Grand Gulf COL Application
Technical Orientation

March 19, 2008

FSAR – Chapter 1

- IBR DCD with no departures
- IBR ESPA SSAR
- Useful Tables
  - Left Margin Annotations
  - Referenced topical reports
  - Listing of Conceptual Design Information (CDI)
  - SRP, RG, RG 1.206 conformance
  - COL Item cross reference
  - ESPA SSAR to FSAR cross reference
- COL Items
  - Six (6) COL Applicant Items
  - One (1) COL Holder Item
- Mix of standard and site-specific information

FSAR – Chapter 3

- IBR DCD with one departure
  - Design ground motion response spectra (3.7 – discussed later)
- COL Items
  - Five (5) COL Applicant Items
  - Two (2) COL Holder Items
- 15 Sections IBR DCD with no additional text (3.1, 3.3, 3.4, 3.8, Appendices 3B – 3L) – same as R-COLA
- Seven (7) Sections are 100% Standard with R-COLA (3.2, 3.5, 3.6, 3.10, 3.11, 3.12, 3.13)

FSAR – Chapter 3 (cont'd)

- Section 3.9 nearly identical to R-COLA – GG not lead plant for vibration monitoring
- Section 3A has CDI (site-specific seismic soil interaction) – refers to Chapter 2 – discussed later
- Sections 3.12 and 3.13 added per RG 1.206 (not in the DCD)

FSAR – Chapter 6

- IBR DCD with no departures
- COL Items
  - Four (4) COL Applicant Items
  - One (1) COL Holder Item
- Six (6) Sections IBR DCD with no additional text (6.0, 6.3, 6.5, Appendices 6A – 6C) – same as R-COLA
- Two (2) Sections 100% Standard with R-COLA (6.1, 6.6)
- Section 6.2 is Standard except for one sentence
- Site-specific information
  - Control Room Habitability Analysis (6.4) – for toxic gas, no monitoring or mitigating systems required

FSAR – Chapter 8

- IBR DCD with no departures
- COL Items
  - Eleven (11) COL Applicant Items
  - No COL Holder Items
- Site-specific information
  - Power grid (8.1.2.1)
  - Transmission lines (8.2.1.1)
  - Switchyard (8.2.1.2.1; Figures 8.2-202 thru 8.2-204)
  - Failure analysis and protective relaying (8.2.1.2.1.1)
  - Reliability and stability (8.2.2.1)
  - Switchyard DC power (8.2.1.2.1.1)
  - Transmission system operator agreement (8.2.1.2.1.3)
  - Transmission system monitoring (8.2.2.1.2)

FSAR – Chapter 9

- IBR DCD with no departures
- COL Items
  - 23 COL Applicant Items
  - Three (3) COL Holder Items
- Section 9.1 – 100% standard with R-COLA
- Section 9.2
  - DCD/Standard: Reactor Component Cooling Water, Ultimate Heat Sink, Condensate Storage and Transfer, Chilled Water, Turbine Component Cooling Water
  - Site-specific: Plant Service Water, Make-up Water, Potable and Sanitary, Station Water
  - Site specific ITAAC for Plant Service Water (Part 10)

FSAR – Chapter 9 (Continued)

- Section 9.3
  - DCD/Standard: Compressed Air, Process Sampling, Equipment and Floor Drains, Chemical and Volume Control, Standby Liquid Control, Instrument Air, Service Air, High Pressure Nitrogen Supply, Auxiliary Boiler
  - Site-specific: Hydrogen Water Chemistry, Oxygen Injection
- Section 9.4: IBR DCD with no additional text – same as R-COLA
- Section 9.5:
  - Fire Protection (9.5.1, 9A, 9B): Mix of site-specific and standard information – IBR Fire Protection Program from DCD (9.5.1.15)
  - Communications (9.5.2): Site-specific
  - Lighting (9.5.3): IBR DCD no additional text - same as R-COLA
  - Diesel Generator Support Systems (9.5.4-9.5.8): Mostly IBR DCD and standard information (one paragraph of site-specific information involving corrosion protection for underground fuel transfer piping)

