin Pigg | SNC |
| 15 Julie Giles | SCE & G |
| 16 Amy Monroe | SCE & G |
| 17 JOSEPH BRAVERMAN | BNL |
| 18 ANTHONY JAMES | ORS |
| 19 Tony Alb | Progress Energy |
| 20 Dan Patton | Bechtel |
| 21 Bob Hirmanpaw | NuStart |
| 22 Mike Melton | WEC |
| 23 BOB WHORTON | SCE & G |
| 24 Chuck Brockhoff | Westinghouse |
| 25 TOBY BURNETT | Westinghouse |
| 26 Jeff Peterson | |
| 27 John Davie | Bechtel |
| 28 David Fenster | Bechtel |

AP1000 Design Control Document Amended Design

Chapter 2 Site Parameters

Chapter 2 Overview

- Site Parameters
 - Geography and Demography
 - Nearby Industrial, Transportation, and Military Facilities
 - Meteorology
 - Hydrologic Engineering
 - Geology, Seismology, and Geotechnical Engineering

Changes as Part of the DC amendment

- Add information on on-site explosion hazard
- Increased temperature parameters
- Increased control room atmospheric dispersion factors χ/Q
- Increased probable maximum precipitation
- Added soil cases for evaluation of vibratory ground motion
- Added spectra to address hard rock high frequency ground motion

On-site Explosion Hazard

- Not previously in Design Certification
- More efficient to review in DCA than COLA
- Liquid Hydrogen is main concern
- Evaluated per Reg. Guide 1.91
- Also evaluated flammable vapor cloud
- Chemical hazard evaluated as COL activity

Review Items

- 6 SER Open Items – Resolved
- 2 Post SER RAIs – Resolved
- 7 Confirmatory Items – DCD

2.2 RAI

- **RAI-SRP2.2-RSAC-01** – Explosion hazards of explosive chemicals stored onsite
 - Hydrogen, Hydrazine, Fuel oil and other chemicals evaluated for explosion potential
 - Hydrogen evaluated for flammable vapor cloud potential
 - Chemical hazard evaluated as a COLA item

2.4 Open Items

- **OI-SRP2.4RHEB-01-01** – Normal Ground Water elevation
 - The normal ground water elevation is the ground water elevation established during site selection.
- **OI-SRP2.4RHEB-01-02** – Maximum ground water elevation
 - normal groundwater elevation up to plant elevation 98'
 - flood level up to plant elevation 100'
 - The AP1000 is designed to withstand isolation for a period of seven days

2.5 Open items

- **OI-SRP2.5-RGS1-03** – Acceptance Criteria and screening requirement for site-specific GMRS
 - Changes to DCD Section 2.5.2.1, Item 6 to show the acceptance criteria and the sixth screening requirement (shear wave velocity)
- **OI-SRP2.5-RGS1-04** – Consideration of 3-D effects for site-specific analysis in DCD
 - DCD Subsection 2.5.2.3 was revised to require 3-D analysis for conditions outside of the certified design such as non-uniform soil conditions

2.5 Open items

- **OI-SRP2.5-RGS1-15** – Clarify DCD language and agreement between Tier 1 and Tier 2 Criteria
 - Revised Tier 1 Table 5.0-1 and Tier 2 Table 2-1 to refer to CSDRS instead of SSE
- **OI-SRP2.5-RGS1-09** – Evaluation of maximum dynamic bearing pressure in structural analysis
 - RAI-TR85-SEB1-03 addressed staff questions related to maximum bearing demand.

2.5 RAI

- **RAI-SRP2.5-RGS1-21** – Definition and explanation for Liquefaction Potential, Fault Displacement Potential, Dynamic Bearing Capacity, and HRHF GMRS
 - These questions were resolved by changes to DCD language in text and Tier 1 table.

Questions?



Presentation to the ACRS Subcommittee

**Westinghouse AP1000 Design Certification Amendment
Application Review
SER Chapter 2
Site Characteristics
July 21, 2010**

Overview of AP1000 DCD

| DCD SECTION | | SUMMARY OF CHANGES |
|-------------|---|-----------------------------|
| 2.0 | Site Characteristics Introduction | * |
| 2.1 | Geography and Demography | No Changes from Revision 15 |
| 2.2 | Nearby Industrial, Transportation, and Military Facilities | Changes from Revision 15 |
| 2.3 | Meteorology | Changes from Revision 15 |
| 2.4 | Hydrologic Engineering | Changes from Revision 15 |
| 2.5 | Geology, Seismology and Geo-technical Engineering | Changes from Revision 15 |

*Changes to site characteristics table evaluated in 2.3, 2.4, and 2.5 of the AP1000 SER with open items

Staff Review Team

- **Technical Review Team**
 - **Seshagiri Tammara**, Section 2.2, Physical Scientist
 - **Brad Harvey**, Section 2.3, Senior Physical Scientist (Meteorologist)
 - **Kenneth See**, Section 2.4, Hydrologist
 - **Weijun Wang**, Section 2.5, Senior Geotechnical Engineer
- **Project Management**
 - **Sikhinra (SK) Mitra**

Overview of Section 2.2

- Section 2.2 has technical information of interest.
 - RAI-SRP2.2-RSAC-01 – Explosion Hazards due to chemicals stored onsite
 - This issue deals with hazards from the following events:
 - Explosions
 - Flammable Vapor Cloud Ignition
 - Toxicity and Asphyxiation
 - Fires

RAI-SRP2.2-RSAC-01

- **Issue:**
 - The Explosion Hazards due to chemicals stored onsite were not evaluated in DCD
- **Resolution:**
 - Applicant proposed AP1000 DCD FSAR text with an addition of a table to include chemicals along with minimum safe distances such that 1 psi overpressure is not exceeded for Rev. 18.
- Item is now CI-SRP2.2-RSAC-01

Overview of Section 2.5

- Section 2.5 of the SER had 4 Open Items
 - **OI-SRP2.5-RGS1-03 – DCD Site Soil profiles for SSI Analyses**
 - **OI-SRP2.5-RGS1-04 – 3D Effects in Site-Specific SSI Analyses**
 - OI-SRP2.5-RGS1-09 – Dynamic Bearing Capacity Values
 - OI-SRP2.5-RGS1-15 – Update of Tier 2, Table 2-1
- All open Items are resolved

OI-SRP 2.5-RGS01-03 Generic Soil Profiles

- **Issue:**
 - Insufficient information for a COL applicant to compare a soil site to the generic DCD profile categories used in the Soil Structure Interaction (SSI) analysis
- **Resolution**
 - Applicant proposed to add a DCD requirement that a site-specific analysis should consider 3-D effects when site parameters fall outside the certified design and loads are not evenly applied throughout the foundation
- Item is now CI-SRP2.6-RGS01-03

OI-SRP2.5-RGS1-04 Site-Specific 3-D SSI Analysis

- **Issue:**
 - Unclear when a COL applicant may need to conduct a 3-D site-specific SSI analysis for site conditions not considered in the certified design
- **Resolution:**
 - Applicant proposed to add a DCD requirement that a site-specific analysis should consider 3-D effects when site parameters fall outside of the certified design and loads are not evenly applied throughout the foundation
- Item is now CI-SRP2.5-RGS1-04

Additional Items

- In responses to Chapter 3/TR 85 RAIs, RAI-TR85-SEB1-35 R3/36 R3, the applicant proposed some changes to Section 2.5:
 - Add COL Information Item 2.5-17: waterproof membrane
 - Revised design settlement parameters to allow larger settlements
- The staff needs to confirm that the revised DCD incorporates proposed changes

AP1000 Design Control Document Amended Design

Chapter 16

Chapter 16 Overview

- This chapter describes the:
 - Technical Specifications and Bases
 - Investment Protection Controls.
- Licensing Lead: Thom Ray
- Technical Lead: Chuck Brockhoff

Chapter 16 Open Items

- 10 Open Items were identified and subsequently closed. Significant open items and RAI discussed below.
 - OI-SRP16-CTSB-42 – Provide technical bases and derivation of the revised $OT\Delta T$ & $OP\Delta T$ setpoint equation (Justify/Revise WCAP)
 - OI-SRP16-CTSB-25 – Provide justification for RCS flow testing in place of precision heat balance (primary side flow calorimetric) and provide associated Surveillance Requirement (SR).
 - OI-SRP16-CTSB-32 – TSTF-448, MCRE testing SR and methodology.
 - RAI-SRP16.3-CTSB-SCP-1, Incorporate a Setpoint Control Program in the TS Administrative Controls Section IAW ISG-8

Chapter 16 - OI-SRP16-CTSB-42

● Issue:

- Provide technical bases and derivation of the revised $OT\Delta T$ & $OP\Delta T$ setpoint equation (Justify/Revise WCAP)

● Final Resolution

- The technical bases and derivations of the revised $OT\Delta T$ & $OP\Delta T$ setpoint equations were provided in APP-GW-GLR-137. The content of further review of those equations is tied to Chapter 7.2.2.1.1 of the SER.
 - Determine power via cold leg density, hot leg enthalpy and cold leg enthalpy. $OT\Delta T$ setpoint is determined via interpolation of DNB core limits. $OP\Delta T$ setpoint is a fixed value.

Chapter 16 - OI-SRP16-CTSB-25

● Issue:

- Provide justification for RCS flow testing in place of precision heat balance (primary side flow calorimetric) and provide associated SR.

● Final Resolution

- A new SR was added to perform a channel calibration of RCS total flow rate indication and the Tech Spec Bases were updated to include a discussion of uncertainty analyses related to the use of elbow taps as an alternate method for RCS flow verification.
- More discussion on RCS Flow Measurement is scheduled for tomorrow as an ACRS follow-up item.

Chapter 16 - OI-SRP16-CTSB-32

- **Issue:**

- TSTF-448, MCRE testing SR and methodology

- **Final Resolution**

- TSTF-448 was fully implemented to include tracer gas surveillance along with a Technical Specification Action for an inoperable Control Room Envelope and a MCRE Habitability Program. The DCD changes were provided in RAI responses for Chapter 6.4 along with changes to the Main Control Room Ventilation System.

Chapter 16 - RAI-SRP16.3-CTSB-SCP-1

● Issue:

- Incorporate a Setpoint Control Program (SCP) in the TS Administrative Controls Section per ISG-8.

● Final Resolution

- As allowed by Option 3 of ISG-8; a Setpoint Control Program based on the approved methodology provided in WCAP-16361, “Westinghouse Setpoint Methodology for Protection Systems – AP1000,” Section 5.5.14 was created with a description of the program and changes to incorporate the SCP in Tech Spec sections 3.1.8, 3.3.1, and 3.3.2 and their bases were implemented to address yet to be selected plant specific instrumentation and associated uncertainties.

Questions?



Presentation to the ACRS Subcommittee

**Westinghouse AP1000 Design Certification Amendment
Application Review
SER Chapter 16
Technical Specifications**

July 21-22, 2010

Staff Review Team

- Technical Staff
 - **Bob Tjader**, Lead Reviewer, Technical Specifications Branch
 - **Malcolm Patterson**, Reliability and Risk Analyst
 - **Hien Le**, Use and Application, LCO and SR Applicability, RCS System, ECCS Systems, Containment Systems, Plant Systems, Refueling Operations, Design Features & Admin Controls Analyst
 - **Dayne Dority**: Electrical & Instrumentation Systems Analyst
 - **Rick Scully**: Safety Limit, Reactivity Control Systems & Power Distribution Limits Analyst
- Project Management:
 - **Sikhindra (SK) Mitra**

Overview

- Chapter 16 of the AP1000 DCA SER with Open Items (OIs) was issued with a total of 10 Open Items
- All Open Items are Resolved
- Item to be discussed:
 - DCD CI-SRP16.3-CTSB-SCP-1 / VEGP CI-16.1-1 (Setpoint Control Program)

Technical Specification (TS) Combined License Information

In accordance with DC/COL-ISG-8*, at COL issuance all TS information must be resolved by:

- Providing a plant specific value (Option 1), or
- Providing a value that is bounding to plant specific value (Option 2), or
- Providing an administrative control TS that requires use of an NRC-approved methodology to determine plant specific value and document for recording value (Option 3)

*DC/COL-ISG-8, “Technical Specification Information that Combined License Applicants Must Provide in Combined License Application”

DCD CI-SRP16.3-CTSB-SCP-1

Setpoint Control Program

- **Issue** - All values specified for trip setpoints and allowable values in Tables 3.3.1-1 and 3.3.2-1 are to be determined via an option specified in COL/DC-ISG-8.
- **Resolution** – After selection of specific instrumentation, the trip setpoints will be calculated using Option 3, a setpoint methodology specified in the setpoint control program (SCP) specified in Administrative Controls Section 5.5.21.
 - Applicant provided suitable SCP for incorporation. Staff will confirm the SCP is suitably incorporated into the DCD.

**AP1000 Design Control Document
Amended Design
Review of Chapter 17
AFSER with No Open Items**

July 21 & 22, 2010

Chapter 17 - Quality Assurance

- Chapter 17 describes Quality Assurance, including
 - Design Reliability Assurance Program
 - Combined License Information Items

Chapter 17 - Open Items

Three Open Items were identified and subsequently closed:

- OI-SRP17.3-CQVP-01
 - NRC inspection of Westinghouse QMS implementation

- OI-SRP17.4-SPLA-01
 - PRA model: basis for deleting CCF

- OI-SRP17.4-SPLA-04
 - D-RAP ITAAC request

Chapter 17 - OI-SRP17.3-CQVP-01

- **Issue:**

- NRC inspection of Westinghouse QMS (Quality Management System) implementation

- **Final Resolution:**

- Issue closed – (No W action) The NRC has completed their inspection, and has determined that no additional inspections are required

Chapter 17 - OI-SRP17.4-SPLA-01

● Issue:

- Basis for deleting CCF (common cause failure) event of the RCP switchgear circuit breakers in the PRA model

● Final Resolution:

- Issue closed – These breakers are consistently identified as risk-significant because of high RAW (risk achievement worth) for common cause failure, and the rationale for inclusion is changed to RAW/CCF in the DCD
- Now Confirmatory Item CI-SRP17.4-SPLA-01

Chapter 17 - OI-SRP17.4-SPLA-04

- **Issue:**

- Revise ITAAC to assure design/construction supports D-RAP (Design Reliability Assurance Program) assumptions and insights consistent with ISG-18

- **Final Resolution:**

- Issue closed – ITAAC verifies safety-related SSCs are designed within a 10 CFR 50 Appx B quality program, and nonsafety-related SSCs are designed to satisfy investment protection QA criteria.
- Verifies as-built is consistent with certified design
- Now Confirmatory Item CI-SRP17.4-SPLA-04

Questions?



Presentation to the ACRS Subcommittee

Westinghouse AP1000 Design Certification Amendment Application Review

**AFSER Chapter 17
Quality Assurance Program**

July 21 – 22, 2010

Staff Review Team

- Technical Staff
 - **Juan Peralta**, Chief, Quality and Vendor Branch – 1, Division of Construction Inspection Programs (CQVA/DCIP)
 - **Kerri Kavanagh**, Senior Reactor Engineer, CQVA/DCIP
 - **Malcolm Patterson**, Reliability & Risk Analyst, PRA and Severe Accidents Branch
 - **Suzanne Schroer**, Reliability & Risk Analyst, PRA and Severe Accidents Branch

- Project Management
 - **Phyllis Clark**
 - **Terri Spicher**

Overview of DCA

| SRP Section/Application Section | | Previously shown with: |
|--|--|-------------------------------|
| 17.1 | Quality Assurance During the Design and Construction Phases | No OI |
| 17.2 | Quality Assurance During the Operations Phase | No OI |
| 17.3 | Quality Assurance During Design, Procurement, Fabrication, Inspection, and/or Testing of Nuclear Power Plant Items | 1 |
| 17.4 | Design Reliability Assurance Program | 1 |
| 17.5 | Quality Assurance Program Description—New License Applicants | No OI |
| 17.6 | Maintenance Rule Program | No OI |
| Totals | | 2 |

Overview of Sections 17.1,2,3 and 5 related to Quality Assurance Programs

- Previously presented to the ACRS with 1 Open Item in section 17.3
 - OI-SRP 17.3-CQVP-01–Possible Future Inspections
 - Closed when staff learned future inspections were not required
- Westinghouse plans to implement Westinghouse Quality Management System (QMS) Revision 5 for the AP1000
 - QMS Rev. 5 which is based on ASME NQA-1-1994 was previously approved by NRC Staff in September, 2002. Staff completed its review of QMS Rev. 5 in October 2008

Overview of Sections 17.4 and 6 related to Reliability Assurance

- Section 17.4 had one open item in SER with OI
 - Resolved by letter dated March, 30, 2009
 - Presented at July 23-24, 2009 ACRS Meeting
- **No changes to 17.4**
- Section 17.6 was presented with no open items at July 23-24, 2009 ACRS Meeting



Bellefonte 3&4

Lee Nuclear 1&2

Summer 2&3

Vogtle 3&4

Harris 2&3

Levy 1&2

Turkey Point 6&7

AP1000 Reference Combined License Application Presentation to ACRS Chapter 16 Standard Topics

July 21, 2010



R-COLA Chapter 16: Standard Topics

Technical Specifications

- 16.1 TECHNICAL SPECIFICATIONS
- 16.2 DESIGN RELIABILITY ASSURANCE PROGRAM
- 16.3 INVESTMENT PROTECTION



R-COLA Chapter 16: Major Topics

- DCD incorporated by reference
 - No standard departures taken
 - Actual Technical Specifications provided in Part 4
- COL information items (Previously discussed)
- 1 Standard open item
 - OI 16.1-1 Include a Setpoint Control Program in Administrative Control section of the TS, as identified in COL/DC-ISG-08
- No VEGP specific items



**AP1000
DCWG**



Bellefonte 3&4

Lee Nuclear 1&2

Summer 2&3

Vogtle 3&4

Harris 2&3

Levy 1&2

Turkey Point 6&7

7/21/2010



Presentation to the ACRS Subcommittee

Vogtle Units 3 and 4 COL Application Review

**Chapter 16
Technical Specifications**

July 21-22, 2010

Staff Review Team

- Technical Staff
 - Travis Chapman, Reactor Operations Engineer, CTSB
- Project Management
 - Terri Spicher
 - Sujata Goetz

Overview

- Chapter 16 of the Standard Content SER with Open Items was issued with one Open Item
 - Open Item Description:
 - Open Item 16.1-1–The staff requested that the applicant identify the method of determining the trip setpoints and allowable values, as well as establish an associated document in which to record the site-specific values and other restrictions necessary to satisfy 10 CFR 50.36.
 - Open Item 16.1-1: Resolved

Open Item 16.1-1

- **Issue** - All values specified for trip setpoints and allowable values in Tables 3.3.1-1 and 3.3.2-1 are to be determined via an option specified in COL/DC-ISG-8.
- **Resolution** - The applicant committed to adopting the setpoint control program approved in the AP1000 DC, which will be verified in a future revision of the VEGP TS, CI 16.1-1.



Bellefonte 3&4

Lee Nuclear 1&2

Summer 2&3

Vogtle 3&4

Harris 2&3

Levy 1&2

Turkey Point 6&7

AP1000 Reference Combined License Application Presentation to ACRS Chapter 17 Standard Topics

July 21, 2010



R-COLA Chapter 17: Standard Topics

Quality Assurance

- 17.1 QUALITY ASSURANCE DURING THE DESIGN AND CONSTRUCTION PHASES
- 17.2 QUALITY ASSURANCE DURING THE OPERATIONS PHASE
- 17.3 QUALITY ASSURANCE DURING DESIGN, PROCUREMENT, FABRICATION, INSPECTION, AND/OR TESTING OF NUCLEAR POWER PLANT ITEMS
- 17.4 DESIGN RELIABILITY ASSURANCE PROGRAM
- 17.5 QUALITY ASSURANCE PROGRAM DESCRIPTION – NEW LICENSE APPLICANTS
- 17.6 MAINTENANCE RULE PROGRAM
- 17.7 COMBINED LICENSE INFORMATION ITEMS
- 17.8 REFERENCES



R-COLA Chapter 17: Major Topics

- DCD incorporated by reference
 - One administrative standard departure taken related to section numbering
- COL information items (Previously discussed)
- 7 Standard open items
 - OI 17.1-1 Address RG 1.33 for operations phase controls
 - OI 17.5-1 Address appropriate regulation references
 - OI 17.5-2 Address Independent Review Committee responsibilities
 - OI 17.5-3 Address use of term "licensee"
 - OI 17.5-4 Address use of commercial grade calibration services
 - OI 17.5-5 Address use of commercial grade dedication
 - OI 17.5-6 Address conformance to pertinent Regulatory Guides
- No VEGP specific items



**AP1000
DCWG**



Bellefonte 3&4

Lee Nuclear 1&2

Summer 2&3

Vogtle 3&4

Harris 2&3

Levy 1&2

Turkey Point 6&7

7/21/2010



Presentation to the ACRS Subcommittee

Vogtle Units 3 and 4 COL Application Review

**AFSER Chapter 17
Quality Assurance Program**

July 21-22, 2010

Staff Review Team

- **Technical Staff**
 - **Juan Peralta**, Chief, Quality and Vendor Branch – 1, Division of Construction Inspection Programs (CQVA/DCIP)
 - **Lynn Mrowca**, Chief, PRA and Severe Accidents Branch
 - **Kerri Kavanagh**, Lead Reviewer, CQVA/DCIP
 - **Suzanne Schroer**, Reliability & Risk Analyst, PRA and Severe Accidents Branch
- **Project Management**
 - **Terri Spicher**

Overview of Vogtle COL Chapter 17 - Quality Assurance

| FSAR Section | | Summary of Departures/Supplements |
|--------------|---|--|
| 17.1 | QA During Design | <ul style="list-style-type: none"> a. VEGP COL 17.5-1 QAP prior to COL issuance covered in Section 17.5 b. 1 Open Item Resolved – now confirmatory item |
| 17.2 | QA During Design and Construction | Incorporated By Reference (IBR) |
| 17.3 | QA Program Description | IBR |
| 17.4 | Design Reliability Assurance Program | No OI |
| 17.5 | QA Program Description – Design Certification, Early Site Permits, and New License Applicants | VEGP COL 17.5-1 QAP following to COL issuance STD COL 17.5-2 QAP for procurement, fabrication, installation, construction, and testing of SSC's STD COL 17.5-4 QAP for operations STD COL 17.5-8 RAP integration with QAP 6 Open Items Resolved – now confirmatory items |
| 17.6 | Maintenance Rule Program | No OI |

Resolution of Open Items

- The six Open Items from 17.5 were related to NEI Technical Report, 06-14, “Quality Assurance Program Information.”
 - This NEI report was not approved by the NRC when the standard content SER was completed.
 - NEI 06-14 provides a generic template for ESP and COL applicants to develop a QAP description consistent with the regulatory requirements
 - NEI 06-14, Revision 7
 - Addressed generic issues identified during the review of COL applications.
- The Open Item from 17.1 was related to R.G. 1.33.
 - The applicant did not commit to R.G. 1.33.
 - Now Vogtle (applicant) has committed to QA regulatory guides, specifically RG 1.33



Bellefonte 3&4

Lee Nuclear 1&2

Summer 2&3

Vogtle 3&4

Harris 2&3

Levy 1&2

Turkey Point 6&7

**AP1000 Reference
Combined License Application
Presentation to ACRS
Chapter 2 Topics
Sections 2.4**

July 21, 2010



R-COLA Section 2.4 HYDROLOGIC ENGINEERING **Major Topics:**

- DCD incorporated by reference
 - One administrative standard departure taken related to section numbering

- ESPA SSAR incorporated by reference
 - ESP COL Action Item 2.4-1 addresses the non-use of chelating agents in liquid streams that could be comingled with radioactive liquid effluents. This is discussed in FSAR Subsection 11.2.2.1.6.
 - VEGP SUP 2.4-1 addresses the long term groundwater level monitoring program, both during construction and operation of the new units
 - Used to confirm the direction of groundwater flow in the vicinity of Units 3 and 4 power blocks by comparing to data collected during ESP phase
 - Program would be revised as needed upon the review and evaluation of the observed data



R-COLA Section 2.4 Major Topics

- Two additional COL information items addressed
 - COL 2.4-2 Floods
 - Local Probable Maximum Precipitation (PMP) flooding evaluated. Site grading and storm water management ditches designed to convey the peak discharge of the PMP flood event safely offsite without flooding safety-related SSCs.
 - COL 2.4-6 Flood Protection Emergency Operating Procedures – none required
- No Standard open items
- No VEGP specific items



Presentation to the ACRS Subcommittee

Vogtle Units 3 and 4 COL Application Review

**AFSER Section 2.3
Meteorology**

July 21-22, 2010

Staff Review Team

- **Technical Staff**
 - **Brad Harvey**, Senior Physical Scientist (Meteorologist)

- **Project Management**
 - **Thomas Galletta**

Overview

- Section 2.3 of the FSAR incorporates by reference:
 - Section 2.3 of the AP1000 DCD (Rev 17)
 - Section 2.3 of the VEGP ESP SSAR (Rev 5)

| <i>SER Section</i> | <i>AP1000 COL Information Item</i> | <i>ESP COL Information Item</i> | <i>Supplemental Information</i> | <i>Variances</i> |
|-----------------------------------|------------------------------------|---------------------------------|---------------------------------|--------------------|
| 2.3.1 Regional Climatology | VEGP COL 2.3-1 | VEGP ESP COL 2.3-1 | VEGP SUP 2.3-1 | VEGP ESP VAR 2.3-1 |
| 2.3.2 Local Meteorology | VEGP COL 2.3-2 | - | - | - |
| 2.3.3 Onsite Monitoring | VEGP COL 2.3-3 | - | - | - |
| 2.3.4 Accident χ/Q Values | VEGP COL 2.3-4 | - | VEGP SUP 2.3-2 | - |
| 2.3.5 Routine χ/Q Values | VEGP COL 2.3-5 | - | - | - |

2.3.1 – Regional Climatology

- Information Items
 - VEGP COL 2.3-1
 - Provide site-specific regional climatic information
 - VEGP ESP COL 2.3-1
 - If choosing a design other than AP1000, provide meteorological characteristics to evaluate UHS cooling tower
- Information Items addressed in the ESP SSAR and by choice of AP1000 reactor design
- Supplemental Information
 - VEG SUP 2.3-1
 - Provided information concerning winter precipitation roof loading
- Variance
 - VEGP ESP VAR 2.3-1
 - Proposed changes to max/min normal air temperature site characteristic values that should be compared to AP1000 DCD site parameter values

2.3.2 – Local Meteorology and 2.3.3 – Onsite Monitoring

- Information Items
 - VEGP COL 2.3-2
 - Provide site-specific local meteorological information
 - VEGP COL 2.3-3
 - Describe site-specific onsite meteorological measurements program
- Information Items addressed in ESP
SSAR

2.3.4 – Accident χ/Q Values and 2.3.5 – Routine χ/Q Values

- Information Items
 - VEGP COL 2.3-4
 - Provide site-specific short term atmospheric dispersion estimates
 - VEGP COL 2.3-5
 - Provide site-specific long term atmospheric dispersion estimates
- Information Items addressed in the ESP SSAR; additional information provided on control room dispersion estimates
- Supplemental Information
 - VEGP SUP 2.3-2
 - Provided reference to control room dispersion model

Technical Topics of Interest

- Variance VEGP ESP VAR 2.3-1
 - Changes to the Vogtle maximum and minimum normal air temperature site characteristic values
 - 1% and 99% annual exceedance values provided in ESP SSAR versus 1% and 99% seasonal exceedance values (0.4% and 99.6% annual exceedance values) required by the AP1000 DCD
- AP1000 COL Information Item VEGP COL 2.3-4
 - Development of the control room design-basis accident atmospheric dispersion factors

Conclusion

- Section 2.3 of the FSAR is a combination of information from three sources
 - Standard content from the AP1000 DCD
 - Site-specific information from the Vogtle ESP SSAR
 - Additional site-specific information presented in the COL FSAR
- This combination of information addresses the required information related to meteorology



Bellefonte 3&4

Lee Nuclear 1&2

Summer 2&3

Vogtle 3&4

Harris 2&3

Levy 1&2

Turkey Point 6&7

**AP1000 Reference
Combined License Application
Presentation to ACRS
Chapter 2 Topics
Section 2.3**

July 21, 2010



R-COLA Section 2.3 METEOROLOGY

Major Topics:

- DCD incorporated by reference
 - No Departures taken
- ESPA SSAR incorporated by reference
 - ESP variance 2.3-1 revises the maximum and minimum normal site temperatures to reflect seasonal (versus annual) exceedance probability values
 - Seasonal values are slightly more extreme than annual values
 - VEGP site characteristics remain within AP1000 DCD site parameters
 - ESP COL Action Item 2.3-1 acknowledges that the AP1000 design does not utilize an ultimate heat sink cooling tower, thus related meteorological characteristics need not be evaluated
 - VEGP SUP 2.3-1 provides a site specific evaluation of snow loading on the AP1000 roof structures
 - Evaluated per ASCE 7-98 criteria
 - Snow load and winter PMP accommodated by AP1000 roof design



R-COLA Section 2.3 Major Topics

- Three COL information items addressed
 - COL 2.3-3 Description of VEGP Meteorological Monitoring Program Compliance
 - COL 2.3-4 Short Term (Accident) Diffusion Estimates
 - Evaluated short term atmospheric dispersion factors at the EAB and LPZ due to changes in the AP1000 building dimensions in DCD Revision 17. Dispersion values (X/Q) at the EAB and LPZ were unchanged.
 - Compared site-specific dispersion factors to AP1000 DCD factors for the CR HVAC intake and Annex Building door to ensure control room functionality. Some dispersion values (X/Q) changed slightly, but remained bounded by the AP1000 DCD values.
 - COL 2.3-5 Long Term (Routine Release) Diffusion Estimates evaluated at the EAB and beyond using the revised AP1000 building dimensions in DCD Revision 17
 - Minor changes in dispersion values (X/Q) remained bounded by DCD values
- No Standard open items
- No VEGP specific items



Presentation to the ACRS Subcommittee

Vogtle Units 3 and 4 COL Application Review

**AFSER Sections 2.4
Hydrologic Engineering**

July 21-22, 2010

Staff Review Team

- **Technical staff**
 - **Jill Caverly**, Senior Hydrologist
 - **Hosung Ahn**, Hydrologist

- **Project Management**
 - **Ravi Joshi**

Overview

- Section 2.4(Hydrologic Engineering) of the FSAR is a combination of information from three sources:
 - Standard content from the AP1000 COL
 - Site specific information from the Vogtle Early Site Permit (ESP)
 - Additional application specific information

Technical Topics of Interest

- Floods
- Flooding Protection Requirements
- Groundwater Monitoring
- Accidental Release of Radioactive Liquid Effluents

Floods

- **VEGP COL 2.4-2, Floods**
 - Applicant provided a detailed site drainage plan and numerical modeling files
- **Staff's Review**
 - Reviewed FSAR 2.4.2 and numerical modeling files:
 - Site map with drainage plan compared to model inputs: sub-basins, culverts, construction features, channels, and cross sections
 - Confirmed PMP-generated flows, structural features, channel conveyance characteristics, supercritical flow
 - Sensitivity analyses of model inputs: Manning's roughness coefficients, contraction-expansion coefficients, and weir coefficients (blocked culverts)

