

Backup Slides

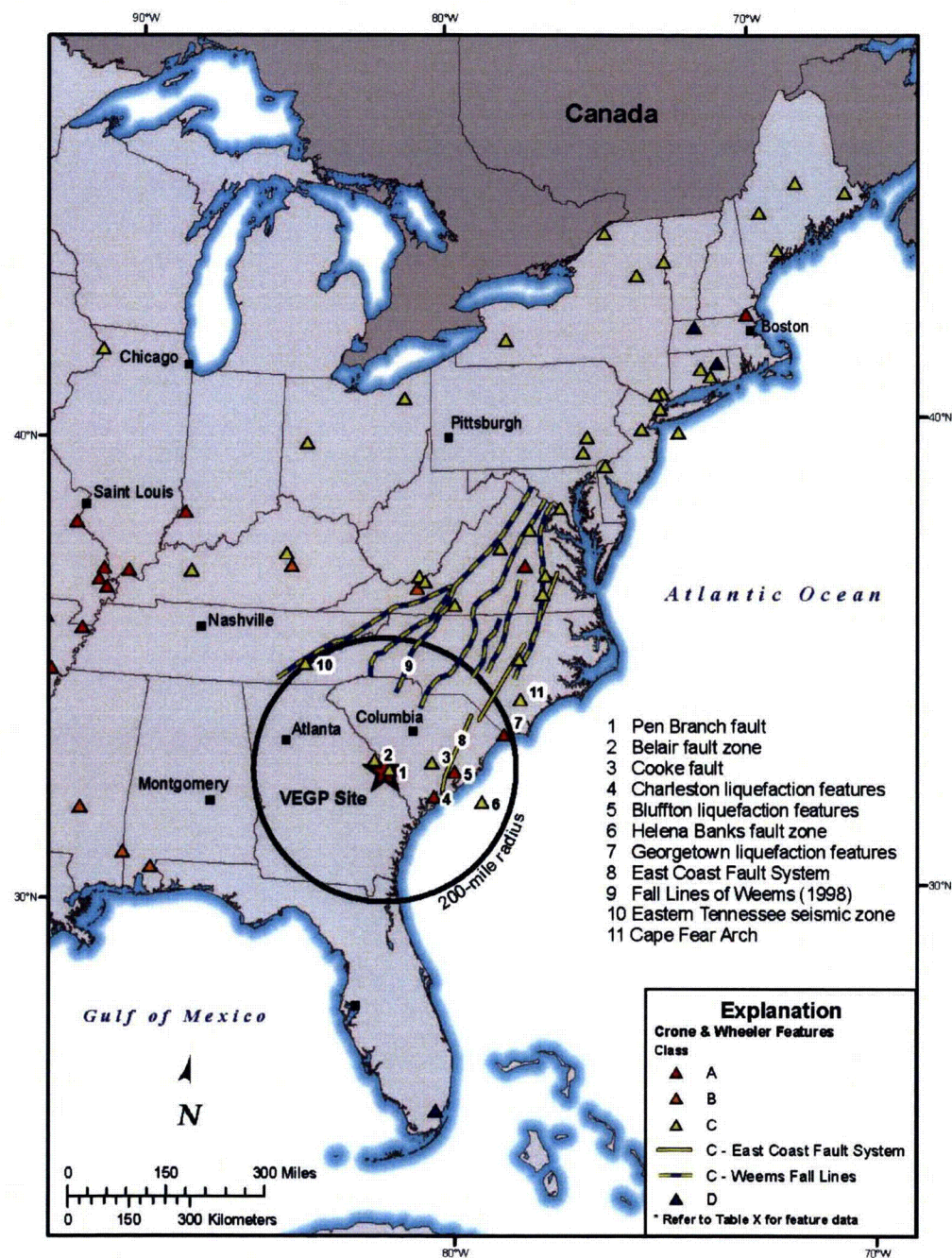
Vogtle ACRS Meeting

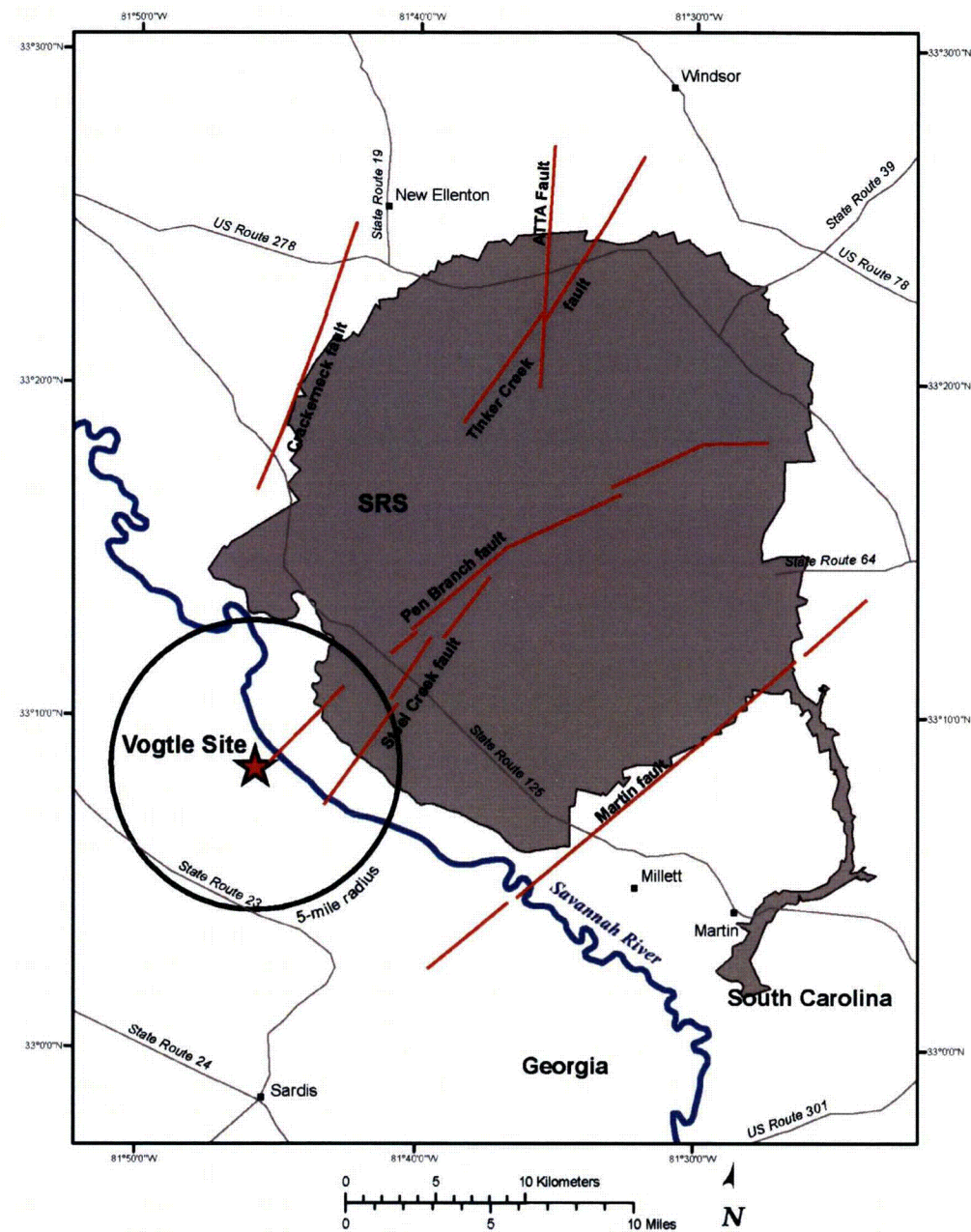
October 24, 2007

Geology and Seismic Sources
2.5.1, 2.5.2, and1 2.5.3

Regional and Local Geology Slides

Potential Quaternary Features Map





Source: Cumbe et al. 2000

Figure 2.5.1-23 SRS Faults — First-Order Faults of Cumbe et al. (2000)

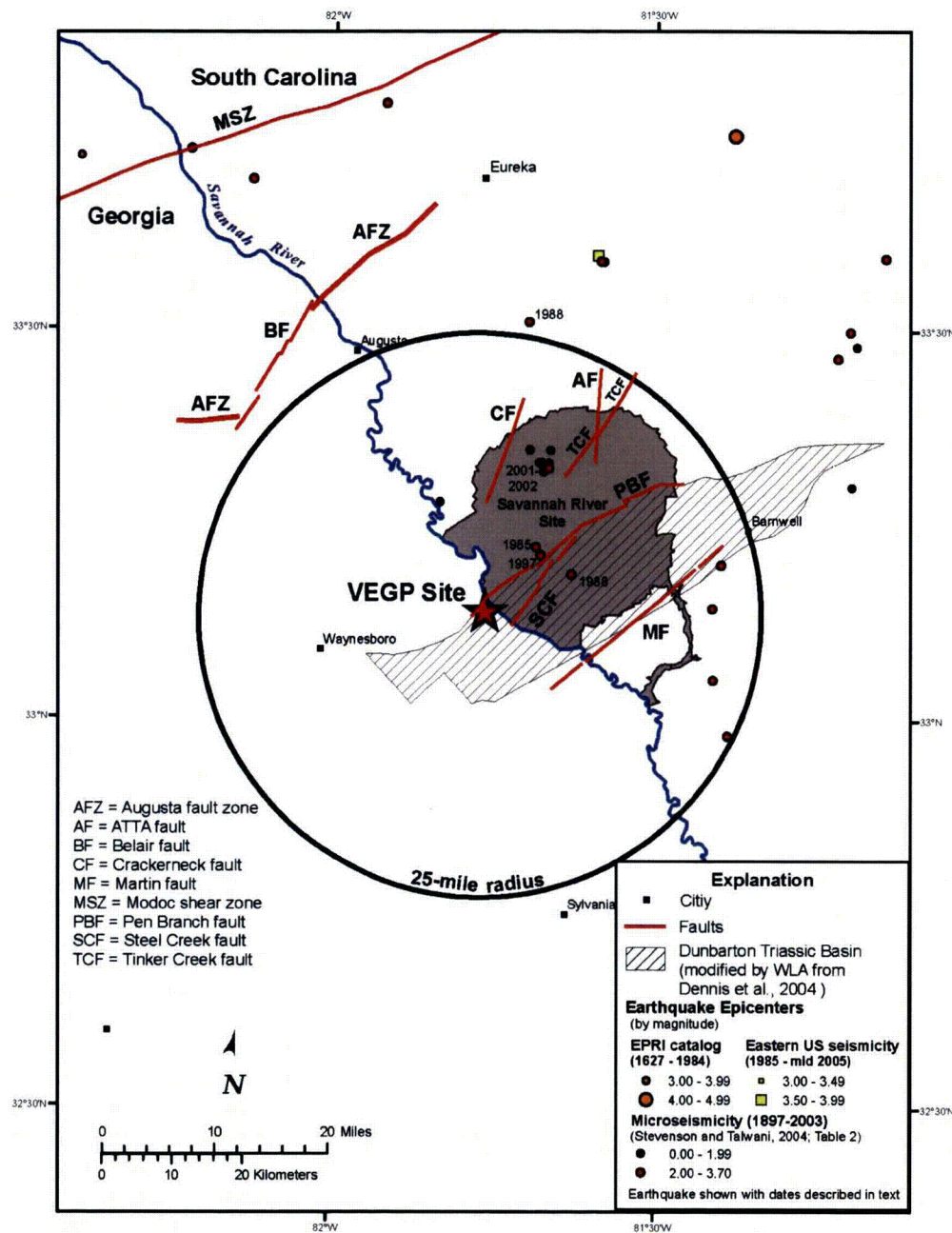


Figure 2.1-16 Site Vicinity Tectonic Features and Seismicity



RAI Figure 2.5.3-2C. Photograph Illustrating Downward Termination of a "Clastic Dike."



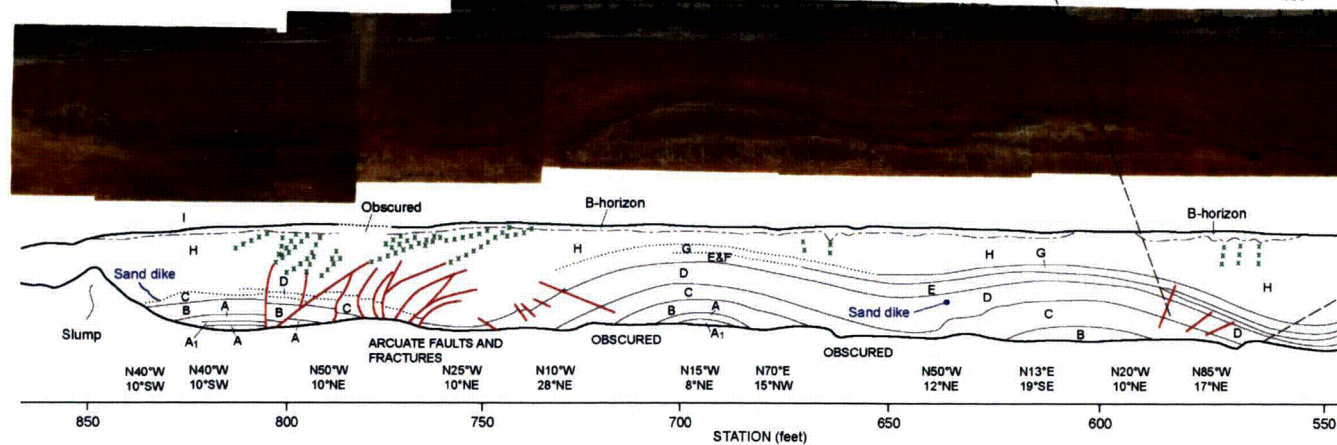
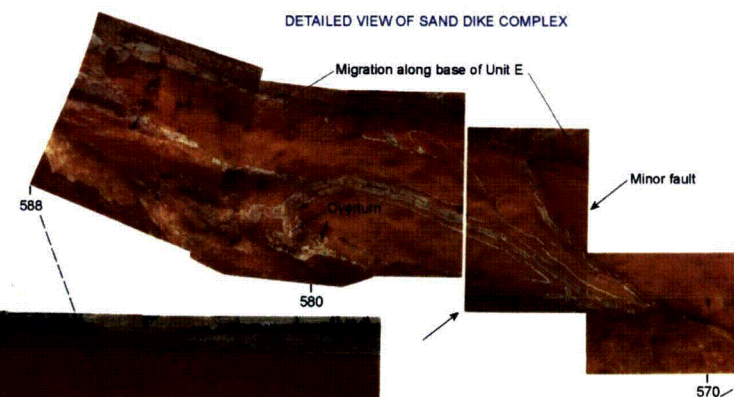
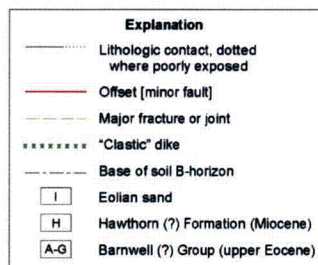
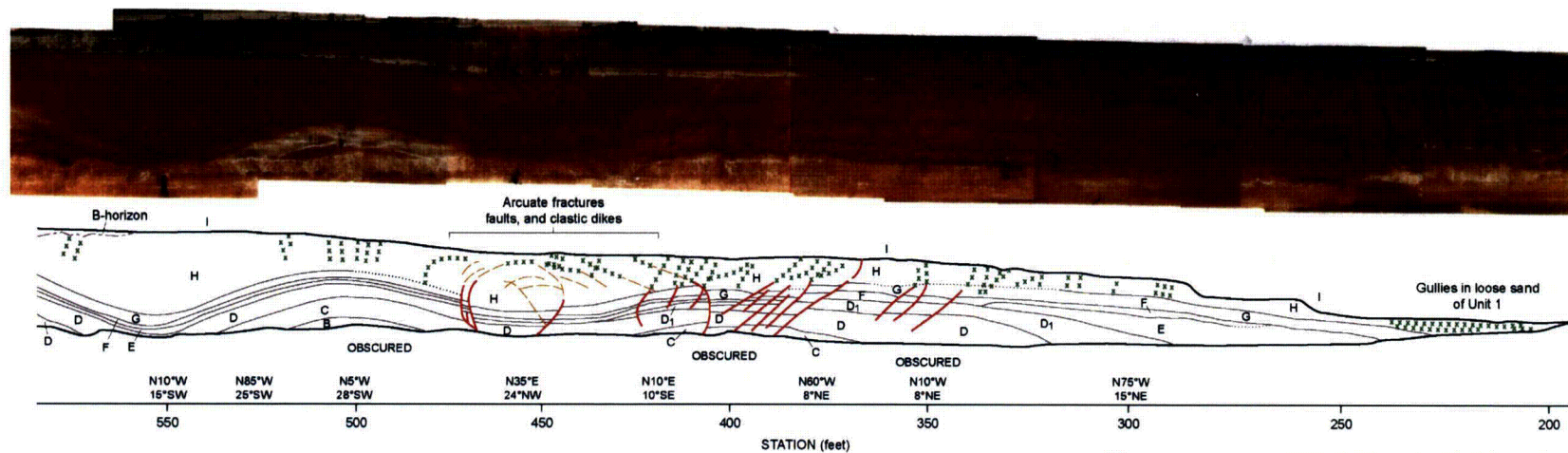
Source: Bechtel 1984b