FSAR – Chapter 10

- IBR DCD with no departures
- COL Items
  - One (1) COL Applicant Item
  - One (1) COL Holder Item
- Two (2) Sections IBR DCD with no additional text (10.1, 10.3) – same as R-COLA
- Section 10.2 is 100% standard with R-COLA
- Section 10.4 contains site-specific information:
  - Circulating Water
  - Chemical Injection
  - Normal Power Heat Sink

FSAR – Chapter 11

- IBR DCD with no departures
- COL Items
  - 12 COL Applicant Items
  - No COL Holder Items
- One (1) Section IBR DCD with no additional text (11.1) – same as R-COLA
- Three (3) Sections 100% standard with R-COLA [11.2 (NEI 07-11), 11.4 (NEI 07-10), 11.5 (NEI 07-09)]
- Section 11.3: Site-specific information added for cost-benefit (NEI template) and offsite release references

FSAR – Chapter 12

- IBR DCD with no departures
- COL Items
  - Eleven (11) COL Applicant Items
  - No COL Holder Items
- Appendix 12A IBR DCD with no additional text – same as R-COLA
- Six (6) additional Sections 100% standard with R-COLA [12.1, 12.3, 12.5, 12.6, 12AA (NEI 07-08), 12BB (NEI 07-03)]
- Site-specific information:
  - Section 12.2 - Offsite doses, Airborne releases
  - Section 12.4 - Dose assessment (the reference to 12CC)
  - Appendix 12CC – Dose to construction workers

FSAR – Chapter 14

- IBR DCD with no departures
- COL Items
  - Two (2) COL Applicant Items
  - Four (4) COL Holder Item
- Section 14.1: IBR DCD with no additional text –same as R-COLA
- Section 14.2: Mix of standard and site-specific information
- Section 14.3: 100% standard with R-COLA

FSAR – Chapter 15

- IBR DCD with no departures and no additional text – same as R-COLA
- No COL Items

FSAR – Chapter 17

- IBR DCD with no departures
- COL Items
  - Four (4) COL Applicant Items
  - No COL Holder Items
- Two (2) Sections are 100% standard with R-COLA [17.4 and 17.6 (NEI 07-02)]
- Other Sections have mostly site-specific information
- Quality Assurance Program Description (QAPD) provided in Part 11A
  - QAPD based on NEI 06-14A

FSAR – Chapter 18

- IBR DCD with no departures and no additional text – same as R-COLA
- No COL Items

FSAR – Chapter 19

- IBR DCD with no departures
- COL Items
  - No COL Applicant Items
  - One (1) COL Holder Item
- Seven (7) Sections IBR DCD with no additional text (19.1, 19.3, 19.4, 19A, 19ACM, 19B, 19C) – same as R-COLA
- Section 19.2 is 100% standard with R-COLA
- Section 19.5 text is identical to R-COLA but has site-specific evaluation supporting the conclusions

COLA Part 1 – General and Administrative Information

- General Information
  - Applicants: Entergy Operations, Inc., Entergy Mississippi, Inc, Entergy Louisiana LLC, Entergy Gulf States Louisiana LLC, System Energy Resources, Inc.
  - Requested Licenses
- Financial Information
  - Construction costs
  - Financial qualification
  - Decommissioning funding (per 10 CFR 52.75)
- Other Information

FSAR – Chapter 13

- IBR DCD with no departures
- COL Items
  - 13 COL Applicant Items
  - One (1) COL Holder Item
- Three (3) Sections 100% standard with R-COLA [13.3,13.4, 13.7 (NEI 06-06)]
- Sections 13.1, 13AA: Site-specific organizations
- Sections 13.2, 13BB: Very similar to R-COLA; both reference NEI 06-13A
- Section 13.5: Very similar to R-COLA: main differences are references to ANSI/ANS 3.2 and RG 1.33
- Section 13.6: Similar to R-COLA: ESP COL item addressed differently; both COLAs reference NEI 03-12 Appendix F

COLA Part 5 – Emergency Plan

- Emergency Plan
  - Builds on Major Features approved at ESP; addresses NUREG-0654 evaluation criteria
  - Certification letters
  - Tables providing cross-reference between the Plan and requirements/guidance/plans
  - Part 52.79(b)(4): Describes (minor) updates, corrections to ESP Major Features
- Part 5: "Supplemental Information"
  - Evacuation Time Estimate Report
  - State/Local plans
- EP ITAAC (provided in Part 10)

COLA Part 8 – Safeguards / Security Plans

- Security Plan
  - Followed NEI Template
- Submitted to NRC under separate cover

FSAR – Chapter 2

2.0 - Introduction

- DCD Section 2.0, incorporated by reference
- Required demonstrations per Part 52
  - ESBWR Site Parameters w/ Unit 3 Site Charac. **(Table 2.0-201)**
  - Unit 3 Site Charac. w/ ESP Site Charac.