Floods

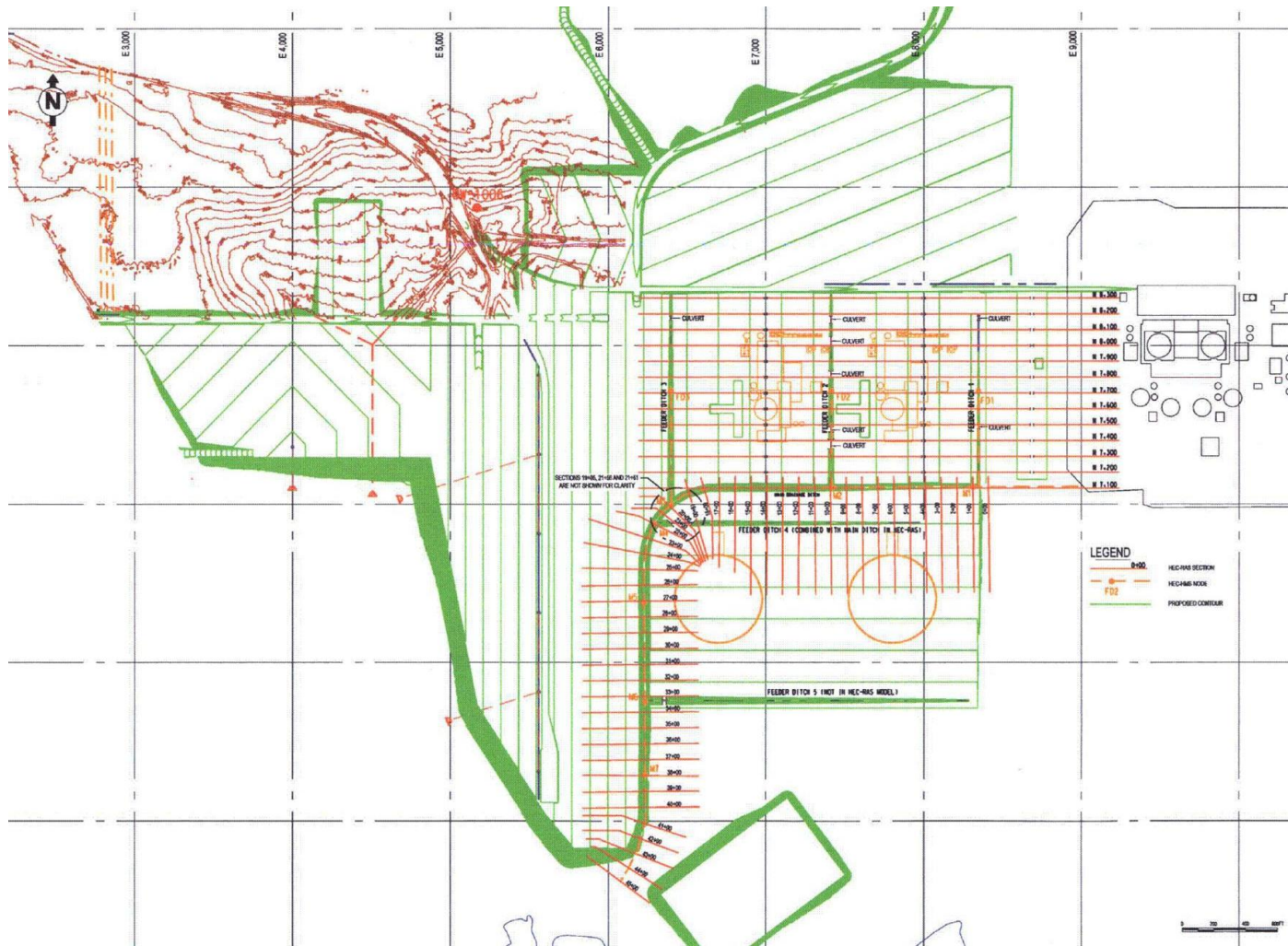
- **RAIS**

- Staff issued 4 RAIs addressing discrepancies in the hydraulic model and the sensitivity of the roughness coefficient.
- Applicant provided updated model and additional explanation of site features and model assumptions

- **Conclusions**

- Sensitivity to Manning's roughness coefficients indicated importance of drainage system maintenance
- Commitment for drainage system maintenance included in FSAR Revision 2
- All RAIs have been addressed and are closed

Floods



Flooding Protection Requirements

- VEGP COL 2.4-2, Flooding Protection Requirements
 - Applicant added to VEGP ESP SSAR Section 2.4.10 by comparing FSAR 2.4.2 flood elevations to plant grade
- Staff's Review
 - Reviewed flooding information in FSAR 2.4.2
 - Confirmed commitment to drainage system maintenance made in FSAR 2.4.2.3
 - Confirmed that additional flood protection is not required

Groundwater Monitoring

- VEGP Sup 2.4-1, Groundwater Monitoring
 - Applicant provided information on changes to groundwater monitoring during and after construction
- Staff Review
 - Staff found supplementary information on groundwater acceptable

Accidental Release of Radioactive Liquid Effluents

- VEGP ESP COL Action Item 2.4-1, Use of Chelating Agents
 - Applicant said that Chelating Agents will not be used
 - If chelating agents are required for a specific purpose, controls will be implemented to prevent comingling of chelating agents with the plant's normal liquid radwaste system
- Staff Review
 - Staff concluded that the Action Item is resolved



Bellefonte 3&4

Lee Nuclear 1&2

Summer 2&3

Vogtle 3&4

Harris 2&3

Levy 1&2

Turkey Point 6&7

AP1000 Reference Combined License Application Presentation to ACRS Containment Vessel Coatings

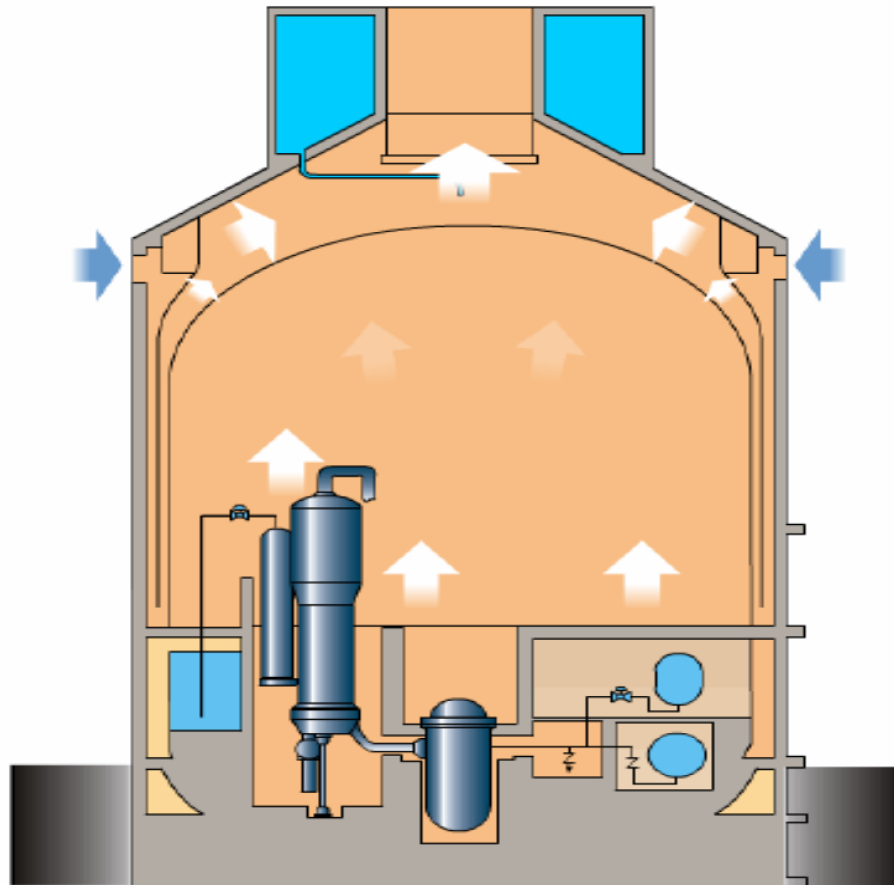
July 21, 2010



R-COLA Special Topic: CV Coatings

- DCD information
 - Containment Vessel construction is ASME III, MC
 - Coatings are discussed in DCD 6.1.2.1
 - Basic coating is inorganic zinc
 - Internal is Level I
 - External is Level III
 - Level I & III are safety-related
 - Initial inspection (and after recoating)
 - COL Information Item – Coatings Program

R-COLA Special Topic: CV Coatings





R-COLA Special Topic: CV Coatings

- COLA information
 - FSAR 6.1.2.1.6 discusses program
 - Recent revision via July 2, 2010 letter (ND-10-1264)

- Installation Program basis - RG 1.54 and ASTM D5144
 - Reg. Guide 1.54 – Service Level I, II, and III Protective Coatings Applied to Nuclear Power Plants
 - FSAR Appendix 1AA – Conforms
 - Endorses ASTM D5144-00
 - ASTM D5144-08 - Standard Guide for Use of Protective Coating Standards in Nuclear Power Plants



R-COLA Special Topic: CV Coatings

- COLA information
 - Operational Monitoring Program
 - Reg. Guide 1.54 – Service Level I, II, and III Protective Coatings Applied to Nuclear Power Plants
 - FSAR Appendix 1AA – Conforms
 - ASTM D5163-05a - Standard Guide for Establishing Procedures to Monitor the Performance of Coating Service Level I Coating Systems in an Operating Nuclear Power Plant
 - ASTM D7167-05 - Standard Guide for Establishing Procedures to Monitor the Performance of Safety-Related Coating Service Level III Lining Systems in an Operating Nuclear Power Plant



R-COLA Special Topic: CV Coatings

- COLA information
 - Operational Monitoring Program
 - 10 CFR 50.55a, ASME Section XI, IWE
 - 10 CFR 50 Appendix J, Visual Inspections
 - 10 CFR 50.65, Reg. Guide 1.160 – **Monitoring the Effectiveness of Maintenance at Nuclear Power Plants**
 - FSAR Appendix 1AA – Conforms
 - Position C.1.5 - **Monitoring Structures**
 - Key activities
 - Condition periodically assessed and evaluated
 - Deficiencies addressed
 - Adjust frequency if warranted



**AP1000
DCWG**



Bellefonte 3&4

Lee Nuclear 1&2

Summer 2&3

Vogtle 3&4

Harris 2&3

Levy 1&2

Turkey Point 6&7

7/21/2010



Bellefonte 3&4

Lee Nuclear 1&2

Summer 2&3

Vogtle 3&4

Harris 2&3

Levy 1&2

Turkey Point 6&7

**AP1000 Reference
Combined License Application
Presentation to ACRS
Chapter 2 Topics
Sections 2.0 – 2.2**

July 21, 2010



R-COLA Chapter 2

Site Characteristics

2.0 SITE CHARACTERISTICS

2.1 GEOGRAPHY AND DEMOGRAPHY

2.2 NEARBY INDUSTRIAL, TRANSPORTATION, AND MILITARY FACILITIES

2.3 METEOROLOGY

2.4 HYDROLOGIC ENGINEERING

2.5 GEOLOGY, SEISMOLOGY, AND GEOTECHNICAL ENGINEERING



R-COLA Section 2.0: Major Topics

SITE CHARACTERISTICS

- Comparison with DCD site parameters
 - Air temperatures, wind speed, seismic, soil, missiles, flood level, ground water level, plant grade elevation, precipitation, atmospheric dispersion values, and population distribution

- DCD incorporated by reference

- ESPA SSAR incorporated by reference
 - Section 1.3 – with variances and/or supplements
 - ESP VAR 2.3-1 related to “normal” air temperatures



R-COLA Section 2.0: Major Topics

- No COL information items
- No Standard open items
- VEGP specific items
 - Provided supplemental table for comparison of VEGP site characteristics with DCD site parameters
 - All VEGP site characteristics are enveloped by DCD site parameters
 - Included Early Site Permit Condition 9 related to atmospheric dispersion values



R-COLA Section 2.1 GEOGRAPHY AND DEMOGRAPHY

Major Topics:

- DCD incorporated by reference
 - One administrative standard departure taken related to section numbering
- ESPA SSAR incorporated by reference
 - No ESP variances
 - COL Information Item 2.1-1 is largely addressed in ESPA, with supplemental information also provided in the FSAR
 - Site location
 - Eastern Burke County, Georgia
 - ~15 miles east-northeast of Waynesboro, Georgia and 26 miles southeast of Augusta, Georgia
 - 3,169-acre coastal plain bluff on the southwest side of the Savannah River
- No Standard open items
- No VEGP major specific items



R-COLA Section 2.2 NEARBY INDUSTRIAL, TRANSPORTATION, AND MILITARY FACILITIES

Major Topics:

- DCD incorporated by reference
 - One administrative standard departure taken related to section numbering
- ESPA SSAR incorporated by reference
 - ESP variance 2.2-1 and ESP COL Action Item 2.2-2 address AP1000 chemicals
 - Quantity of chemicals to be used at Units 3 and 4 addressed in COLA
 - Potential toxic concentrations of Units 3 and 4 chemicals evaluated in COLA
 - FSAR Section 6.4 (control room habitability) impacts considered
 - No hazards impact to control room operators or safety-related SSCs
 - ESP COL Action Item 2.2-1 addresses the onsite hydrazine chemical hazard
 - Units 1 and 2 chemical hazard impact on Units 3 and 4 evaluated in COLA
 - No toxicity, explosion, or flammable vapor threats to control room operators or safety-related SSCs



R-COLA Section 2.2 Major Topics

- Two COL information items addressed
 - COL 2.2-1 Identification of Site-specific Potential Hazards
 - Hydrazine and other onsite chemicals
 - Forest fires and industrial diesel fuel oil storage tank fire
 - Radiological hazard resulting from LOCA at Unit 1 or 2
 - No hazards impact to control room operators or safety-related SSCs
 - COL 6.4-1 Control Room Habitability Toxic Chemical Evaluation (partial)
 - Addresses hydrazine and other chemicals from onsite storage tanks
 - Operator action, dual unit analysis, etc. addressed in FSAR 6.4
- No Standard open items
- Two VEGP confirmatory items



**AP1000
DCWG**



Bellefonte 3&4

Lee Nuclear 1&2

Summer 2&3

Vogtle 3&4

Harris 2&3

Levy 1&2

Turkey Point 6&7

7/21/2010



Presentation to the ACRS Subcommittee

Vogtle Units 3 and 4 COL Application Review

AFSER Sections 2.0-2.2

July 21-22, 2010

Staff Review Team

- Technical staff
 - **Seshagiri Tammara**, Physical Scientist

- Project Management
 - **Ravi Joshi**

Overview

- Sections 2.0(site characteristics), 2.1(Geography and Demography) and 2.2(Near by Industrial, Transportation, and Military Facilities) of the FSAR are combination of information from three sources:
 - Standard content from the AP000 COL
 - Site specific information from the Vogtle Early Site Permit (ESP)
 - Additional application specific information

Technical Topics of Interest

- The evaluation of potential hazard for the impact on new Units 3 and 4 due to accidental hydrazine release from onsite storage tanks located at VEGP unit 1.
- The evaluation of potential hazards for the impact on new Units 3 and 4 due to other chemicals (standard and site-specific) from onsite storage tanks.

Potential Hazards due Accidental Release from storage tanks at VEGP Unit1

- Based on the review and independent confirmatory analyses, the NRC staff finds that hydrazine does not exceed Immediately Dangerous to life and Health (IDLH) concentration outside MCR

Potential Hazards due Accidental Release from storage tanks at VEGP Units 3 and 4

- Based on the review and independent confirmatory analyses, the NRC staff finds that two standard chemicals hydrazine and carbon dioxide, and two site-specific chemicals MPA and ammonium bisulfite exceed respective Immediately Dangerous to life and Health (IDLH) concentration outside MCR, and therefore these chemicals are further evaluated for control room habitability in Section 6.4 of SER.

Conclusions

- The applicant's proposed changes to VEGP COL FSAR Section 2.2.3.2.3.1 and Table 6.4-201 will remain as applicant's confirmatory items 2.2-1 and 2.2-2 respectively.



Bellefonte 3&4

Lee Nuclear 1&2

Summer 2&3

Vogtle 3&4

Harris 2&3

Levy 1&2

Turkey Point 6&7

**AP1000 Reference
Combined License Application
Presentation to ACRS
Chapter 2 Topics
Section 2.5**

July 21, 2010



R-COLA Section 2.5 GEOLOGY, SEISMOLOGY, AND GEOTECHNICAL ENGINEERING

Major Topics:

- DCD incorporated by reference
 - One administrative standard departure taken related to section numbering
- ESP SSAR incorporated by reference
 - Supplemental information on lateral earth pressure provided per RAI response
 - Addresses a portion of COL Item 2.5-11, Lateral Earth Pressure
 - Includes static and dynamic (seismic) lateral earth pressures
 - Full at-rest lateral earth pressures assumed, with no credit for MSE walls
 - Earth pressures due to surcharge and close-in compaction effects considered
 - No hydrostatic forces due to groundwater level 15 feet below NI basemat
 - Site-specific at-rest earth pressure enveloped by DCD by significant margin
 - Early Site Permit Condition 1 addressed
 - Remove-replace or improve soils below/adjacent to Seismic Cat 1 structures
 - Eliminates any liquefaction potential
 - Completion tracked via Part 10, Appendix B, Safety-Related Backfill ITAAC identified in ESPA SSAR Subsection 2.5.4.5.5



R-COLA Section 2.5: Major Topics

- Additional COL information items addressed
 - COL 2.5-17 Below Grade Water Proofing System (New DCD item)
 - Sprayed-on Waterproofing Membrane is selected option presented in the DCD
 - Addressed in COLA Subsection 3.8.5.1, Description of the Foundations
 - Most COL items addressed by ESPA SSAR
 - Note that COL 2.5-2 and COL 2.5-3 (site-specific tectonic and seismic SSI) addressed per a three-dimensional soil structure interaction (3D SASSI) provided in supplemental RAI 3.7.2-1 response. Updated response is being prepared to incorporate post-DCD Revision 17 changes.
- No Standard open items
- VEGP confirmatory item
 - Confirmatory Item 2.5-1 discusses the need to document the revised DCD nuclear island differential settlement criteria in a future VEGP COLA FSAR revision



Presentation to the ACRS Subcommittee

Vogtle Units 3 and 4 COL Application Review

**AFSER Section 2.5
Geological, Seismological, and Geotechnical
Engineering**

July 21-22, 2010

SER Sections-

2.5.1 Basic Geologic and Seismic
Information

2.5.2 Vibratory Ground Motion

2.5.3 Surface Faulting

Staff Review Team-

- **Technical Staff**
 - **Sarah Tabatabai**, Geophysicist
- **Project Management**
 - **Ravindra Joshi**

SER Sections-

2.5.4 Stability of Subsurface Materials
and Foundations

2.5.5 Stability of Slopes

Staff Review Team-

- **Technical Staff**
 - **Dr. Weijun Wang**, Geotechnical Engineer
 - **Jenise Thompson**, Geologist
- **Project Management**
 - **Ravindra Joshi**

SER Sections 2.5.1, 2.5.2, and 2.5.3

- **Sections 2.5.1, 2.5.2, and 2.5.3 of VGP COL FSAR is a combination of information from three sources:**
 - AP1000 DCD Rev. 17
 - Plant Specific Information
 - ESP SSAR was incorporated by reference, which resolves the following COL Information Items:
 - VEGP COL 2.5-1 (includes provision of geologic information)
 - VEGP COL 2.5-2 (includes provision of seismic information, comparison of GMRS with CSDRS, and comparison of site conditions with properties used in generic AP1000 analyses)
 - VEGP COL 2.5-3 (provision of site-specific seismic analysis in case of CSDRS exceedance or if site conditions differ from AP1000 analyses)
 - VEGP COL 2.5-4 (provision of information related to tectonic and non tectonic faulting)
- **No technical issues, RAIs, or Open Items remain**

SER Section 2.5.4

- Section 2.5.4 of VGP COL FSAR is a combination of information from three sources:
 - AP1000 DCD Rev. 17
 - Plant Specific Information:
 - Two COL information items/ technical issues addressed and resolved by providing additional information in the application.
 - ESP SSAR was incorporated by reference:
 - Resolved 8 COL information items and one ESP permit condition.
- Five RAIs were issued and resolved.
- One Confirmatory Item remains.

Lateral earth pressure determination (VEGP COL 2.5-11)

- Issue:
 - VEGP ESP SSAR Section 2.5.4 does not include a discussion of the lateral earth pressures or hydrostatic pressures at the site.
- Resolution:
 - The applicant provided a detailed calculation of the total lateral earth pressure consisting of surcharge at-rest pressure, static at-rest pressure, seismic at-rest pressure, hydrostatic pressure and compaction induced pressure on the foundation structure.
- Staff confirmed that the total lateral earth pressure is enveloped by the standard design.

Site-Specific Settlement Analyses (VEGP COL 2.5-13)

- Issue
 - The estimated site-specific settlement does not meet the AP1000 DCD Rev. 17 standard design requirement. The estimated differential settlement is less than 2.54 cm (1.0 in.) but greater than 1.27 cm (0.5 in.).
- Resolution
 - The applicant states that the differential settlement requirement in the revised AP1000 DCD will be changed to 7.62 cm (3 in.) from 1.27 cm (0.5 in.).
- Item is now CI 2.5-1

SER 2.5.5: Stability of Slopes

- Section 2.5.5 of VGP COL FSAR is a combination of information from three sources:
 - AP1000 DCD Rev. 17
 - Plant Specific Information
 - ESP SSAR was incorporated by reference, which resolves the following COL Information Items:
 - VEGP COL 2.5-14 (includes provision of site stability of slopes)
 - VEGP COL 2.5-15 (includes provision of site stability of embankments and dams)
- No technical issues remain.
- No RAIs or Open Items.



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Shaw • Westinghouse Electric Company*

VC Summer Units 2 and 3 Introduction

**Al Paglia
SCE&G – Manager
NND Licensing**



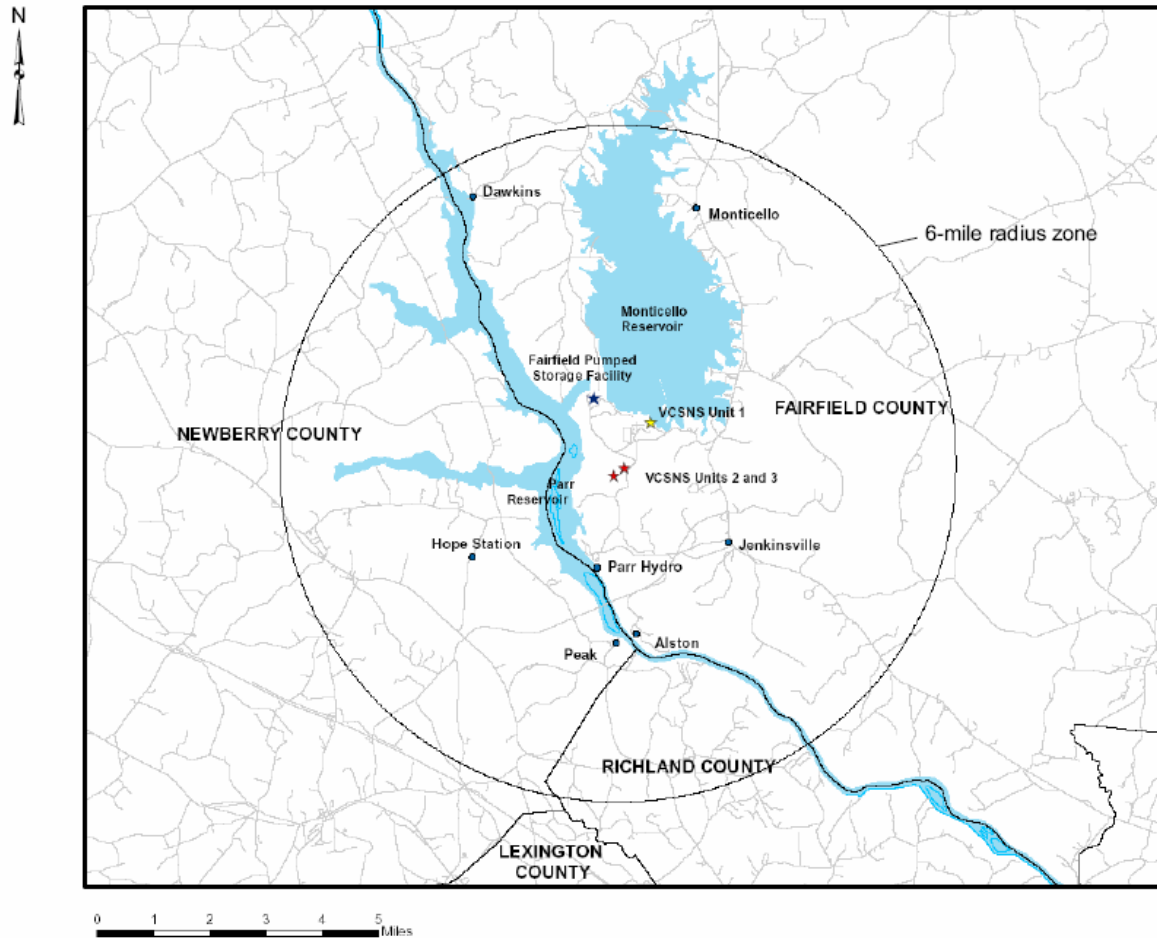
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Appendix 3

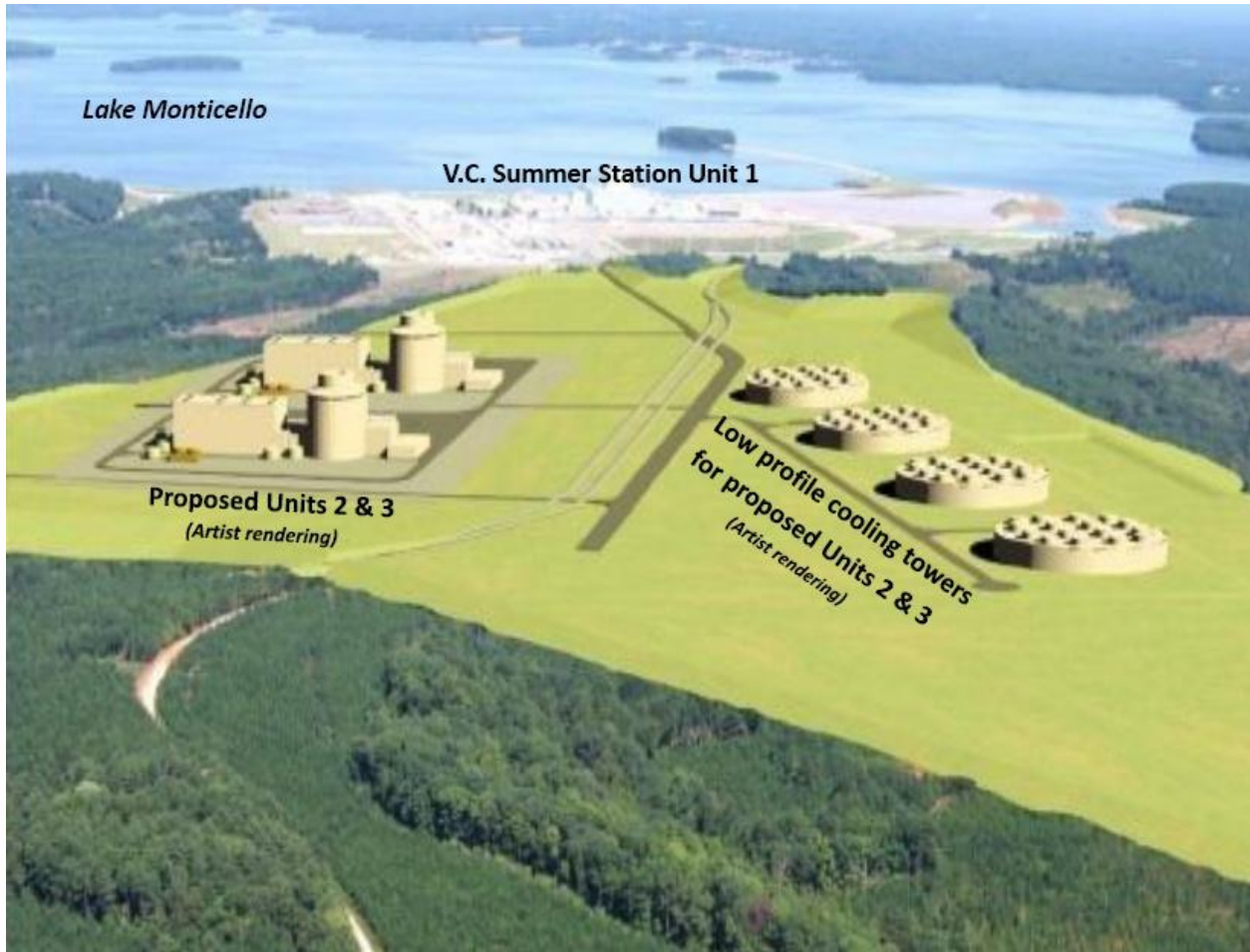
VCSNS Units 2 and 3



VCSNS Units 2 and 3



VCSNS Units 2 and 3 AP1000



Introductions

- Bob Whorton (Section 2.5) – Consulting Engineer – Civil/Structural with SCE&G for 39 years.
- Steve Summer (Section 2.3) – Supervisor and Environmental technical lead for all 3 VCSNS Units for 32 years.
- Amy Monroe (Sections 2.0-2.2) – Senior Licensing Engineer – Mechanical Engineer with SCE&G for 27 years.



*SCE&G • Santee Cooper
Shaw • Westinghouse Electric Company*

VC Summer Units 2 and 3 SAR Sections 2.0-2.2

Amy Monroe

**SCE&G – Licensing Senior
Engineer**

SAR Section 2.0 Site Characteristics

- DCD Incorporated By Reference
- Table 2.0-201 compares site-specific parameters to the AP1000 required design parameters found in DCD Table 2.1
 - Hard rock site
 - “Typical” southeastern climatology

Major Items of Interest

- VCS DEP 2.0-2 addresses the maximum safety wet bulb (noncoincident) air temperature of 87.3°F, a value 1.2°F above the AP1000 DCD value of 86.1°F
 - FSAR Chapters 5, 6 and 9 contain the technical basis for the acceptability of the site parameter

SAR Section 2.1 Geography and Demography

- DCD Incorporated By Reference
- VCSNS Units 2 and 3 are co-located approximately 1 mile south on the existing VCSNS Unit 1 site in rural Fairfield County, South Carolina.
- Largest nearby population center is Columbia, South Carolina located approximately 26 miles to the southeast of the site.

SAR Section 2.2 Nearby Industrial, Transportation and Military Facilities

- DCD Incorporated By Reference
- VCSNS Unit 1 is located approximately 1 mile to the north
- Railroad line runs along Broad River west of the site

Major Items of Interest

- Evaluations of potential accidents
 - AP1000 standard chemicals and site specific additions
 - VCSNS Unit 1 on-site chemicals
 - Railroad shipments
 - Airways
- Evaluated hazards were determined to be acceptable.

Comments





Presentation to the ACRS Subcommittee

V.C. Summer Units 2 and 3 COL Application Review

AFSER Sections 2.0-2.2

July 21-22, 2010

Staff Review Team

- **Technical staff**
 - **David Sisk**, Physical Scientist

- **Project Management**
 - **Michael Wentzel**
 - **Joseph Sebrosky**

Overview

- Sections 2.0(site characteristics), 2.1(Geography and Demography) and 2.2(Near by Industrial, Transportation, and Military Facilities) of the FSAR is a combination of information from two sources:
 - Standard content from the AP 1000 COL
 - Additional application specific information

Technical Topics of Interest

- Exemption request for the maximum safety wet-bulb (noncoincident) air temperature
- The evaluation of aircraft and airway hazards
- The evaluation of the potential hazard to new Units 2 and 3 due to an accidental release from storage tanks located at VCSNS Unit 1.
- The evaluation of potential hazards to new Units 2 and 3 due to other chemicals from Norfolk Southern's rail line.

Maximum Safety Wet-bulb (noncoincident) Air Temperature Exemption

- DCD Revision 17 Tier 1 value for maximum wet bulb (noncoincident) is 86.1 F.
 - VC Summer site parameter value is 87.3 F
- Exemption request will be discussed in several sections of the VC Summer SER:
 - Section 2.0 discusses the exemption and if appropriate will make the finding that the special circumstances of 10 CFR 50.12 are met (finding temporarily relocated to Section 9.2)
 - Section 2.3 discusses whether the regional meteorological data supports the 87.3 F value
 - Sections 5.4, 6.2, 6.4, 9.1, and 9.2 of the SER will evaluate impacts of higher temperature on the design

Maximum Safety Wet-bulb (noncoincident) Air Temperature Exemption, cont'd

- Sections 5.4, 6.2, 6.4, 9.1, and 9.2 of the SER will include evaluations of the following:
 - Incontainment refueling water storage tank (IRWST) temperature control with the normal residual heat removal system (Section 5.4 of the SER)
 - Containment pressure control (Section 6.2 of the SER)
 - Control room habitability (Section 6.4 of the SER)
 - Other systems that are affected (Sections 9.1 and 9.2)
 - Service water system
 - Spent fuel pool cooling system
 - Component cooling water system
 - Central chilled water system

Aircraft and Airway Hazards

- Based on an independent review of airways passing near VCSNS, the NRC confirmed that Airway V53 passes approximately 2.25 miles from VCSNS Units 2 and 3. As a consequence, the third criterion of Section 3.5.1.6 of NUREG-0800 is not met. The staff will evaluate this consequence in SER Section 3.5.1.6.