Figure 2.5.3-1 Contorted Bedding in Garbage Trench at VEGP Site



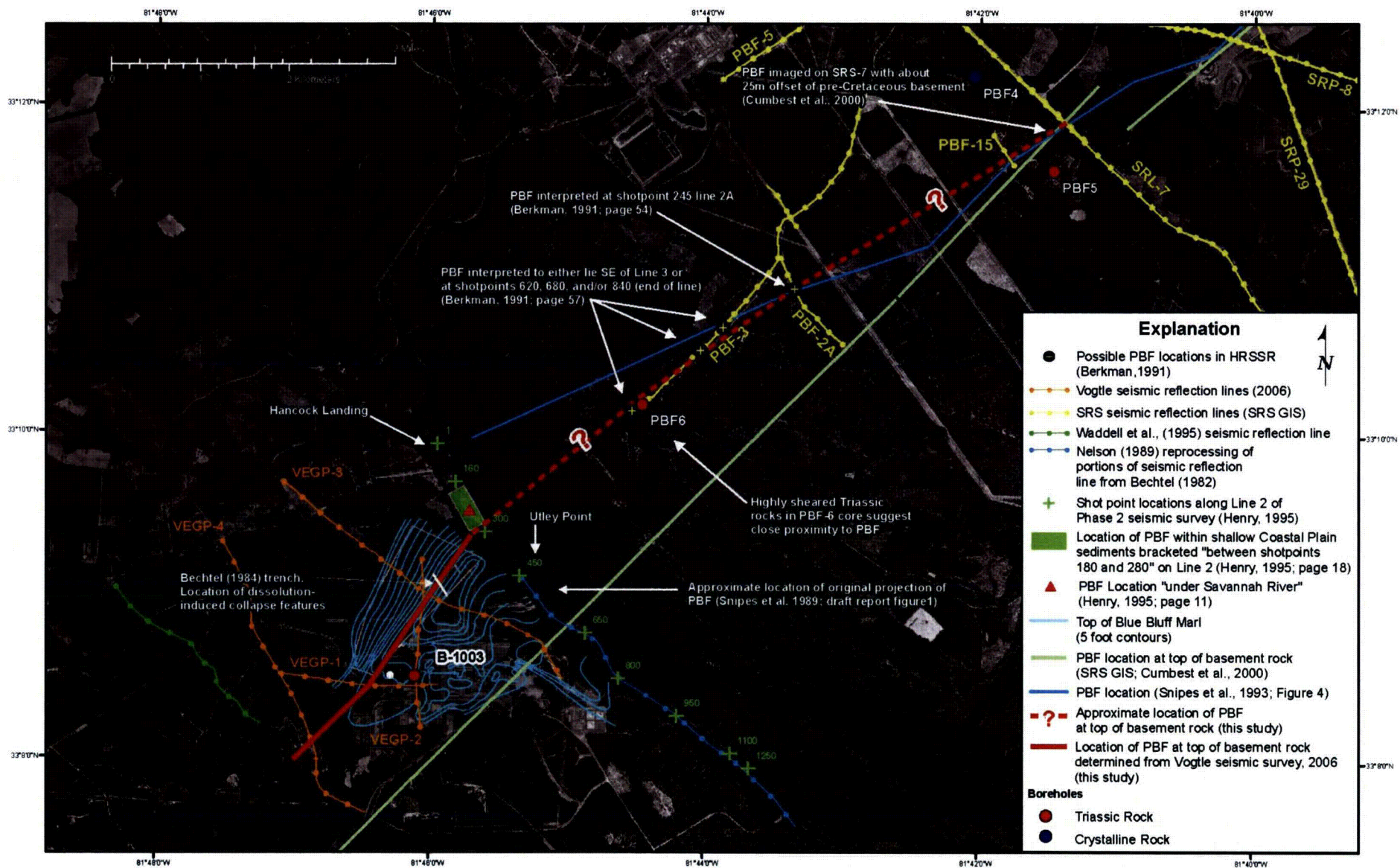
Source: Bechtel 1984b

Figure 2.5.3-2 West Wall of Garbage Trench Showing Small Offsets (1-24 inches) (Upper) and Arcuate Fractures and Clastic Dikes Over Center of Depression (Lower)

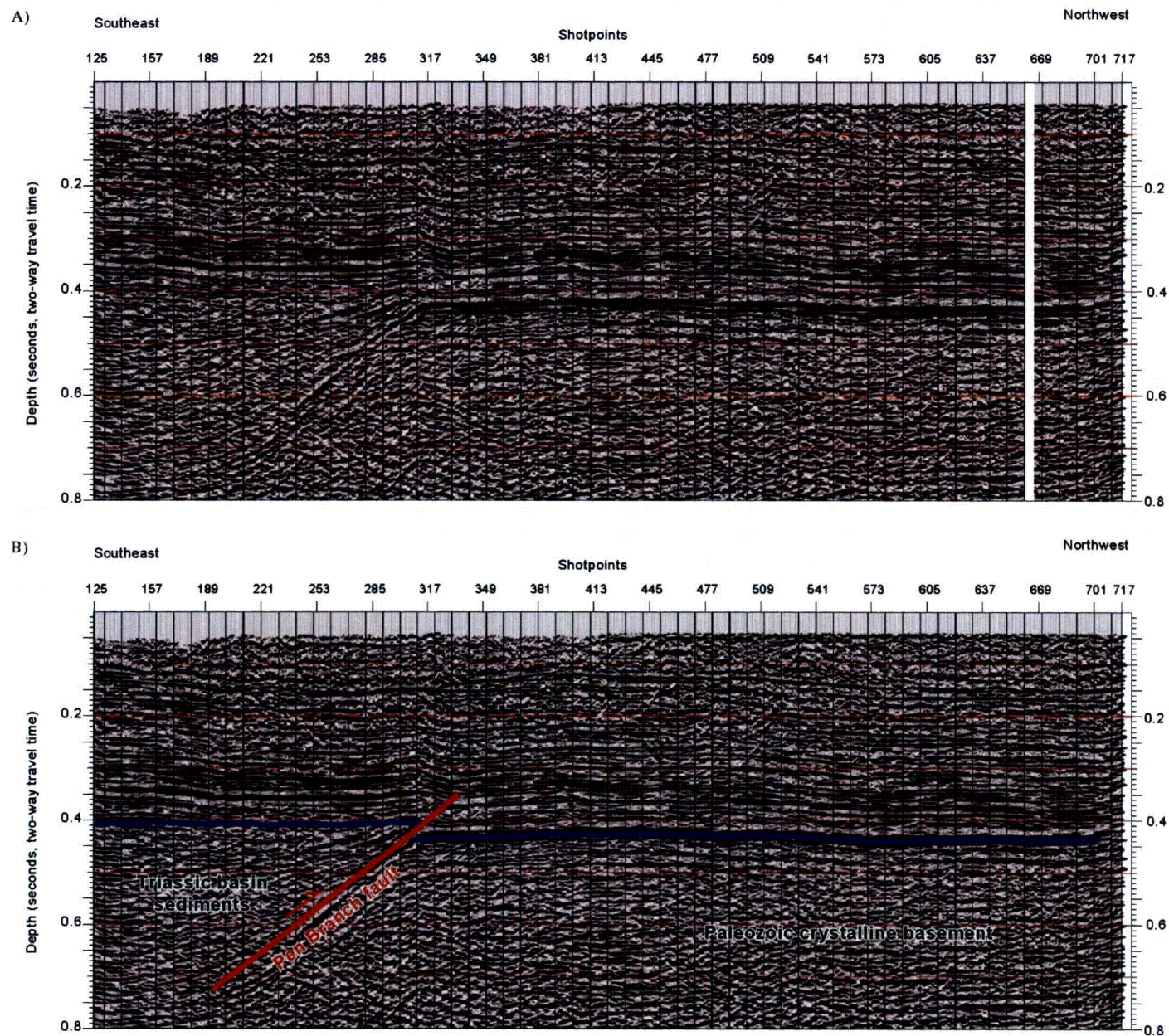


Modified after Figure 3 (Bechtel, 1984)

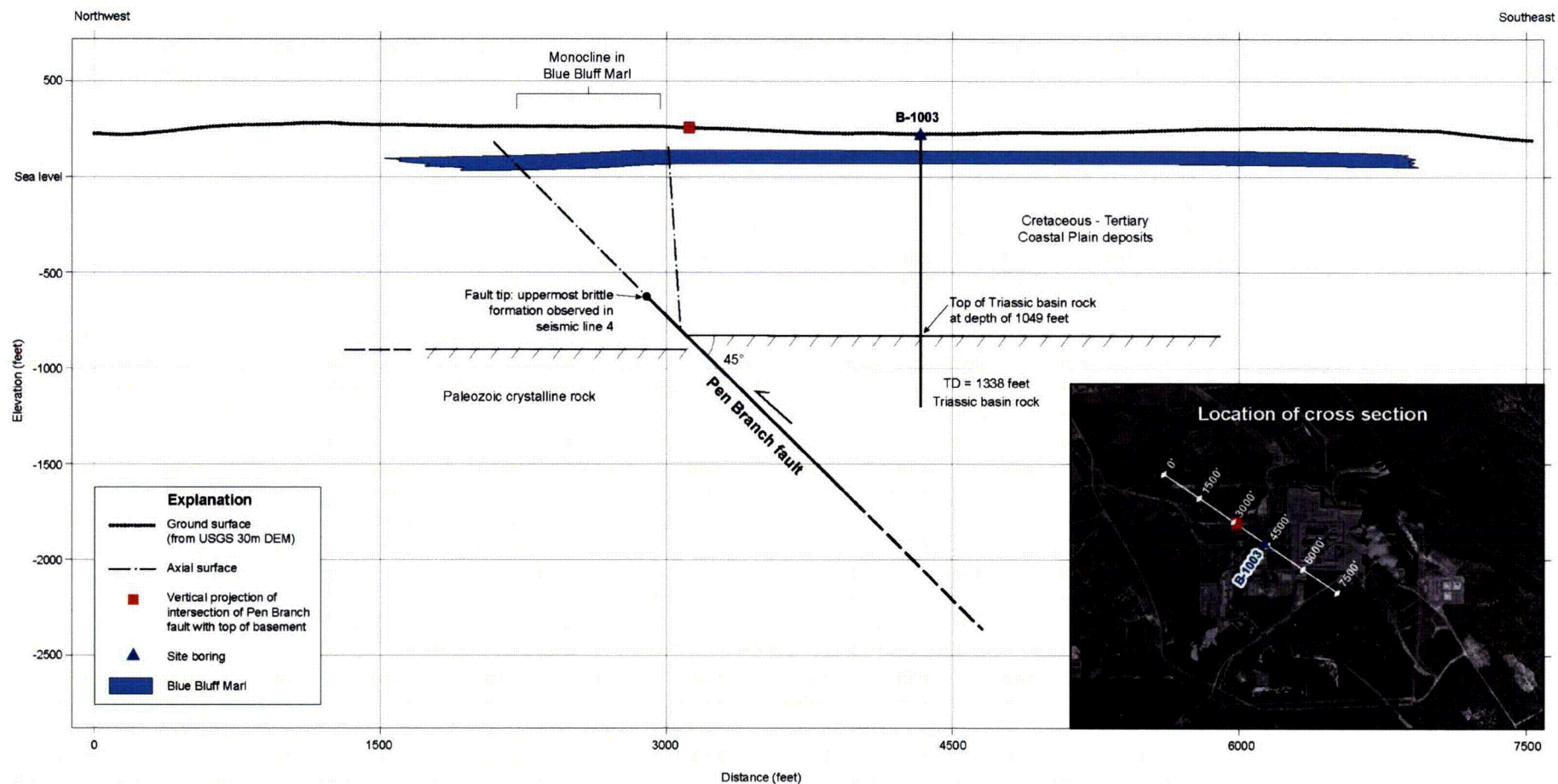
Pen Branch Fault Slides



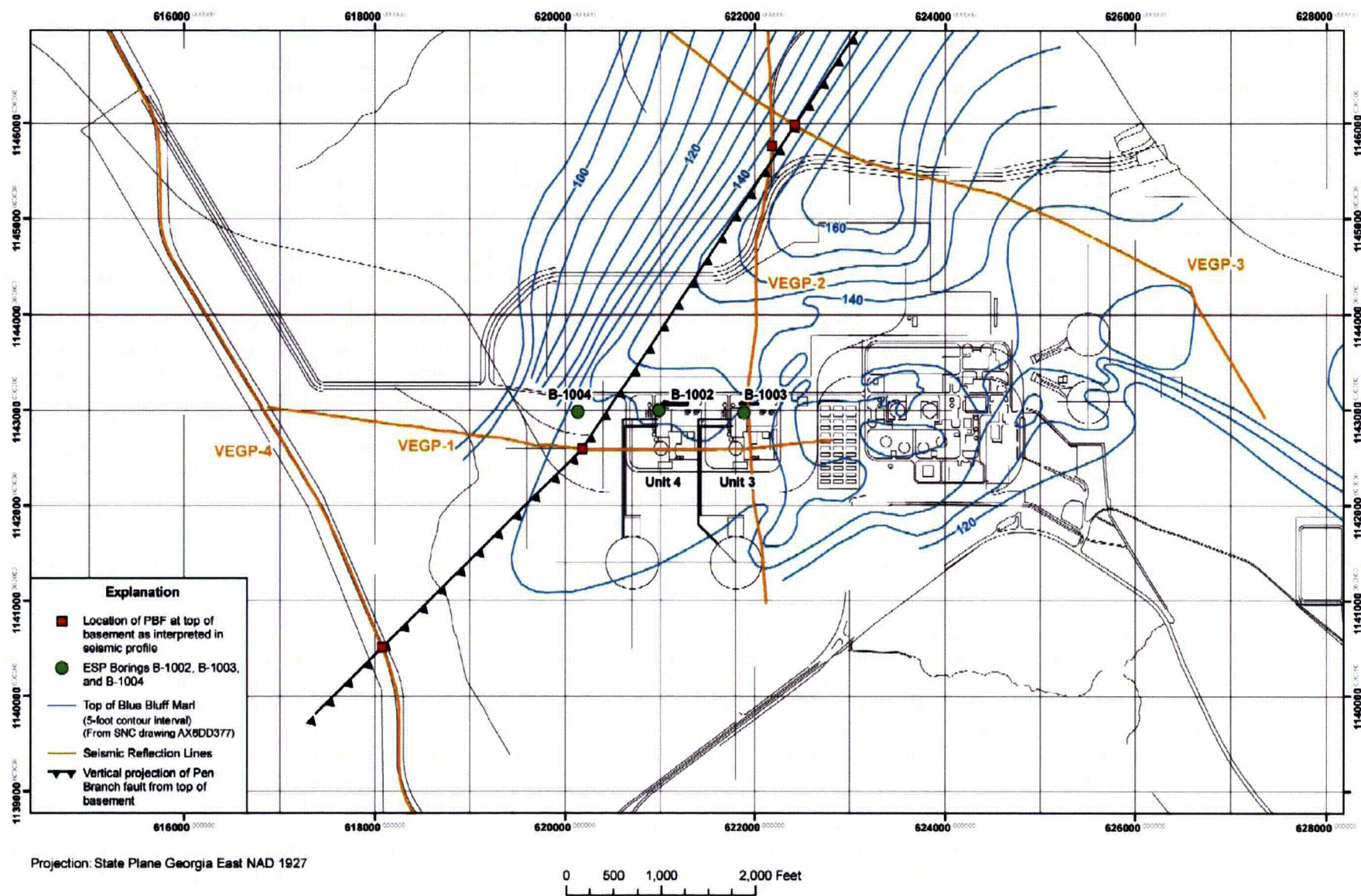
Location of Pen Branch Fault



(A) Seismic Reflection Line 4 (Time Section; Display Velocity = 12,000 fps)
 (B) Interpretation (Blue Line Represents Top of Basement)