    (Table 2.0-202; Permit Condition PC 3.A)
  - Unit 3 Design Charac. w/ ESP Controlling Values of Parameters and DBA Source Term Plant Parameters

    (Table 2.0-203; Permit Condition PC 3.B)
- Applicable DCD COL Information **(Table 2.0-2R)**

FSAR – Chapter 2

2.1 - Geography, Demography

- Specific power block location provided in COLA
- Unit 3, Structures & Equipment - General Arrangement **(Fig. 2.1-201)**
- Unit 3 Site Plan **(Fig. 2.1-202)**
- Unit 3 EAB within Unit 1 site property boundary
- EOI maintains ingress, egress control & authority to evacuate
- ESBWR PRA population density bounding

FSAR – Chapter 2

2.2 - Nearby Facilities, Transportation Routes

- Control Room Habitability, Toxic Gas **(FSAR 2.2.3.1.2)**
  - Offsite source: MS River barge transport of chlorine & ammonia
  - Onsite sources: Unit 1, Unit 3 **(Analysis in FSAR 6.4)**
- Unit 1 turbine missile impacts on Unit 3

  (FSAR 2.2.3.1.7)

FSAR – Chapter 2

2.3 - Meteorology

- Probable maximum winter precipitation **(FSAR 2.3.1.2; ESP Variance 2.3-1)**
- Meteorological Tower, Unit 3 Cooling Tower, Interaction **(FSAR 2.3.2)**
- Control Room atmospheric dispersion estimates, site-specific **(FSAR 2.3.4)**
- Long term dispersion coefficients **(FSAR 2.3.5)**

FSAR – Chapter 2

2.4 - Hydrology

- Site grading plan **(FSAR 2.4.1.1; Figure 2.4.1-201)**
- Unit 3 power block, closest distance to nearest surface water **(FSAR 2.4.1.2; ESP Variance 2.4.1-1)**
- Effects of local intense precipitation; site drainage system **(FSAR 2.4.2.3)**
- PMP effects on local streams **(FSAR 2.4.3)**

FSAR – Chapter 2

2.4 - Hydrology (Cont'd)

- Groundwater use; ESPA SSAR correction regarding source of groundwater for general plant use
  (FSAR 2.4.12.1)
- Groundwater levels, movement; highest measured groundwater, **(FSAR 2.4.12.2.3; ESP Variance 2.4.12-1)**
- Hydrologic properties **(FSAR 2.4.12.2.4)**
- Measurable perched groundwater **(Fig. 2.4.12-205)**
- Accidental release, rad. liquid effluent to ground, surface water **(FSAR 2.4.13; Permit Condition PC3.E(2))**

Part 7 – Departures Report

- Summary
  - Departure (1)
  - Variances (6)
  - Exemptions (2)
- Difference from R-COLA
  - R-COLA provided supplemental information locations

Part 7 – Departures Report (cont'd)

- Departure from DCD
  - Seismic Spectra Exceedance **(DEP 2.0-1; Table 2.0-201, Sh 11)**
- Variances from ESP Site Characteristics
  - Design Response Spectra **(VAR 2.0-1; Table 2.0-202, Sh 16)**
  - Minimum Shear Wave Velocity of Soil at the Proposed Plant Foundation Level **(VAR 2.0-2; Table 2.0-202, Sh 17)**
  - Distance to Closest Surface Water

    (VAR 2.4.1-1; Table 2.0-202, Sh 14)
  - Highest Ground Water Elevation **(VAR 2.4.12-1; Table 2.0-202, Sh 11)**

Part 7 – Departures Report (cont'd)