Potential Hazard Due To An Accidental Release From Unit 1 Storage Tanks

- Based on an independent confirmatory analyses, the NRC staff finds that an accidental release of Ammonium Hydroxide (28%) from storage tanks located at VCSNS Unit 1 would exceed the IDLH concentration outside the MCR. This chemical is further evaluated for control room habitability in SER Section 6.4.

Potential Hazards Due To Other Chemicals Transported By Rail

- Based on an independent confirmatory analyses, the NRC staff finds that two chemicals transported via rail, cyclohexylamine and chlorodifluoromethane would exceed their respective IDLH concentrations outside the MCR. These chemicals are further evaluated for control room habitability in SER Section 6.4.

Confirmatory Items

- The applicant's proposed changes to VCSNS COL FSAR Section 2.2.3.1.3 and Tables 2.2-209 and 6.4-201 will remain as applicant's confirmatory items 2.2-1, 2.2-2, and 2.2-3, respectively.

AP1000 Design Control Document Amended Design

Section 3.7 Seismic Design

Section 3.7 Overview

- 3.7.1 Seismic Input
 - Design Response Spectra
 - Supporting media
- 3.7.2 Seismic System Analysis (Structures)
 - Seismic analysis methods
 - Soil-Structure interaction
 - Floor response spectra
 - Combination of modal responses
 - Seismic interactions

Section 3.7 Overview

- 3.7.3 Seismic Subsystem Analysis (Mechanical Systems and Components)
 - Seismic Analysis Methods
 - Combination of modal responses
 - Analytical Procedure for piping
- 3.7.4 Seismic Instrumentation – No Changes
- Combined License Information
 - Timing clarification

Section 3.7 Changes

- Extension of hard-rock sites to soil sites
- Utilization of 3-D finite element shell models
- Effect of High Frequency Ground Motion
- Use of the Coherency Function
- Classification of adjacent buildings

Extension of hard-rock sites to soil sites

- AP1000 Design Certification (DCD Rev. 15) is for a fixed base hard rock site.
- Design Certification amendment adds 5 other rock and soils cases.
- AP1000 certified seismic design response spectra (CSDRS) is unchanged.
- Soil-Structure interaction evaluation
- Revised floor response spectra

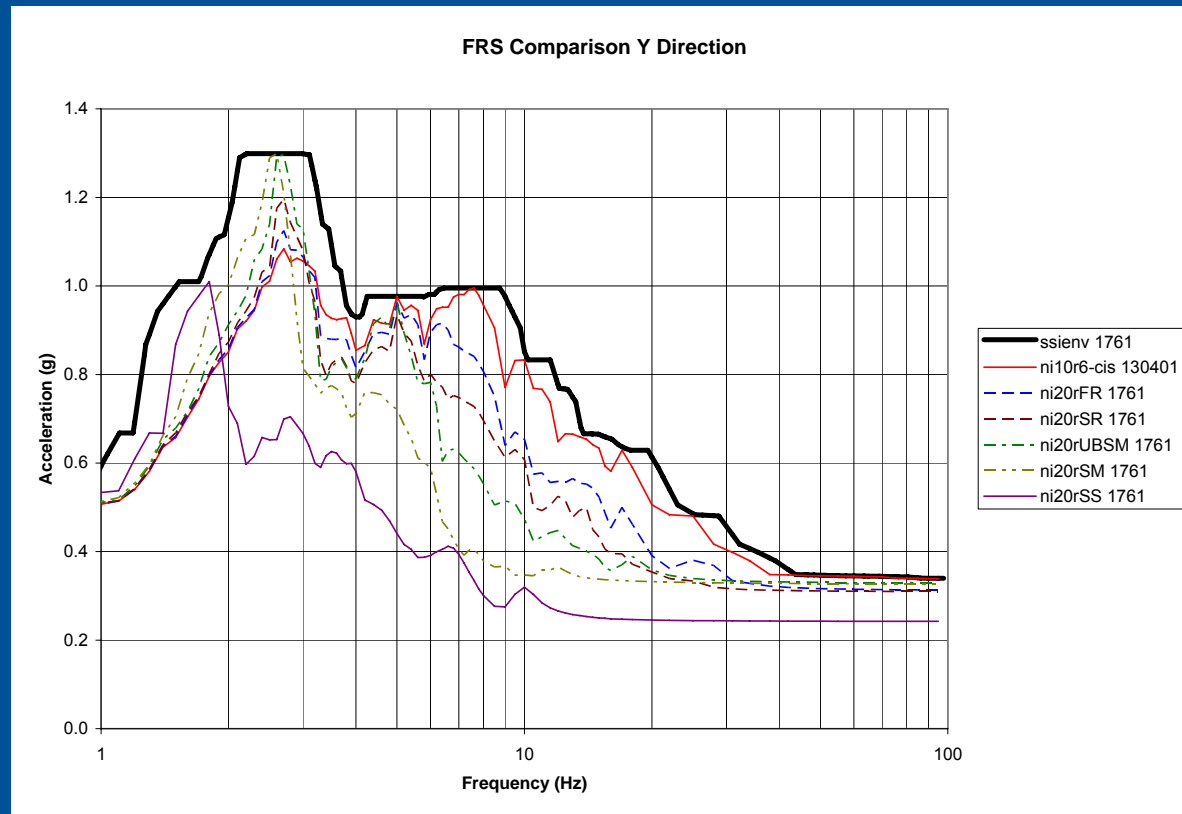
Soil Cases

- Hard-rock site - V_s of 8000 fps
- Firm-rock site - V_s of 3500 fps
- Soft-rock site - a V_s of 2400 fps increasing linearly to 3200 fps at a depth of 240 feet
- Upper bound soft-to-medium soil site - a V_s of 1414 fps increasing parabolically to 3394 fps at 240 feet

Soil Cases

- Soft-to-medium soil site - a V_s of 1000 fps, increasing parabolically to 2400 fps at 240 feet,.
- Soft-soil site - a V_s of 1000 fps increasing linearly to 1200 fps at 240 feet

Typical Floor Response Spectra for 6-Soil Case (RPV Support)



Utilization of 3-D finite element shell models

- The design certification used 3-D lumped mass models for time history analysis to represent the auxiliary building, containment internal structures (CIS), shield building (SB), and steel containment.
- Design Certification amendment uses 3-D finite element shell models for auxiliary building, shield building, and CIS

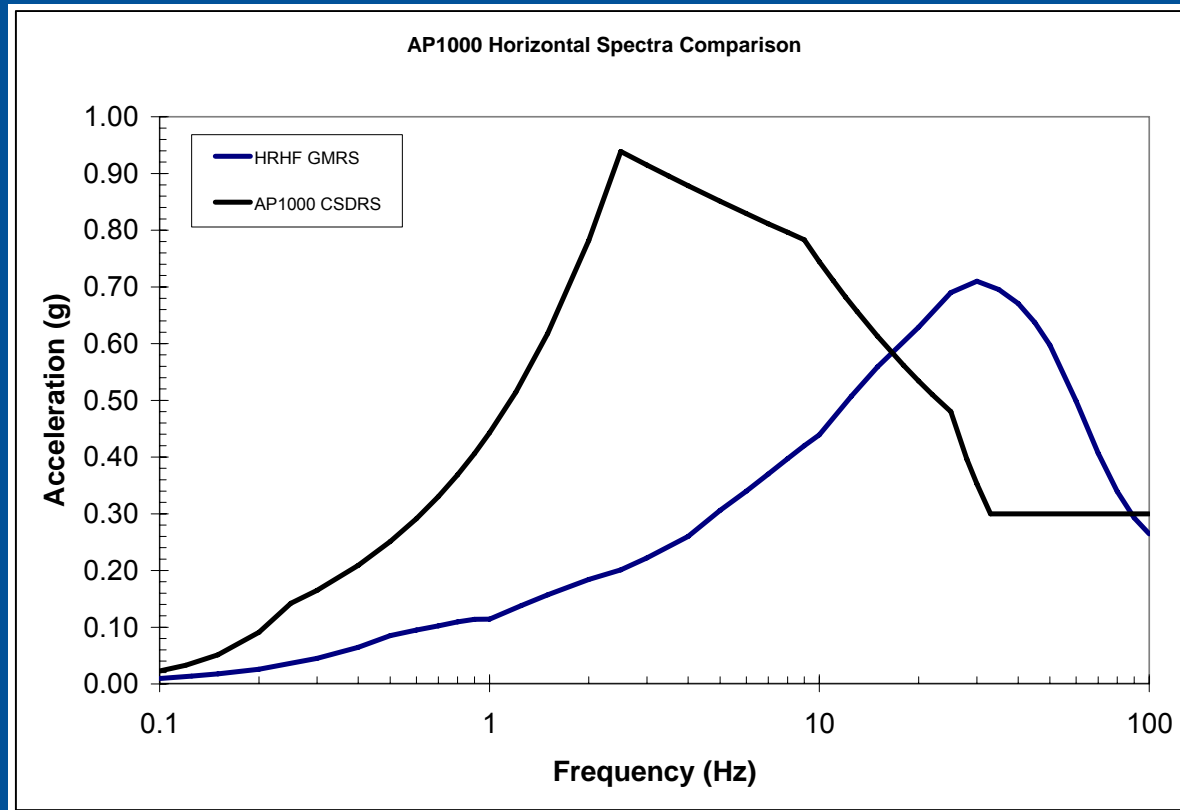
Utilization of 3-D finite element shell models

- Three main models are used for the SSI and seismic analysis
 - ANSYS NI10
 - ANSYS NI20
 - SASSI NI20
- ANSYS NI05 is used for design of the structures using seismic loads

Effect of High Frequency Ground Motion

- Seismic analysis and design of the AP1000 plant is based on the CSDRS,
 - Dominant energy content is in the low frequency range of 2-10 Hz
- Spectra shapes for the Central and Eastern United States (CEUS) show increased amplification in the frequency range above 10 Hz.
- The AP1000 hard-rock high frequency (HRHF) response spectra shape was developed to envelop the site-specific GMRS of several high frequency sites

CSDRS and HRHF Spectra



Effect of High Frequency Ground Motion

- SSCs were evaluated using both the CSDRS and the HRHF response spectra as seismic inputs and then make comparisons of important analysis parameters
- The evaluation is done on a sampling/screening basis and included building structures, reactor pressure vessel internals, primary component supports, primary loop nozzles, piping, and electro-mechanical equipment.

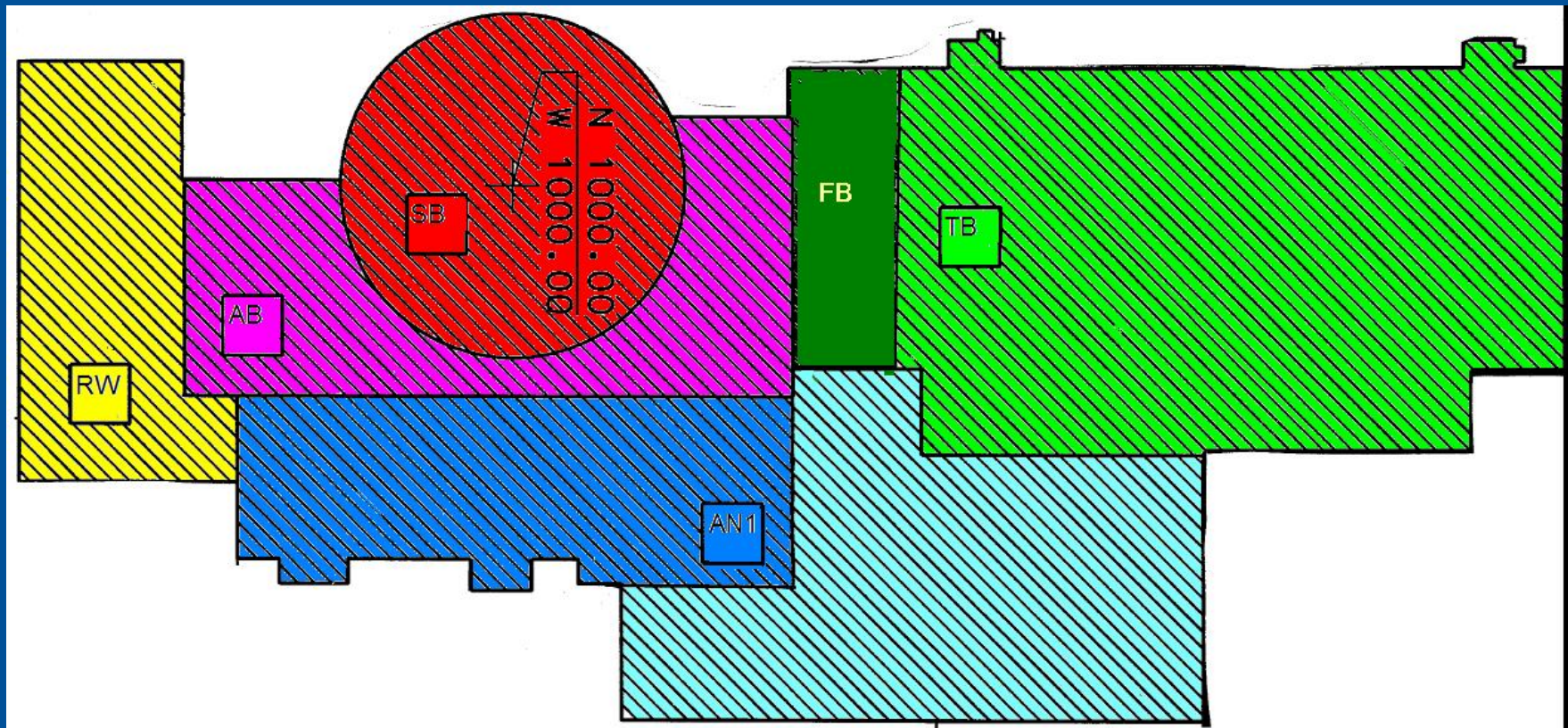
Use of the Coherency Function

- In DCD Revision 15, a coherent seismic analysis was used for developing the in-structure floor response spectra
- A seismic ground motion coherency function is being used to reduce the amplifications caused by the HRHF ground motion.
- The incoherency of seismic waves has an effect on structures with large dimensions,
- The incoherency of seismic waves generally results in a reduction of structural translational responses

Classification of adjacent buildings

- First Bay of Turbine Building
 - More robust – Reinforced concrete
 - Larger; contains more equipment
 - SC II
 - Remainder of Turbine Building is non-seismic
- Annex Building adjacent to Nuclear Island
 - Reinforced concrete and steel framing - SC II
 - Access control to Nuclear Island
 - Remainder of Annex Building is a low rise non-seismic structure

Classification of adjacent buildings



Open Items

- 15 Open Items in 3.7 SER
 - These open items are a result of NRC staff questions about changes to the DCD
 - Most of the questions are due to the addition of soil cases
- 8 Items Completed Since SER Prep.
- 4 Confirmatory Items

Open Items

- **OI-SEB1-3.7.1-018** - Free field in-column response spectra
 - In-column response spectra at the basemat elevation was plotted for each of the generic sites PGA are all above 0.1g
- OI-SRP3.7.1-SEB1-19 - Concrete cracking and damping value
- OI-TR03-001 - Describe analysis assumptions used for the revised SB design dynamic models

Open Items

- OI-TR03-005 - Justify 0.8 stiffness reduction factor for concrete cracking used for the SB analysis
- OI-TR03-032 - Description of the proposed method using more detailed NI05 model to evaluate flexible regions.
- **OI-SRP3.7.1-SEB1-03** - Demonstrate the implementation of the approach for HRHF analysis
– Resolved at Audit

Open Items

- **OI-SRP3.7.1-SEB1-04** - Containment shell models
 - Figures in RAI response have been updated to reflect the corrected seismic model.
- OI-SRP3.7.1-SEB1-06 - NI20 model for flexible regions up to 50 Hz
- **OI-SRP3.7.1-SEB1-08** - Model inconsistency
 - differences in Figure 5.1-7 and 5.1-8 in Technical Report 115 are due to the differences in geometry between the NI10 and NI20 models at the Southeast and Northeast Corners

Open Items

- **OI-SRP3.7.1-SEB1-09** - Model inconsistency, review SASSI results, and how are exceedances of CSDRS-based ISRS by HRHF-based ISRS addressed
 - Reviewed during audit
 - Exceedances of CSDRS-based ISRS by HRHF-based ISRS are addressed as part of the sampling evaluation

Open Items

- **OI-SRP3.7.1-SEB1-10** - Review SASSI results and update figures provided as part of previous revisions
 - Reviewed during audit
 - Figures have been updated
- **OI-SRP3.7.1-SEB1-11** - Review SASSI results and update figures
 - Reviewed during audit
 - Figures have been updated

Open Items

- OI-SRP3.7.1-SEB1-17 - Treatment of missing mass in mode superposition
- OI-SRP3.7.1-SEB1-15 - Structure-soil-structure interaction analyses of buildings adjacent to the NI
- OI-TR03-007 - Modeling approach (sloshing) for the PCS water storage tank
 - dimensions of the PCS tank were not changed and the sloshing analysis is not changed

Questions



Presentation to the ACRS Subcommittee

**SER with Open Items
Section 3.7 – Seismic Design**

**Westinghouse AP1000 Design Certification Amendment
Application Review**

July 21-22, 2010

Staff Review Team

- Technical Staff
 - Brian Thomas, Chief, SEB1
 - Bret Tegeler, Sr. Structural Engineer
 - Pravin Patel, Structural Engineer
- Project Management
 - Terri Spicher
- Contractor Support
 - Brookhaven National Laboratory (C. Costantino, R. Morante)

OVERVIEW

- **Changes in analysis/design due to:**
 - Extension of AP1000 design from hard rock site to a range of soil/rock sites
 - Seismic re-analyses of Nuclear Island (NI) structures for updated seismic loading utilizing 3-D FEM (Finite Element Shell Models)
 - Evaluation of the effects of High Frequency Ground Motion (HRHF)
 - Use of the Seismic Wave Coherency Functions per Interim staff guidance ISG-COL-001

Phase 2 Status of 3.7 (Rev.17)

| SRP Section/Application Section | | AP1000 Changes |
|---------------------------------|----------------------------|---|
| 3.7.1 | Seismic Design Parameters | a) Extend the AP1000 certified seismic hard-rock design basis, to include a broad range of soil and rock sites. |
| 3.7.2 | Seismic System Analysis | <ul style="list-style-type: none"> a) Use 3-D shell models of building structures, instead of 3-D stick models. b) Conduct SSI analyses using SASSI, for 5 site conditions. c) Evaluate a representative hard rock high frequency (HRHF) motion for potential effects on the design of the AP1000 SSCs, using the EPRI ground motion coherency function. |
| 3.7.3 | Seismic Subsystem Analysis | No changes |

Phase 2 Status of 3.7 (Rev. 17)

| SRP Section/Application Section | | AP1000 Status |
|--|----------------------------|---------------------------------------|
| 3.7.1 | Seismic Design Parameters | 2 Open Items 1 Confirmatory Item |
| 3.7.2 | Seismic System Analysis | 11 Open Items 3 Confirmatory Items |
| 3.7.3 | Seismic Subsystem Analysis | 1 Open Item |

Section 3.7.1 – Seismic Design Parameters

- Open Items:
 - OI-SRP3.7.1-SEB1-18
 - Submit the free-field, in-column response spectra and associated PGA at bottom of foundation, for each of the generic site columns (firm rock and soil sites), demonstrating that the criteria in 10 CFR Part 50, Appendix S are satisfied.
 - OI-SRP3.7.1-SEB1-19
 - Justify the concrete stiffness and damping value(s) used in the building seismic analyses.

Section 3.7.2 – Seismic System Analysis

- Open Items:
 - OI-TR03-001
 - Include in TR-03 the dynamic modeling details for the enhanced shield building design.
 - OI-TR03-005
 - Demonstrate that only minor concrete cracking occurs, justifying the use of 0.8 factor for concrete stiffness reduction.
 - OI-TR03-032; OI-SRP3.7.1-SEB1-06
 - Demonstrate that additional local amplification in flexible regions (walls, floors, roof) is adequately considered in developing ISRS for the CSDRS and for the HRHF ground motion .

Section 3.7.2 – Seismic System Analysis

- Open Items:
 - OI-SRP3.7.1-SEB1-03
 - Correct the errors in the HRHF analysis model, re-run the ACS SASSI analysis, submit the revised results to the staff. [TR-115, Rev. 2, submitted by applicant]
 - OI-SRP3.7.1-SEB1-04
 - Demonstrate that high frequency modes in the SCV upper closure dome are not excited by HRHF ground motion.
 - OI-SRP3.7.1-SEB1-08
 - Explain inconsistent ANSYS NI20 results, compared to ANSYS NI10 and SASSI NI20 results, at 2 locations on the Aux Bldg roof.

Section 3.7.2 – Seismic System Analysis

- Open Items:
 - OI-SRP3.7.1-SEB1-09, OI-SRP3.7.1-SEB1-10, OI-SRP3.7.1-SEB1-11:
 - Clarify and justify both the low frequency in-structure response reductions and the high frequency in-structure response reductions obtained by applying ground motion incoherency in the HRHF analysis. Address after performing re-analysis with the corrected model.
 - OI-SRP3.7.1-SEB1-17
 - Provide details on how residual rigid response in modal superposition time history analysis is addressed. Explain differences and/or similarities between applicant's method and RG 1.92, Revision 2 approach, and justify any differences.

Section 3.7.2 – Seismic System Analysis

- Open Items:
 - OI-SRP3.7.1-SEB1-15
 - Submit detailed results for structure-soil-structure interaction between the NI and adjacent Seismic Category II building structures.

Section 3.7.3 – Seismic Subsystem Analysis

- Open Items:
 - OI-TR03-007
 - Re-evaluate sloshing phenomenon in the PCCS tank on top of the shield building, factoring in subsequent shield building design changes that may affect earlier conclusions.

Phase 2 Status of 3.7 (Rev. 17) As of July 21, 2010

| SRP Section/Application Section | | AP1000 Status |
|--|----------------------------|--------------------------------------|
| 3.7.1 | Seismic Design Parameters | 1 Open Item 2 Confirmatory Items |
| 3.7.2 | Seismic System Analysis | 6 Open Items 8 Confirmatory Items |
| 3.7.3 | Seismic Subsystem Analysis | 1 Confirmatory Item |

AP1000 Design Control Document Amended Design

Section 3.8 Design of Category I Structures

Section 3.8 Overview

- Steel Containment
- Concrete and Steel Internal Structures
- Other Category I Structures
- Foundations

Section 3.8 Changes from DCD Rev. 15

- Redesign of the Shield Building
 - Discussed in a later meeting
- Extended the AP1000 structure design to sites ranging from soft soils to hard rock.
- Critical Section Design Updated
 - Soil Cases
 - Design finalization
- Settlement evaluation during construction
 - Include construction sequence limits

Construction Sequence Limits

- Prior to completion of both the shield building and auxiliary building at elevation 82' -6":
 - Concrete may not be placed above elevation 84' -0" for the shield building or containment internal structure.
 - Concrete may not be placed above elevation 117' -6" in the auxiliary building, except in the CA20 structural module, where it may be placed to elevation 135'-3".

Material specification changes Since DCD Rev. 15

- Containment - change the process for creating high quality, vacuum-degassed steel
- Modules - change in material of structural modules from Nitronic 33 to Duplex 2101
- Industry standard change from NQA-2 to NQA-1 for packaging, shipping, receiving, storage and handling
- Concrete material – changed the compressive strength of concrete in the shield building from 4,000 psi to 6,000 psi

Elimination of COL information items

- Design of containment vessel adjacent to large penetrations.
- PCS water storage tank inspections that were redundant to ITAACs.
- In-service inspection of containment vessel that is required by other NRC regulations including 10 CFR 50.55a

Section 3.8 Open Items

- 20 Open Items have been identified in SER for DCD Chapter 3.8
- 1 Additional RAI
- 5 confirmatory items identified in SER
- 10 Items have been submitted since SER was prepared
- 2 Placeholder items.

Section 3.8.2 – Steel Containment

Open Items

- **OI-SRP3.8.2-SEB1-03** – Address questions about load combinations for the steel containment design including wind tornado and hydrogen generated pressure loads
 - The AP1000 containment is not subject to direct wind loads
 - Hydrogen pressure and burn loads clarified

Section 3.8.2 – Steel Containment Open Items

- **OI-SRP3.8.2-SEB1-02** – Details with compliance to Regulatory Guides 1.7, 1.57, 1.160, and 1.199.
 - Addressed conformance with Reg. Guides including hydrogen pressure loads, load combinations, maintenance rule information, and anchors

Section 3.8.2 – Steel Containment Open Items

- OI-RAI-TR09-05 – Open Item against TR09 awaiting closure of OI-SRP3.8.2-SEB1-03.
 - Placeholder for NRC action
- OI-RAI-TR09-08 – Details regarding temperature and external pressure loads of containment.
 - This answer pending containment design change.

Section 3.8.2 – Steel Containment Open Items

- **OI-SRP3.8.2-CIB1-01** – include bounding calculation using -40°F, and wind speed of 48 mph in calculation of lowest service metal temperature
 - Westinghouse will revise APP-MV50-Z0C-039 Rev. 0 to incorporate the bounding case
- **RAI-SRP3.8.2-SPCV-01** – Explain assumptions used in evaluation to determine containment external pressure.
 - This answer pending containment design change.

Section 3.8.3 - Concrete and Steel Internal Structures - Open Items

- OI-SRP3.8.3-SEB1-01 – Use of AISC/ANSI N690 Supplement 2 and AWS Standards.
- OI-SRP3.8.3-SEB1-03 – Further justification needed regarding the proper stiffness utilization for the modules of the CIS and for other reinforced concrete structures.

Section 3.8.3 - Concrete and Steel Internal Structures - Open Items

- OI-SRP3.8.3-SEB1-04 – Description of how the loads from the module could be properly transferred from the module to the embedded bars in the base concrete.
- OI-SRP3.8.3-SEB1-05 – Include information on plate thicknesses as Tier 2* information in the DCD.
 - DCD is revised to include plate thickness

Section 3.8.4 - Other Category I Structures - Open Items

- OI-SRP3.8.4-SEB1-03 – Request for more detail in the DCD related to enhanced shield building design and reason for removal of certain Tier 2* information.
- OI-TR85-SEB1-29 – Computer code used to proportion the cross-sectional strength of members involving concrete materials.
 - NRC MACRO Inspection on May 11 - 13, 2010 resolved this issue.

Section 3.8.4 - Other Category I Structures - Open Items

- OI-TR85-SEB1-27 – Implementation of 100-40-40 method for combination of the three direction seismic loading

Section 3.8.5 - Basemat - Open Items

- OI-TR85-SEB1-10 – Request to make TR-09, TR-57, and TR-85 Tier 2* or provide acceptable alternative.
- OI-TR85-SEB1-35 – Further clarification in the DCD on the waterproofing materials.
 - Additional information is included in the DCD on waterproofing used under the foundation of the AP1000.

Section 3.8.5 - Basemat - Open Items

- OI-TR85-SEB1-32 – Assumption of Uniform Soil Spring Beneath the Basemat.
- OI-TR85-SEB1-37 – Additional information on the evaluation of stability and the soil friction angle
 - DCD information on stability evaluation and the Minimum Soil Angle of Internal Friction is added and clarified.