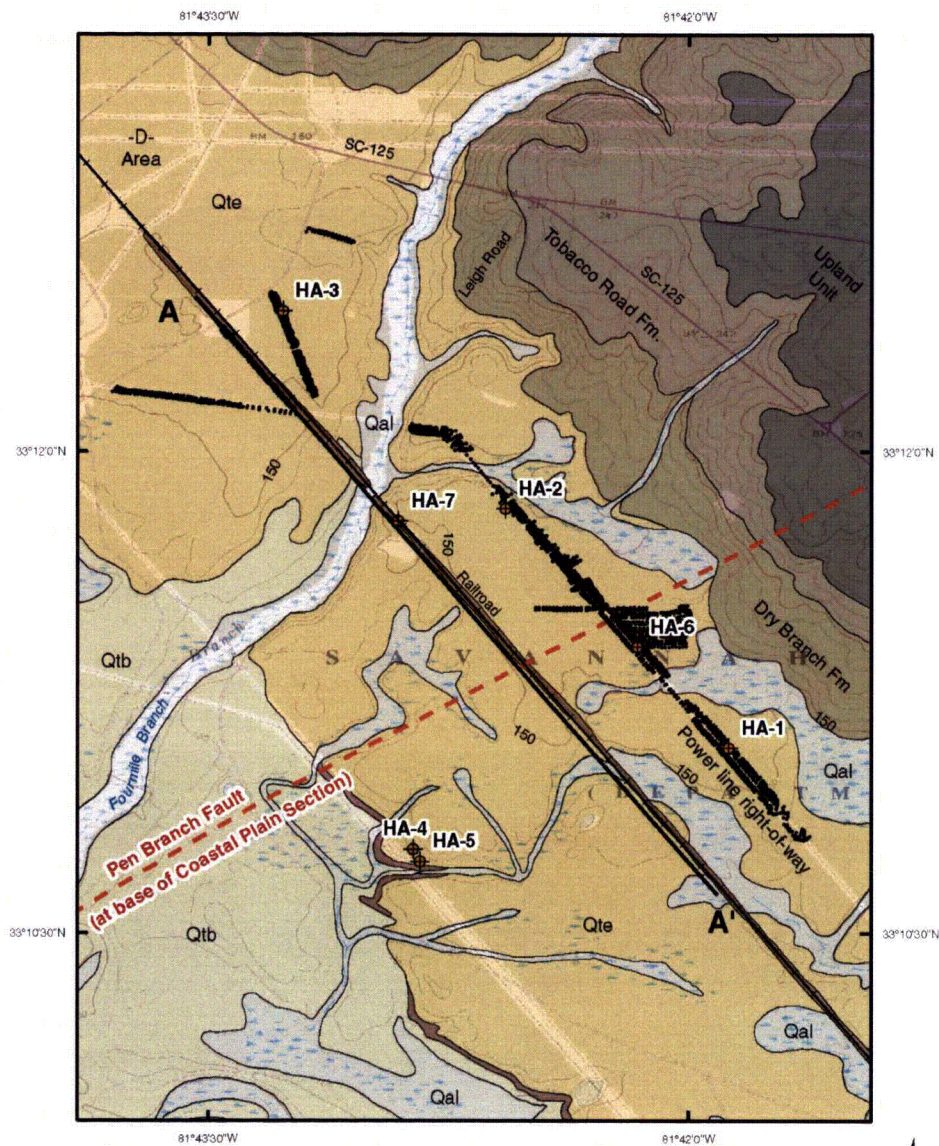


NW-SE Cross Section Showing Pen Branch Fault Beneath VEGP Site



VEGP Site Plant Layout

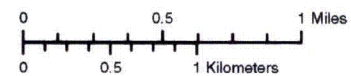
Geologic Map of Qte Terrace Study Area



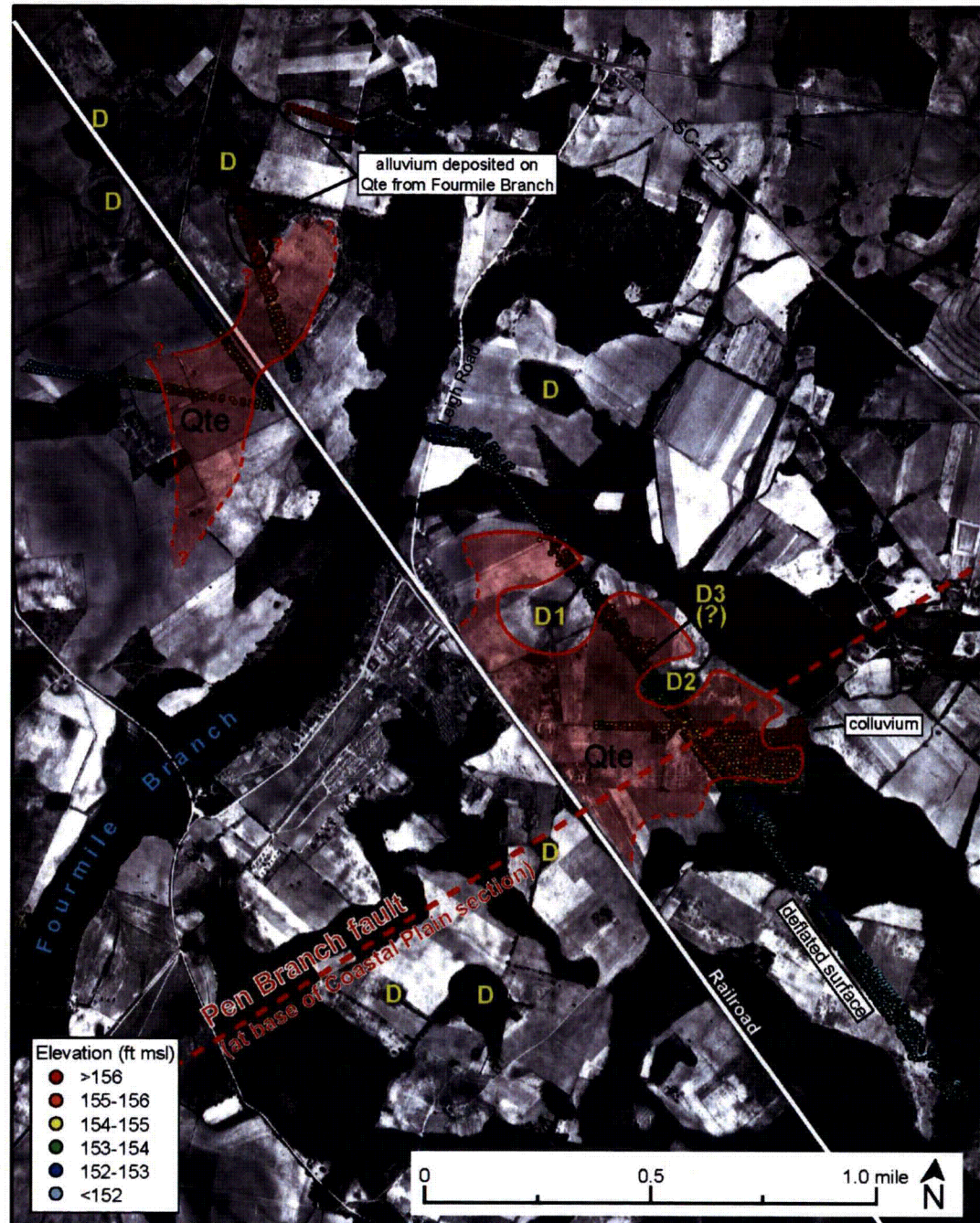
Explanation

- ◆ Hand auger location
- Terrace survey point

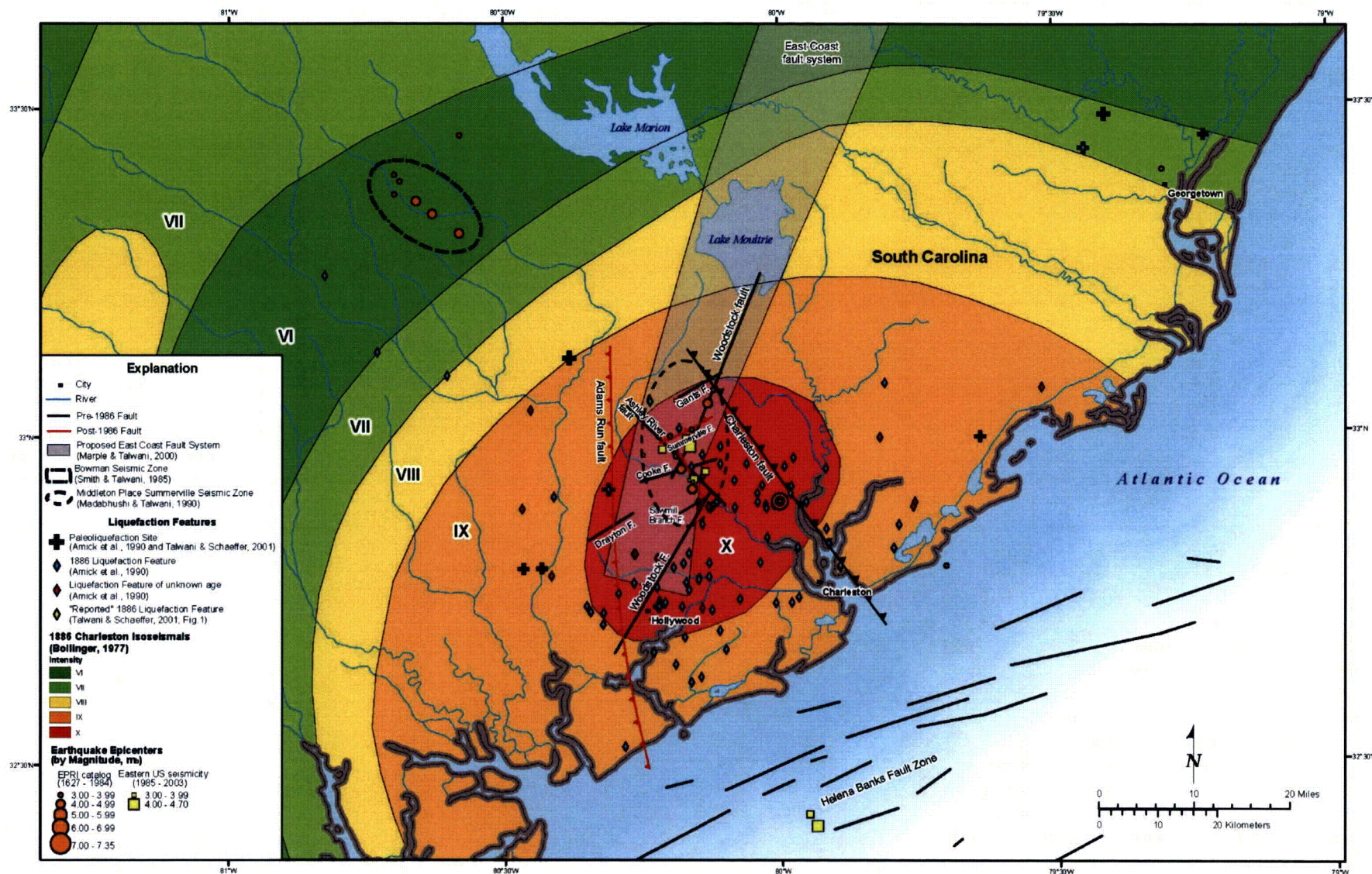
Geology Modified after Geomatrix (1993) and Nystrom (1998)



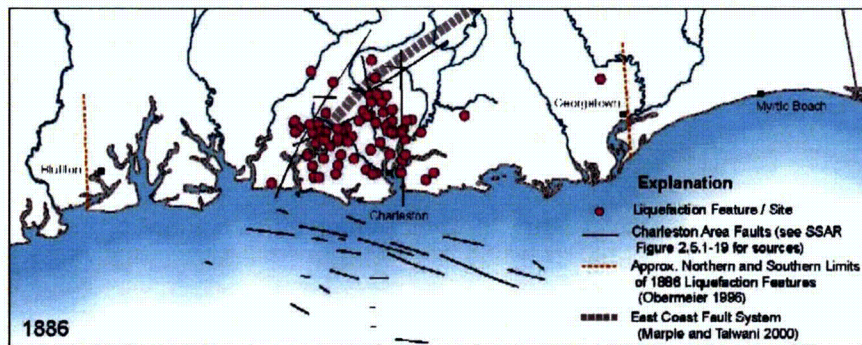
Geomorphic Map Showing Best Preserved Remnants of Qte Terrace



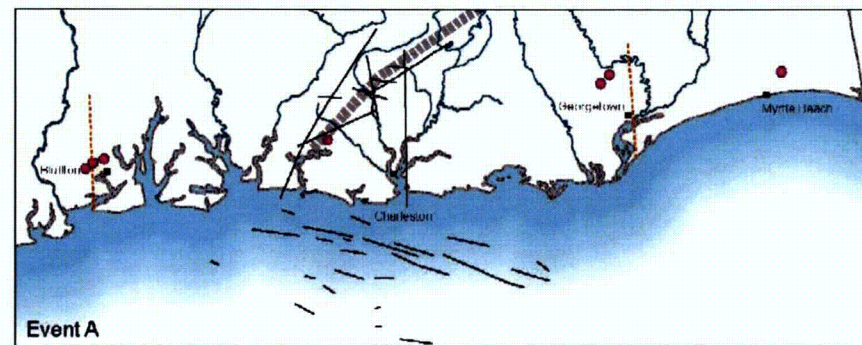
Charleston Slides



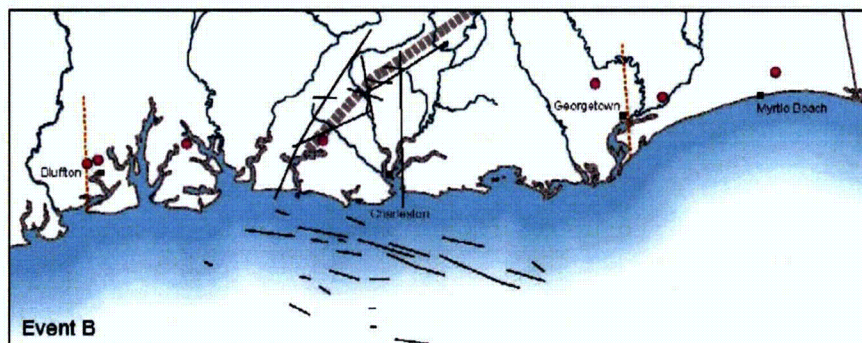
Local Charleston Tectonic Features



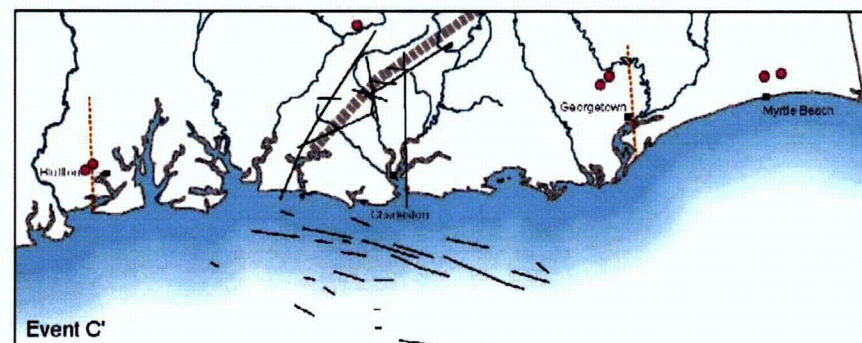
Source: Amick et al. (1990)