- Variance from ESP Application SSAR Method
  - Determination of Roof Loads Due to Extreme Winter Precipitation **(VAR 2.3-1; FSAR 2.3.1.2)**
- Variance from ESP Postulated Source Term
  - Accident Analyses **(VAR 2.0-3; Table 2.0-203, Sh 3)**
- Exemptions
  - Seismic Spectra Exceedance (Departure from Tier 1) **(DEP 2.0-1; Table 2.0-201, Sh 11)**
  - Fitness for duty program description per expected rule **(FSAR 13.7)**

ER – Chapter 2

Chapter 2 – Environmental Description

- Station Location **(2.1)**
  - Footprint: Figure 2.1-201
- Land **(2.2)**
  - Proposed transmission corridor: Figure 2.2-201
  - Description of desktop analysis
- Water **(2.3)**
  - Correction to ESP regarding use of Catahoula Formation

ER Chapter 2

Chapter 2 – Environmental Description (Cont'd)

- Ecology **(2.4)**
  - Species surveys
  - Transmission line evaluation
- Socioeconomics **(2.5)**
  - Katrina effects
  - Unit 3: regulated unit
  - Historic properties, results of Phase I survey

Figure 2.1-201. GGNS Site Center Point and Facility Layout

Revision 0

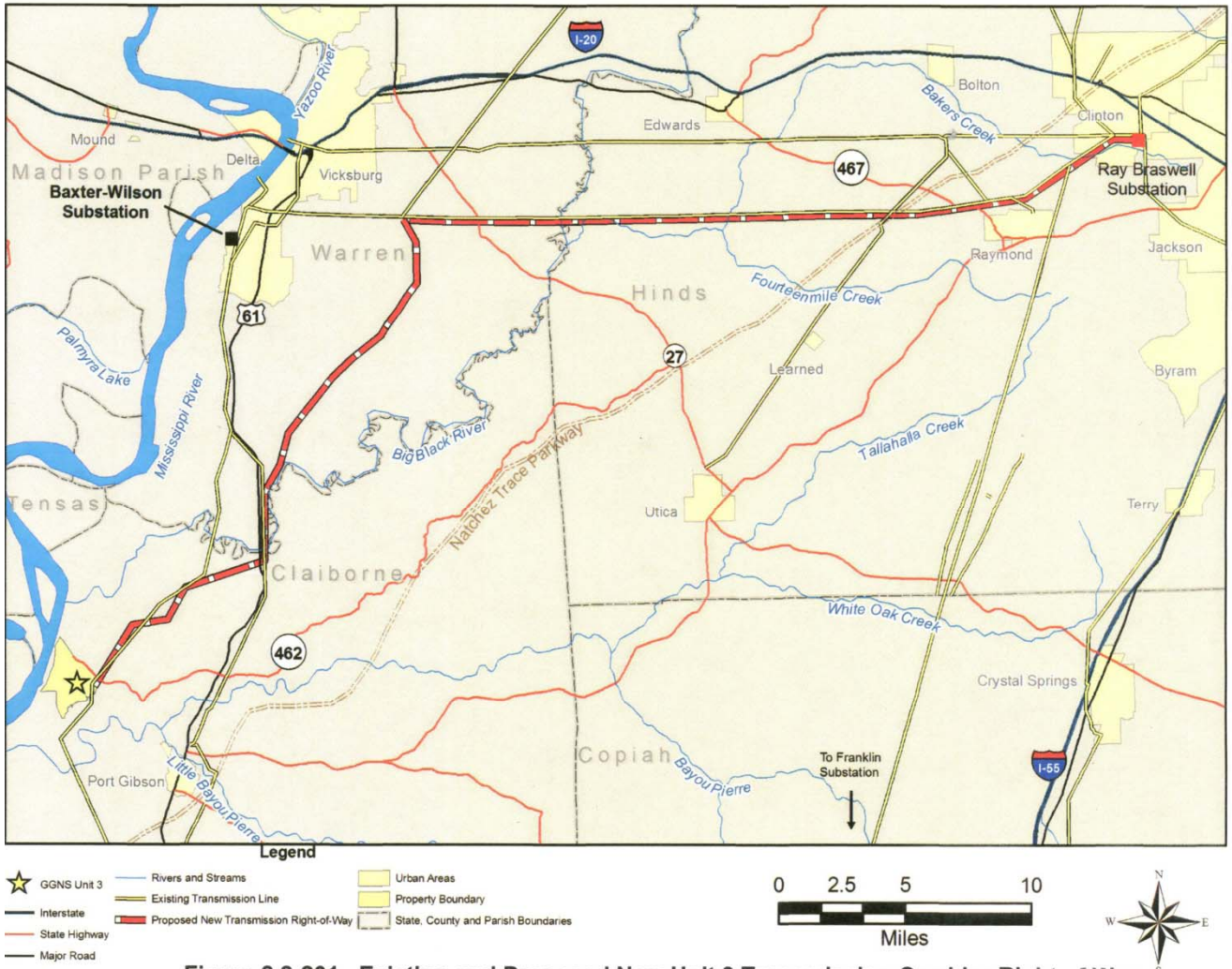


Figure 2.2-201. Existing and Proposed New Unit 3 Transmission Corridor Right of Way

FSAR Chapter 2

FSAR 2.5 - Geology, Seismology, Geotechnical Engineering

- SSAR 2.5.1 (Basic Geologic, Seismic Info.): IBR w/no variance or supp. info **(FSAR 2.5.1)**
- COL stage methodology, data gathering: Supported development of Unit 3 site-specific Ground Motion Response Spectra ("GMRS")
  - Unit 3 GMRS supersedes ESP Site Characteristic Design Response Spectra **(FSAR 2.5.2; Variance 2.0-1)**
- DCD Certified Seismic Design Response Spectrum (CSDRS) bounds GMRS except at low frequencies **(FSAR 2.5.2.5; FSAR 3.7.1.1.4; Departure 2.0-1; also Exemption from Tier 1; Figs. 2.0-201,202)**

FSAR Chapter 2

FSAR 2.5 – Geology and Seismology (Cont'd)

- Use of minimum equivalent shear wave velocity

  (Table 2.0-201, Sh 9; Table 2.0-202, Sh 17; Variance 2.0-2; FSAR 2.5.2; FSAR 2.5.4)
- SSAR 2.5.3 (Faulting): IBR w/no variance or suppl. info

  (FSAR 2.5.3)
- Stability of subsurface materials **(FSAR 2.5.4)**
  - Extensive supplemental information; Section 2.5.4 integrates results of COL investigation, testing program