Section 3.8.4 - Other Category I Structures - Open Items

- **OI-TR85-SEB1-36** – Include Nuclear Island Settlement Criteria in Tier 1 of the DCD
 - Additional settlement criteria are added to Tier 1 Table 5.0-1
- **OI-TR85-SEB1-17** – Further evaluation of construction sequence limitations needed for stiffer foundation materials.
 - DCD is changed to make limitations applicable to all soils except hard rock

Section 3.8.6 – Combined License Information - Open Items

- **OI-SRP3.8.6-SEB1-01** – Evaluate change to COL information item related to Containment Vessel Design Adjacent to Large Penetrations against TR09 changes
 - NRC Placeholder
- **OI-SRP3.8.6-SEB1-02** – Consistency between ITAAC to inspect PCS water storage tank for cracking and guidance in DCD Section 3.8.4.7.
 - ITAAC is revised to clarify inspection

Questions



Presentation to the ACRS Subcommittee

**SER with Open Items
Section 3.8 – Design of Category I Structures**

**Westinghouse AP1000 Design Certification Amendment
Application Review**

July 21-22, 2010

Staff Review Team

- Technical Staff
 - Brian Thomas, Chief, Structural Engineering Branch
 - John Ma, Sr. Structural Engineer
- Project Management
 - Terri Spicher, AP1000
- Contractor Support
 - Brookhaven National Laboratory (J. Braverman)

OVERVIEW

- **Changes in analysis/design due to:**
 - Extension of AP1000 design from hard rock site to a range of soil/rock sites
 - Seismic re-analyses of Nuclear Island (NI) structures for updated seismic loading
 - Shield Bldg. redesign (not addressed in this meeting)
 - Use of additional analysis methods for design (i.e., response spectra & time history analyses)
 - Change in structural steel materials and concrete strength
 - Revised stiffness assumption for containment internal structures
 - Revision required for seismic stability evaluation
 - Elimination of Combined License Information Items

Phase 2 Status of 3.8 (Rev.17)

| SRP Section/Application Section | | AP1000 Changes |
|---------------------------------|--|---|
| 3.8.2 | Steel Containment | <ul style="list-style-type: none"> a) Calculation update due to extension from hard rock site to a range of soil/rock sites b) Addressed Rev. 15 COL Action Item for design of containment vessel next to large penetrations (Technical Report TR-09) c) Deleted requirement for in-service inspection of containment vessel, in accordance with ASME Code Section XI, Subsection IWE; transferred responsibility to COL |
| 3.8.3 | Concrete and Steel Internal Structures of Steel or Concrete Containments | <ul style="list-style-type: none"> a) Removed Section 3.8.3.4.1.2 “Stiffness Assumptions for Global Seismic Analyses” b) Revised Section 3.8.3.5.7 – “Design Summary Report” |

Phase 2 Status of 3.8 (Rev.17)

| SRP Section/Application Section | | AP1000 Changes |
|---------------------------------|--|---|
| 3.8.3 | Concrete and Steel Internal Structures of Steel or Concrete Containments | <ul style="list-style-type: none"> c) Revised Appendix 3H – Auxiliary and Shield Building Critical Sections d) Revised Section 3.8.3.6 – “Materials, Quality Control, and Special Construction Techniques.” e) Revised Section 3.8.6.3 – “Concrete Placement” f) Reduced height of 2100 ft³ pressurizer |
| 3.8.4 | Other Seismic Category I Structures | <ul style="list-style-type: none"> a) Revised 3.8.4.2 – “Applicable Codes, Standards, and Specifications.” b) Redesign of shield building. (not addressed in this meeting) c) Revised design analysis procedures under Section 3.8.4.4.1 – “Seismic Category I Structures” d) Revised Section 3.8.4.5.3 – “Design Summary Report.” |

Phase 2 Status of 3.8 (Rev.17)

| SRP Section/Application Section | | AP1000 Changes |
|---------------------------------|-------------------------------------|--|
| 3.8.4 | Other Seismic Category I Structures | e) Revised Section 3.8.4.6.1.1 – “Concrete.” Specimen age for strength test increased to 56 days for certain concrete, compressive strength increased to 6,000 psi in shield bldg., and additional revisions to chemical composition and proportioning of concrete mix. |
| 3.8.5 | Foundations | a) Revised 3.8.5.4.1 – “Analyses for Loads during Operation.” Revised 3.8.4.2 – “Applicable Codes, Standards, and Specifications.” b) Revised design analysis procedures under Section 3.8.4.4.1 – “Seismic Category I Structures” c) Revised Section 3.8.4.5.3 – “Design Summary Report.” |

Phase 2 Status of 3.8 (Rev.17)

| SRP Section/Application Section | | AP1000 Changes |
|--|------------------------------|---|
| 3.8.6 | Combined License Information | <ul style="list-style-type: none">a) Revised 3.8.6.1 by eliminating COL information item, because it had been addressed in APP-GW-GLR-005 (TR-09) and incorporated into DCDb) Revised 3.8.6.2 through 3.8.6.4 with regard to remaining COL information items |

Phase 2 Status of 3.8 (Rev. 17)

| SRP Section/Application Section | | AP1000 Status |
|--|--|--------------------------------------|
| 3.8.1 | Concrete Containment | Not applicable |
| 3.8.2 | Steel Containment | 4 Open Items 1 Confirmatory Item |
| 3.8.3 | Concrete and Steel Internal Structures of Steel or Concrete Containments | 4 Open Item 2 Confirmatory Items |
| 3.8.4 | Other Seismic Category I Structures | 1 Open Items |
| 3.8.5 | Foundations | 8 Open Items 2 Confirmatory Items |
| 3.8.6 | Combined License Information | 2 Open Items |

Section 3.8.2 – Steel Containment

- Open Items:
 - OI-SRP3.8.2-SEB1-02
 - Explain whether design, construction, and inspection are in accordance with RGs 1.7, 1.57, 1.160 and 1.199
 - OI-SRP3.8.2-SEB1-03
 - Explain why DCD does not include load combinations that combine wind load with design pressure load and tornado wind load with external pressure load; clarify hydrogen generated pressure loads
 - OI-RAI-TR09-05
 - Describe the loads considered, how they were combined, and whether the containment post –LOCA flooding load was included; placeholder for OI-SRP3.8.2-SEB1-03
 - OI-RAI-TR09-08
 - Describe pressure and temperature condition used in Service Level A combination, and technical basis for deciding it is the worst case

Section 3.8.3 – Concrete and Steel Internal Structures of Steel or Concrete Containments

- Open Items:
 - OI-SRP3.8.3-SEB1-01
 - Identify whether the AP1000 plant meets industry standard AISC-N690-1994, Supplement 2 (2005) and the more recent versions of the applicable AWS standards
 - OI-SRP3.8.3-SEB1-03
 - Justify the use of the stiffness reduction factor of 0.8 for containment internal structures (CIS) and reinforced concrete structures
 - OI-SRP3.8.3-SEB1-04
 - Describe how the loads from the CIS could be properly transferred to the base concrete, and explain how the design is performed
 - OI-SRP3.8.3-SEB1-05
 - Include required plate thicknesses for the CIS, and correct the designation of the Tier 2* information in DCD Section 3.8.3.5.8.1

Section 3.8.4 – Other Seismic Category I Structures

- Open Items:
 - OI-SRP3.8.4-SEB1-03
 - Address Staff concerns about incomplete information regarding the identification of required reinforcement for concrete sections, reduction in number of critical sections evaluated, reasoning behind certain loads not appearing in the load combinations, inconsistency in allowable stress values, and removal of some Tier 2* information

Section 3.8.5 – Foundations

- **Open Item:**
 - **OI-TR85-SEB1-10**
 - **Identify TR-09, TR-57, and TR-85 as Tier 2* information, or provide an acceptable justification as to why they are not**
 - **OI-TR85-SEB1-35**
 - **Provide more details about the type and industry standard used for the waterproofing membrane, and information that demonstrates adequacy of waterproofing material**
 - **OI-TR85-SEB1-32**
 - **Demonstrate that assumption of uniform soil pressure acting at the bottom of basemat is conservative/adequate**
 - **OI-TR85-SEB1-27**
 - **Confirm combination method of loads from the 3 directional components of earthquake motion used for basemat design**

Section 3.8.5 – Foundations

- Open Item:
 - OI-TR85-SEB1-29
 - Explain apparent error found in computer macro code used to design concrete members. Independent simplified confirmatory analysis being performed.
 - OI-TR85-SEB1-37
 - Clarify site-specific evaluation requirements for sliding and overturning stability for use by COL applicants
 - OI-TR85-SEB1-36
 - Present settlement criteria in DCD Tier 1, Table 5.0-1 – Site Parameters
 - OI-TR85-SEB1-17
 - Justify why construction sequence limitations are unnecessary for “soft rock,” “firm rock,” or “hard rock” sites

Section 3.8.6 – Combined License Information

- Open Item:
 - OI-SRP3.8.6-SEB1-01
 - Placeholder for resolution of remaining TR-09 RAIs; needed to accept removal of COL Information Item for containment design around penetrations
 - OI-SRP3.8.6-SEB1-02
 - Include commitment to inspect the PCS tank for significant cracking in accordance with ACI 349.3R-96 in ITAAC Table 3.3-6, and explain whether inspection will be performed for all three structural regions (PCS tank boundary, shield building roof, and tension ring). Inconsistencies exist between which regions will be inspected according to the ITAAC and Section 3.8.4.7

As of July 21, 2010

| SRP Section/Application Section | | AP1000 Status |
|--|--|--------------------------------------|
| 3.8.1 | Concrete Containment | Not applicable |
| 3.8.2 | Steel Containment | 4 Open Items 1 Confirmatory Item |
| 3.8.3 | Concrete and Steel Internal Structures of Steel or Concrete Containments | 3 Open Items 2 Confirmatory Items |
| 3.8.4 | Other Seismic Category I Structures | 1 Open Item |
| 3.8.5 | Foundations | 5 Open Items 5 Confirmatory Items |
| 3.8.6 | Combined License Information | 1 Open Item 1 Confirmatory Item |



Presentation to the ACRS Subcommittee

**Vogtle Units 3 and 4 COL Application Review
Upcoming ACRS Interactions**

Eileen McKenna, Branch Chief (AP1000 Projects)
Jeffrey Cruz, Branch Chief (AP1000 Projects)

July 21 -July 22, 2010

Upcoming ACRS Meetings

- Near term interactions (tentative)
 - September 2010
 - DCD Chapters 5,7,8,13, and 18
 - Vogtle Chapters 5,7,8,13,14 and 18
 - Summer-Plant Specific issues-Section 2.4, and Emergency Plan

 - October 2010
 - DCD Chapters 6, and 15
 - Vogtle Chapters 6,and 15

ACRS Interactions

| Date | Topics(s) |
|---|--|
| September 20-21, 2010 Advanced FSER Presentations | Day 1 AP1000 DCD Chapters 5, 7, 8, 13, 18 Day 2 Vogtle COL Chapters 5, 7, 8, 13, 14, 18 Summer Plant Specific Issues-Section 2.4 and Emergency Planning |
| October 5, 2010 Advanced FSER Presentations | Day 1 AP1000 DCD Chapters 6, 15 Vogtle Chapters 6, 15 |
| November 18-19, 2010 Advanced FSER Presentations | Day 1 AP1000 DCD All Chapters and 1, 3,9, 19, 23 Day 2 Vogtle All Chapters and 1, 3,9, 19 Summer COL Chapters (Plant Specific Portion) and plant specific issues-Wet Bulb Temperature |
| December 2-3, 2010 ACRS Full Committee Meeting | Days 1 AP1000 DCD All Chapters Day 2 Vogtle COL All Chapters Summer COL All Chapters |



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VC Summer Units 2 and 3 SAR Section 2.3 Meteorology

Steve Summer

**SCANA Services – Supervisor
Environmental Services**

Major Items of Interest

- DCD Incorporated by Reference
 - VCS DEP 2.0-2 deals with a maximum safety wet bulb temperature (noncoincident) of 87.3°F, a value of 1.2°F above the AP1000 DCD value of 86.1°F

Major Items of Interest

- 5 COL Information Items Addressed
 - COL 2.3-1 Regional Climatology
 - COL 2.3-2 Local Meteorology
 - COL 2.3-3 Onsite Meteorological Measurement Program
 - COL 2.3-4 Short Term (Accident) Diffusion Estimates
 - COL 2.3-5 Long Term (Routine Release) Diffusion Estimates

Major Items of Interest

- With the exception of the previously discussed departure, all AP1000 required siting characteristics are fully acceptable.

Unit 1 Met Tower

Units 2 & 3
General Location

New Met Tower
(built 12-2006)



COL Information Item 2.3-3

- Three years of data from the VCSNS Unit 1 meteorological monitoring location was collected, analyzed and submitted (while the Units 2 and 3 tower was being constructed and data was being collected).
- After comparing Units 2 and 3 tower data to the Unit 1 data, lake effects were found to have a greater impact than originally expected.

COL Information Item 2.3-3

In light of the data comparison,

- Two years of data from the Units 2 and 3 tower were subsequently utilized to update the application with more representative information.
- The overall conclusions were effectively unchanged based on the new data.

Comments





Presentation to the ACRS Subcommittee

V.C. Summer Units 2 and 3 COL Application Review

**AFSER Section 2.3
Meteorology**

July 21-22, 2010

Staff Review Team

- **Technical Staff**
 - **Kevin Quinlan**, Physical Scientist (Meteorologist)
- **Project Management**
 - **Mike Wentzel**

Content of Section 2.3

- FSAR Chapter 2.3 incorporates by reference Revision 17 of the AP1000 DCD.

- COL items, Supplemental Information, and a Departure
 - VCS COL 2.3-1 – Regional Climatology
 - VCS COL 2.3-2 – Local Climatology
 - VCS COL 2.3-3 – Onsite Meteorological Measurements Program
 - VCS COL 2.3-4 – Short-Term Diffusion Estimates
 - VSS COL 2.3-5 – Long-Term Diffusion Estimates
 - VCS SUP 2.0-2 – Comparison Table of Site Parameters and Site Characteristics
 - VCS SUP 2.3-1 – Regional and Local Climatology
 - VCS DEP 2.0-2 – Noncoincident Wet-Bulb

Technical Topics of Interest

- 2.3.1 Regional Climatology
 - Comparison of climatic site parameters and site characteristics
 - 50-year/100-year Wind Speed (3-second gust)
 - Maximum Tornado Wind Speed
 - Maximum Roof Load (Winter Precipitation)
 - 0% Exceedance and 100-year Return Period Temperatures
 - **VCS DEP 2.0-2** stated that the 100-year return period noncoincident wet-bulb temperature of 87.3 F exceeded the AP1000 DCD site parameter value of 86.1 F
- 2.3.2 Local Meteorology
 - Addressed the Cooling Tower-Induced Effects on Temperature, Moisture, and Salt Deposition
 - Provided detailed information showing that the VCS meteorological data is representative of the site area

Technical Topics of Interest

- 2.3.3 Onsite Meteorological Measurement Program
 - COL applicant described the onsite meteorological measurements program and provided a copy of the resulting meteorological data.
 - Applicant met RG 1.23, Revision 1 criteria for siting of the tower in relation to Units 2 & 3
 - New meteorological tower began recording data in December 2006.
 - Staff verified that the location of the new tower is representative of the site area.
 - Unit 1 meteorological tower will serve as a backup data source for Units 2 and 3 during routine service, maintenance, and accidental atmospheric radiological releases.

Technical Topics of Interest

- 2.3.4 Short-Term (Accident) Diffusion Estimates
 - Comparison of atmospheric dispersion site parameters and site characteristics
 - COL FSAR presented EAB & LPZ χ/Q values
 - COL FSAR presented Control Room χ/Q values
- 2.3.5 Long-Term (Routine) Diffusion Estimates
 - Comparison of atmospheric dispersion site parameters and site characteristics
 - COL FSAR 2.3-5 verified release points and receptor locations



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VC Summer Unit 2/3

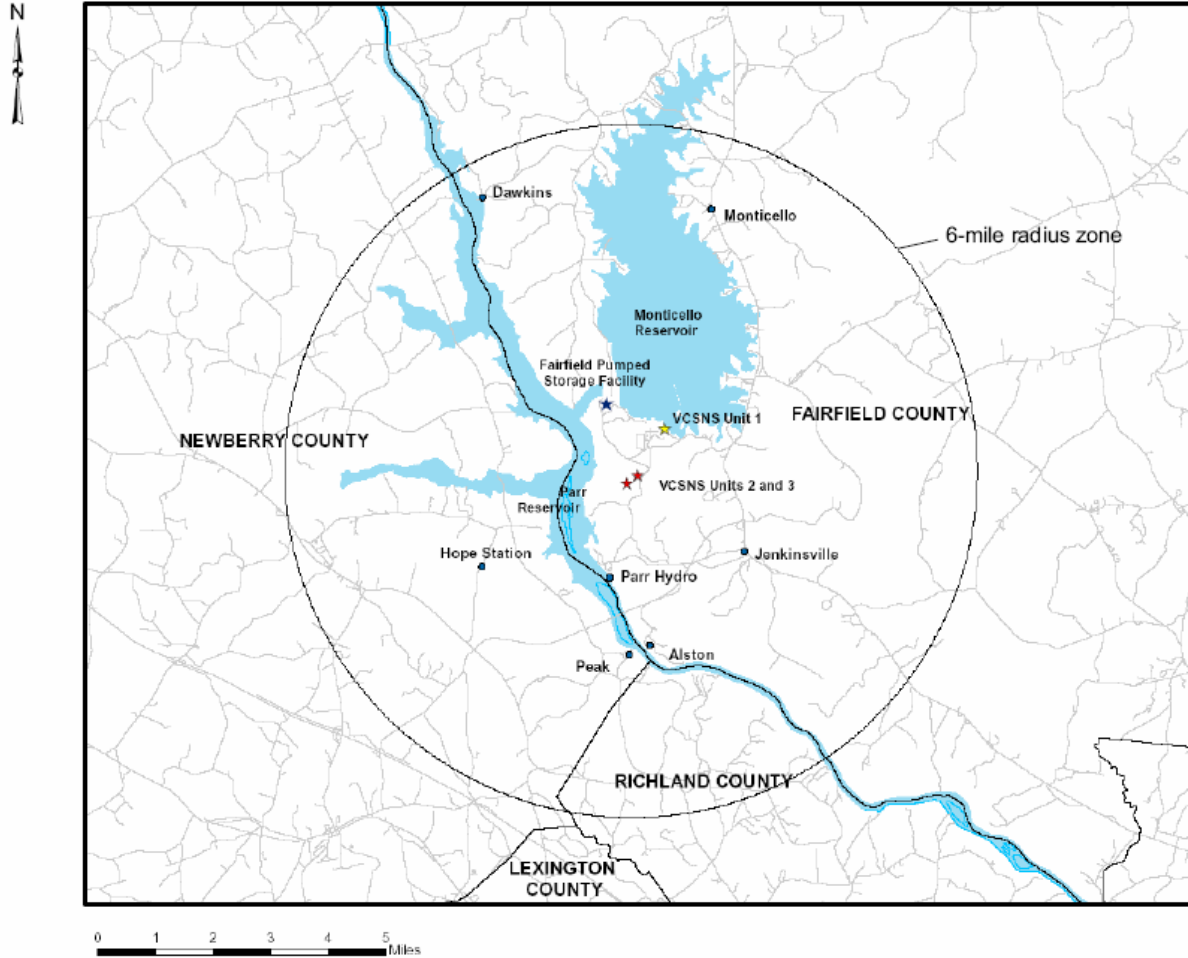
Site Overview & SAR Section 2.5

Bob Whorton

SCE&G - Consulting Engineer



VC Summer Unit 2/3



Lake Monticello

V.C. Summer Station Unit 1

Proposed Units 2 & 3
(Artist rendering)

Low profile cooling towers
for proposed Units 2 & 3
(Artist rendering)



Appendix 3

Unit 1 – 2007 Aerial Photo

Units 2/3



VC Summer Site - Jan 2010

VCS
Units
2&3



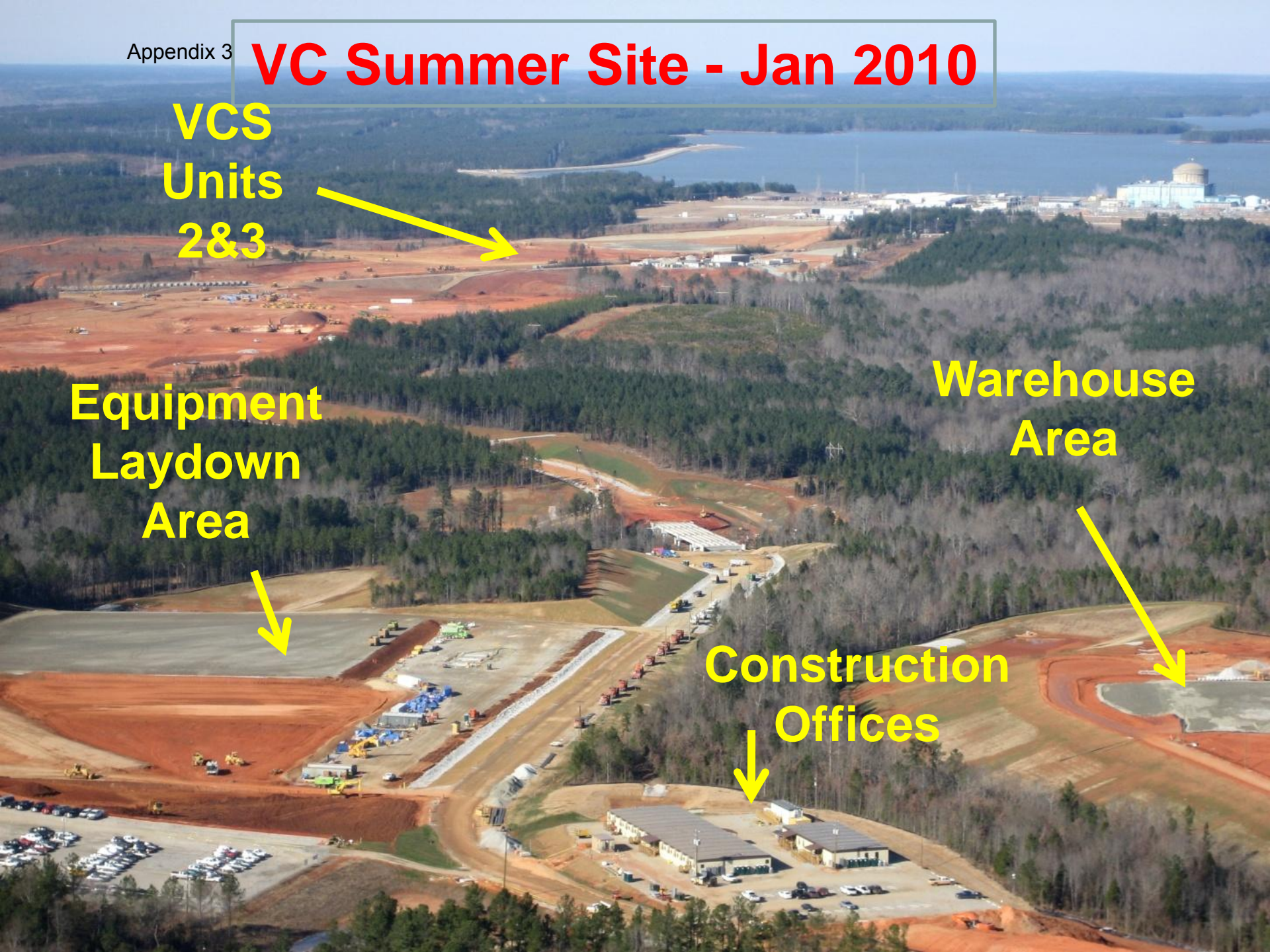
Equipment
Laydown
Area



Warehouse
Area



Construction
Offices



U2 Power Block Excavation & Geologic Mapping

Appendix 3



Unit 2 Power Block Excavation



Unit 2 Excavation



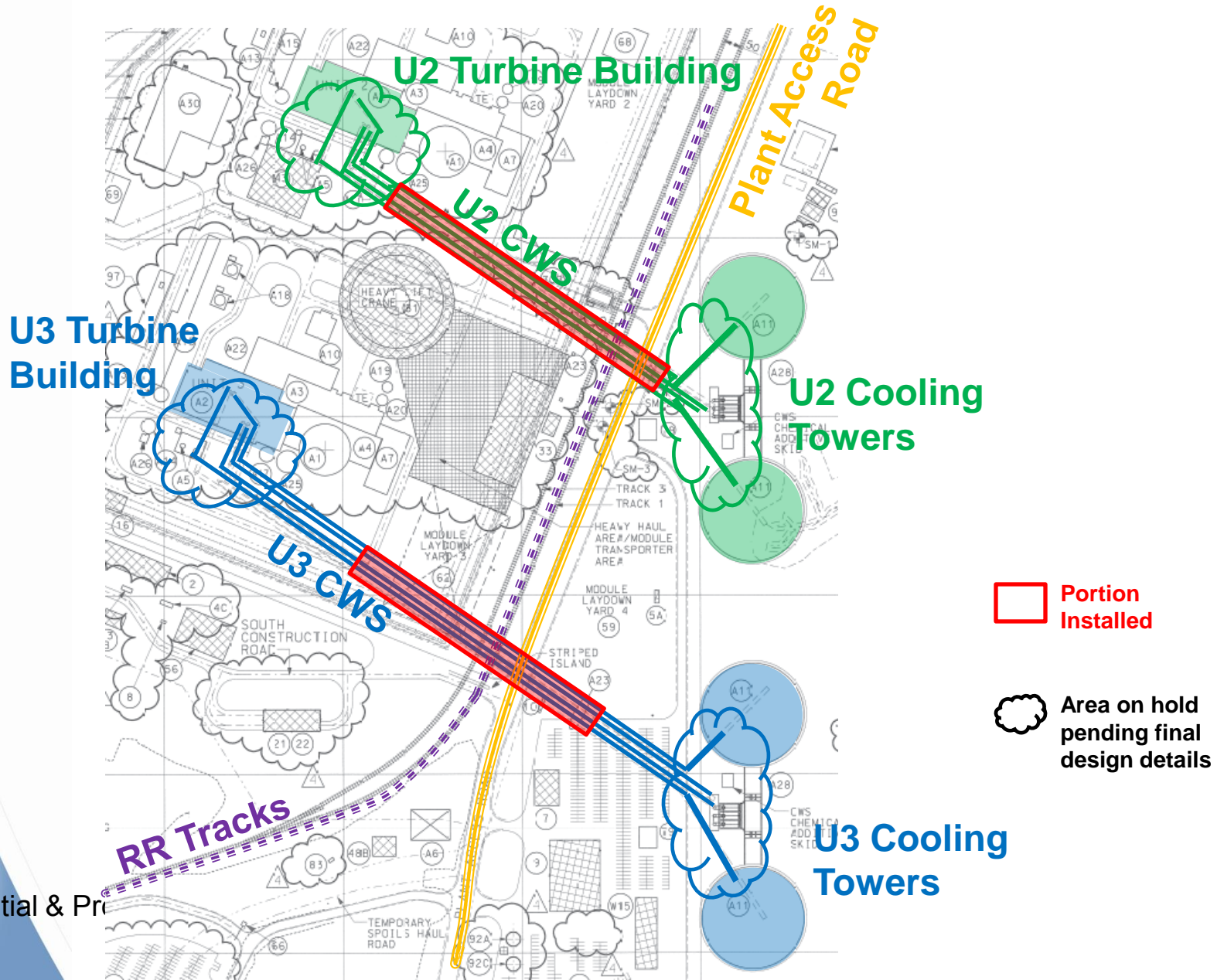
Unit 2 Panel Section Geologic Mapping



Engineer —
Not a
Geologist

07/08/2010 13:41

CWS Pipe Installation



CWS Pipe Installation

**Unit 2 CWS West
End Bulkhead**



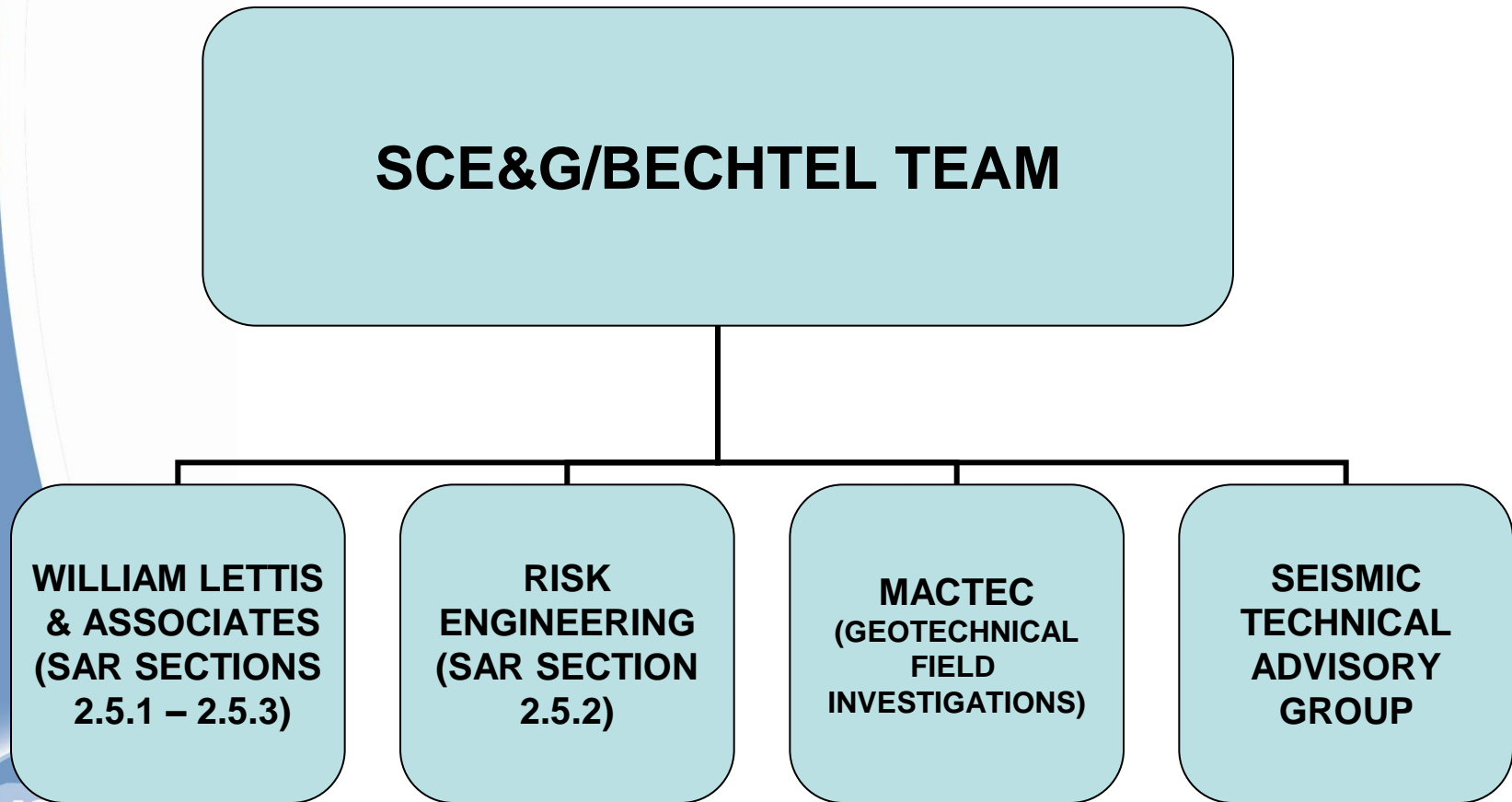
**Unit 3 CWS Excavation
and Installation**



Unit 3 – CW Line Installation



SAR SECTION 2.5 TECHNICAL DEVELOPMENT



SUMMER - SEISMIC TECHNICAL ADVISORY GROUP (TAG)

- **Dr. Martin Chapman – Virginia Tech**
- **Dr. Allin Cornell – Stanford**
- **Dr. Robert Kennedy – Consultant**
- **Mr. Don Moore – Southern Company**
- **Dr. Carl Stepp – Consultant**



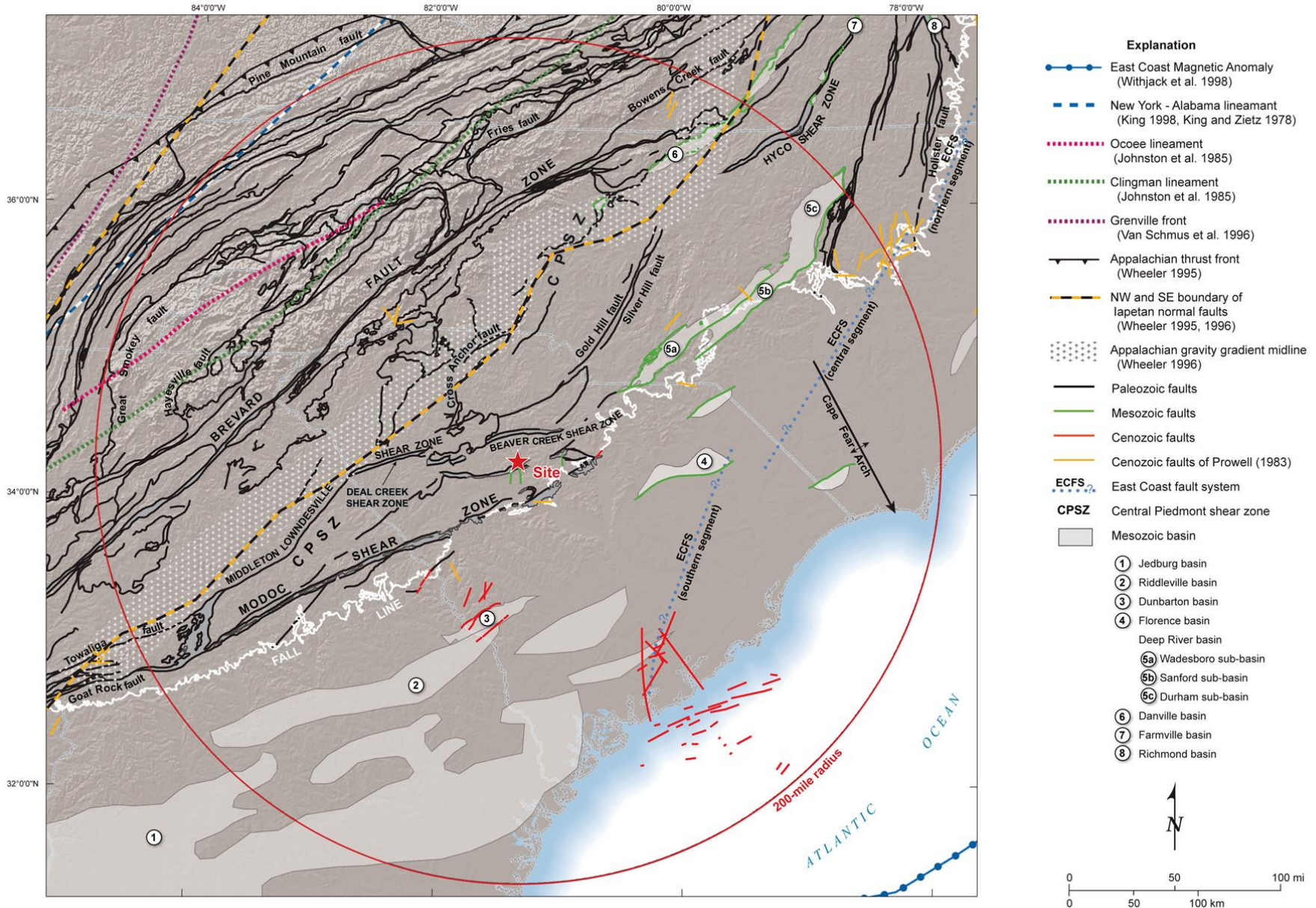
SCE&G VC Summer COL

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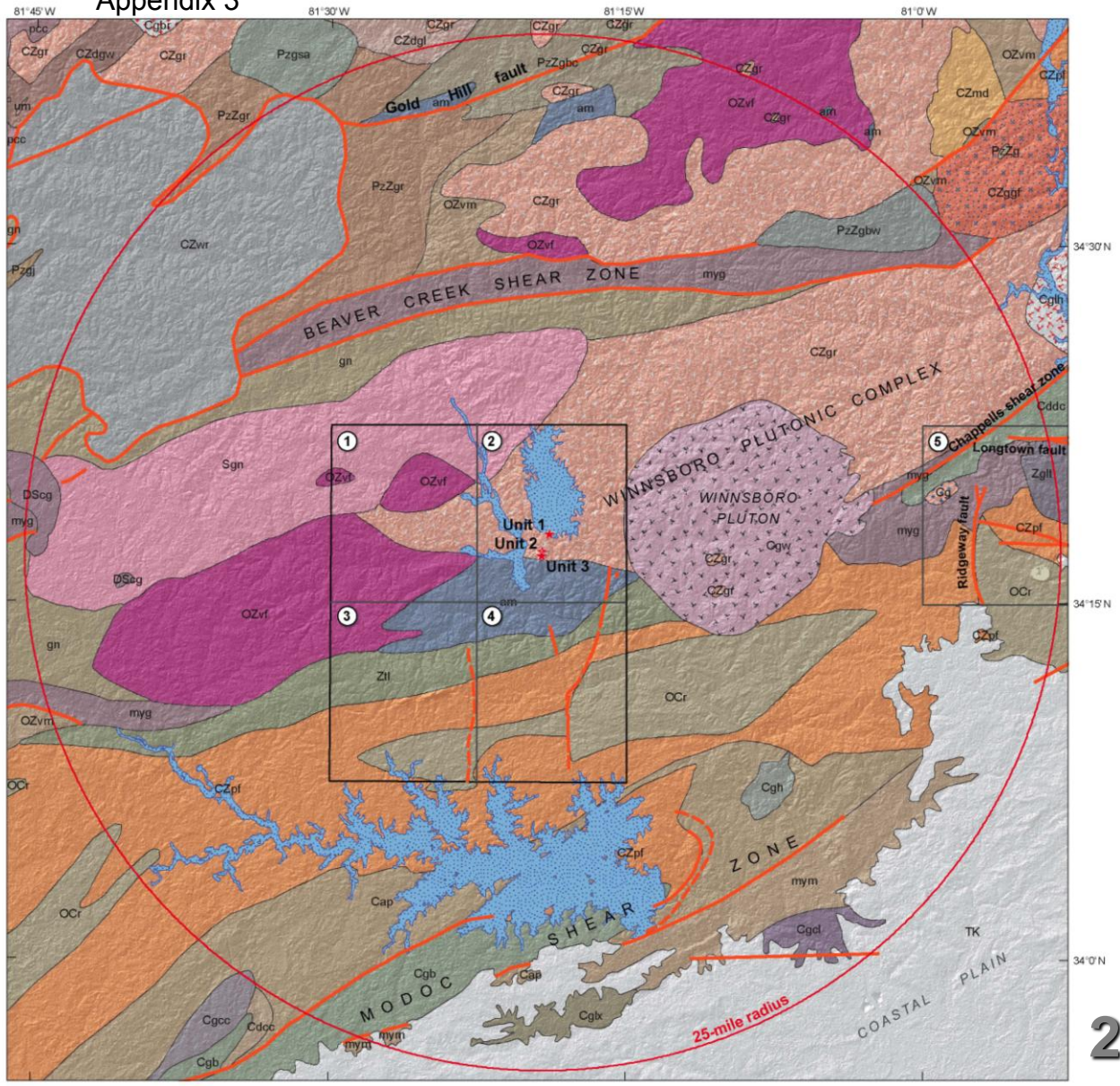
SAR Sections 2.5.1 and 2.5.3