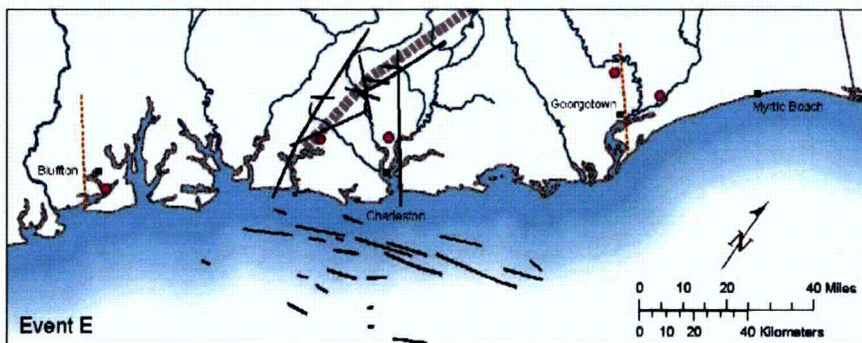
Source: Talwani and Schaeffer (2001)



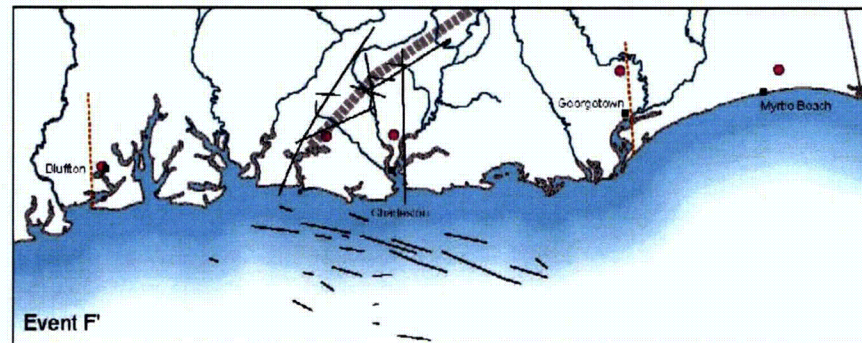
Source: Talwani and Schaeffer (2001)



Source: modified after Talwani and Schaeffer (2001)



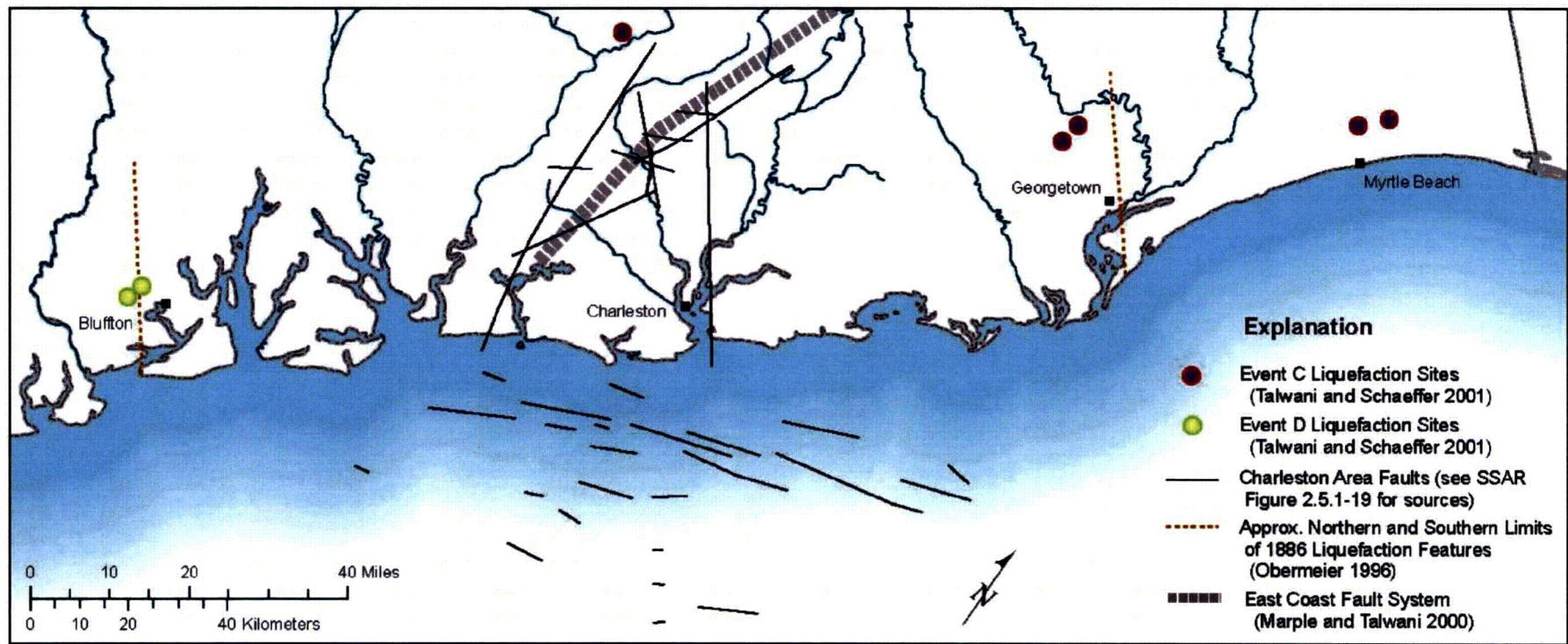
Source: Talwani and Schaeffer (2001)



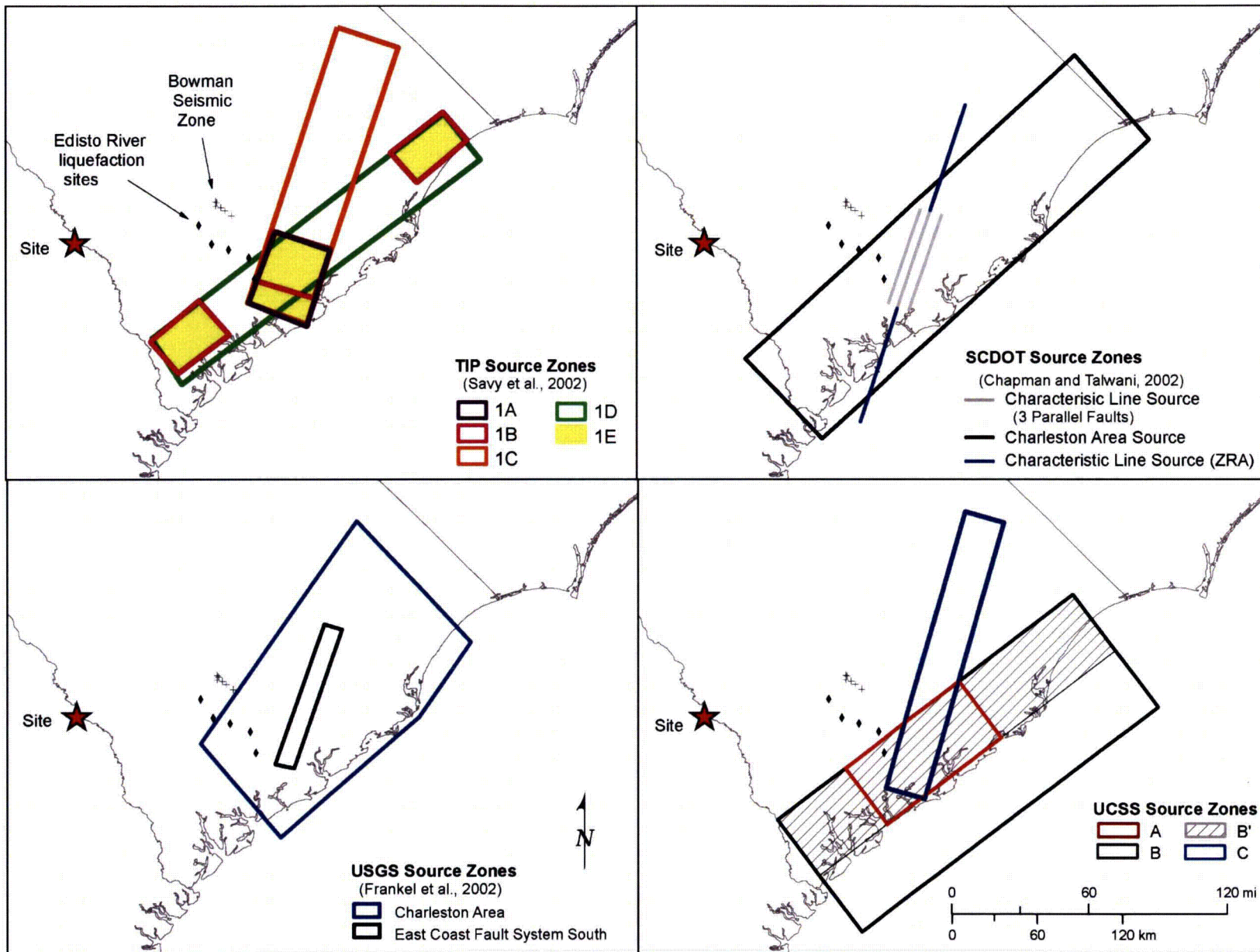
Source: modified after Talwani and Schaeffer (2001)

RAI Figure 2.6.1-11

Geographic Distribution of Liquefaction Features Associated with Charleston Earthquakes