  - Format: Follows SRP 2.5.4; RG 1.206

FSAR Chapter 2

FSAR 2.5 – Geology and Seismology (Cont'd)

- Slope Stability **(FSAR 2.5.5)**
  - Integrates results of COL stage analyses
  - Includes consideration of site grading plan, groundwater characterization, and use of compacted fill
- For GG site response analysis, used Approach 3 of NUREG/CR-6728 **(FSAR 2.5.2.4)**
- Geotechnical boring logs from 2007 site characterization work **(Appendix 2AA)**
- Backfill ITAAC – same as R-COLA **(Part 10)**

ER Highlights

Chapter 1 – Introduction

- Proposed Project **(1.1)**
  - Includes proposed timeline and ownership information
- Reviews, Approvals, and Consultations **(1.2)**
  - Table updated from ESP
- Report Contents **(1.3)**
  - Requirements of 10 CFR 51.50(c)(1) i – v

ER Highlights

Chapter 3 - Plant Description

- Plant Description **(3.0)**
  - Table 3.0-201 demonstrates ESP design parameters bound GG Unit 3 COL design characteristics [§51.50(c)(1)]
  - Table 3.0-201 main table
    - Refers to other ER sections if COL parameters not bounded
    - Comments provide additional clarification
    - Tables 3.0-202 through -208 referenced for details of certain parameters
    - Parameter definitions in Table 3.0-209
  - Supplemental design information provided in Chapter 3 to support ESP unresolved issues and provide new (and significant) information
  - FSAR Chapter 2 addresses site characteristics [§51.50(c)(1)]

ER Highlights

Chapter 3 - Plant Description

- External Appearance And Plant Layout **(3.1)**
  - ESBWR selected for GG U3
- Reactor Power Conversion System **(3.2)**
  - Key ESBWR parameters provided
  - Electrical & thermal power, fuel parameters
- Plant Water Use **(3.3)**
  - Updates water consumption and water treatment information (GW use and GW quality impacts unresolved at ESP)
  - Revised water balance diagram
  - Water treatment supplemental information
- Cooling System **(3.4)**
  - NPHS Cooling system update: relocation of CTs, and final design (1 NDCT and 1 MDCT)
  - UHS and PSWS supplemental information
  - Intake information (Figures 3.4-201 and -202): screen design, and embayment areal extent (dredge spoils impacts unresolved)