Basic Geologic and Seismic Information & Surface Faulting

200-mi Map of Tectonic Features



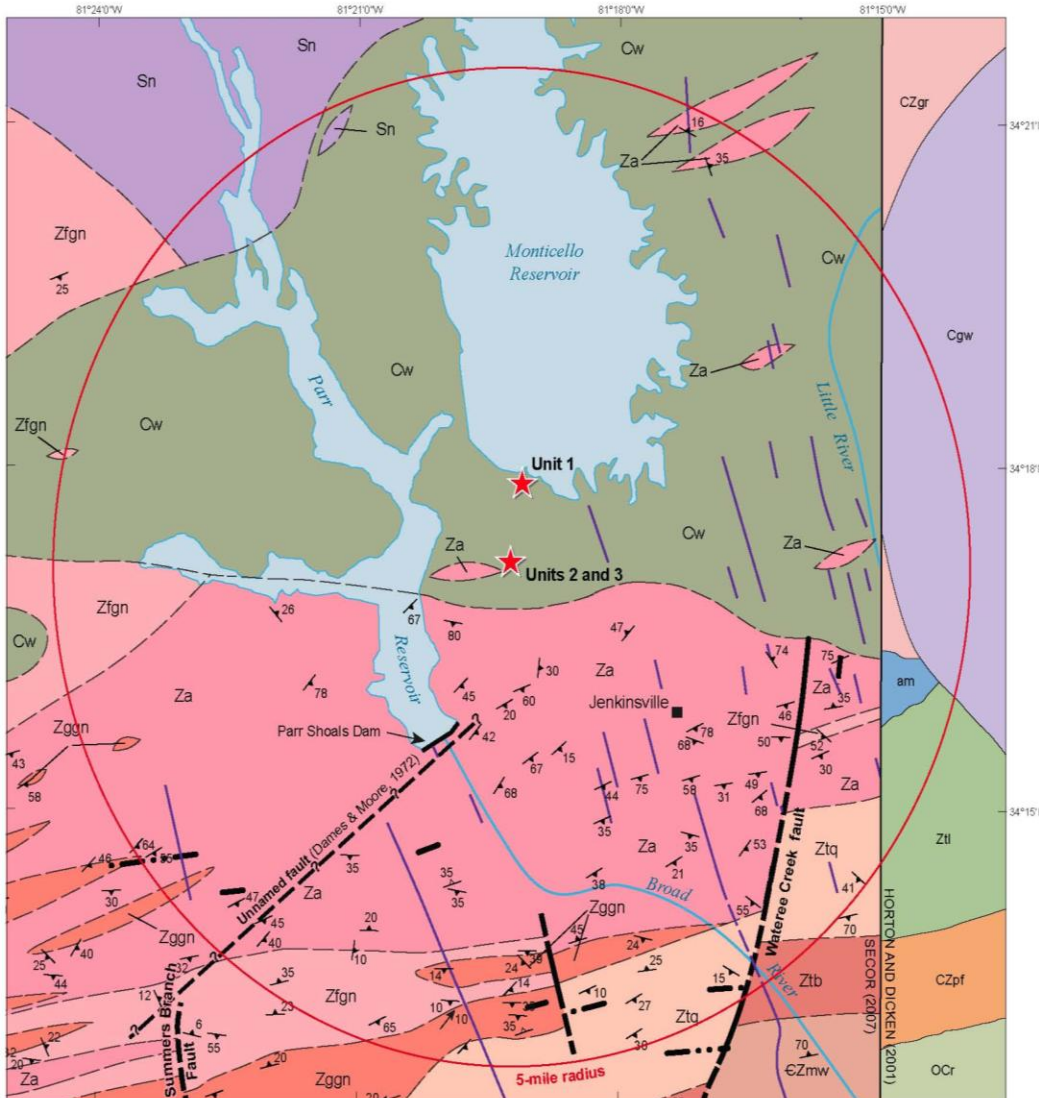
Appendix 3



25-mi Geologic Map

Modified from Horton and Dicken (2001), Hibbard et al (2006), and Secor (2007)

5-mi Geologic Map



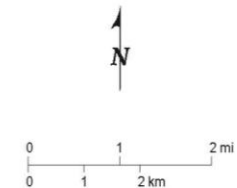
- Explanation**
- Stratigraphic or intrusive contact
 - Fault zone, unsilicified
 - Fault zone, silicified
 - Axis of overturned syncline
 - 70° Attitude of compositional layering; vertical
 - 40° Attitude of S₁ foliations; vertical
 - 80° Attitude of S₁ foliations; vertical
 - ↗₁₀ Bearing and plunge of L_{0x1} and L₁ lineations

Secor (2007) 1:24,000 scale

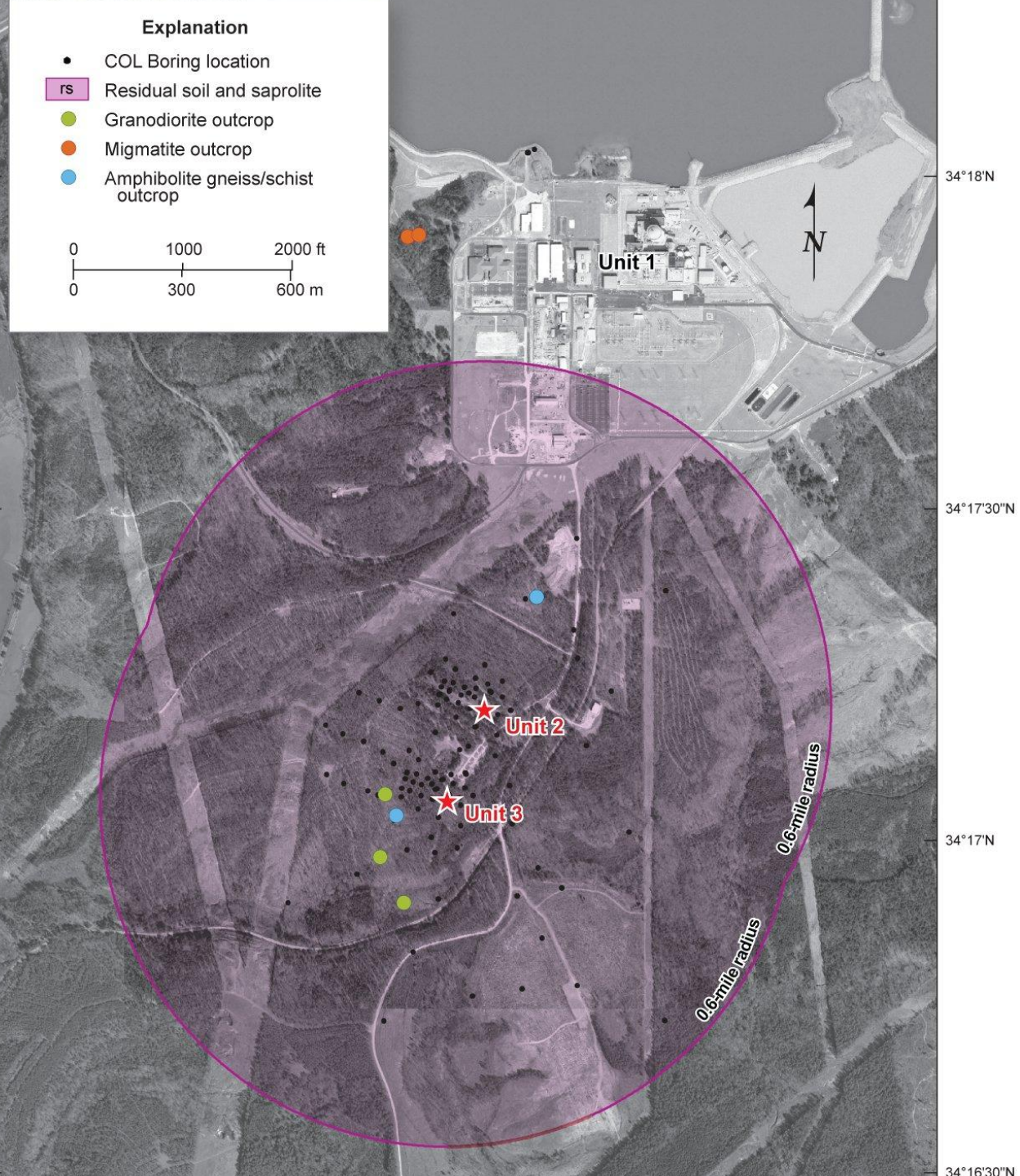
- TRIASSIC & JURASSIC
— Diabase dike
- CARBON-IFEROUS
Cw Winnsboro plutonic complex (granitic)
- SILURIAN
Sn Newberry plutonic complex (granitic)
- CAMBRIAN?
Zmw Metamudstone and metawacke
- PROTEROZOIC
Zg Amygdaloidal greenstone
Ztb Intermediate metatuff breccia
Ztq Felsic metatuff and quartzite
Zggn Leucocratic granitoid gneiss
Zfgn Felsic biotite gneiss
Za Amphibolite and hornblende gneiss

Horton and Dicken (2001) 1:500,000 scale

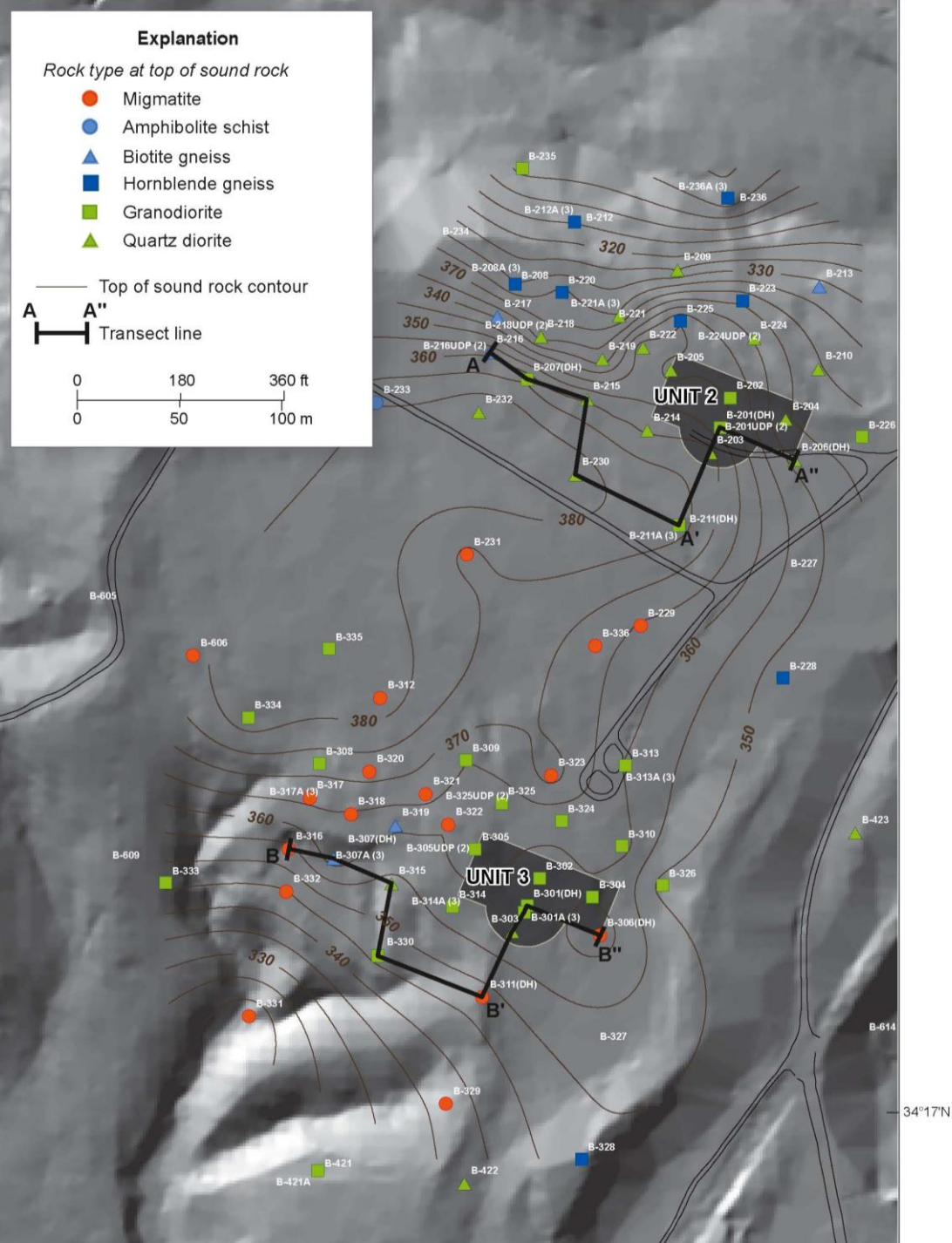
- Cgw Winnsboro plutonic complex (granitic)
- CZgr Metamorphosed granite to granodiorite
- am Amphibolite and amphibole gneiss
- Zl Little Mountain metatolalite
- CZpf Persimmon Fork Formation
- OCr Richtex Formation



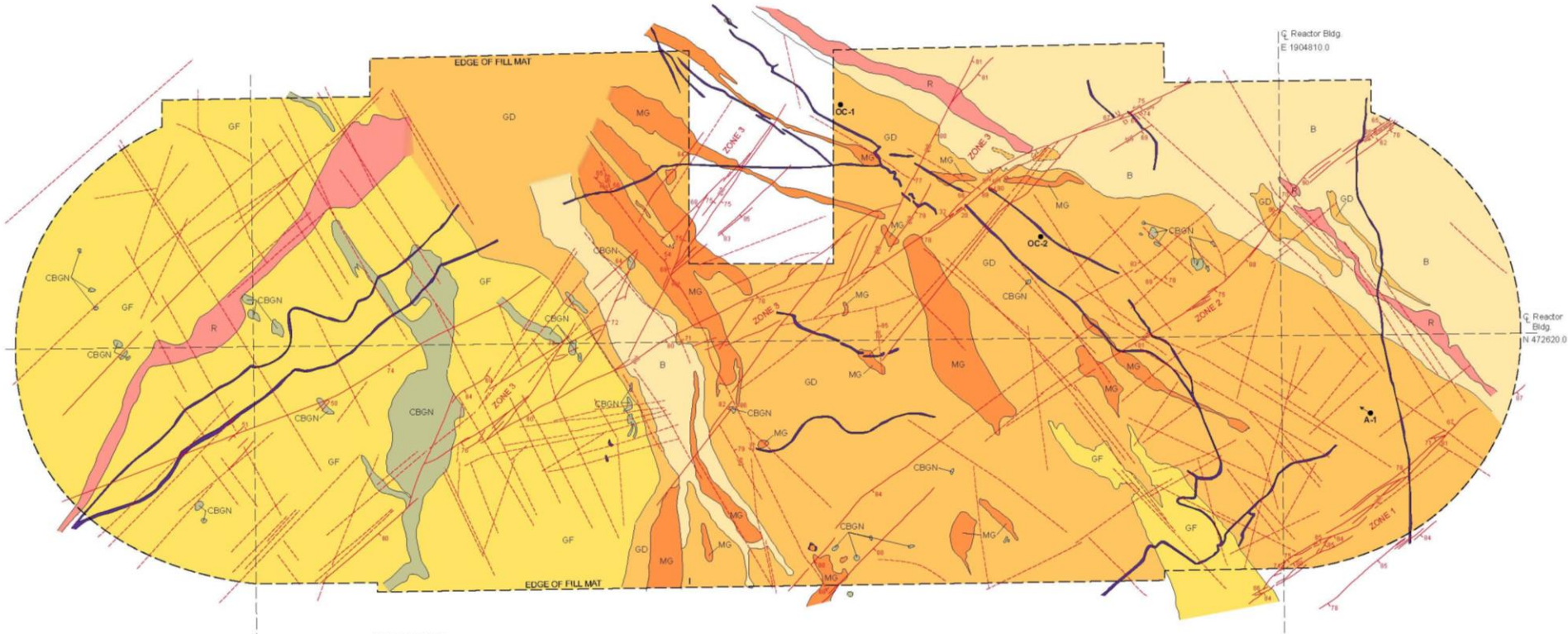
0.6-mi Surficial Geologic Map



Top of Sound Rock Beneath Units 2 and 3



Unit 1 Foundation Map (Right)



Explanation

- | | |
|--|---|
| B Contact breccia | Pink-filled fractures with sense of slip as shown; U = upside, D = downside |
| CBGN Charlotte belt gneiss | Other fractures with sense of slip as shown |
| MG Migmatite of gneissic composition | Displaced vein with dip |
| GF Granofels | Geologic contact |
| GD Medium-grained granodiorite | Angle boring |
| R Fine-grained granodiorite | Overcone boring |
| Aplite and/or pegmatite dike | |

Map modified after Dames & Moore (1975), Addendum I

Unit 1 Surface Faulting Summary

- Excavation mapping of Unit 1 found small, bedrock shears. These minor features were demonstrated to have last moved between 300 and 45 Ma.
- It was concluded that minor bedrock shears likely exist throughout site, but these do not represent a surface rupture hazard

Unit 2/3 COLA RESULTS

- No Quaternary Fault or Capable Tectonic Sources exist within 25 Miles of the Site
- Maximum Potential for Vibratory Ground Motion at the Site due to Reservoir Induced Seismicity is Bounded by the AP1000 Certified Seismic Design Response Spectra



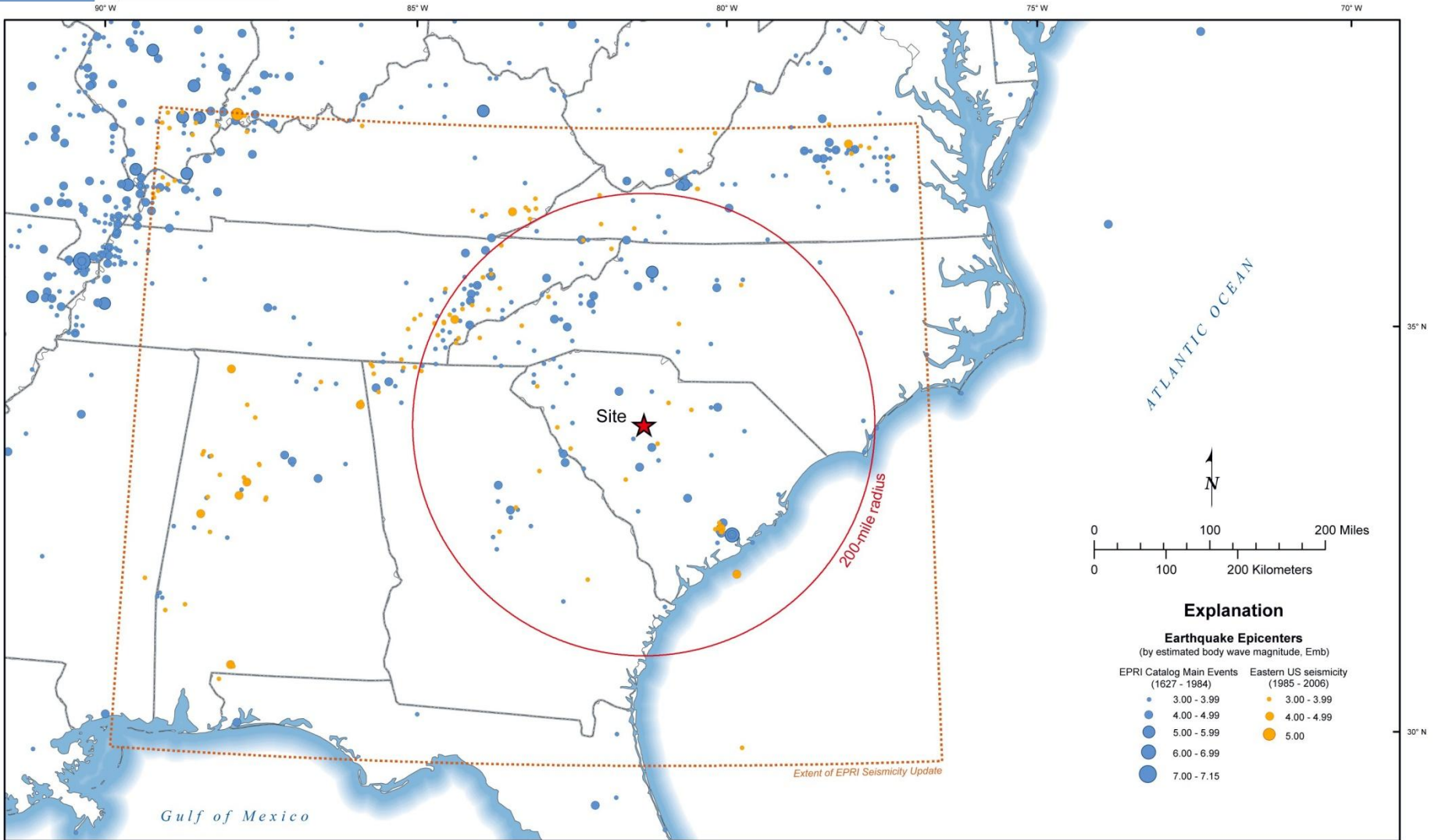
SCE&G VC Summer COL

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FSAR Sections 2.5.2

Vibratory Ground Motion

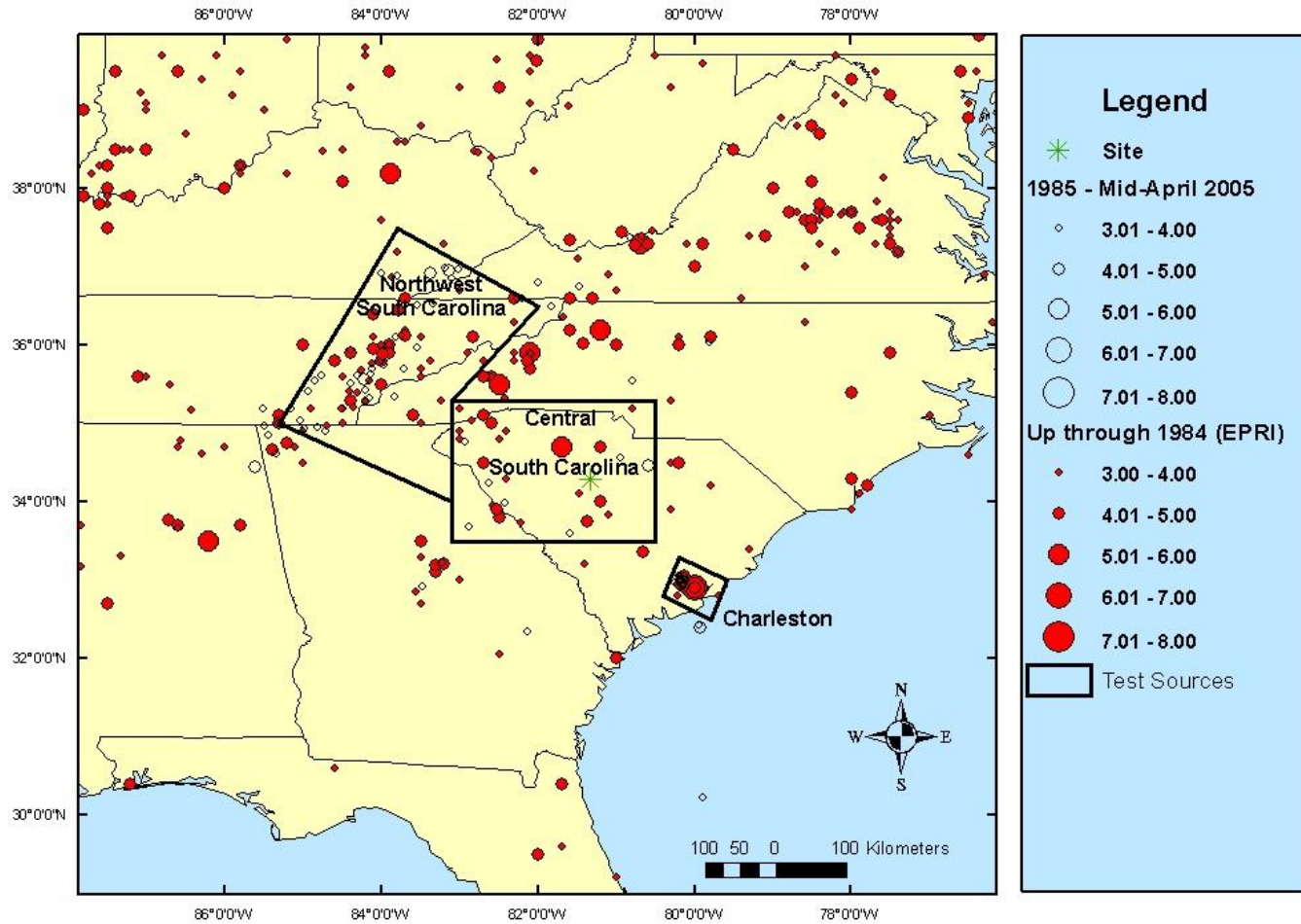
Updated Seismicity Catalogs



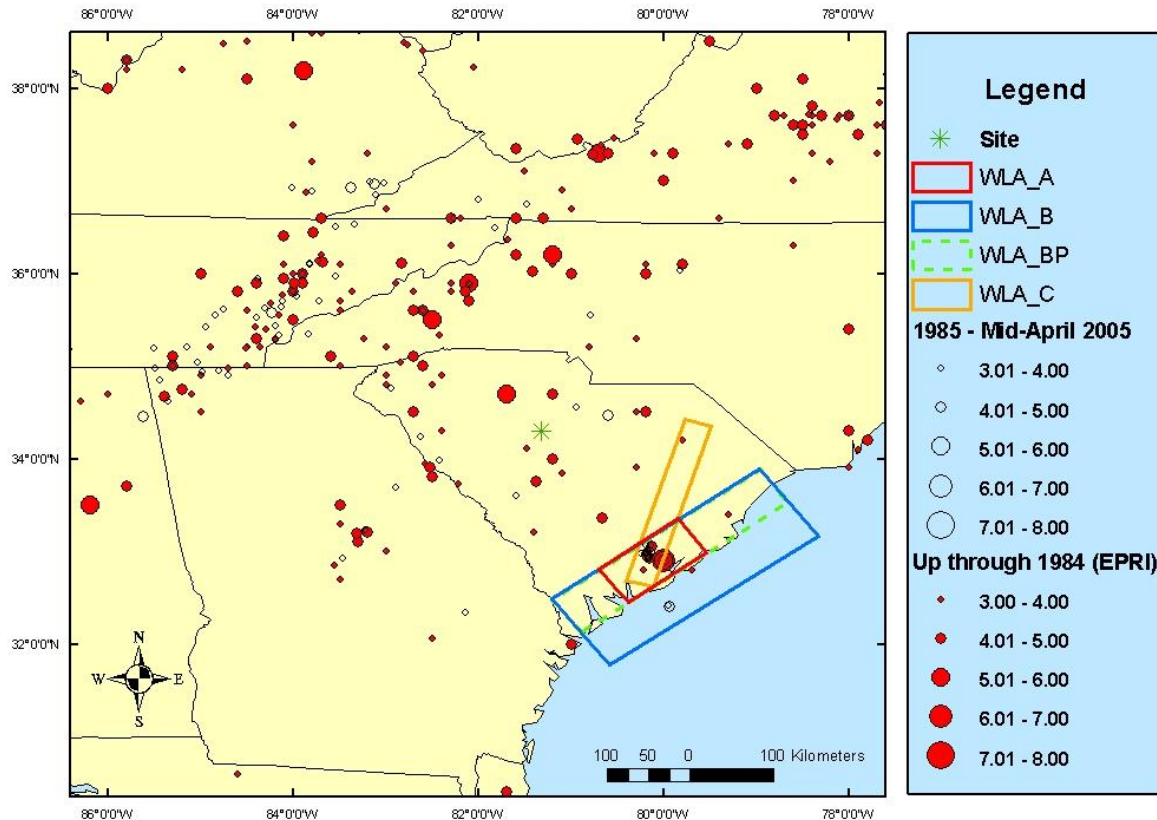
Probabilistic Seismic Hazard Analysis

- Replicated 1989 EPRI hazard results
- Evaluated effect of updated seismicity
- Updated the Charleston seismic sources
- Developed Seismic Hazard and UHRS (hard rock)
- Developed V/H ratios and GMRS (hard rock)

Historical seismicity in vicinity of Summer site and three areas used to test the effects of additional seismicity