RAI Figure 2.5.2-11, Liquefaction Sites for Events C', C, and D



Comparison of Charleston Source Zone Models

EPRI Seismic Source Zones Slides

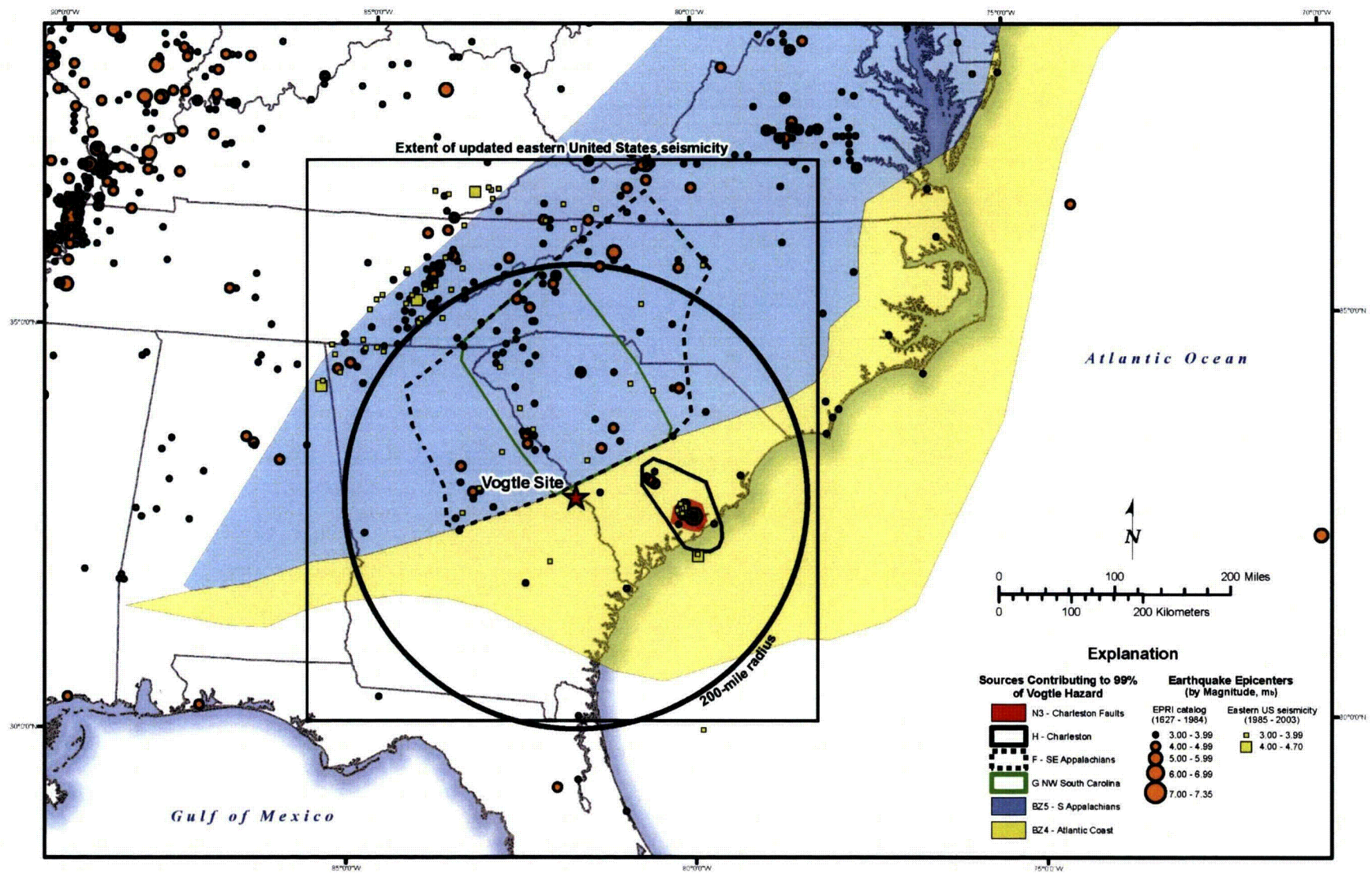


Figure 2.5.2-1 Bechtel EPRI Zones

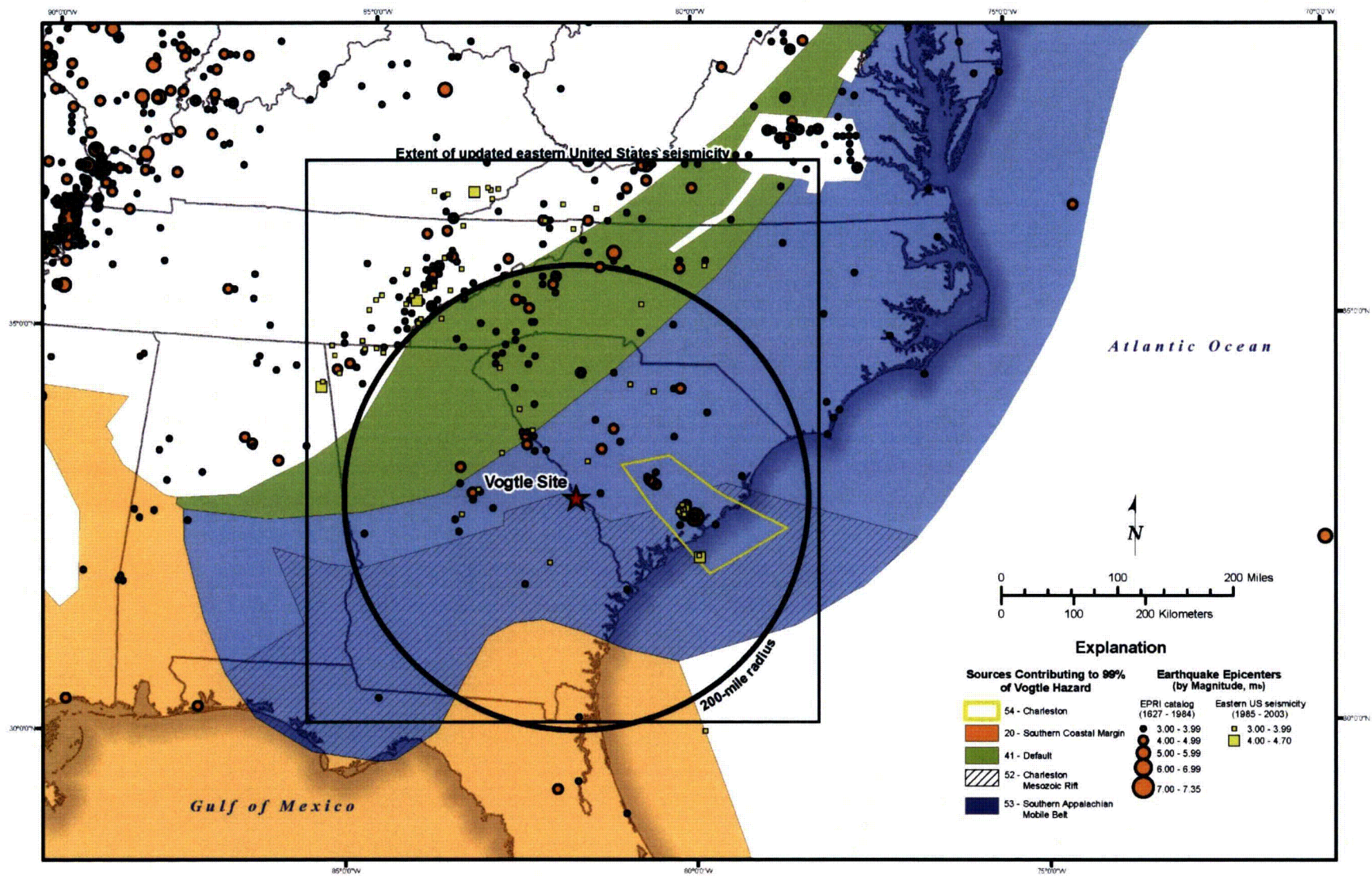


Figure 2.5.2-2 Dames and Moore EPRI Zones

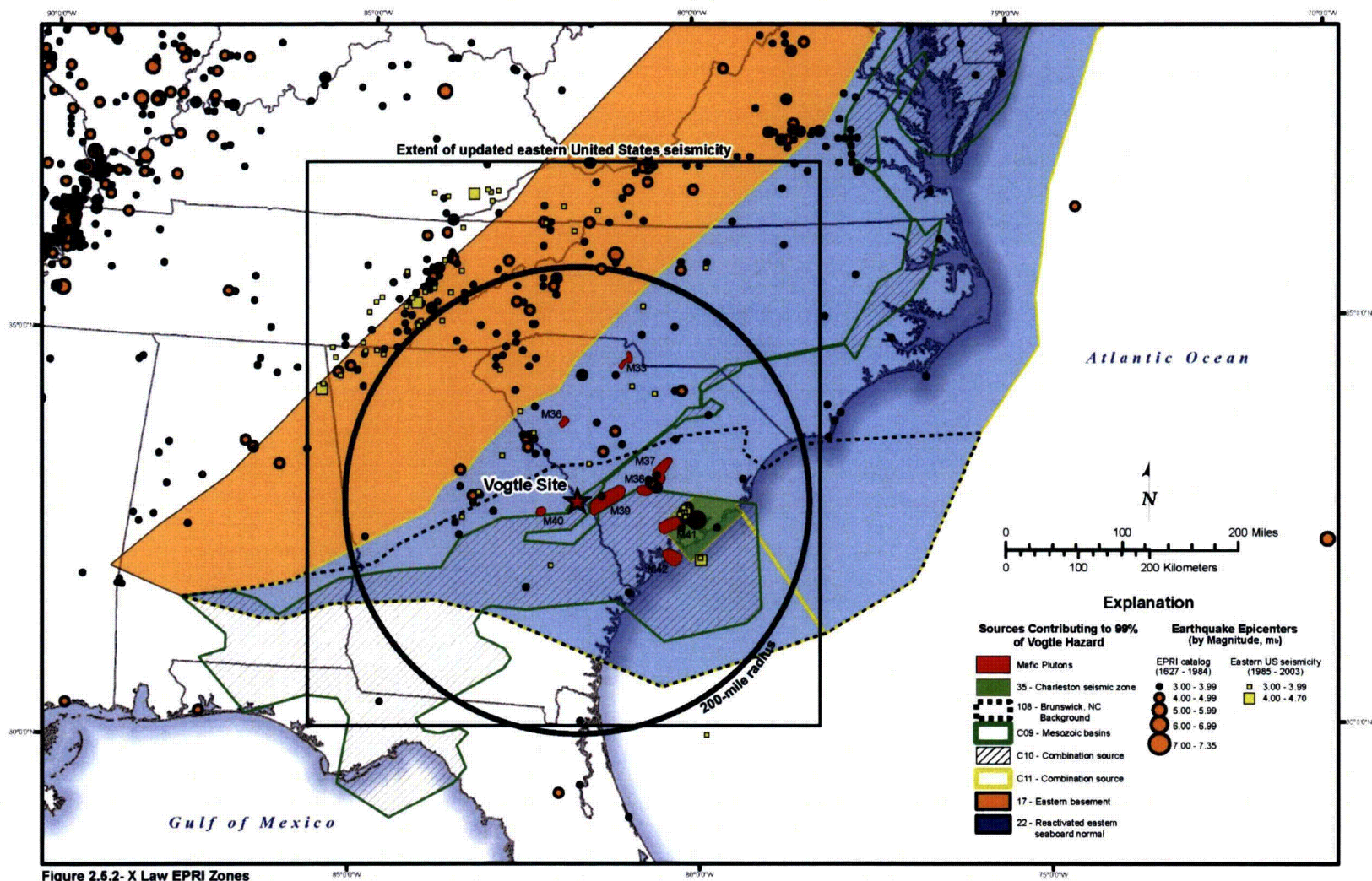


Figure 2.5.2- X Law EPRI Zones

Figure 2.5.2-3 Law EPRI Zones

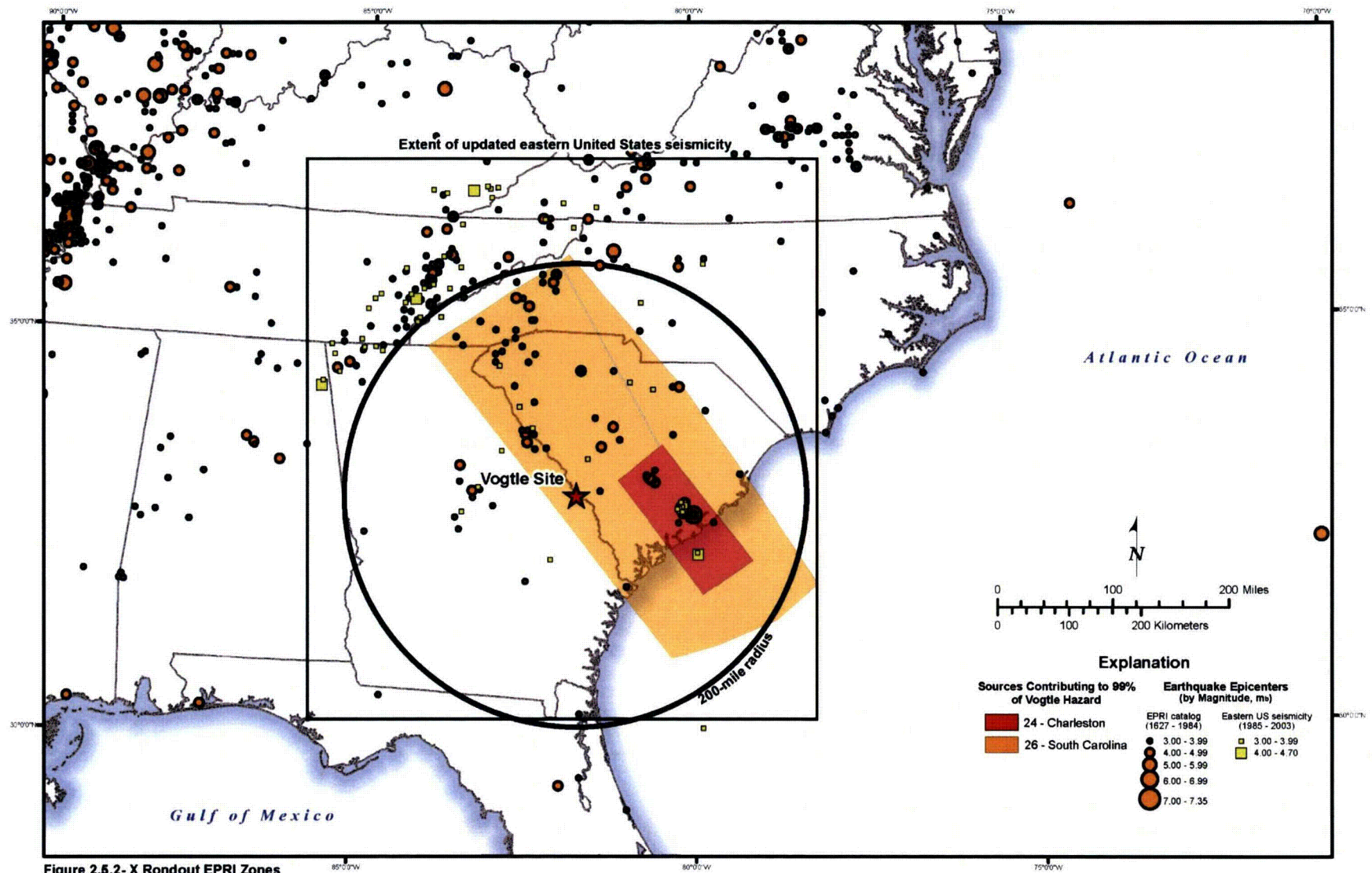


Figure 2.5.2- X Rondout EPRI Zones

Figure 2.5.2-4 Rondout EPRI Zones

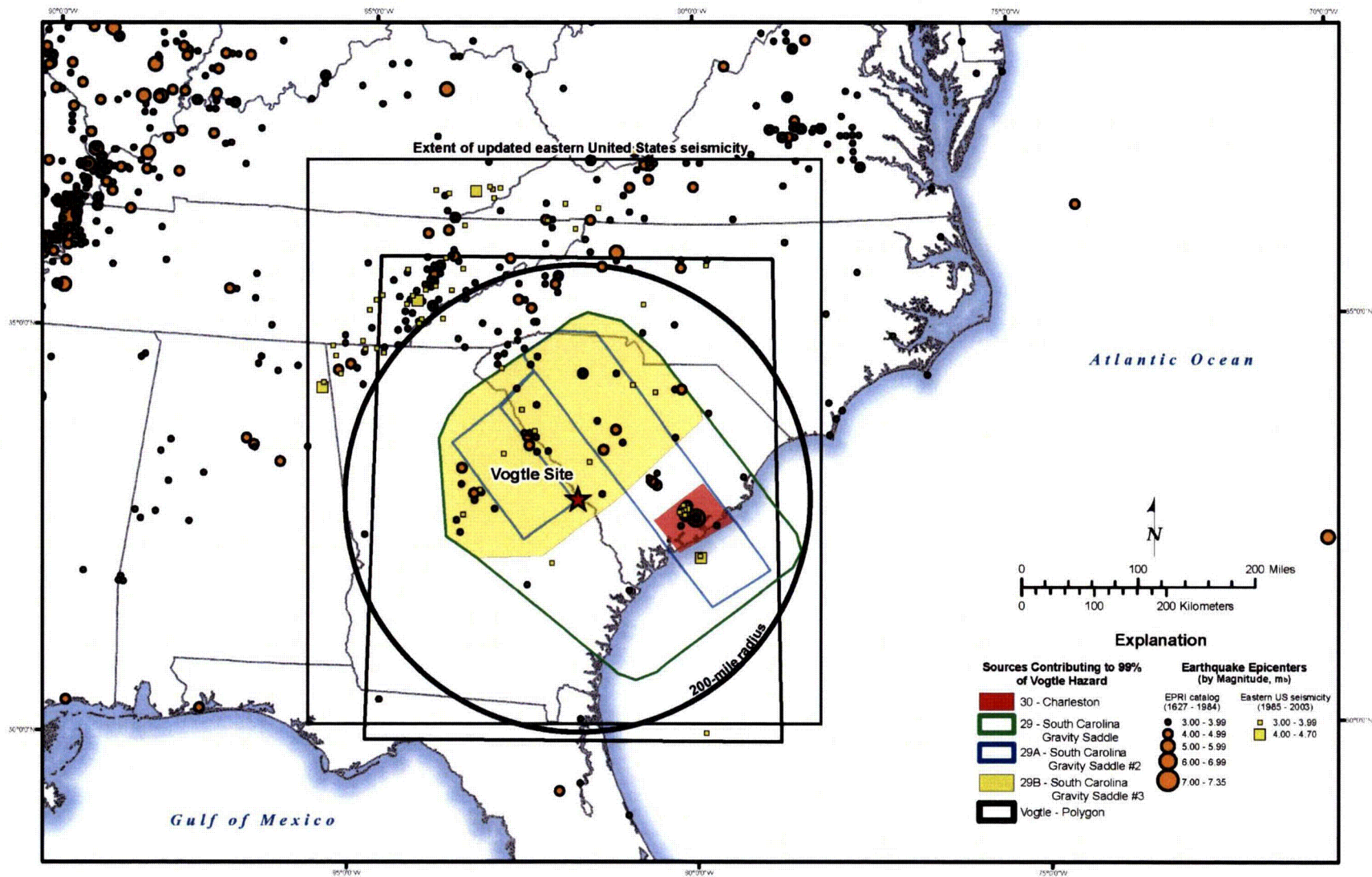


Figure 2.5.2-5 Woodward-Clyde EPRI Zones

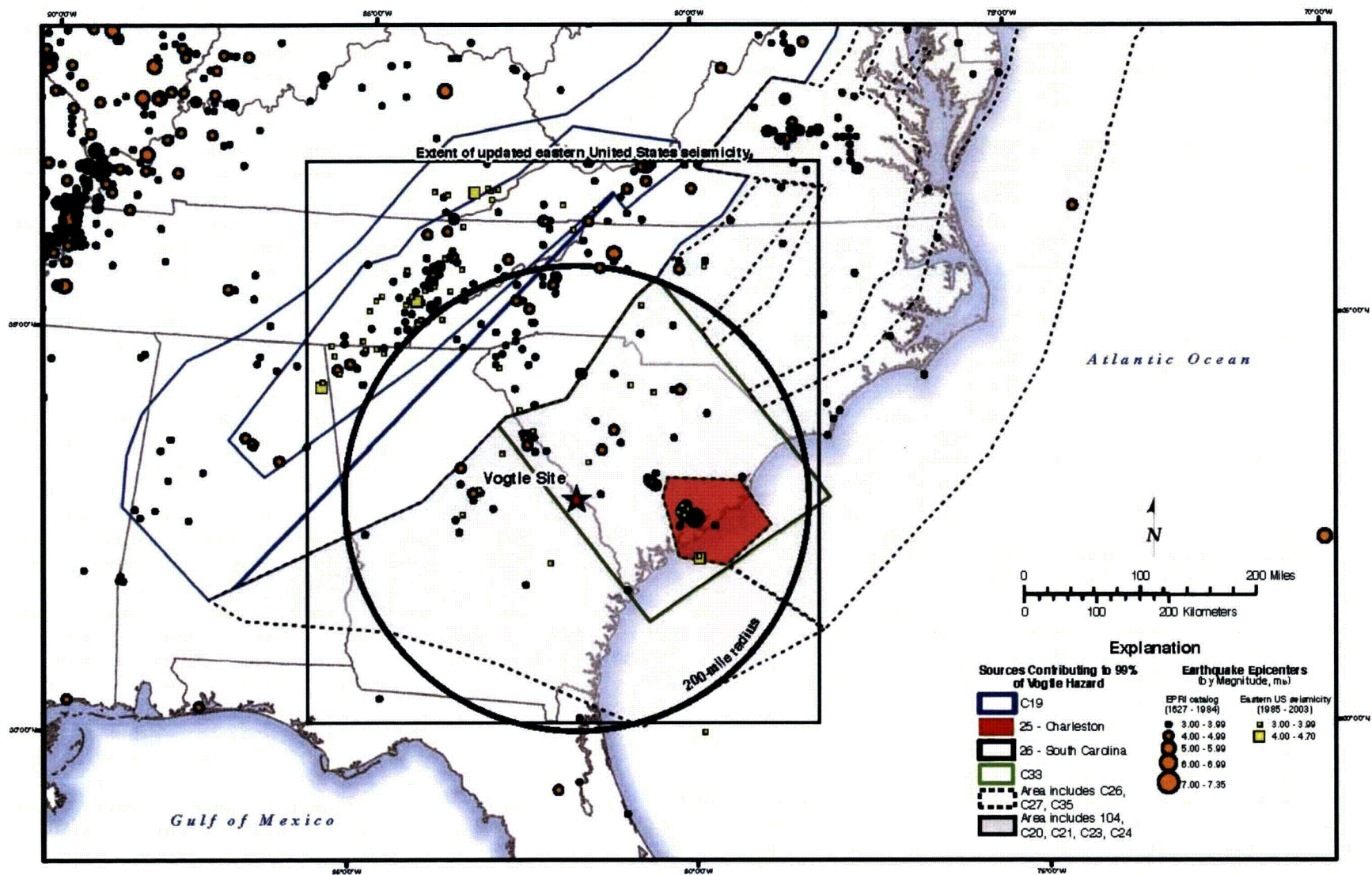


Figure 2.5.2-6 Weston EPRI Zones

No flow boundary along the surface water divide.