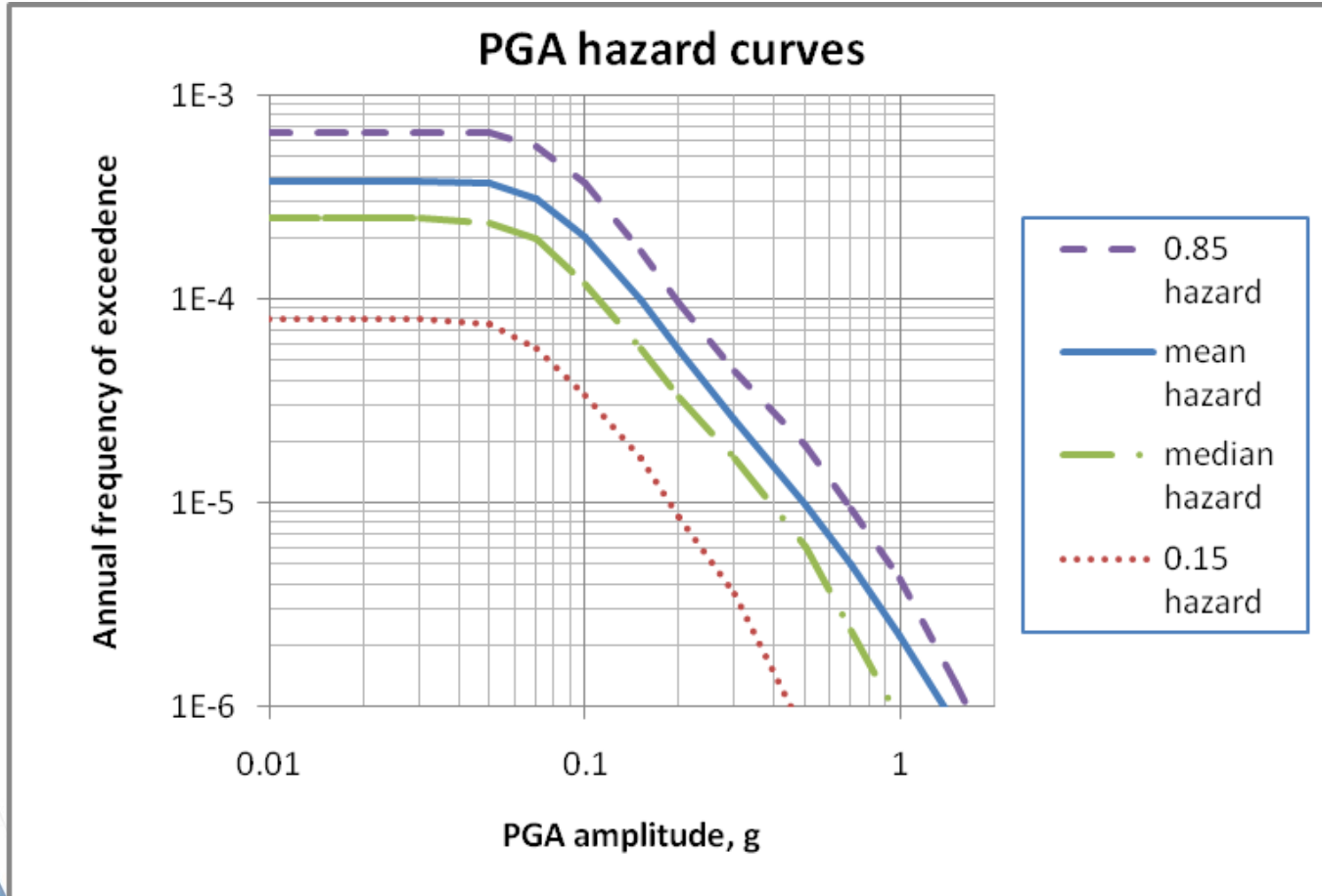
Geometry of Four Sources Used in Updated Charleston Seismic Source (UCSS) Model



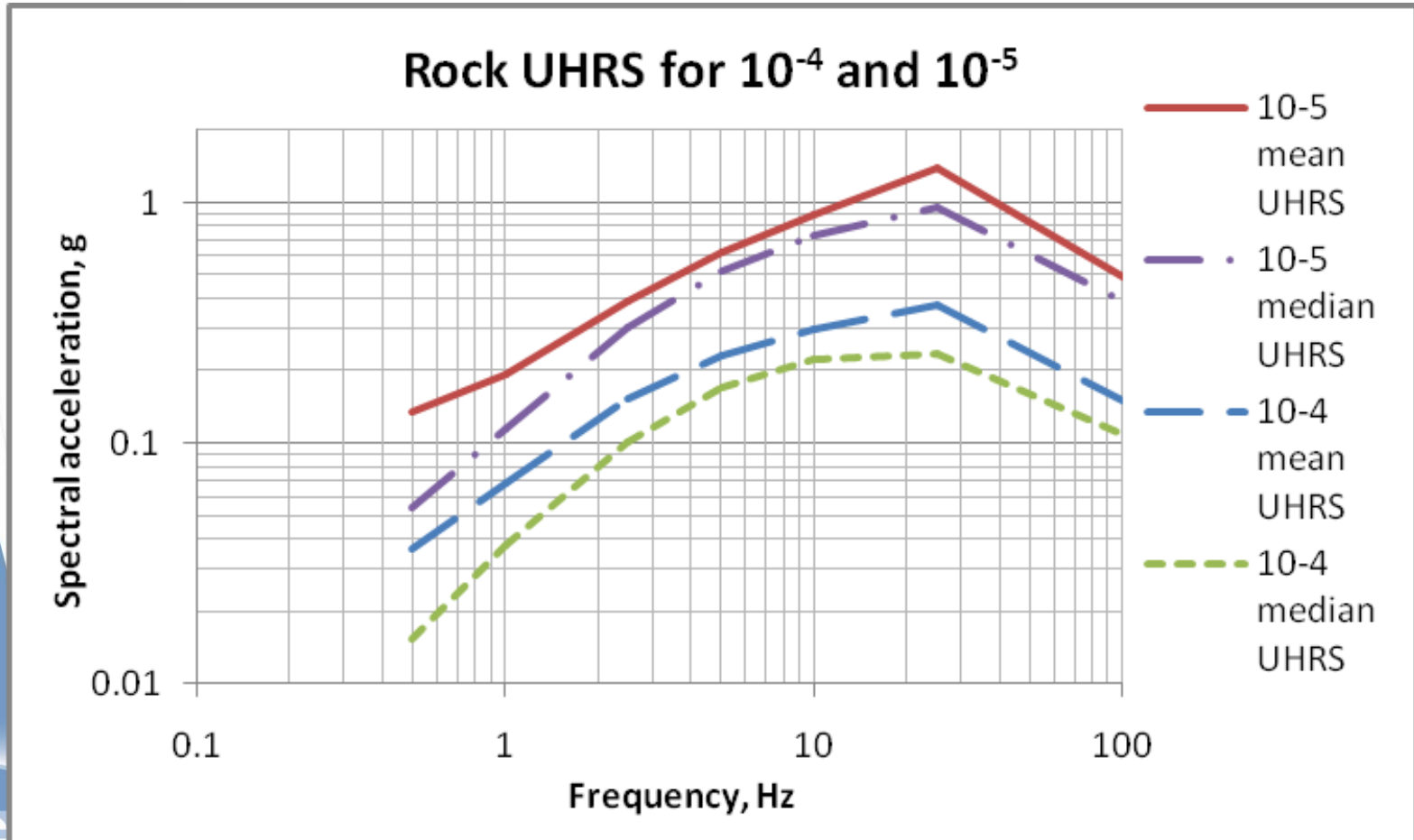
Summary of VC Summer Seismic Source Model

- No new Capable Tectonic Sources were identified within the site region
- No modifications to the Eastern Tennessee Seismic Zone were required
- Updated Charleston model replaced the EPRI sources (as adopted from Vogtle)
- New Madrid Source was added (which adopted the Clinton characterization)

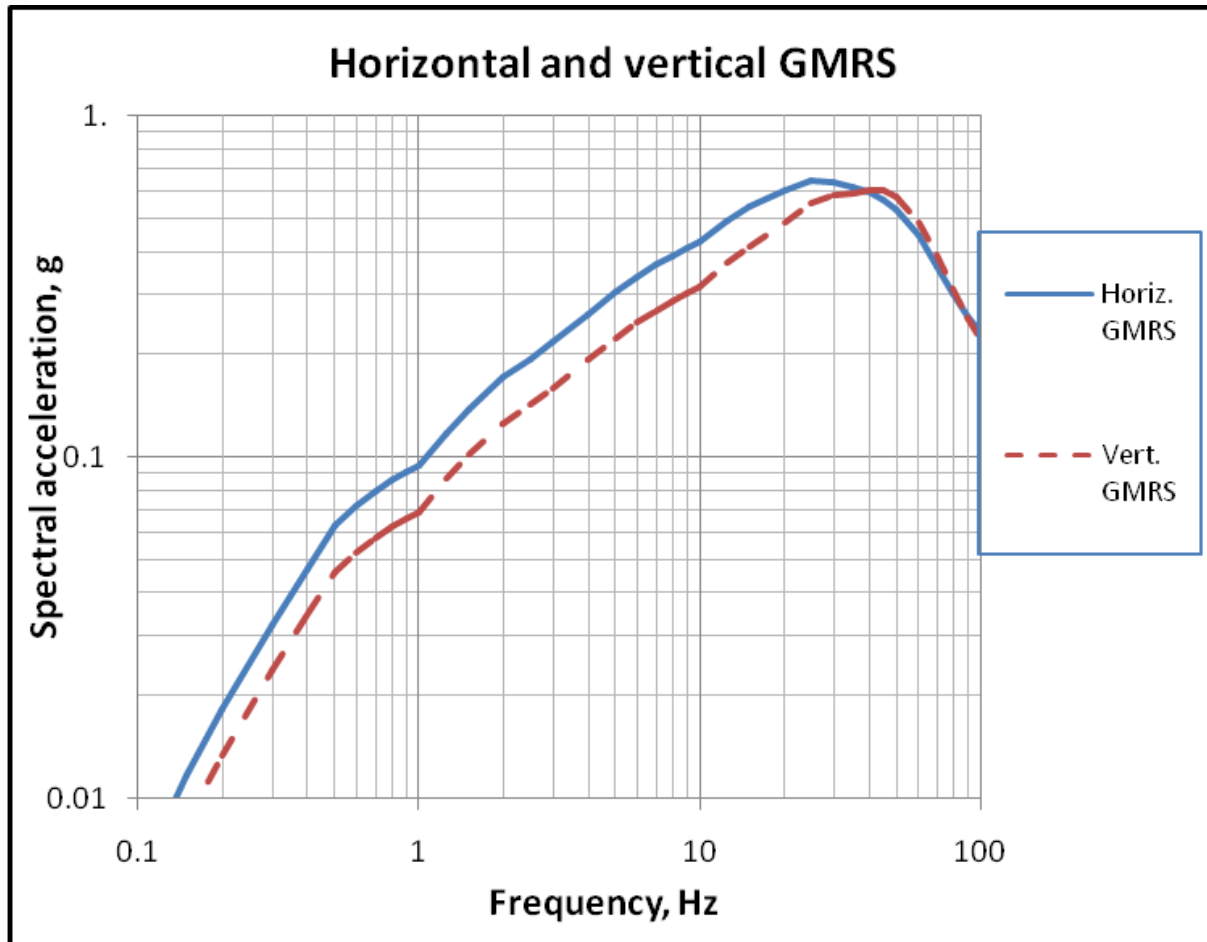
Mean and Fractile PGA Seismic Hazard Curves



Mean and Median Uniform Hazard Response Spectra



Horizontal and Vertical GMRS



V. C. Summer Nuclear Station, Units 2 and 3
COL Application
Part 2, FSAR

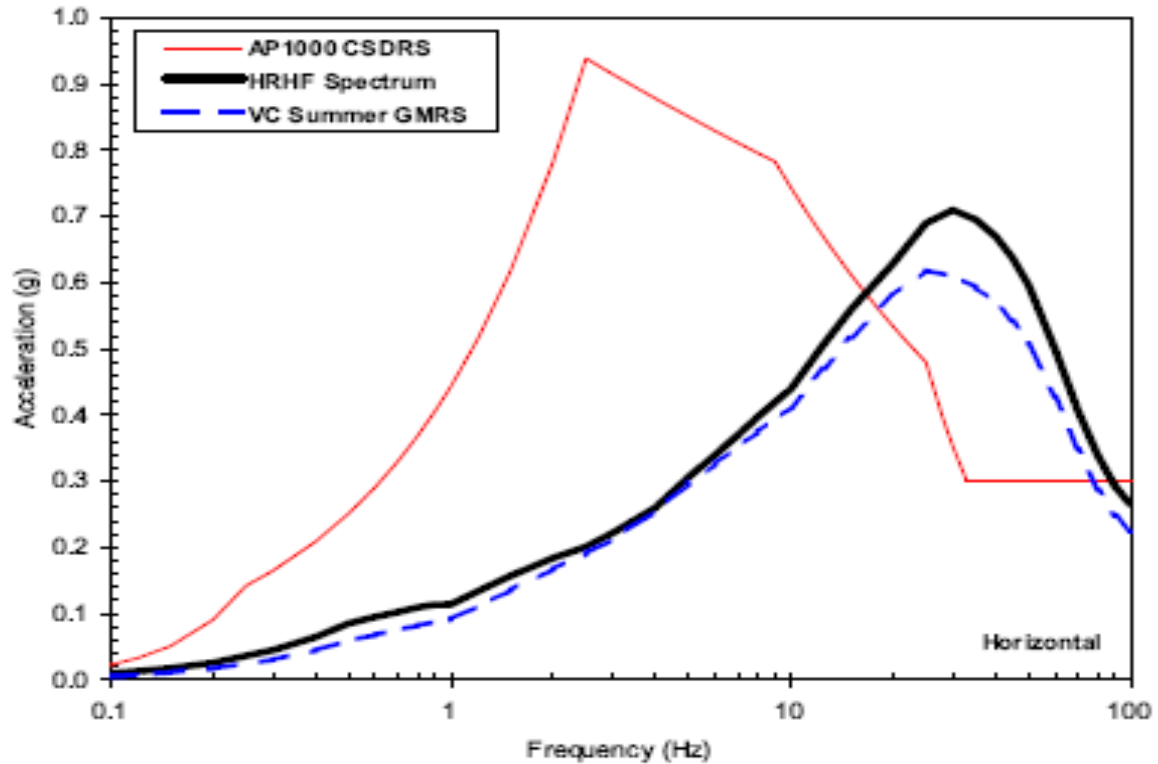


Figure 2.0-201. Comparison Plot of V. C. Summer GMRs and HRHF Spectra for the Horizontal Component of Motion



SCE&G VC Summer COL

*SCE&G • Santee Cooper
Shaw • Westinghouse Electric Company*

FSAR Sections 2.5.4

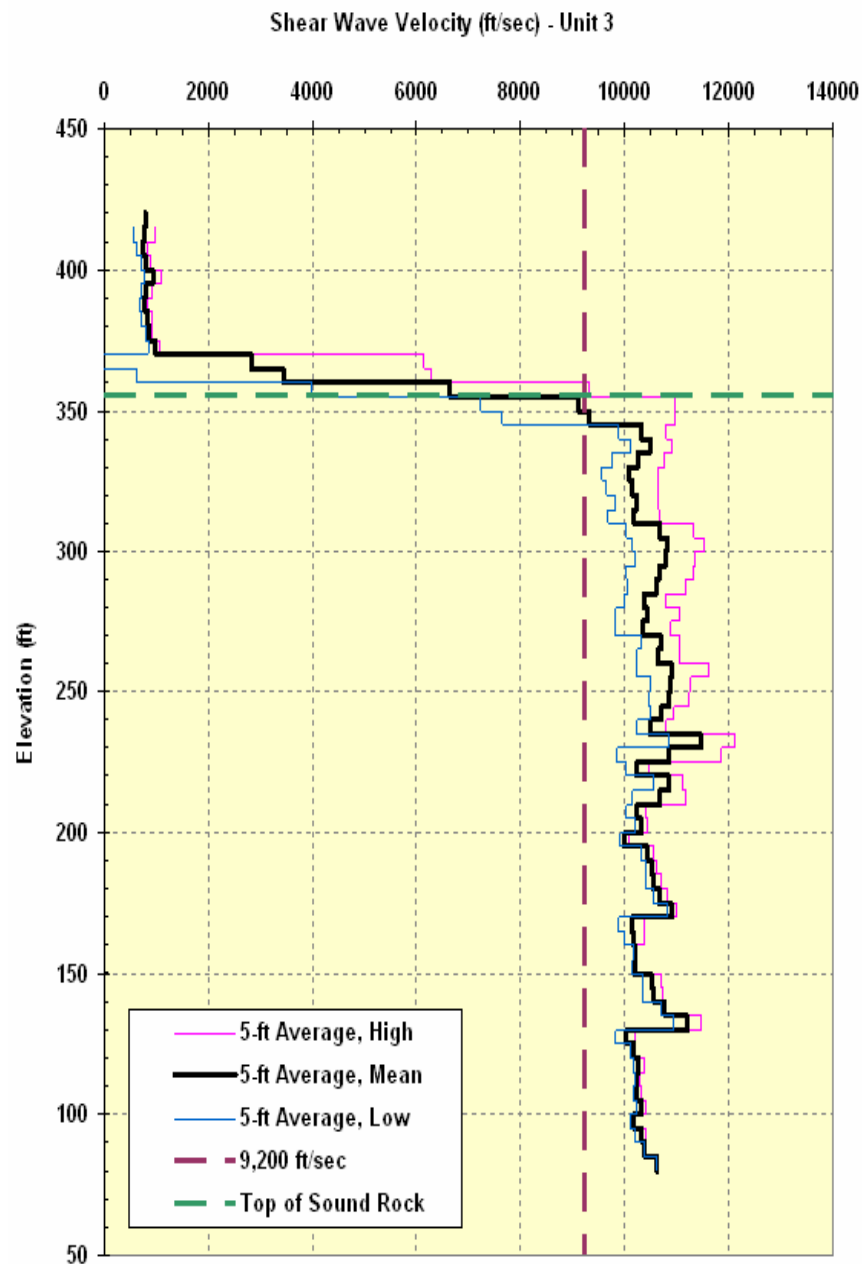
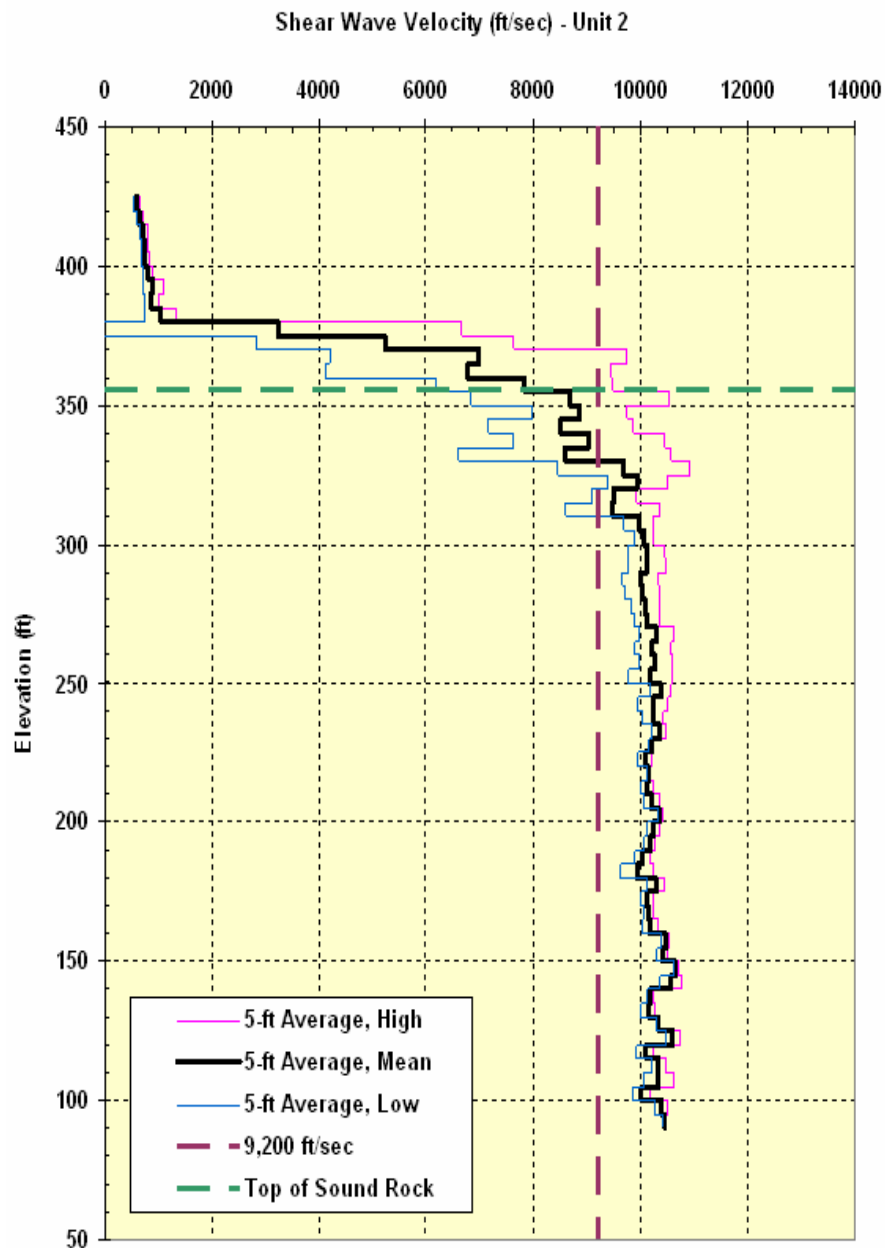
Site Geotechnical Characterization/ Foundations

Description of Subsurface Materials

- **Residual Soil** – reddish silty sands and sandy silts with variable clay content
- **Saprolite** – completely weathered rock but w/preserved relict rock structure, mainly silty sands
- **Partially Weathered Rock (PWR)** – decomposed rock matrix mixed w/semi-hard rock fragments
- **Moderately Weathered Rock (MWR)** -- >50% by volume of sound rock interspersed w/decomposed zones
- **Sound Rock** – Hard fresh to slightly discolored rock (granodiorite, quartz diorite, gneiss, schist, migmatite)

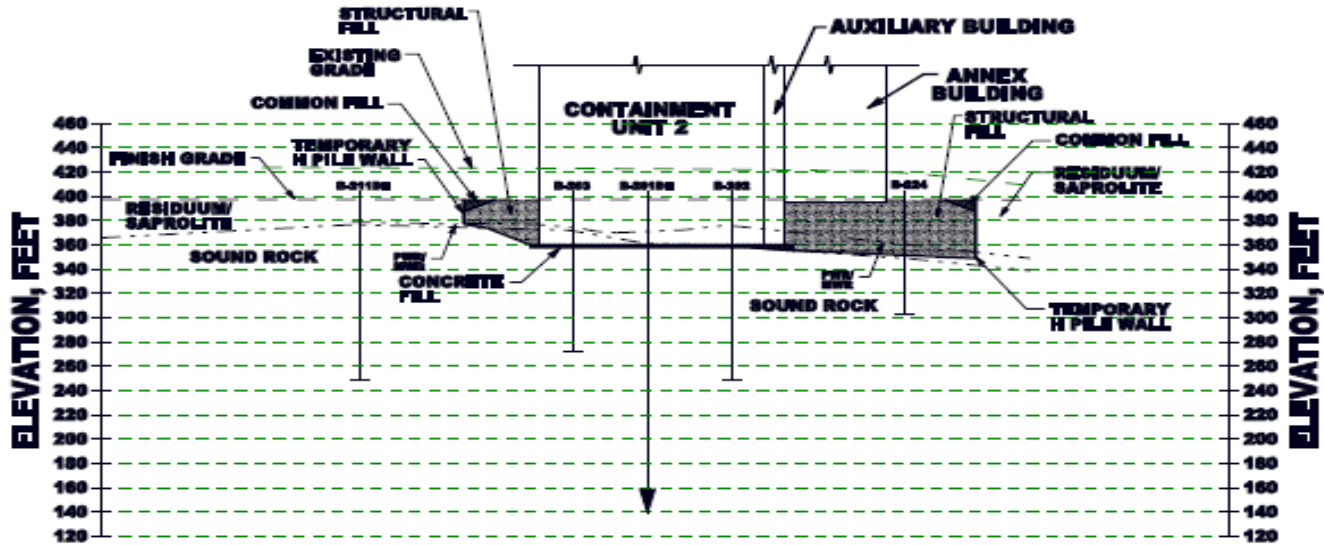
2.5.4.7.2 Vs Averaging at 5 Ft Intervals

Appendix 3



Excavation Cross-Section

V. C. Summer Nuclear Station, Units 2 and 3
 COL Application
 Part 2, FSAR



SECTION 1 A

- LEGEND**
- STRUCTURAL FILL**
 - CONCRETE FILL**
 - COMMON FILL**
 - BORING DESIGNATION**
 - PARTIALLY WEATHERED ROCK**
 - MODERATELY WEATHERED ROCK**

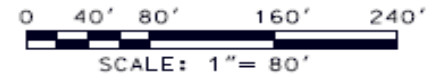


Figure 2.5.4-220. Cross-Section of Structure Foundation A-A



Section 2.5.4.8 Liquefaction Potential

- Nuclear Island is on sound rock or on concrete on sound rock.
- Power Block structures, including Seismic Category II Annex Building and Turbine Building (1st Bay) are on compacted structural fill. Which will not liquefy
- No saprolite is within the zone of influence of the foundation loading of Seismic Category I / II structures

CONCLUSION: Liquefaction can not impact plant safety

VCSNS UNIT 1 EXCAVATION SHEAR FRACTURES

- **Late 1973 - Unit 1 Excavations Removed Overburden Material to Competent Rock**
- **Dames & Moore Resident Geologist Identified Shear Fractures at Rock Surface**
- **Early 1974 - NRC Issued Stop-Work-Order**
- **SCE&G Mobilized Team of Regional Experts for Further Evaluations**

EXPERT REVIEW TEAM

- **Dr. Robert Butler – UNC**
- **Dr. Gil Bollinger – Virginia Tech**
- **Dr. Robert Carpenter – Georgia**
- **Dr. Villard Griffin – Clemson**
- **Dr. Jasper Stuckey – NC State**

Geological Investigation – Dames & Moore

GEOLOGICAL INVESTIGATION

- **Detailed Geologic Mapping & Sampling**
- **Excavation of Trenches**
- **Drilling an Inclined Boring**
- **Radiometric Age Dating**
- **X-Ray Defraction Analysis**

GEOLOGICAL INVESTIGATION

- **Literature Searches**
- **Aerial Photo & ERTS-1 Imagery**
- **Gravity & Magnetic Data Analysis**
- **In-Place Stress Measurement**
- **Review of Local Microseismic Data**
- **Off-Site Geological Reconnaissance**

Unit 1 Excavation (Northeast View)



Unit 1 Excavation (South View)



UNIT 1 CONCLUSIONS

- **Rock Structure Characteristics Considered Typical of Piedmont Conditions – With Similar Fractures Likely to be Found Anywhere in the Surrounding Region**
- **Documentation of Recent Tectonic Displacement (within 100 Miles of the Site) Does Not Exist**
- **Shear Orientation is Consistent with Regional Joint Pattern and Not Integral with Any Known Fault System**

UNIT 1 CONCLUSIONS

- **A Hydrothermal Event Occurred Subsequent to Termination of All Shear Movement with Emplacement of Zeolite Laumontite (which has not deformed)**
- **Age Dating Indicates that Movement Along the Shears could not have Occurred Later than 45 MYBP and Probably Inactive for 150-300 MYBP**
- **In-Situ Rock Stresses are Relatively Low**

UNITS 2 & 3 CONCLUSIONS

- **Consistent with the results of the Unit 1 investigation, we expect foundation excavations for Units 2 & 3 will have similar shear fractures. Current mapping indicates that such features are integral with the geologic setting.**
- **Current Geological Investigations have not Identified any New Data to Change our Current Interpretations.**
- **Units 2 & 3 Excavations are being geologically mapped and results documented for review by NRC.**
- **SAR Section 2.5.1 Concludes that the Shear Fractures are not Capable Tectonic Sources and do not Represent Ground Motion or Surface Rupture Hazards to the Site.**

UNIT 1

RESERVOIR INDUCED SEISMICITY

- **1974-76 – Prior to Construction of Monticello Reservoir, Background Microseismic Activity ~ 1 Event Every 6 Days [Jenkinsville (JSC)]**
- **Mid-1977 – SCE&G Installed 4-Station Microseismic Network (Recommended by Dr. Gil Bollinger)**
- **December 1977 - March 1978 Monticello Reservoir Filled**
- **Late December 1977 – Microseismic Activity Dramatically Increased (Peaking at 800 Events During February 1978)**