Model cells along the blue bluff marl is treated as a drain boundary.

Pond treated as a constant head boundary

Model orientation

Constant head boundary along perennial streams

Darin boundary along intermittent streams

- Streams (treated as drain cells in the model)
- Constant head boundary
- No flow boundary
- Pond (constant head cells in the model)

Conceptual Model

Subsurface Investigation Beyond ESP Program

◆ COL Boring Program (complete)

- 174 additional borings
- 68 additional borings within new power block
- 42 borings through the Marl
- 6 downhole P-S suspension logging through Marl
- 8 test pits for borrow material
- Lab testing program

◆ RCTS Testing Program (in-process)

- 7 tests using engineered fill
- 4 tests in Blue Bluff Marl
- 6 tests in Lower Sands

◆ Engineered Fill Test Pad Program (planned)

- Optimize backfill placement procedures
- Confirm properties for engineered fill under field conditions

ESP Geotechnical Investigation

Use of Available Data

◆ Existing Data from Unit 1&2 licensing activities:

- 474 borings on-site prior to PSAR
- 111 borings on-site post-PSAR
- 16 borings were directly in Unit 3&4 power block

◆ Savannah River Site - available information:

- Extensive soil borings
- Deep borings into Dunbarton basin and crystalline bedrock
- RCTS test results
- Shear wave velocity measurements
- Extensive reflection/refraction surveys

WELCOME

You Are Now Inside The
VOGTLE ELECTRIC GENERATING PLANT
EMERGENCY PLANNING ZONE

In the unlikely event of a serious emergency at Vogtle this siren will sound. If warned of an emergency, listen to one of the following radio stations or tv stations:

WBBQ-FM 104.3	WJBF(ch.6)
WBBQ-AM 1340	WRDW(ch.12)
WKXC-FM 99.5	WAGT(ch.26)
WDOG-FM 93.5	

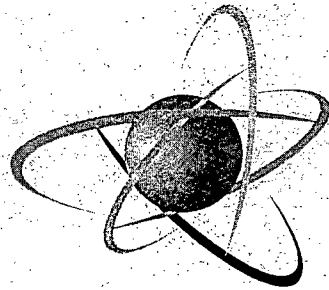
Stay Tuned to Find Out What to Do.

If you live or work within this area, please keep your
Alert Radio PLUGGED IN AND TURNED ON

The Alert Radio will provide you with important instructions during an emergency.

If you live or work nearby and **DO NOT HAVE** an Alert Radio
Please contact V.E.G.P. Emergency Communications:
(706)-437-7105 or (706)-826-3632

Thanks and
PLEASE DRIVE SAFELY



U.S.NRC

UNITED STATES NUCLEAR REGULATORY COMMISSION

Protecting People and the Environment

Presentation to the ACRS Subcommittee

Safety Review of the Vogtle Early Site Permit Application

Presented by

Christian Araguas, Project Manager

NRO/DNRL/NWE1

October 24, 2007



Purpose

- Brief the Subcommittee on the status of the staff's safety review of the Vogtle early site permit (ESP) application
- Support the Subcommittee's review of the application and subsequent interim letter from the ACRS to the Commission
- Address the Subcommittee's questions



Meeting Agenda

- Schedule Milestones
- Vogtle ESP Application
- Key Review Areas / Open Items
- Review of Geology, Seismology and Geo-technical Engineering
- Review of Radiological Consequences of Design Basis Accidents (DBAs)
- Safety Evaluation Report (SER) Conclusions
- Presentation Conclusion
- Discussion / Questions



Completed Milestones

- Received Vogtle ESP Application - 8/15/2006
- Acceptance Review Completed - 9/19/2006
- Inspections / Site Audits:
 - Quality Assurance - 8/2006
 - Emergency Planning - 10/2006
 - Hazards & Security - 11/2006
 - Meteorology - 12/2006
 - Hydrology, Geology, Health Physics - 1/2007
- RAls issued to the Applicant - 3/15/2007
- SER with Open Items issued - 8/30/2007
- Responses to Open Items Received - 10/15/2007



Remaining Milestones

- ACRS Full Committee Meeting – 11/1/2007
- ACRS Interim Letter Assumed – 11/2007
- Advanced SER with no Open Items due to ACRS – 5/16/2008
- ACRS Full Committee Meeting – 6/2008
- ACRS Final Letter Assumed – 7/2008
- Final SER issuance – 8/6/2008
- Mandatory Hearing – Spring 2009
- Commission Decision Assumed – Summer 2009



Principal Contributors

- Demography/Geography/Site Hazards: Rao Tammara
- Meteorology: Joseph Hoch, Brad Harvey
- Hydrology: Goutam Bagchi, Hosung Ahn, Kenneth See
 - Support from PNNL
- Geology/Seismology/Geo-Tech Engineering: Clifford Munson, Yong Li, Gerry Stirewalt, Sarah Gonzalez, Thomas Cheng, Laurel Bauer, Tomeka Terry, Weijun Wang, Meralis Plaza-Toledo, Zahira Cruz-Perez
 - Support from USGS and BNL



Principal Contributors

- Radiological Effluent Release Dose Consequences from Normal Operation: Steven Schaffer, Jean-Claude Dehmel
- Emergency Planning: Bruce Musico, Daniel Barss, Robert Moody
 - Support from FEMA and PNNL
- Physical Security: Marc Brooks, Al Tardiff
- Radiological Consequence Analysis: Michelle Hart
- Quality Assurance: Milton Concepcion-Robles



Vogtle ESP Application

- Proposed ESP site located in eastern Burke County, GA (26 miles southeast of Augusta, GA)
- Adjacent to and west of existing VEGP Units 1 and 2
- ESP applicant, SNC, submitted application on behalf of 4 co-owners: Georgia Power Company, Oglethorpe Power Corporation, Municipal Electric Authority of Georgia, and the City of Dalton, GA
- Application for ESP is for two additional reactors



Vogtle ESP Application

- SNC referenced the Westinghouse AP1000 Certified Design in its Application
- SNC requests permit approval for 20 year term
- SNC seeks approval for limited work authorization (LWA-1, LWA-2) activities
- SNC seeks approval for complete and integrated emergency plans with ITAAC as part of ESP



Vogtle ESP Application

- LWA-1 Request
 - Submitted with Original Application
 - Covers site preparation activities such as excavation for facility structures, construction of service facilities, installation of temporary construction support facilities, and construction or expansion of non-safety related SSCs
- LWA-2 Request
 - Submitted August 16, 2007
 - Covers placement of engineered backfill including retaining walls, preparation of nuclear island foundations (mudmats, waterproofing, rebar, foundation embedments)
 - SRP Section 2.5.4, "Stability of Subsurface Materials and Foundations"
 - SRP Section 3.8.5, "Foundations"
 - SRP Section 17.5, "QA Program Description for Design Certification, Early Site Permits and New License Applicants"
 - Fitness for Duty for Construction Activities



Key Review Areas

2.1 Geography and Demography

■ Site Location and Description

- Coordinates, site boundaries, orientation of principal plant structures, location of highways, railroads, waterways that traverse the exclusion area

■ Exclusion Area Authority and Control

- Legal authority, control of activities unrelated to plant operation, arrangements for traffic control

■ Population Distribution

- Current and future population projections, characteristics of the LPZ, population center distance, and population density



Key Review Areas

2.2 Nearby Industrial, Transportation, and Military Facilities

- Identification of Potential Hazards in Site Vicinity
 - Maps of site and nearby significant facilities and transportation routes
 - Description of facilities, products, materials, and number of people employed
 - Description of pipelines, highways, waterways, railroads and airports
 - Projections of industrial growth



Key Review Areas

■ Evaluation of Potential Accidents

Design-Basis Events: Accidents that a probability of occurrence on the order of magnitude of 10^{-7} per year or greater and potential consequences exceeding 10 CFR 100 dose guidelines

- Explosions and Flammable Vapor Clouds - Truck Traffic, Pipelines, Mining Facilities, Waterway Traffic, Railroad Traffic
- Release of Hazardous Chemicals - Transportation Accidents, Major Depots, Storage Areas, Onsite Storage Tanks
- Fires — Transportation Accidents, Industrial Storage Facilities, Onsite Storage, Forest
- Radiological Hazards — SRS, VEGP Units 1 and 2



Key Review Areas

2.3 Meteorology

- Involves site specific information such as:
 - regional climatology
 - local meteorology
 - onsite meteorological measurements program
 - short-term atmospheric dispersion estimates for accidental releases
 - long-term dispersion estimates for routine releases



Key Review Areas

- Meteorological Site Characteristics
 - The applicant identified meteorological site characteristics related to:
 - Climatic extremes and severe weather
 - Atmospheric dispersion (accident & routine releases)



Key Review Areas

- Climatic Site Characteristics
 - Extreme Wind
 - Tornado
 - Precipitation (for Roof Design)
 - Ambient Design Temperature
 - Generic
 - AP1000 Specific



Key Review Areas

- Atmospheric Dispersion Site Characteristics
 - Short-Term Dispersion Estimates for Accident Releases
 - EAB and LPZ χ/Q Values
 - Long-Term Dispersion Estimates for Routine Releases
 - EAB, Nearest Resident, Nearest Meat Animal, Nearest Vegetable Garden



Key Review Areas

- Meteorological Open Items
 - Provide a justification for using a 30-year period of record (1966 to 1995) to define the AP1000 maximum safety design temperatures. The staff believes these temperatures should be based on a 100-year return interval. (Open Item 2.3-1)



Key Review Areas

3.5.1.6 Aircraft Hazards

The plant design should consider that aircraft accidents that could lead to radiological consequences in excess of the exposure guidelines of 10 CFR 50.34(a)(1) with a probability of occurrence greater than an order of magnitude of 10^{-7} per year

- Federal airways, holding patterns, or approach patterns should be at least 2 statute miles away
- Military installation or any airspace usage (ex. bombing ranges) should be at least 20 miles from site
- All airports should be at least 5 miles from site
- All airports should have projected operations less than:
 - $500d^2$ for airports within 5 to 10 miles
 - $1000d^2$ for airports outside of 10 miles



Key Review Areas

Chapter 11 - Doses from Routine Liquid and Gaseous Effluent Releases

- Staff performed the following review and analysis:
 - Confirmed liquid and gaseous effluent releases
 - Confirmed appropriate exposure pathways
 - Confirmed the use of appropriate liquid dilution, and atmospheric dispersion/deposition
 - Confirmed the use of appropriate land usage parameters
 - Verified Applicant's calculated doses using NRC recommended models
 - Performed an independent dose assessment for liquid pathways showing the applicants doses to be conservative



Key Review Areas

■ Doses from Routine Liquid and Gaseous Effluent Releases and Comparison to Regulatory Criteria

Regulation	Type of Effluent	Pathway	Organ	Regulatory Limit (mrem/yr per unit)	Applicant SAR (mrem/yr per unit)	NRC SER (mrem/yr per unit)
10 CFR 50, Appendix I	Liquid	all	total body	3	0.017	0.001
		all	any organ	10	0.021	0.012
	Gaseous	all	total body	5	0.56	0.56
		all	skin	15	2.2	2.2
	Iodine & Particulate	all	any organ	15	5.9	5.9
	Gaseous	γ air dose	n/a	10 mrad	0.67 mrad	0.67 mrad
		β air dose	n/a	20 mrad	2.8 mrad	2.8 mrad
40 CFR 190	all	all	total body	25 per site	2.4 (4 units)	2.4 (4 units)
	all	all	thyroid	75 per site	12 (4 units)	12 (4 units)
	all	all	other organs	25 per site	8.9 (4 units)	8.9 (4 units)



Key Review Areas

13.3 Emergency Planning

- Complete and Integrated Emergency Plan
 - Submitted by SNC as part of ESP application
 - Agency Certifications (E-plans are practicable and they will participate)
 - Complete and integrated plan provides *reasonable assurance* that adequate protective measures can and will be taken in the event of a radiological emergency



Key Review Areas

■ NRC Review

- 10 CFR 50.47 and Appendix E to Part 50
- NUREG-0654/FEMA-REP-1(including Suppl. 2)
- SRP Section 13.3, "Emergency Planning
- SRP Table 14.3.10-1 (EP ITAAC)

■ Federal Emergency Management Agency (FEMA) Review

- FEMA Headquarters and Region IV Atlanta Office
- 44 CFR 350 and REP program guidance
- NUREG-0654/FEMA-REP-1(including Suppl. 2)
- Exercise demonstrates adequacy of offsite procedures (ITAAC)



Key Review Areas

■ Offsite State/Local Jurisdictions

- State of Georgia
- Burke County
- State of South Carolina
- Aiken County
- Allendale County
- Barnwell County



Key Review Areas

- Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC)
 - First use of EP ITAAC under 10 CFR Part 52 review
 - SECY-05-197 and SRM (Generic EP ITAAC)
 - NUREG-0800 (SRP Table 14.2.10-1)
 - ESP/COL applicant proposes site-specific ITAAC



Key Review Areas

- Emergency Action Levels (EALs)
 - NEI 99-01 (LWRs) – NRC endorsement ongoing
 - NEI 07-01 (passive, advance LWRs) – NRC endorsement ongoing
 - Vogtle EALs based on NEI 07-01 – awaiting NEI 07-01 review
 - ITAAC will reflect some construction dependent EALs



Key Review Areas

■ Open Items

- 13.3-4: The review and acceptance of the application's EALs for Units 3 and 4
- 13.3-10: Discuss whether State and local agencies have reviewed the new ETE and provided comments, and discuss the resolution of those comments



Key Review Areas

13.6 Physical Security

Need to determine whether site characteristics are such that adequate security plans and measures can be developed

■ Consideration for :

- Pedestrian And Vehicular Land Approaches
- Railroad and Water Approaches
- Potential "high-ground" Adversary Advantage Areas
- Integrated Response Provisions
- Nearby Road Transportation Routes



Key Review Areas

Chapter 17: ESP Quality Assurance Measures

Verify that the ESP application included within the scope of its QA program activities that would affect the capability of systems, structures, and components (SSCs) important to safety.

- Inspection completed in August 2006:
 - Review of NDQAM/plans/implementing procedures of applicant and major contractors.
 - Review of data collection, analyses, and evaluation methodologies, including site characterization.
- In-office Technical Review completed in January 2007 :
 - Verify that the applicant adequately applied the guidance in Section 17.1.1 to demonstrate the integrity and reliability of data that were obtained during ESP activities.
 - The applicant utilized NEI 06-14A, "Quality Assurance Program Description (QAPD)," as template for the NDQAM.
- Submittal of revised NDQAM on August 2007 to include LWA activities within the scope of ESP.



Key Review Areas

Section 2.4: Hydrologic Engineering

■ Floods

- SER Section 2.4.2: Local flooding
- SER Section 2.4.3: Flooding in rivers and streams
- SER Section 2.4.4: Dam failures
- SER Section 2.4.5: Storm surges and seiche
- SER Section 2.4.6: Tsunami
- SER Section 2.4.7: Ice-induced flooding
- SER Section 2.4.8: Canals and reservoirs
- SER Section 2.4.9: Channel diversion
- SER Section 2.4.10: Flooding protection requirements



Key Review Areas

- Low water
 - SER Section 2.4.11: Low water considerations
- Groundwater
 - SER Section 2.4.12: Groundwater use
 - SER Section 2.4.13: Release of radionuclides in ground and surface waters



Key Review Areas

- **Section 2.4.2: Floods**
 - Independently estimated and verified local intense precipitation; specified as a site characteristic
- **Section 2.4.3: Probable Maximum Flood (PMF) on Streams and Rivers**
 - Independently estimated PMF using bounding approach; verified applicant's conclusion that the site is dry during PMF in Savannah River
- **Section 2.4.4: Potential Dam Failures**
 - Verified applicant's analysis; verified site is dry during dam break flood
- **Section 2.4.5: Probable Maximum Surge and Seiche Flooding**
 - Verified applicant's analysis; staff's independent bounding estimate concluded site will remain dry
- **Section 2.4.6: Probable Maximum Tsunami Hazards**
 - Hierarchical review; staff concluded that a probable maximum tsunami near the mouth of the Savanna River will not reach site grade
- **Section 2.4.7: Ice Effects**
 - Using historical data from 9 stations, staff concluded ice formation is unlikely



Key Review Areas

■ Section 2.4.8: Cooling Water Canals and Reservoirs

- No safety-related canals or reservoirs as a source for cooling water are proposed since VEGP Units 3 and 4 will not rely on any external water source for safety-related cooling water
- Staff determined that a design parameter is needed related to initial filling and occasional makeup purposes, leading to **Open Item 2.4-1**
 - Staff identified Permit Condition 2.4.8-1 stating that VEGP Units 3 and 4 will not rely on any external water source for safety-related cooling water other than initial filling and occasional make-up water
 - Alternatively, the applicant may propose a design parameter related to safety-related water use stating that no safety-related water is required for the proposed plants at the VEGP site other than initial filling and occasional make-up water

■ Section 2.4.9: Channel Diversion

- VEGP Units 3 and 4 will not rely on any external water source for safety-related cooling water
- Combined with staff-proposed Permit Condition 2.4.8-1, diversion of the Savannah River away from the site will not affect safe operation of the units
- Staff determined it is unlikely Savannah River could divert into the site



Key Review Areas

■ Section 2.4.10: Flooding Protection Requirements

- Not needed for a safety-related SSC if its entrances and openings are located above the proposed site grade of 220 feet MSL
- Site drainage system will be designed such that all safety-related SSC would be safe from flooding from local intense precipitation

■ Section 2.4.11: Low Water Considerations

- Combined with staff-proposed Permit Condition 2.4.8-1, safety-related SSC will not be affected by low water conditions in Savannah River

■ Section 2.4.12: Groundwater

- Staff reviewed groundwater characteristics and data provided by the applicant
- Staff determined that applicant should provide an improved and complete description of the current and future local hydrological conditions, including alternate conceptual models, to demonstrate that the design bases related to groundwater-induced loadings on subsurface portions of safety-related SSCs would not be exceeded; alternatively, the applicant can provide design parameters for buoyancy evaluation of the plant structures – **Open Item 2.4-2**



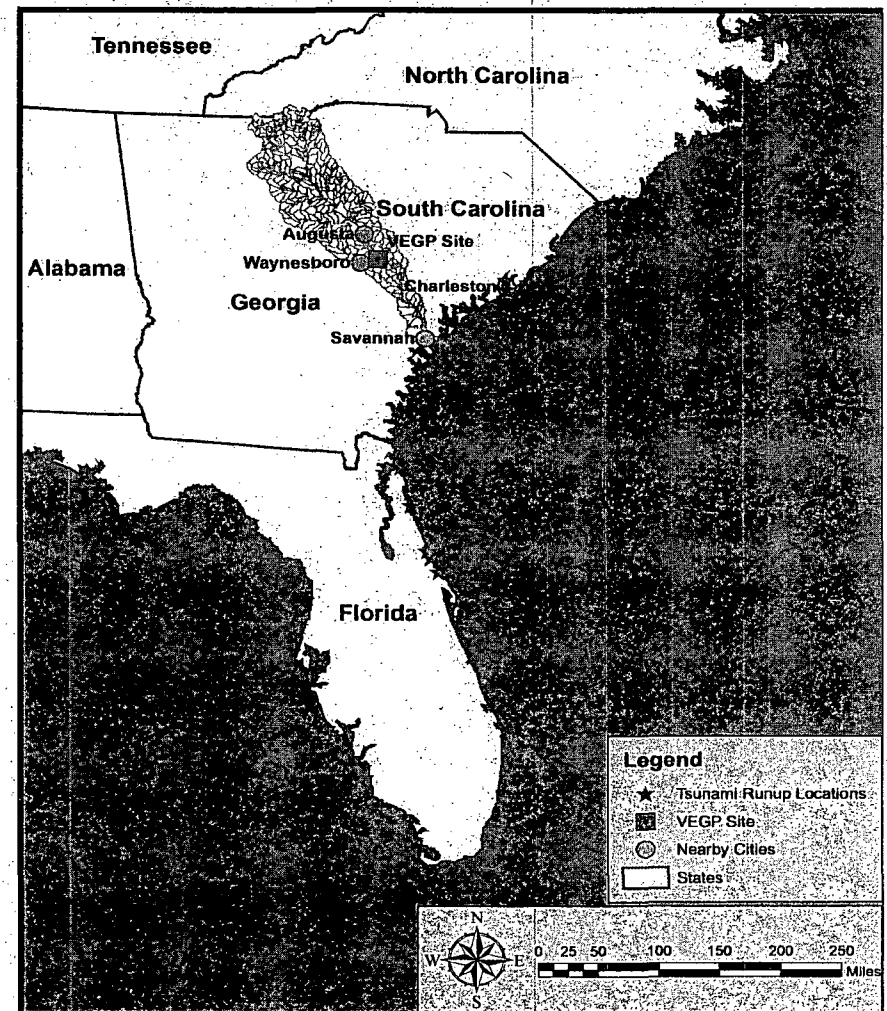
Key Review Areas

- Section 2.4.13: Accidental Releases of Radioactive Liquid Effluents In Ground And Surface Waters
 - Transport of radioactive liquid effluent is a combinatorial problem with multiple possible environmental pathways – the pathway with the most severe release consequence is of interest for site suitability determination
 - Uncertainty due to spatially and temporally varying characteristics
 - Existing hydrology of the site does not necessarily represent the future hydrology; substantial change to the post-construction landscape and hydrologic features may lead to changes in distribution of recharge and the underlying water table and, therefore, changes to the groundwater pathway
 - Applicant described a single groundwater pathway to the northwest towards Mallard Pond; staff did not concur with dilution data and release points
 - Staff determined that alternate conceptual models exist that may lead to migration of radioactive liquid effluent (1) to the west and through Daniels Branch, eventually to the southeast and (2) to the east toward the Savannah River through the Tertiary aquifer because of communication between the Water Table and the Tertiary aquifers
 - An adequate number of combinations of release locations and feasible pathways has not been considered – **Open Item 2.4-3**



Key Review Areas

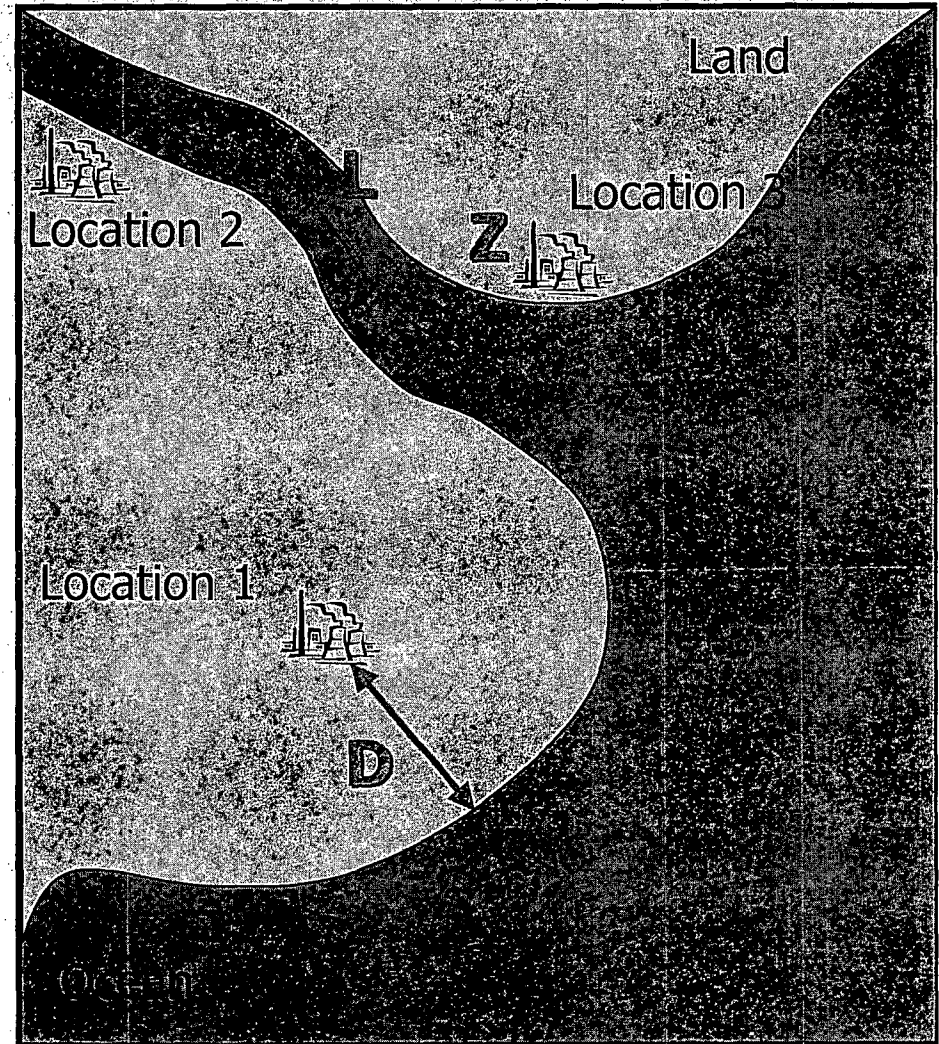
- Vogtle ESP Tsunami Assessment
 - Hierarchical review approach
 - step 1: regional screening
 - step 2: site screening
 - step 3: comprehensive tsunami hazard assessment (THA)
 - step 1: regional screening
 - Historical tsunami runup information from National Geophysical Data Center (NGDC)
 - Existing tsunami runup events north and south of the Savannah River Estuary
 - Actual runup heights missing in the NGDC database; Charleston runup less than 1 ft; estimated runup on east coast of 10 ft from 1755 Lisbon earthquake and tsunami
 - The Savannah River Estuary is subject to tsunami events

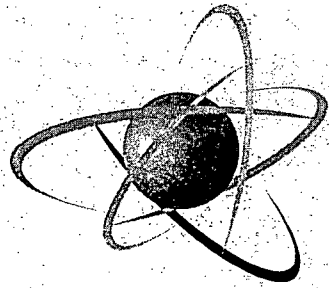




Key Review Areas

- step 2: site screening
 - The DLZ rule
 - D: horizontal distance,
 - L: longitudinal distance along river or stream from estuary, and
 - Z: elevation of the site
 - The Vogle ESP site: 100 mi inland from the coast, approximately 150 river miles from the estuary, and at an elevation of 220 ft MSL
 - A tsunami would need to inundate 100 mi inland and run up to 220 ft MSL, and a tidal bore would need to travel 150 mi upstream and reach 220 ft MSL
 - In US, tidal bores occur in Cook Inlet, Alaska
- step 3: comprehensive THA
 - Not needed





U.S.NRC

UNITED STATES NUCLEAR REGULATORY COMMISSION

Protecting People and the Environment

Presentation to the ACRS Subcommittee

Safety Conclusions from the Review of the Vogtle Early Site Permit Application

Presented by

Christian Araguas, Project Manager

NRO/DNRL/NWE1

October 24, 2007



SER Conclusions

- SER defers general regulatory conclusion regarding site safety and suitability to FSER after open items addressed
- Some conclusions from individual sections without open items:
 - Applicant has provided appropriate quality assurance measures equivalent to those in 10 CFR Part 50 Appendix B
 - Demonstrated that radiological effluent release limits associated with normal operation from the type of facility proposed to be located at the site can be met for any individual located offsite (10 CFR 100.21(c)(1))



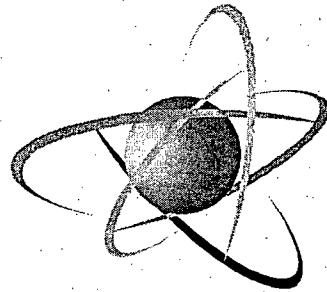
SER Conclusions

- Radiological dose consequences of postulated accidents meet the criteria set forth in 10 CFR 50.34(a)(1) for the type of facility proposed to be located at the site (10 CFR 100.21(c)(2))
- Potential Hazards associated with nearby transportation routes, industrial and military facilities pose no undue risk to facility that might be constructed on the site (10 CFR 100.21(e))
- Site characteristics are such that adequate security plans and measures can be developed (10 CFR 100.21(f))



Presentation Conclusion

- SER with Open Items Issued 8/30/07
 - 40 Open Items
 - 2 Permit Conditions
 - 19 COL Action Items
- Open Item Responses Received 10/15/07
- Reviewing Supplemental Information for Approval of LWA-2
- Next Interaction with ACRS 6/2008 on FSER (tentative)



U.S.NRC

UNITED STATES NUCLEAR REGULATORY COMMISSION

Protecting People and the Environment

Review of the Implementation of Lessons Learned from Early Site Permits

Presentation to:

Advisory Committee on Reactor Safeguards

Sub-Committee on Early Site Permits

October 24, 2007



Agenda

- Background
- Identification of Lessons Learned
- Status of Implementation of Lessons Learned
- Questions / Comments



Background

- Review and Completion of 2 Early Site Permits (ESPs)
- Ongoing Review of 2 ESPs
- Previous ACRS Meeting on Lessons Learned



Identification of Lessons Learned

- Common Understanding Between Staff and Applicant
- Applicability of 10 CFR Part 21 "Reporting of Defects and Noncompliance" Requirements for ESP Applicants
- Applicability 10 CFR Part 50 Appendix B "Quality Assurance Criteria for Nuclear Power Plants" Requirements for ESP Applicants
- Development of Guidance to Ensure Reliability of Internet Information
- Development of Improved Guidance on Electronic Submissions of Applications