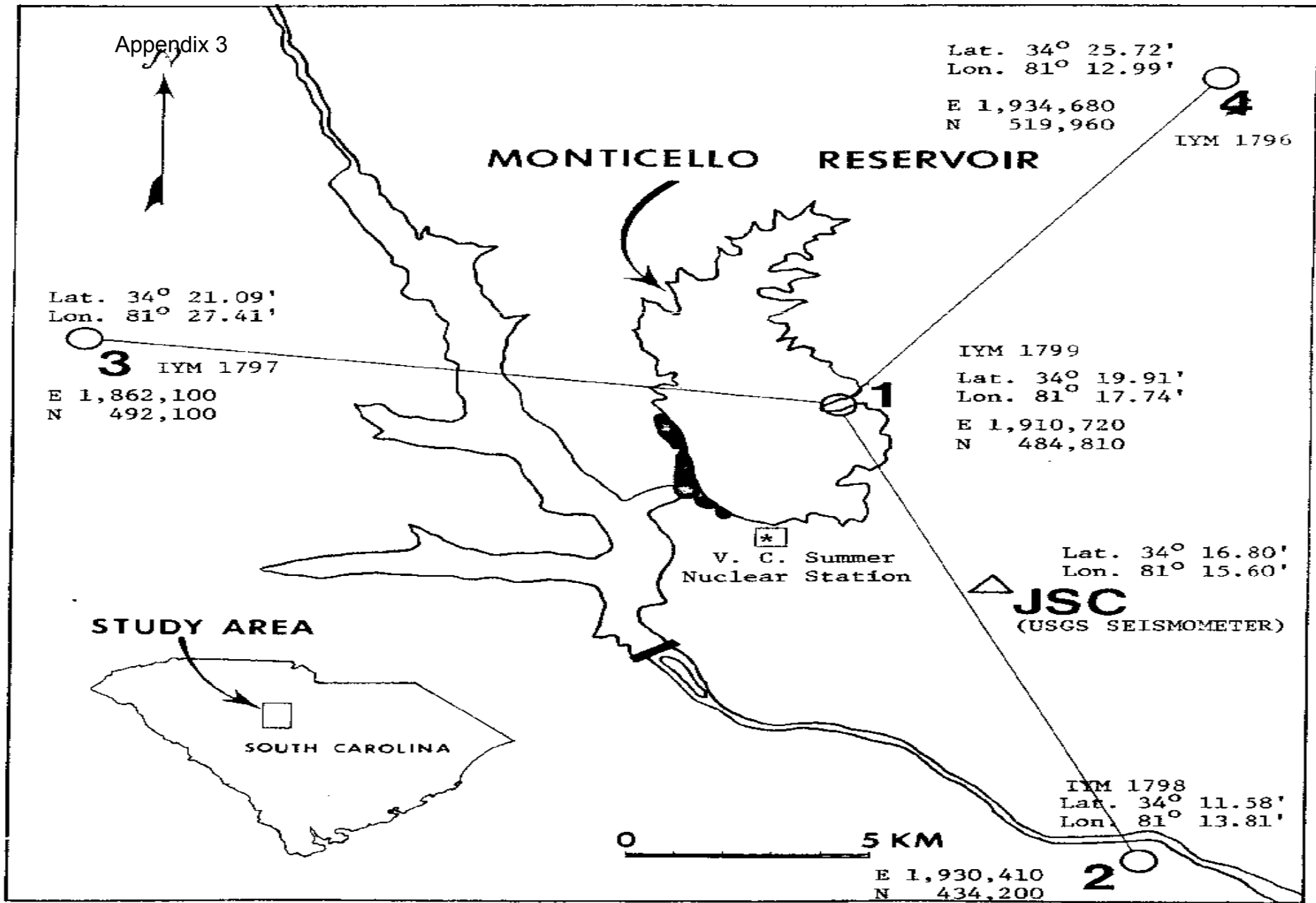
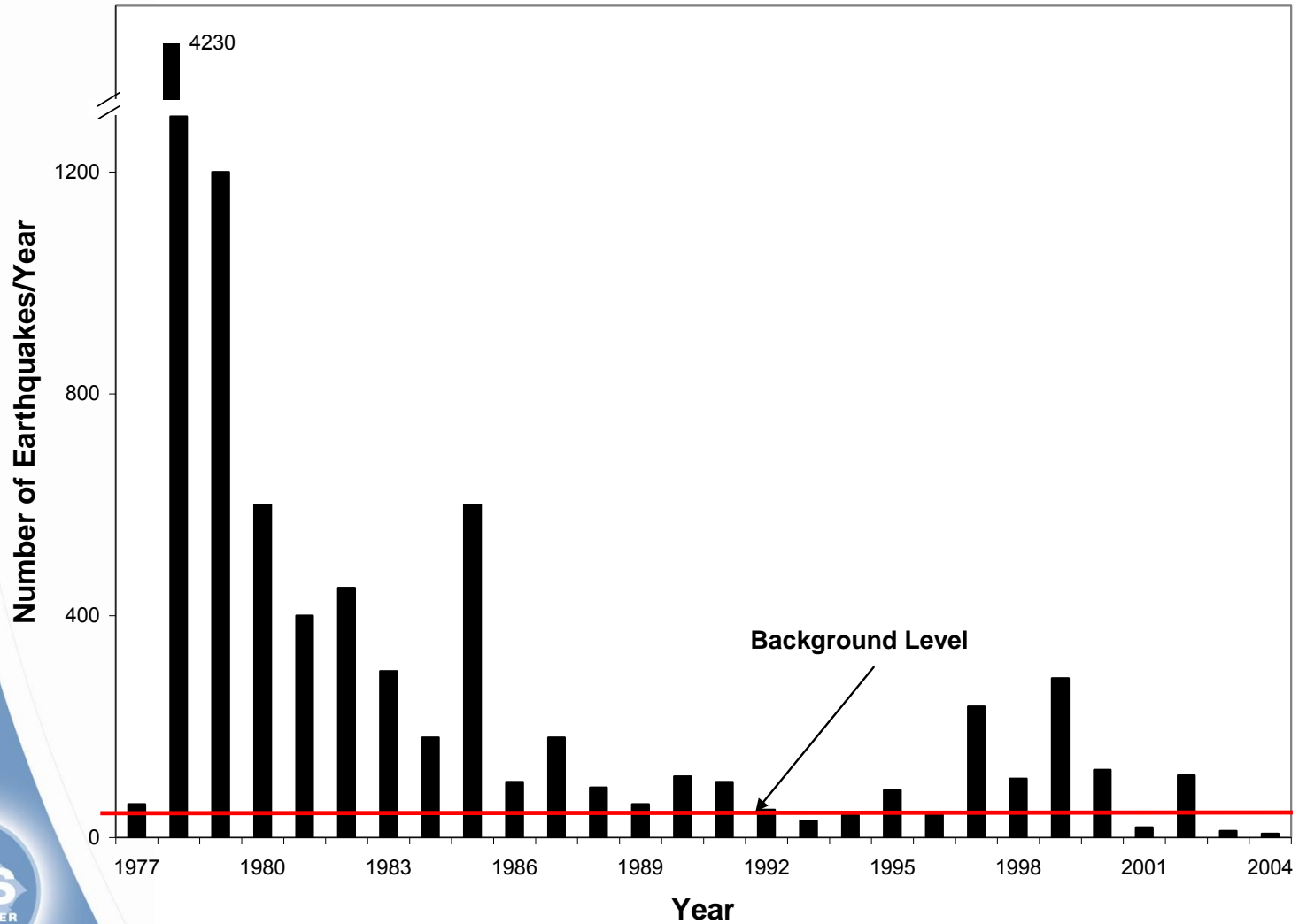


Figure 3
 ORIGINAL LOCATIONS OF SCE&G 4-STATION MICROSEISMIC NETWORK

RIS Histogram (1977 – 2004)

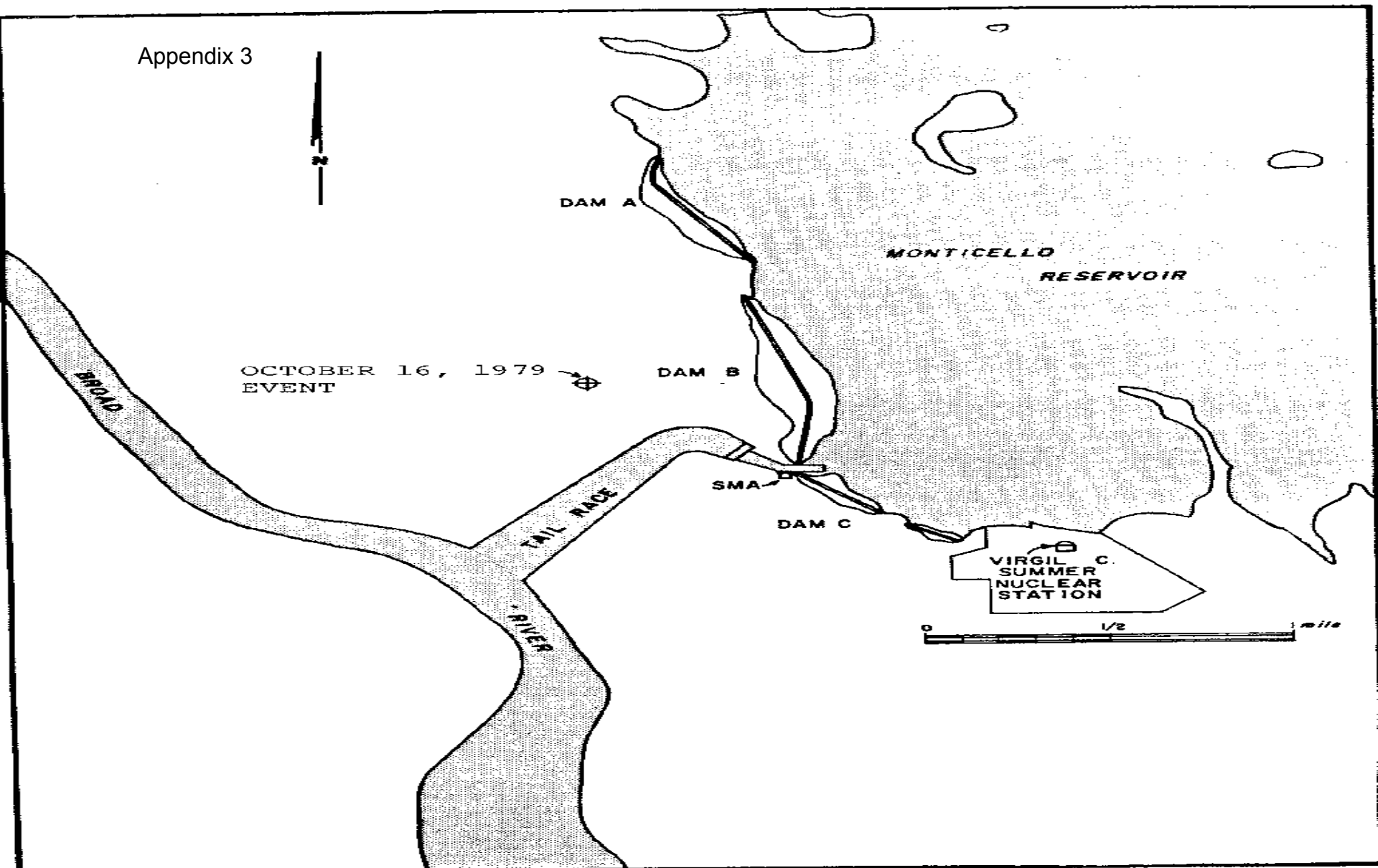


SEISMIC MONITORING PROGRAM



- **1974 – SC Network Seismometer at Jenkinsville (JSC) Installed Nearby (approximately 2.5 miles SE of Unit 1)**
- **1977 - SCE&G Microseismic Monitoring Network (4-Station) Installed, with Data Evaluated by Dr. Pradeep Talwani (USC)**
- **1995 – NRC Approved the SCE&G Request for Discontinuation of the Seismic Monitoring Network**
- **1996 – SCE&G Donates Network Instrumentation to USC (along with providing supplemental funding)**
- **2004 – USC Terminates Network Operation due to Equipment Age and Failures**
- **2010 – Jenkinsville Seismometer (JSC) Continues operation as part of the SC Seismic Network**

RESERVOIR INDUCED SEISMICITY

- **Early-1978 - USGS Installed a Strong Motion Accelerometer at a Free-Field Dam Abutment of Monticello Reservoir which recorded two events:**
 - **August 27, 1978 – M_L 2.8 – PGA: 0.25g**
 - **October 16, 1979 – M_L 2.8 – PGA: 0.36g**



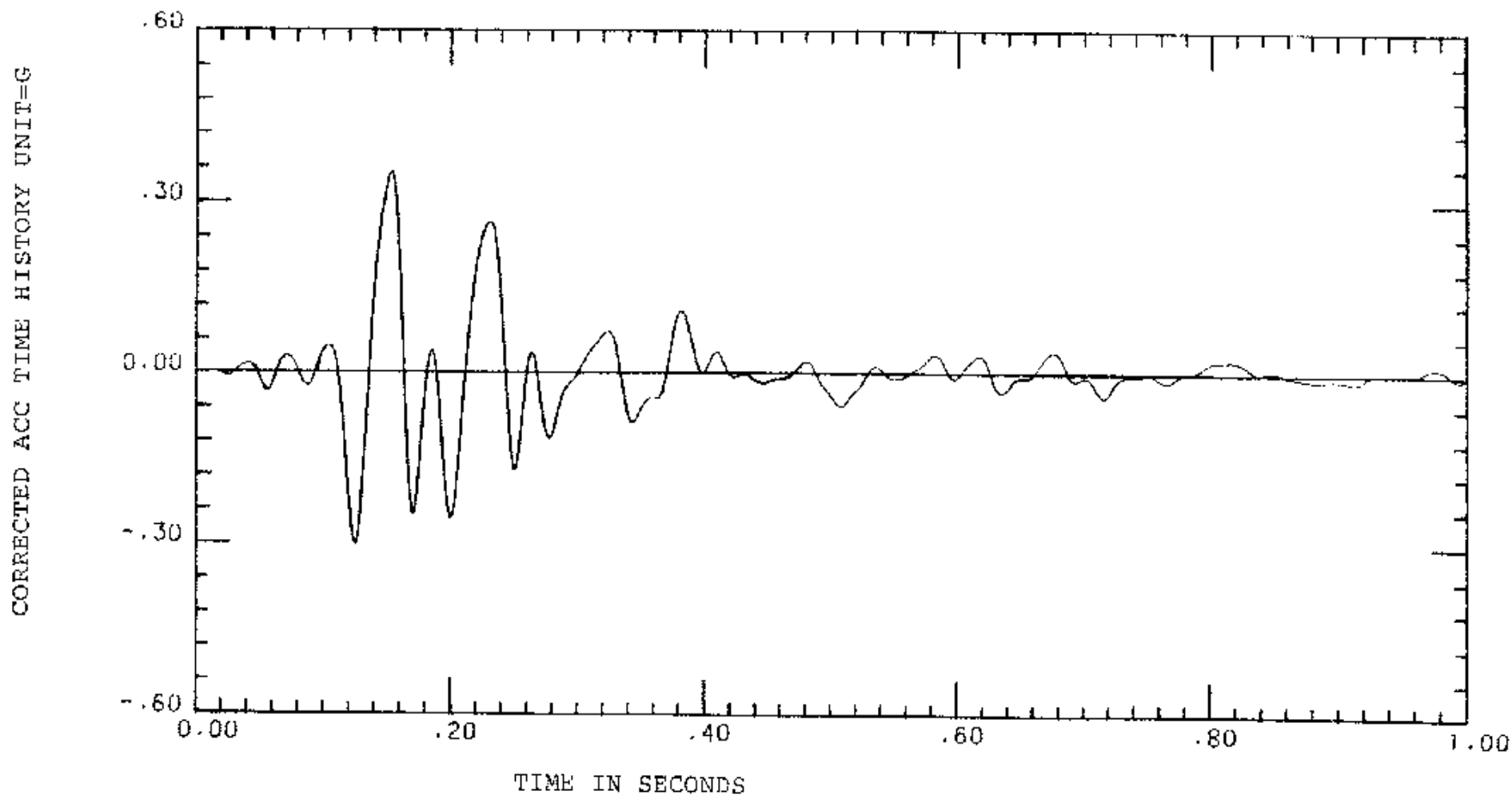
LEGEND:

-  COMPUTED LOCATION OF EPICENTER OF 0.36g EVENT OF OCTOBER 16, 1979
-  LOCATION OF STRONG MOTION ACCELEROGRAPH

South Carolina Electric & Gas Co.
Virgil C. Summer Nuclear Station

OCTOBER 16, 1979
EARTHQUAKE

Figure 9



TIME HISTORY OF CORRECTED 180° RECORD WITHOUT CLIPPING

Figure 10

UNITS 2 & 3 CONCLUSIONS

- **SAR Section 2.5.2 Documents RIS Associated with Monticello Reservoir**
- **Microseismic Activity has diminished to the Pre-Impoundment Background Rate with Occasional Spurts of Activity**
- **RIS does not Increase Ground Motion Hazards for the Site**



**SEISMIC TECHNICAL ADVISORY
GROUP REVIEW**

**VIRGIL C. SUMMER NUCLEAR STATION
UNITS 2 & 3 COLA**

*SCE&G • Santee Cooper
Shaw • Westinghouse Electric Company*

(AS PRESENTATION TO THE
NUCLEAR REGULATORY COMMISSION
October 3, 2007)

Seismic Technical Advisory Group (TAG)

Prof. Martin C. Chapman – Virginia Tech

Prof. C. Allin Cornell – Stanford University

Dr. Robert P. Kennedy – Consultant

Mr. Donald P. Moore – Southern Nuclear

Dr. J. Carl Stepp – Consultant

Participatory Peer Review

- **TAG review meetings:**
 - **Four meetings at selected COLA completion stages**
 - **Review draft technical results**
 - **Joint TAG meetings with parallel COLA preparation activities**

TAG Coordination

- **AP1000 Seismic Review Committee (APSRC) - SCE&G, Duke, Entergy, TVA**
 - **New Plant Seismic Issues Resolution Program - EPRI, NEI**
 - Updating seismic regulatory guidance
 - **AP1000 foundation interface issues - NuStart**
 - **COLA preparation joint TAG meetings**
 - Bellefonte Nuclear Station (BNS)
 - William States Lee Nuclear Station (WSLNS)
 - Virgil C. Summer Nuclear Station (VCSNS)
 - Grand Gulf Nuclear Station (GGNS)

TAG Summer Unit 2/3 Conclusions

- **Preparation of the VCSNS Units 2 & 3 COLA properly implemented state of practice methods and procedures in compliance with NRC's updated seismic regulatory guidance and interim staff guidance.**
- **Coordination with concurrent preparation of COLA for BNS, WSLNS, and GGNS and with Industry-NRC generic seismic issue resolution was particularly effective and productive.**
- **The TAG concurs with the results and conclusions presented in the Safety Analysis Report supporting the VCSNS Units 2 & 3 COLA and consider them to be appropriately and adequately supported by the data and analysis.**
- **These endorsements were included in the TAG letter which accompanied the Summer COLA submittal.**



Comments





Presentation to the ACRS Subcommittee

**V.C. Summer Nuclear Station Units 2 and 3
COL Application Review**

**AFSER Section 2.5
Geology, Seismology, and Geotechnical Engineering**

July 22, 2010

Staff Review Team

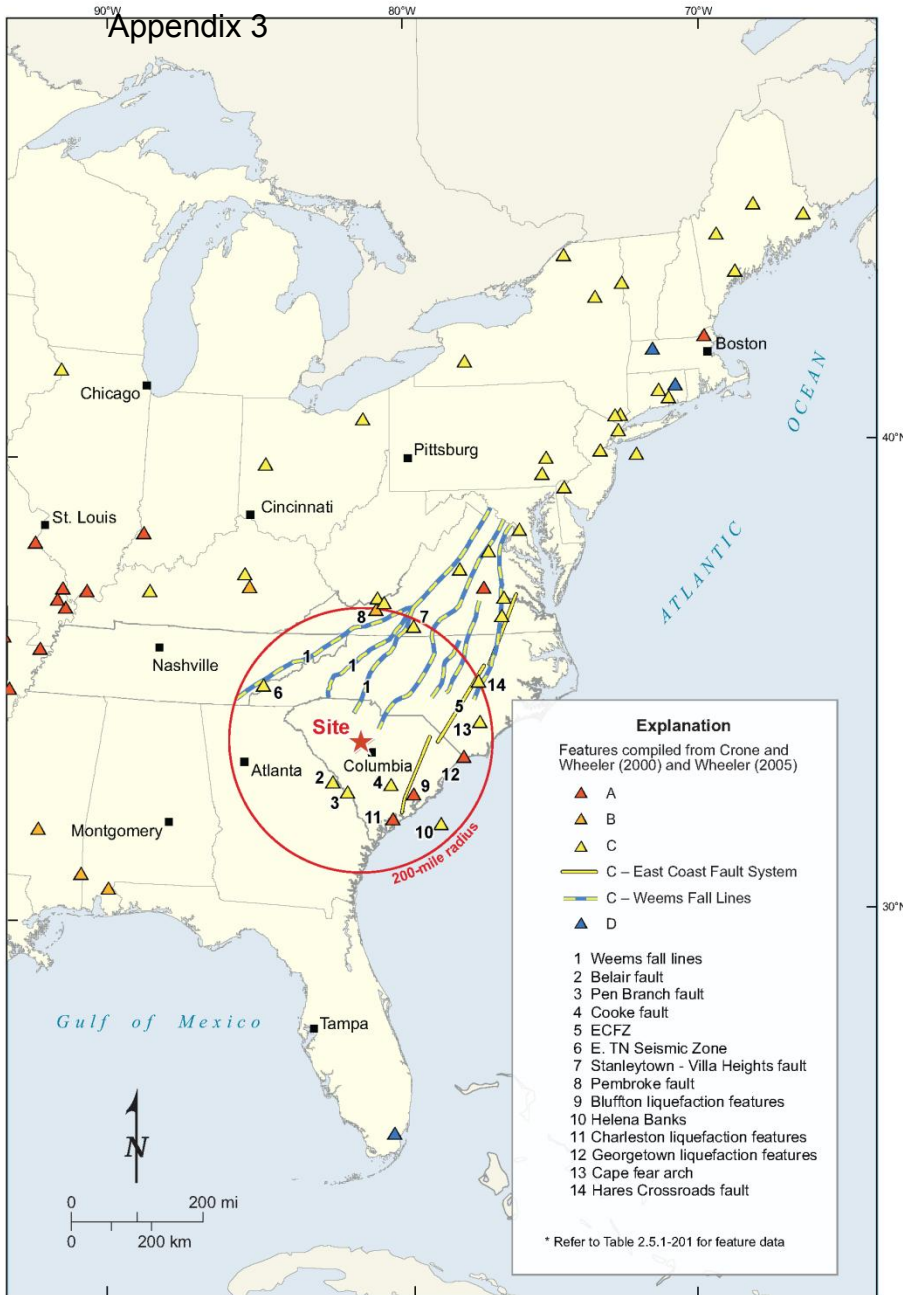
- Sections 2.5.1 and 2.5.3
 - Dr. Gerry L. Stirewalt, Senior Geologist (presenter)
 - Meralis Perez-Toledo, Geologist
 - Drs. Anthony J. Crone and Richard W. Briggs, U.S. Geological Survey Geologists
- Section 2.5.2
 - Sarah Tabatabai, Geophysicist (presenter)
 - Drs. David M. Boore, Stephen H. Hartzell, and Yuehua Zeng, U.S. Geological Survey Geologists
- Sections 2.5.4 and 2.5.5
 - Dr. Weijun Wang, Senior Geotechnical Engineer (presenter)
 - Frankie Vega, Geotechnical Engineer
 - Dr. Carl J. Constantino and Thomas W. Houston, Information Systems Laboratories Geotechnical Engineering Consultants
- Project Management
 - Mike Wentzel

Overview

- Section 2.5 of the VCSNS AFSER issued with two Confirmatory Items and one License Condition
 - All COL Information Items (11 for AFSER Section 2.5.4 and two for AFSER Section 2.5.5) resolved based on FSAR Revision 2.
 - All Confirmatory Items resolved based on FSAR Revision 2, except 2.5.2-1 related to fractile hazard curves and 2.5.4-1 related to concrete fill design, thermal cracking, and monitoring.
 - License condition 2.5.1-1 for AFSER Section 2.5.1 related to geologic mapping of excavations for safety-related structures.

Section 2.5.1–Basic Geologic and Seismic Information

- **Capability of tectonic structures mapped in the site region, site vicinity, and site area**
 - Issue: Ensure that no potentially-capable tectonic faults (i.e., faults of Quaternary age, 2.6 million years ago [Ma] to present) have been mapped in the site region, site vicinity, or site area.
 - Applicant identified 14 potential Quaternary tectonic features in the site region (i.e., potentially capable tectonic structures with possible associated seismic hazard).
 - No mapped tectonic structure to which the 1886 Charleston area earthquake can be associated has been identified. Charleston area is characterized as a seismic source zone for assessment of seismic hazard (AFSER Section 2.5.2).



2.5.1 – Basic Geologic and Seismic Information

Potential Quaternary Features in the VCSNS Site Region (AFSER Figure 2.5.1-2 after FSAR Figure 2.5.1-215)

Section 2.5.1–Basic Geologic and Seismic Information

- **Capability of tectonic structures mapped in the site region, site vicinity, and site area**
 - Resolution: Staff’s review of detailed responses to RAIs resolved concerns related to occurrence of potentially capable tectonic structures mapped in the site region, site vicinity, and site area.
 - Staff found that information (i.e., constraining field relationships and radiometric age dates) provided by the applicant documented that no Quaternary tectonic faults have been mapped in the site region, site vicinity, and site area.

Section 2.5.1–Basic Geologic and Seismic Information

- **Potential for tectonic structures in excavations for safety-related structures**
 - Issue: Ensure that no capable tectonic faults exist in the excavations for safety-related structures.
 - Staff must examine geologic features observed and mapped in excavations for safety-related structures to ensure that no capable tectonic faults exist.
 - Minor shear zones proven by the applicant to be at least 45 Ma in age were mapped in the Unit 1 excavation, and similar structures may occur in the excavations for Units 2 and 3.
 - Resolution: License Condition 2.5.1-1 requires applicant to perform geologic mapping of excavations for safety-related structures; evaluate geologic features discovered; and notify NRC when excavations are open for examination.

Section 2.5.2–Vibratory Ground Motion

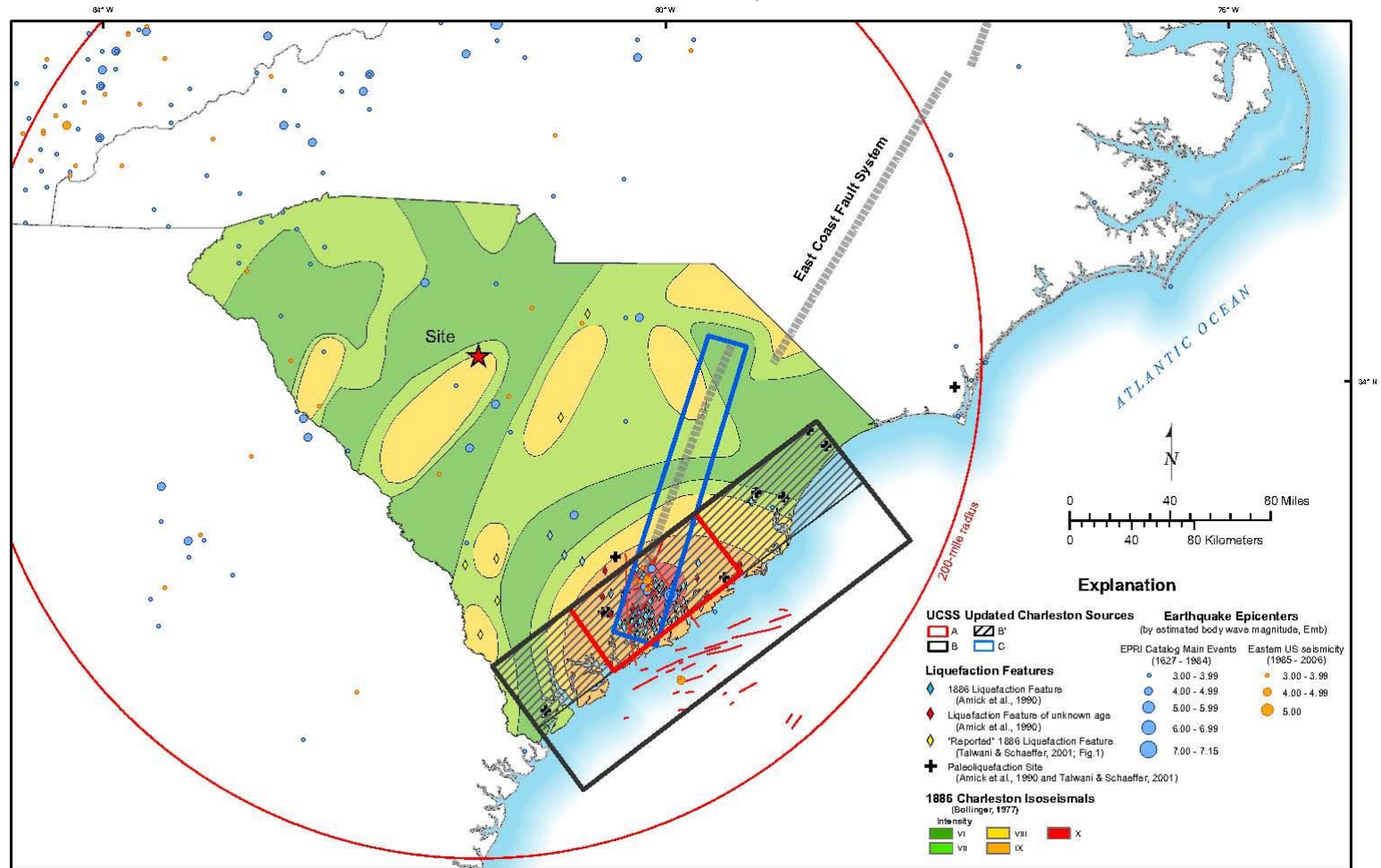
- **Reservoir-Induced Seismicity (RIS)**
 - Issue: Staff was concerned about the largest potential seismic event associated with the Monticello reservoir due to RIS, and whether water level changes in the reservoir have been correlated with seismicity.
 - Resolution: Applicant documented that the two largest reservoir-induced earthquakes were of magnitude 2.8 (1978 and 1979); that the AP1000 CSDRS bounds the postulated magnitude 4.5 event for Unit 1; and that no correlation has been shown between seismicity and water level changes since initial filling of the reservoir.

Section 2.5.2–Vibratory Ground Motion

• **Charleston Seismic Zone**

- Issue: Applicant updated the original 1986 EPRI Charleston seismic source models with the UCSS model originally presented in the SSAR for the Vogtle ESP site (SNC, 2008).
 - Staff asked applicant to address a newly-reported Charleston area paleoliquefaction feature (Talwani and others, 2008) in regard to the UCSS model.
- Resolution: Talwani and others (2008) estimated a magnitude of about 6.9 for the causative earthquake, which falls within the M_{\max} range captured in the UCSS model, and the newly-reported paleoliquefaction feature lies within one of the source area geometries defined for the UCSS model.

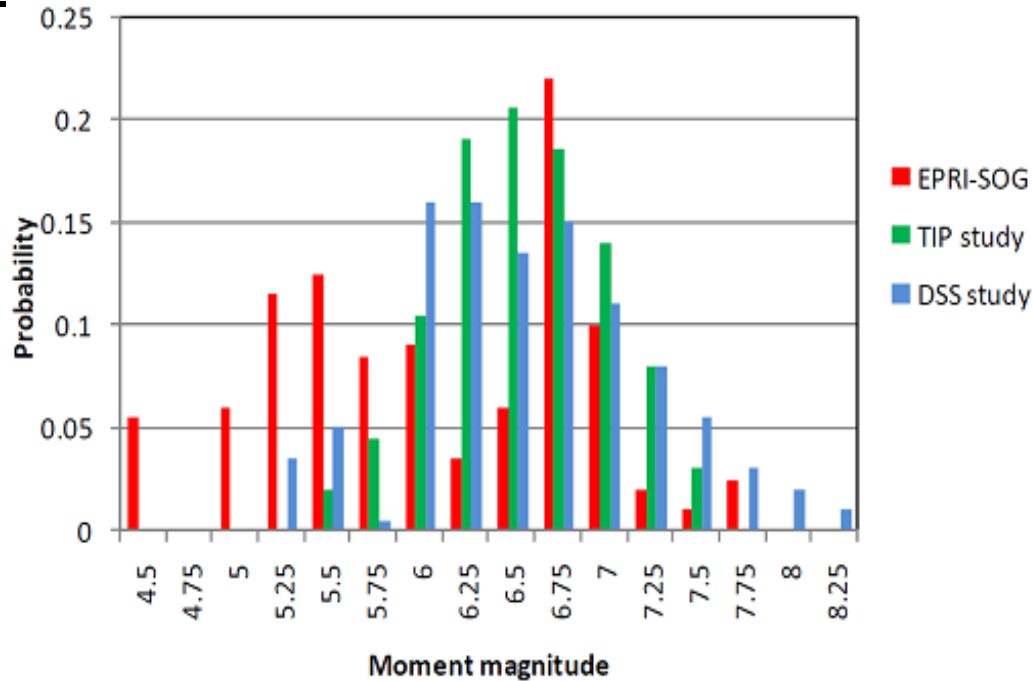
Section 2.5.2–Vibratory Ground Motion



Updated Charleston Seismic Source (UCSS) Model
(FSAR Figure 2.5.2-213)

Section 2.5.2–Vibratory Ground Motion

- **Eastern Tennessee Seismic Zone (ETSZ)**
 - Issue: Applicant did not include newer ETSZ source models that post-date the 1986 EPRI study in the VCSNS PSHA.