Identification of Lessons Learned

- Incorporation of ESP Definitions into Staff Guidance (Site Characteristics, Combined License (COL) Action Item, Permit Conditions, Plant Parameter Envelope (PPE))
- Development of Guidance on the Review of Performance-Based Methodology for Seismic Hazards
- Review the Development and Study of Climate Change for the Next 20 years
- Update Guidance for the Review of Hydrology
- Development of Guidance on the Treatment of the High Frequency Component of Seismic Ground Motion



Status of Implementation of Lessons Learned

- Common Understanding Between the Staff and Applicant
 - Completed Updates to Standard Review Plan (NUREG-0800) “Review of Safety Analysis Reports for Nuclear Power Plants” March 2007
 - Issued RG 1.206 “Combined License Applications for Nuclear Power Plants” on June 20, 2007
 - Issued Part 52 rulemaking on August 28, 2007
 - Developed Office Instruction, NRO-REG-100, “Acceptance Review Process for Design Certifications and Combined License Applications” on September 26, 2007
 - Held Interactions with Industry (Design-Centered Working Group Meetings)

was Chpt. 19



Status of Implementation of Lessons Learned

- Applicability of 10 CFR Part 21 “Reporting of Defects and Noncompliance” Requirements for ESP Applicants
 - 10 CFR Part 52 Provides Clarity on Applicability of 10 CFR Part 21 to ESP Applicants
- Applicability 10 CFR Part 50 Appendix B “Quality Assurance Criteria for Nuclear Power Plants” Requirements for ESP Applicants
 - 10 CFR Part 52 Provides Clarity on Applicability of 10 CFR Part 50 Appendix B to ESP Applicants



Status of Implementation of Lessons Learned

- Development of Guidance to Ensure Reliability of Internet Information
 - No Additional Guidance Has Been Developed
 - Currently Applying Previous Review Methods from North Anna, Grand Gulf and Clinton ESPs

*DAP: ACPS comment was focused on the future
There needs to be some way to validate information
can be hacked*

*The staff should find time to deal with this (perhaps not this year but within 5 years)
How to avoid going overboard*



Status of Implementation of Lessons Learned

- Development of Improved Guidance on Electronic Submissions of Applications
 - Combined all guidance documents for electronic submissions to the NRC into one document
 - Original issued on 6/28/07 in the Federal Register for public comment
 - Revision 2 issued on 10/4/07 in the Federal Register for public comment
 - Simplified PDF document submittal checklist created
 - Video Clips developed to assist users in preparing PDFs in compliance with NRC guidelines
 - Download distiller and preflight profile
 - Convert MS-Word document into PDF
 - Convert Wordperfect document to PDF
 - Pre-flight verification and document testing
 - Desk Reference Guide for PDF Document Generation



Status of Implementation of Lessons Learned

- Incorporation of ESP Definitions into Staff Guidance (Site Characteristics, Combined License (COL) Action Item, Permit Conditions, Plant Parameter Envelope (PPE))
 - The staff has created revision 1 to Standard Review Plan – 0800, section 1.0, to incorporate these definitions
 - The staff trained its reviewers on these definitions for the review of the Vogtle ESP application
- Development of Guidance on the Review of Performance-Based Methodology for Seismic Hazards
 - Incorporated into Regulatory Guide (RG) 1.208, “A Performance-Based Approach to Define the Site-Specific Earthquake Ground Motion”



Status of Implementation of Lessons Learned

- Review the Development and Study of Climate Change for the Next 20 years
 - Based on ACRS feedback, the staff has taken a proactive approach regarding potential climate changes.
 - Revised SRP 2.3.1
 - Used new approach for the Vogtle ESP
 - Considered current scientific thoughts, including the 2007 Intergovernmental Panel on Climate Change (IPCC) report
 - Analyzed long-term climate trends surrounding the site
 - Issued an open item relating to an adequate period-of-record for design basis temperatures data
 - Contacted ASCE and ASHRAE regarding climate change
 - Planning attendance at scientific conferences
 - Proposing hurricane research study

frequency and intensity
applied research



Status of Implementation of Lessons Learned

- Update Guidance for the Review of Hydrology
 - Updated SRP Section 2.4
 - Reflects a hierarchical review approach for efficient and timely reviews
 - Tsunami review guidance expanded to other effects – drawdown, erosion etc
 - Close coordination with President's National Tsunami Hazard Reduction Program
 - Participating in International tsunami workshops
 - Participating in IAEA Guidelines on Hydrological and Meteorological Hazards
 - Ice thickness evaluation approach updated
 - All site characteristic parameters must be incorporated in the SSAR (not staff calculations)
 - Updating of regulatory guide on flooding is underway

RE 1.59



Status of Implementation of Lessons Learned

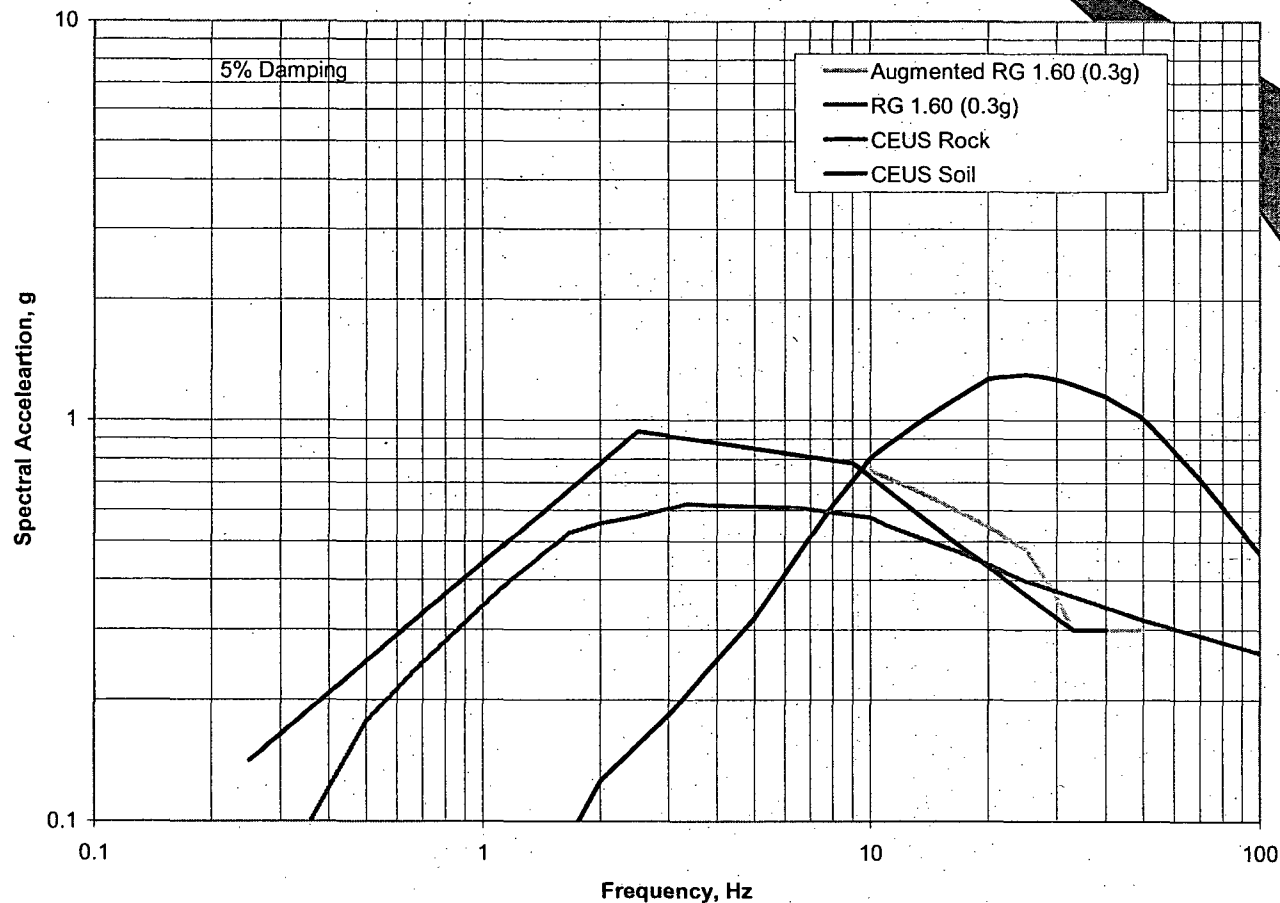
- Development of Guidance on the Treatment of the High Frequency Component of Seismic Ground Motion
 - Guidance on ground motion spectra
 - RG 1.208 and interim staff guidance
 - Extensive interaction with stakeholders
 - Industry technical studies and ²white papers
 - Corresponding staff review and position
 - Technical approach
 - Ground motion input using realistic incoherency effects
 - Implementation and validation of coherency function in computer codes
 - Potential increase in torsion and rocking effects on structures and in-structure response spectra

large foundation footprint



Status of Implementation of Lessons Learned

Input Ground Design Spectra





Status of Implementation of Lessons Learned

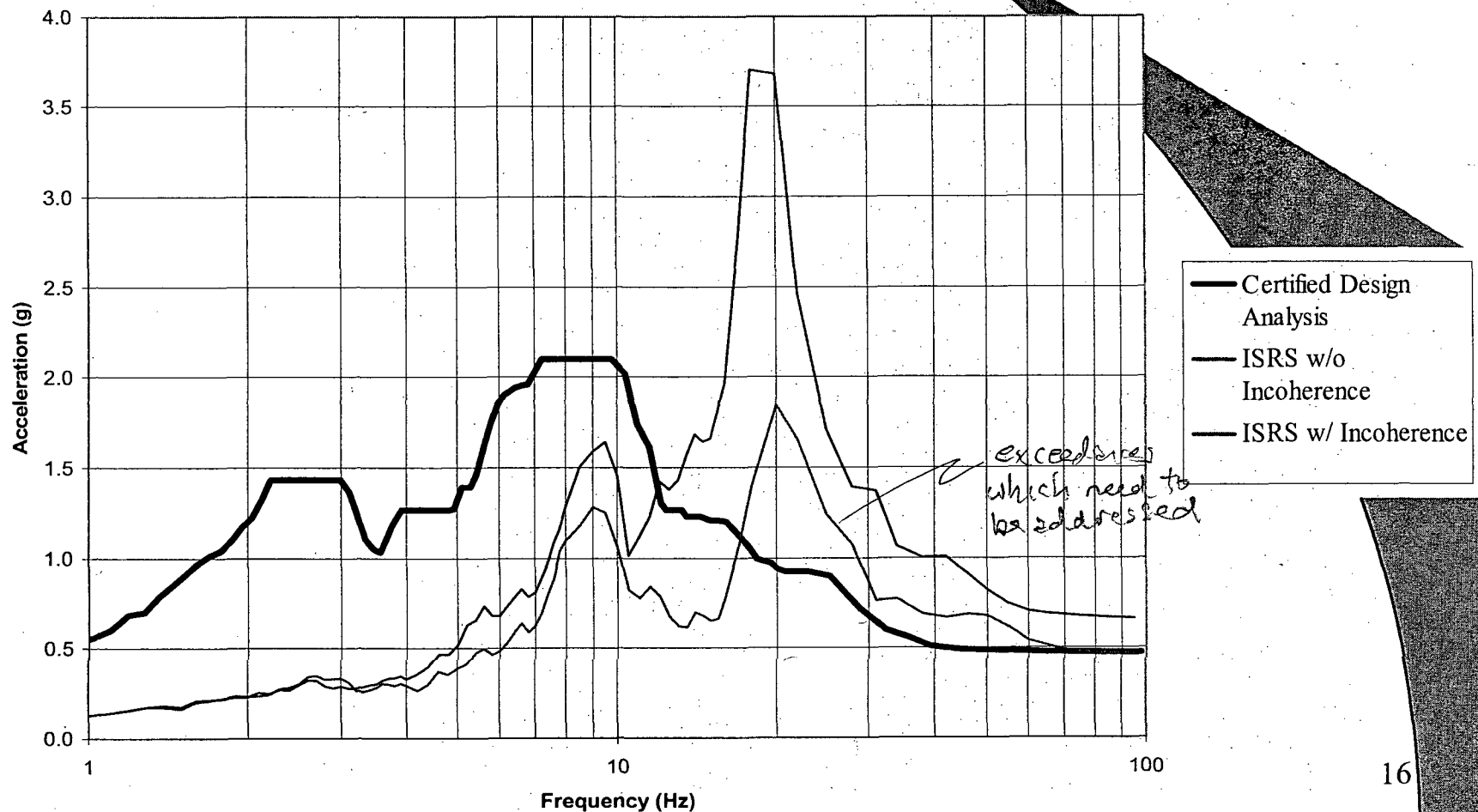
- Technical approach (Continued)
 - Scope and extent of evaluation to validate existing design for a specific site
 - Effects on sensitive equipment
 - Screening and evaluation
- Updated SRP Sections 3.7.1 and 3.7.2 and draft interim staff guidance provide a path forward



Status of Implementation of Lessons Learned

Exceedances of In-Structure Spectra Can Still Occur

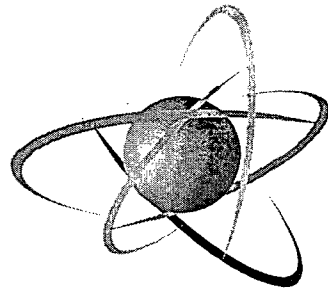
FRS Comparison Y Direction





Questions / Comments

?



U.S.NRC

UNITED STATES NUCLEAR REGULATORY COMMISSION

Protecting People and the Environment

Radiological Consequences of Design Basis Accidents

Michelle Hart
Sr. Health Physicist



Regulatory Criteria

- 10 CFR 52.17
- Part 100 siting criteria
- Dose criteria in 50.34(a)(1)
 - EAB
 - TEDE 25 rem for any 2 hour period after onset of accident
 - LPZ
 - TEDE 25 rem for duration of accident
- SRP accident-specific dose acceptance criteria



Reference Plant

- AP1000 DCD, Rev. 15
 - Design reference atmospheric dispersion factors (χ/Q_s) for EAB and LPZ
 - Site parameters in DCD, Tier 1
 - Accident-specific source terms
 - Ci/sec release rates in Westinghouse document response to RAI for ESP
 - RG 1.183 PWR accident guidance used as applicable to AP1000 design in DCD Rev. 15



Use of Reference Plant for Site Analysis

- Site-specific short-term χ/Q_s for each offsite receptor were less than AP1000 design reference χ/Q_s for each time averaging period

- Example:

LPZ	0-8 hr	DCD	0.00022 sec/m ³
		site	0.0000704 sec/m ³



Use of Reference Plant for Site Analysis (cont.)

- Accident dose for site is DCD dose adjusted by factor to account for difference in site-specific χ/Q_s to design reference χ/Q_s
- Dose for a time averaging period is directly related to χ/Q for that period

External Dose = Integrated Source $\times (\chi/Q)$ \times DCF

CEDE = Integrated Source $\times (\chi/Q)$ \times BR \times DCF



Use of Reference Plant for Site Analysis (cont.)

- Ratio of site to design χ/Q_s applied to accident-specific dose results in AP1000 DCD, Rev.15 gives estimate of site-specific dose for each accident analyzed in AP1000 DCD



Use of Reference Plant for Site Analysis (cont.)

- Ratio for each averaging period is less than one, therefore dose for site is less than reported in AP1000 DCD, Rev. 15
- Can confirm by taking AP1000, Rev. 15 source term release rates for each DBA and calculating site-specific DBA dose using site-specific χ/Q_s



Staff Finding

- AP1000, Rev. 15 DBA radiological analyses were shown to meet 10 CFR 50.34(a)(1) siting dose criteria
- Site-specific accident doses were shown to be less than AP1000, Rev. 15 reported doses
- Therefore, site meets 10 CFR 50.34(a)(1) siting dose criteria for DBAs



Review at COL

- Review at COL would determine if chosen plant fits within the assumptions for the ESP
 - ESP applies to AP1000 (DCD Rev. 15)
- Permit
 - AP1000
 - Accident release rate source terms
 - Site parameters include offsite χ/Q_s