Comparison of ETSZ M_{max} distributions from EPRI-SOG, TIP, and TVA Dam Safety Studies (AFSER Figure 2.5.2-13)

Section 2.5.2–Vibratory Ground Motion

• **Eastern Tennessee Seismic Zone**

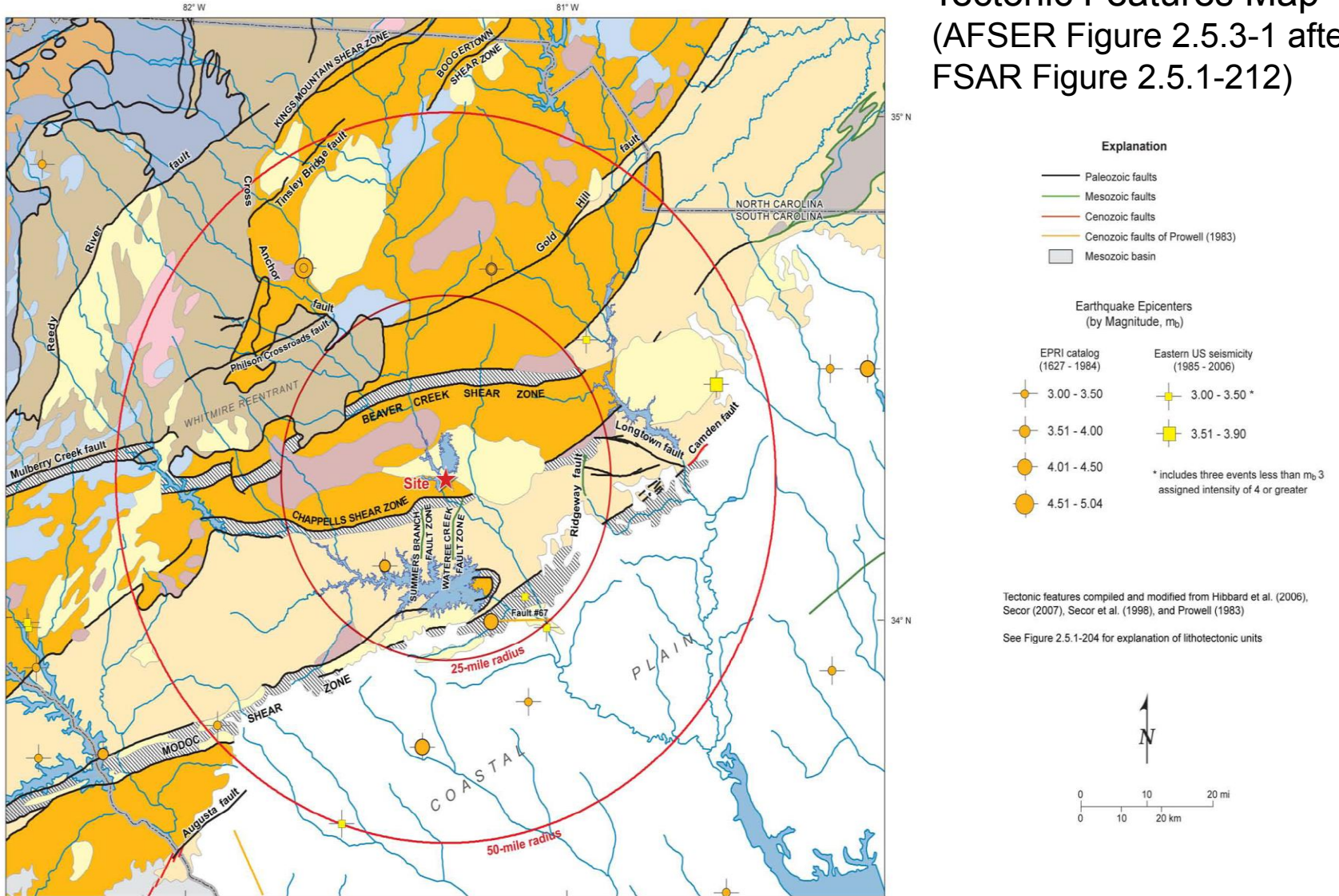
- Resolution: Applicant referred to a sensitivity study conducted by NEI for the ETSZ (2008) and concluded, based on results of that generic study for a hypothetical site in the middle of the ETSZ, that changes resulting from updating the 1986 EPRI study were not significant.
 - Staff performed an independent sensitivity analysis to assess whether the updated M_{\max} distribution used in the NEI sensitivity study significantly changed the final GMRS for the VCSNS site.
 - Results of staff's sensitivity calculation showed that increasing original EPRI-SOG M_{\max} distributions for the ETSZ did not significantly impact seismic hazard for the VCSNS site. GMRS values increased only slightly at 1 Hz (0.094 g to 0.104 g) and 10 Hz (0.428 g to 0.468 g).

Section 2.5.3–Surface Faulting

- **Surface Faulting in the Site Vicinity & Site Area**
 - Issue: Ensure that no capable surface or near-surface tectonic faulting exists in the site vicinity and site area.
 - Applicant documented that tectonic surface structures have been mapped in the site vicinity.
 - Resolution: Staff’s review of detailed responses to RAIs resolved concerns related to occurrence of capable surface or near-surface faulting in the site vicinity and site area.
 - Staff found that information (i.e., constraining field relationships and radiometric age dates) provided by the applicant documented that no surface or near-surface Quaternary tectonic faults occur in the site vicinity or site area.
 - Non-tectonic surface or near-surface deformation is not expected because of the physical properties of crystalline bedrock in the site vicinity and site area and at the site.

2.5.3 Surface Faulting

V. C. Summer Site Vicinity
Tectonic Features Map
(AFSER Figure 2.5.3-1 after
FSAR Figure 2.5.1-212)



2.5.3 Surface Faulting



Exposure of the Wateree Creek fault (206-144 Ma in age), located 3 km (2 mi) south of the VCSNS site

Section 2.5.4–Stability of Subsurface Material and Foundations

- **Excavation Plan**

- Issue: Identification of “sound rock” in the field during excavation, and how to maintain integrity of “sound rock” underlying Category 1 foundations.
- Resolution: Applicant stated that all overlying soils would be removed with a large ripper or trackhoe until non-rippable (i.e., “sound rock”) was reached. “Sound rock” will be confirmed in the field by a geologist using a rock hammer and visual inspection. This non-explosive method of excavation will not affect integrity of rock underlying the Category 1 foundations.

Section 2.5.4–Stability of Subsurface Material and Foundations

• **Concrete Fill Underlying Foundations**

- Issue: How to ensure that concrete fill underlying Category 1 foundations has similar properties as “sound rock”, and how to resolve a potential thermal cracking issue for some areas with up to 17 ft of concrete fill.
- Resolution: Applicant indicated that concrete fill will have a similar strength and shear wave velocity as “sound rock”; appropriate industry standards will be followed for concrete fill design and thermal cracking control; and a thermal control monitoring plan will be provided.
 - Confirmatory Item 2.5.4-1: Staff will ensure that a detailed concrete fill design, thermal cracking control, and monitoring plan are included in a revised FSAR.

Section 2.5.5–Stability of Slopes

- **No technical issues of interest for AFSER Section 2.5.5**
 - Applicant addressed 2 COL Information Items (VCS COL 2.5-14 and VCS COL 2.5-15) related to stability of all earth and rock slopes and the need for additional dams or embankments to be constructed at the site.
 - Staff found that slopes at the site are at an adequate distance from the power block and cooling tower area, and there is no need for additional dams or embankments to be constructed at the site.

Attachment 4

**AP1000 Design Safety Evaluation Report Meeting
ACRS Subcommittee Action Items (DRAFT)
July 23 – 24, 2009, October 6-7, 2009, November 5, 2009,
February 2-3, 2010, April 22, June 24-25,
and July 21-22, 2010
Revised 8/27/2010**

| ID No. | Action Item | Status | Source (Chapter/ Discussion) | Westingho use/ Bellefonte application | Who has action | Comment/Disposition |
|--------|--|--------|---|---------------------------------------|----------------|---|
| | <i>ITEMS Below are from July meeting</i> | | | | | |
| 2 | Can Non-condensable gases affect flow from IRWST. a) what ITAAC will be included b) heatup analysis -Abdel-Khalik, Banerjee | open | 7/23 Summary discussion Chapter 1, Updated in Feb. | W | W | ACTION: Westinghouse provided a discussion during Feb. meeting on how non-condensable gas issue was addressed. "need to hear rest of story" |
| 4 | RCP Flywheel Design; I would like to receive stress corrosion test reports performed by W or pump supplier on the 18Cr 18Mn retainer ring material. I suspect that they have not tested this material sufficiently (if at all) to demonstrate SCC resistance in the coolant environment. Even though the ring is sealed in a Alloy 625 can, the assembly will not be inspected in service, and there will be no way of knowing whether the can will remain leak tight during service. If SCC of the retainer ring occurs, a serious accident would be likely. -Armijo Also, interested in RCP locked rotor failure frequency used in PRA. Tom Kress | open | 7/23 Summary discussion Chapter 5 Updated in Feb. | W W | —DNRL | Westinghouse to provide presentation in future ACRS meeting DNRL to provide results of staff review of revised missile analysis when complete. Was discussed during February meeting. <i>Closed failure frequency concern at 4/22 meeting. Materials were provided to Sam after 4/22 meeting.</i> |

Attachment 4

**AP1000 Design Safety Evaluation Report Meeting
ACRS Subcommittee Action Items (DRAFT)
July 23 – 24, 2009, October 6-7, 2009, November 5, 2009,
February 2-3, 2010, April 22, June 24-25,
and July 21-22, 2010
Revised 8/27/2010**

| ID No. | Action Item | Status | Source (Chapter/ Discussion) | Westingho use/ Bellefonte application | Who has action | Comment/Disposition |
|--------|--|--------|---|---------------------------------------|----------------|---|
| 6 | <p>Flow distribution – Lower plenum anomaly and core inlet flow distribution. What is ratio of peak/average and minimum/average bundle flows with the skirt. Provide further information about the tests ongoing in Japan, including scaling methodology, CFD Method used, Reynolds number. What were the assumptions used in setting up the VIPER model and its justification.</p> <p>-Abdel-Khalik</p> | open | <p>7/24 Morning meeting Chapter 5, Chapter 4</p> <p>Updated in Feb.</p> | W | W/ DNRL/ NEW2 | <p>Westinghouse to provide additional discussion in future ACRS meeting. DNRL <i>has</i> provided background documents from AP1000 review that may help ACRS better understand the issue.</p> |

Attachment 4

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ACRS Subcommittee Action Items (DRAFT)
July 23 – 24, 2009, October 6-7, 2009, November 5, 2009,
February 2-3, 2010, April 22, June 24-25,
and July 21-22, 2010
Revised 8/27/2010**

| ID No. | Action Item | Status | Source (Chapter/ Discussion) | Westingho use/ Bellefonte application | Who has action | Comment/Disposition |
|--------|--|--------|------------------------------|---------------------------------------|----------------|--|
| 10 | <p>Elbow Taps for RCS Flow Measurement. Need further information, discuss uniformity of flow. Provide ACRS background information for Westinghouse change for monitoring RCS flow to reflect an alternate testing method to the precision heat balance. The alternate testing method includes using elbow taps. OI SRP 16 CTSB 25.</p> <p>-Banerjee</p> <p>Additional questions was raised during the April 22 meeting:</p> <p>How are various measurement indications reconciled, at operating plants?</p> <p>For AP1000 Design,</p> <p>What is the uncertainty in core flow;</p> <p>How is the uncertainty estimated;</p> <p>What is the measurement used for; and how accurate does it have to be?</p> <p>-Said</p> <p>Westinghouse to provide a reference for the statistical method of combining diverse measurements.</p> <p align="center">- Sanjoy</p> | open | 7/24 Chapter 16 | W | W/DNRL | <p>DNRL to provide relevant Westinghouse submittals to ACRS. Need submittals from Westinghouse. Communicated to Westinghouse on 1/15/2010</p> <p>Westinghouse addressed this item in July 2010 meeting. Since Said was not presented during the meeting, slides and transcripts were sent to him after the meeting. Said was satisfied with the response by Westinghouse.</p> <p>During the meeting, Sanjoy further requested a reference on the statistical method used for the flow uncertainty.</p> |

Attachment 4

**AP1000 Design Safety Evaluation Report Meeting
ACRS Subcommittee Action Items (DRAFT)
July 23 – 24, 2009, October 6-7, 2009, November 5, 2009,
February 2-3, 2010, April 22, June 24-25,
and July 21-22, 2010
Revised 8/27/2010**

| ID No. | Action Item | Status | Source (Chapter/Discussion) | Westinghouse/Bellefonte application | Who has action | Comment/Disposition |
|--------------------------------------|---|-----------|-----------------------------|-------------------------------------|----------------------------------|---|
| 11 | Aircraft Impact Assessment staff evaluation. Subcommittee wants briefing. -Ray, Banerjee | open 7/24 | Chapter 19 | W | DNRL | NWE1/NWE2 to arrange closed ACRS subcommittee briefing. 19F revision |
| <i>TEMS FROM OCTOBER SC MEETINGS</i> | | | | | | |
| 27 | <i>PRA audit results. COL PRA?</i> | open | 19 | W | NWE2 Member Action | <i>DNRL has provided documents and sent to members on 3/30/2010– under review</i> |
| <i>ITEMS FROM NOV 5 FC MEETING</i> | | | | | | |
| 32 | I&C Architecture(major changes) -Brown And there is still the open questions such as on high speed links Brown 6/25/2010 | open | 11/5 | W | NRC | Addressed on November 19 and Feb 2-3. May be future questions. 6/25/2010, WCAP-17201-P (high speed links) sent to Brown. Integrated Action Item 43 to this item, since it is related to the high speed links. |
| 33 | <i>In addition to design/hardware changes, Committee wants changes to methods</i> -Abdel-Khalik | open | 11/5 Updated in Feb. | W | NRC | <i>ASTRUM was discussd in Feb. New action item 49 has more questions about TH methods.; seismic analyses (future meeting). Pg 76 of Nov 5 Transcripts. Future changes to be highlighted</i> |

Attachment 4

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| 34 | <p><i>HFE DAC closure</i></p> <p>a) For I&C and HEF, Rev 15 DAC that have been deleted in Rev 17, Show the subcommittee details of how those DAC were satisfied, Two or three examples might be sufficient. (Dennis C. Bley)</p> <p>b) I&C DAC – Westinghouse indentified in the Nov 09 meeting that DAC close out was divided into 3 phases:</p> <p>Phase 1 DAC 1, Phase 2 DAC 2, Phase 3 DAC 3</p> <p>What each DAC was intended to include and how each item was closed in each phase should be provided. (Charles Brown)</p> | open | 11/5 Updated in Feb. | W | NRC | <i>Final SER should document DAC closure including acceptance criteria</i> |
| <i>ITEMS FROM NOVEMBER SC MEETINGS</i> | | | | | | |

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| 35 | <p><i>Boric acid deposition report (Bajorek) for Armijo</i></p> <p>“The thrust of these concerns relates to the lack of prototypicality of the coolant used in the downstream flow blockage tests performed by W. Banerjee requested information on the concentration of dissolved aluminum and I was interested in the complete composition of the coolant (not just boric acid). Based on the material presented in the GSI 191 presentation, the coolant carrying the debris in these tests did not match or even approximate the composition, pH or temperature of the coolant that will exist after a LOCA. The physical state of the AIOOH will be highly dependent on chemistry and temperature, and this is the material that cements the fibrous debris. Without tests in prototypical environments, I do not see how anyone can conclude that the debris will not block the entries to the fuel assemblies. Maybe the staff can resolve my concern.” - Armijo</p> | open | GSI-191 Updated in Feb. | | NRC | <i>Provide copy of report</i> |
| 36 | <i>Amount of aluminum. See 35 -Banerjee and Armijo</i> | open | GSI-191 | | W | <i>Discuss with staff SER. Pg 1-293 of Nov 19 meeting Transcripts</i> |

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| 37 | <p><i>Statistical analysis of fuel assembly tests</i></p> <p>“Banerjee, Wallis and I requested statistical analyses of the fuel assembly tests. There were a limited number of tests, and a several experimental variables. The issue here is the statistical validity of the reported findings and conclusions of these tests.” – Armijo</p> <p>Armijo further clarified in his e-mail on 7/1/2010, “ The heart of my question was whether there was sufficient repeatability in the tests. Given the same test variables in duplicate tests, did Westinghouse get reasonably similar results”</p> | open | GSI-191 | | <p>W ACRS</p> | <p><i>Provide copy of report – possibly included in RAI response</i></p> <p><i>GSI-191 Test Reports sent to Sam on July 6, 2010.</i></p> |
| 38 | <p><i>Concrete scouring</i> -Ray</p> | open | GSI-191 | | W and NRC | <p><i>Discuss at future meeting (RAI)</i></p> |
| 39 | <p><i>Hot leg break – debris at top of core</i> -Wallis</p> | open | GSI-191 | | W and NRC | <p><i>Discuss at future meeting (RAI)</i></p> |
| ITEMS FROM FEBRUARY SC MEETINGS | | | | | | |
| 46 | <p>Components MOV, POV testing, how is the risk informed and ranked. PRA is not sufficient and need to review other criteria. -Stetkar, Shack</p> | open | 3 | | W | <p><i>W to provide info on risk ranking</i></p> |
| 47 | <p>Table 15.0-5 Uncertainties table need further discussion. Were instrument drift/ other uncertainties counted in the 1-2% power changes? (Said)</p> | open | 15 | | W/DNRL | <p><i>Present at future meeting</i></p> |

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| 48 | Confirm 1) if there are interlocks for ADS1, 2, 3, 4 actuation and what kind of failure it can occur. 2) If it occurs, what is the impact to the safety analysis? | open | | | W | <i>W to provide info at future meeting</i> |
| 49 | <p>Sanjoy had issues on codes:</p> <p>a) ASTRUM is approved for other Westinghouse PWRs, justify that it can be applied to the AP1000. What is the similarity of the AP1000 compared to the Westinghouse PWR for the LBLOCA in the initial blowdown phase?</p> <p>b) W/TRAC is the best estimate code. What the conservativeness was used in the Rev. 15 compared to the best estimate approach used in the Rev. 17, which lowered the PCT significantly.</p> <p>c) Since the certified design, what are the changes in the code? Provide a summary report. WEC responded that the main changes Error of modeling in pressurizer and hot spot. (Sanjoy)</p> | open | Chapter 15 | | W | <i>W to provide info at future meeting</i> |

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| 50 | In LOCA calculation, the collapsed liquid level in the core remains at about six feet, what is the uncertainty of the six ft in water level? (Sanjoy) | open | Chapter 15 | | W | <i>W to provide info at future meeting</i> |
| ITEMS FROM APRIL 2010 SC MEETINGS | | | | | | |
| 51 | Details of the plate-to-plate welds for the SC wall steel plates and how the quality of welds are assured. - Boza and Sam. | open C | Chapter 3 Shield Building Design | | W | |
| 52 | Details of the roof beam to tension ring connection. | open C | Chapter 3 Shield Building Design | | W | |
| 53 | Explanation of the pushover analysis methodology: how were the lateral and vertical forces selected, combined and applied, and how are the results of this nonlinear analysis interpreted. - Boza | open C | Chapter 3 Shield Building Design | | W | |
| ITEMS FROM June 2010 SC MEETINGS | | | | | | |

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| 54 | <p>AP1000 Containment coating issues—corrosion allowance, coating monitoring, Inspection program (ASME—ASTM requirements), RG 1.54, containment leak rate testing in relation with corrosion caused leakage. The ACRS subcommittee chairman would like to have this item on the July meeting.</p> <p align="center">—Ray</p> | Closed C | chapter 6 | COL Applicant | COL Applicant | <p><i>SNC discussed the programs in the July meeting. However, members asked more questions on the configurations of the containment system and shield building. Westinghouse committed to provide more information when they discuss the SB in future. New action Item was created as #60.</i></p> |
| 55 | <p>Testing of Squibb Valves— Verification/qualification program, IST program. - Banerjee</p> <p>Member Brown requested details on how many tests, what's the configuration, what are the upstream pressures, and etc, aside from how do you test them once they are in service. - Brown</p> | | Discussed in Chapter 14 and WEC will address it again in Chapter 3 | W/COL | W/COL | <p><i>Both WEC and COL need to address this item.</i></p> |

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| 56 | <p>How the functional requirements related ITAAC (e.g., Turbine overspeed protection) will be verified? (What process will be used to verify the requirements). How does ITAAC for turbine overspeed protection diversity, independence, and redundancy get written to adequately inspect computer hardware and software.</p> <p>There was interest in any failure experience with monoblock turbine rotors, and seeking more info about how active sensors function. (june transcripts Page 187-191)</p> <p>Provide RAIs on the subject. - Brown</p> | Open Cha | pter 10 | W/COL | W | <p><i>TR86 and RAI-SRP10.2-SBPA-02 were sent to members. Brown provided additional comments and they were passed to the NRO staff.</i></p> |

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| 57 | <p>In Chapter 12 presentation, Mr. Roach stated: "the plants or facilities have had issues with that ventilation or contamination going into their ducting, that exhaust port was very close to the water level within a couple of feet, in the AP 1000 the exhaust is up approximately 10 - 12 feet above the water level."</p> <p>Member Brown requested a justification of 12 feet above the water level. (June Transcripts, page 26)</p> | open C | chapter 12 | DCD | NRO | |
| 58 | <p>Requested a report that describes the method applicant is using for the spent fuel racks criticality analysis?— Bley June Transcripts Page 13.</p> | Closed | Chapter 4 | | WEC | <p><i>It will be discussed in Chapter 9</i></p> <p><i>Additional Information was provided by NRO and sent to Members in the Sept. 2010 Status CD.</i></p> |
| ITEMS FROM July 2010 SC MEETINGS | | | | | | |
| 59 | <p>Provide Bley with copy of WCAP on setpoint control methodology.</p> | Closed | Chapter 16 | | WEC | <p><i>The document WCAP-16361 (ML061530485) was sent to the members on 8/6/2010</i></p> |

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| 60 | <p>Numerous questions about water distribution around outside of containment and coatings application and inspection. To understand the coating on containment, ACRS needs clear diagrams and illustrations on the configurations of the containment and Shield Building. For example, Sam requested to see water management system for the shield building. Harold requested to confirm that the baffle is protected by Galvanizing. Brown asked how to ensure the right thickness of coating and some type of analysis on the fact that this coating is supposed to prevent rust.</p> <p>Members also requested to review the July 2 letter regarding revision to the Ch 6 of FSAR.</p> <p>Kress recommend to review technical basis behind the choice of 50 psi as the limit below which the chosen coating will not flake off during a LBLOCA. Will this be validated experimentally?</p> | Open | Chapter 3/6 | | WEC | <p><i>WEC will provide more information when they come back on the Shield Building Design. Staff will address this issue in the COL safety evaluation in Chapter 6.</i></p> <p><i>July 2 letter is sent to the member through September AP1000 meeting status CD.</i></p> |

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| 61 | Desire by some members to review ISG-1, pertaining to coherency function and ISG-18 Reliability Assurance Program. | Closed | Chapter 2 | | Staff | <i>ISG-1 Sent to the Members on 8/6/2010. ISG-18 was sent to the members with the AP1000 September meeting Status CD</i> |
| 62 | Consultant Bill Hinze suggested that Section 2.5.2.2.1 should be revised and the results of the U.S. Geological Survey model for the V.C. Summer site should be compared with seismic hazard analysis prepared by the applicant. | open | Chapter 2 | | Summer | Bill produced a meeting report for the subcommittee with comments. |
| 63 | South Carolina Electric and Gas provides the detailed calculation associated with the following: 1) train car release of toxic gas and its effects on control room habitability, and 2) offsite explosive hazards analysis that was done to support the conclusion that such a hazard does not pose a threat to the proposed VC Summer Units 2 and 3. 3) Staff's confirmatory calculations (Sanjoy). | Closed for Part 1 and 2 | Chapter 2 | | Summer | <i>4 reports were received and three of them were sent to the members by e-mail on 8/12. Due to its size, the last one will be add to a CD for members to review.</i> |

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| 64 | When the hydrogen is replenished, you bring some sort of a truck onsite. Is there an additional hazard as far as the amount of hydrogen at that time or would that be handled with the COLA? - Sam, Transcripts page 22. | Open | Chapter 2 | | Vogtle COLA | |
| CLOSED ITEMS | | | | | | |
| 1 | GSI and Generic Issue Process. How is it addressed since Rev. 15? (example GSI-191) | closed | 7/23 Summary discussion Chapter 1 | W | DNRL | Provided additional presentation in Feb meeting |
| 3 | RTD Relocation. Is there an impact on the dead-band for rod control. Are they at upper half or at top of the hot leg? -Abdel-Khalik, Ray | closed | 7/23 Summary discussion Chapter 5 | W W | | Closed at October meeting. Westinghouse to provide presentation in future ACRS meeting |
| 5 | Pressurizer. Does the shape change affect "chugging" behavior with ADS discharge? What is the effect on level control setpoints? | closed | 7/24 Summary discussion Chapter 5 | W W | | Westinghouse provided presentation at Nov ACRS meeting. DNRL has provided documents on safety analyses |

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| 7 | Zinc Injection (information on operating experience (14 foot core). Is there exothermic reaction; how much zinc coats on fuel. | closed | 7/24 Chapter 19 meeting Chapter 5 | W | W | Westinghouse to provide presentation in future ACRS meeting. Discussed at Oct meeting. DNRL to provide documents. Also was discussed during Nov meeting on chapter 9. Closed |
| 8 | PTLR Process. Need to clarify how this is captured in TS, other examples (COLR). | closed | 7/24 Chapter 5 | W | | Closed at Oct meeting |
| 9 | <p>Turbine Overspeed Protection</p> <p>a) frequency of testing (6 months?)</p> <p>b) method of testing</p> <p>c) power supply independence</p> <p>d) diversity</p> <p>f) turbine missile analysis, include 1) How W used the available operating experience to justify both the challenge frequency and the failure rate for the valves. 2) What are those conditional probabilities of the discs coming apart for each of the overspeed conditions, design and intermediate overspeeds.</p> <p>-Ray, Brown, Stetkar</p> | open | 7/23 Chapter 10 Updated in Feb. | W W | — NRC | <p>Westinghouse to revise DCD to correct mis-characterization about speed control, independence. Discussed at Feb meeting. Open questions on intercept valve test frequency and method of testing for overspeed. 3 months -->6 months. Questions on turbine missile analyses diversity</p> <p>In June 2010 meeting, W provided sufficient information and members decided to close this item but produced an new item #56</p> |
| | | | | | | |

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| 12 | Turbine missile generation. ACRS would like more information about assumptions in analysis -Sketkar questions | closed | 7/24 Summary discussion Chapter 10 | W T | VA/DNRL/NWE1 | Issue to be discussed during chapter 3 review where missile generation from one unit s impact on a second unit is discussed. Also missile hazards analysis for existing units on the site should be addressed in presentation to ACRS Discussed at Oct and Feb meeting. Issue of Dual unit sites is adequately addressed. New questions were raised and they are added to Item 9. |
| 13 | BLN Hydrology Issue and QA aspects. Staff to provide inspection report and public meeting accession numbers. | closed | 7/24 Summary discussion Chapter 19 | TVA | DNRL | 8-10-09 update – action complete information provided to Mike Lee in a 7/28 email from Joe Sebrosky Discussion topic to be deferred to RCOLA site specific review |
| 14 | Concerned about ad-hoc basis of the staff's review of design changes to determine if a particular design change impacts other areas of the FSAR. | closed | 7/23 Summary Discussion Chapter 5, Chapter 10 | W DNRL | | Closed by focus on "design changes" not just DCD changes |
| 15 | Would like a better understanding of how GSI 199 (eastern Tennessee seismic zone) affects the seismic margins bounding approach. -Ray | closed | Chapter 19 | both | DNRL/NWE1 | Issue to be discussed during chapter 2 bellefonte presentation or during other SC on GSI-199. Closed in Feb. -site specific |
| 16 | Does the recent flood in France shed any In sights with regard to PRA? -Banerjee | closed | Chapter 19 | both | DNRL/NWE1 | Issue to be discussed during chapter 2 bellefonte presentation. Closed in Feb -site specific |

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| 17 | Present information on "testing". Present testing done to support Rev 15 and 17 design certifications. Present testing done to demonstrate "as-built" – i.e. the initial test program. Present testing that is done throughout the life of the plant. -Abdel-Khalik | closed C | Chapter 14 | Both | W, TVA, DNRL | See item #2 |
| 18 | Concerned about workload and what can be done to help ACRS (suggested that alternatives can be explored like thermal hydraulic issues being discussed for all design centers during one set of ACRS meetings). | closed | 7/24 Summary Discussion | | DNRL | DNRL to discuss issue with upper management and determine if there are alternatives. <i>Closed</i> |
| 19 | Staff to provide information regarding what is meant by rad significant | closed Chapter | Chapter 12 | | | 8/10- update added based on comment from Mike Lee. Need to review transcripts when available to better understand item. <i>Relates to July 22 ACRS letter on NEI-08-08. Generic to all COLs – closed with respect to AP1000 SC</i> |
| 20 | Provide information regarding how digital I&C failure rates were addressed in the PRA and whether there were improvements made in the design as a result of insights from the PRA. -Kress? | closed | Chapter 19 | | | 8/10- update added based on comment from Mike Lee. Need to review transcripts when available to better understand item. Discussed at Feb meeting |
| 21 | In several areas, the Committee sought figures or other visuals to understand the design changes (flow skirt, flywheel), functional block diagram on turbine controls. The Committee will be looking for this in future chapters. | closed NA | | Both | W/TVA/DNRL | <i>Chapter 7 presentation includes several figures. Westinghouse will provide more figures in future presentations (1/15/2010). Closed in Feb</i> |

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| 22 | In most cases, the Committee was not particularly interested in process issues, such as handling of COL holder items. For future meetings, suggest not presenting COL and open items where this is the primary consideration. | closed NA | | Both | W/TVA/D RNL | discussed in February meeting |
| 23 | The Committee was interested in how the staff ensures that overall impacts are considered, such as: could something about COL impact upon the IBR usage, and are all effects of a particular design change evaluated. (relates to item 14 above) | closed | NA | Both | DNRL | DNRL to consider if additional information in this area should be presented to the ACRS. <i>Westinghouse will discuss their process during Nov meeting. Closed</i> |
| 24 | The Committee indicated that there is still confusion about RCOL transition process. | closed | NA | TVA | NWE1 | Provide additional discussion in future ACRS meeting – <i>included during Nov 5 FC meeting. Closed in Feb</i> |
| 25 | <i>Human Factors Engineering, including Computer-Based procedures audit . Task analyses</i> | closed | 18 | W | NWE2 | <i>DNRL provided documents. GA wants information on integration of HRA into HFE (from 11/5) –documents provided</i> |

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| 26 | <p><i>Waste management forecast (by category and volume if available)</i> -Ryan</p> <p><i>After June 2010 meeting, Dr. Ryan has the following comments:</i></p> <p>The answers are there except for the forecast of volumes of materials in storage as Chairman Ray noted at line 12 on page 109.</p> <p>The purpose of these questions is to probe the amount of waste radioactive materials and their onsite storage periods. At some point 20, 40, 60, year hence they can become problematic. The query is to inquire as to their longer term plans for accumulated wastes. I do not agree that these answers close the question.</p> | closed | 11 | | COL | <p><i>COL to provide</i></p> <p><i>Updated after June 2010 meeting.</i></p> <p><i>Closed in July 2010 meeting.</i></p> |
| 28 | <p><i>Pipe break hazard analyses (DAC)</i> -Banerjee, Ray</p> | closed | 3.6 | W | W/NWE2 | <p><i>Provide report when completed (2010)). Closed in Feb</i></p> |
| 29 | <p><i>Screening criteria for striping (thermal fatigue)</i> -Banerjee</p> | closed | 3.12 | W | W | <p><i>Discuss at future meeting. Westinghouse is targeting April. Closed at 4/22 meeting</i></p> |
| 30 | <p><i>WESTEMS code and J-weld</i> -Shack</p> | closed | 3.9.1 | W | NWE2 | <p><i>Open items in SER – will discuss with AFSER. Closed in Feb.</i></p> |
| 31 | <p><i>Chapter 2 geotech information</i></p> | open | | W | W/NWE2 | <p><i>Include when discussing related chapter 3 (seismic)</i></p> <p><i>Chapter 2 and part of Chapter 3 was discussed in July 2010 meeting.</i></p> |

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| 40 | Underground piping (fluids) and conduit (electrical) and how they perform with regard to groundwater intrusion and surface water infiltration. The concern includes the pipe, connections and material performance at the connections (joint adhesives “welding” materials, etc.). A related question are any of the tritium task force results and recent experiences reported for Vermont Yankee and Indian Point raising issues for such piping. (Mike Ryan) | closed | 9 | | W and NRC | Discuss at future meeting. March/April pg 2-187 of Nov 20 meeting Transcripts. Closed at 4/22 meeting |
| 41 | <i>RTCB test frequency</i> | closed | 7, 16 | | W and NRC | Discuss basis for yearly (OI) Additional Information was provided by NRO and sent to Members in Sept. 2010 Status CD. |
| 42 | <i>Cyber Security</i> | closed | 7 | | NRC | NWE2 provided copy of TR. Closed in Feb |
| 43 | <i>HSL (high speed links) “topical report” -Brown</i> | open | 7 | | W | Westinghouse to provide reference. Related to SER OI? Under review. A report was sent on April 5, 2010. This item is replaced by action Item 32. |
| 44 | <i>RTNSS tutorial -Ray</i> | closed | | | DNRL | At Feb meeting |
| 45 | <i>Multiple spurious actuation report -Ray, Maynard</i> | closed | 9 | | DNRL W | Westinghouse to provide copy of report. Proprietary concerns? Feb discussion --> closed. |
| 51 | Get a NRC consultant report on ASTRUM applicability evaluation (NRO provided the report after the meeting). | closed | | | DNRL | DNRL provided report following Feb meeting. Closed |