ER Highlights

Chapter 3 - Plant Description

- Radioactive Waste Management Systems **(3.5)**
  - Pointers to DCD material for radioactive waste systems design
- Non-Radioactive Waste Systems **(3.6)**
  - Information to address unresolved ESP issue with effluent pathways chemical constituents
- Power Transmission System **(3.7)**
  - Information on transmission ROW requirements (new ROW), and design
  - Unresolved issues with off-site land use, wildlife habitat, and potential acute impacts of EMF
- Transportation Of Radioactive Material **(3.8)**
  - Information to address unresolved issue on impacts of crud and activation products on transportation accidents

ER Highlights

Chapter 4 – Environmental Impacts of Construction

- Land Use Impacts **(4.1)**
  - Disposal of net excess cut material
  - No rail service proposed
  - Transmission lines
  - Historic properties
- Water-Related Impacts **(4.2)**
  - Construction groundwater use and groundwater quality
  - Construction dewatering
- Ecological Impacts **(4.3)**
  - Transmission lines

ER Highlights

Chapter 5 – Environmental Impacts of Station Operation

- Land Use Impacts **(5.1)**
  - Inadvertent discovery procedures for cultural resources
- Water- Related Impacts **(5.2)**
  - No operational dewatering
  - Groundwater use
  - Surface water use and discharge
- Cooling System Impacts **(5.3)**
  - Mississippi River bathymetry, temperature, and flow data used to confirm CORMIX results are representative

ER Highlights

Chapter 5 – Environmental Impacts of Station Operation (Cont'd)

- Radiological Impacts of Normal Operation **(5.4)**
  - Certain ESBWR liquid effluent isotopes not bounded by ESP Appendix D
  - Individual, population, and biota doses recalculated using ESBWR source term
- Environmental Impacts of Waste **(5.5)**
  - Chemical effluents
  - Sediment return to Mississippi River

ER Highlights

Chapter 5 – Environmental Impacts of Station Operation (Cont'd)

- Transmission System Impacts **(5.6)**
  - Acute and chronic effects of EMF to members of the public
- Uranium Fuel Cycle Impacts **(5.7)**
  - 1520 MWe impacts approximately one-half the impacts evaluated in NUREG-1817
- Decommissioning **(5.9)**
  - Funding assurance provided in Part 1 of COLA
  - Material inventories less than evaluated in NUREG-0586

ER Highlights

Chapter 6 – Environmental Measurements and Monitoring Programs

- Hydrological Monitoring **(6.3)**
  - One year pre-application groundwater monitoring performed
  - Pre-construction groundwater level monitoring
  - Dewatering monitoring
  - Continuation of Unit 1 monitoring
- Ecological Monitoring **(6.5)**
  - Pre-construction monitoring for Louisiana Black Bear
- Chemical Monitoring **(6.6)**
  - Ongoing Unit 1 monitoring, NPDES monitoring requirements

ER Highlights

Chapter 7, Environmental Impacts of Postulated Accidents Involving Radioactive Materials

- Design Basis Accidents **(7.1)**
  - ESBWR MWt not bounded by ESP ER ABWR MWt
  - Source terms at ESP not bounding for ESBWR
  - DBAs re-evaluated: DCD Ch. 15 Accidents used
- Severe Accidents **(7.2)**
  - Resolved at ESP: ABWR consequences expected to bound ESBWR – SMALL impacts
  - Supplemental information confirms ABWR bounds ESBWR
- Severe Accident Mitigation Alternatives **(7.3)**

ER Highlights

Chapter 8 – Need For Power

- Assessment, deferred from ESP
- Service Area - Entergy Electric System **(8.1)**
- Power Demand **(8.2)**
  - System's Strategic Supply Resources Plan
  - Methodology and forecasts to 2016
- Power Supply **(8.3)**
  - Total reliability needs vs. generation (2007-2016)
- Need for Power Assessment **(8.4)**
  - Current supply deficit; expected to increase over time
- Chapter 8 includes certain Proprietary Information **(Part 9)**

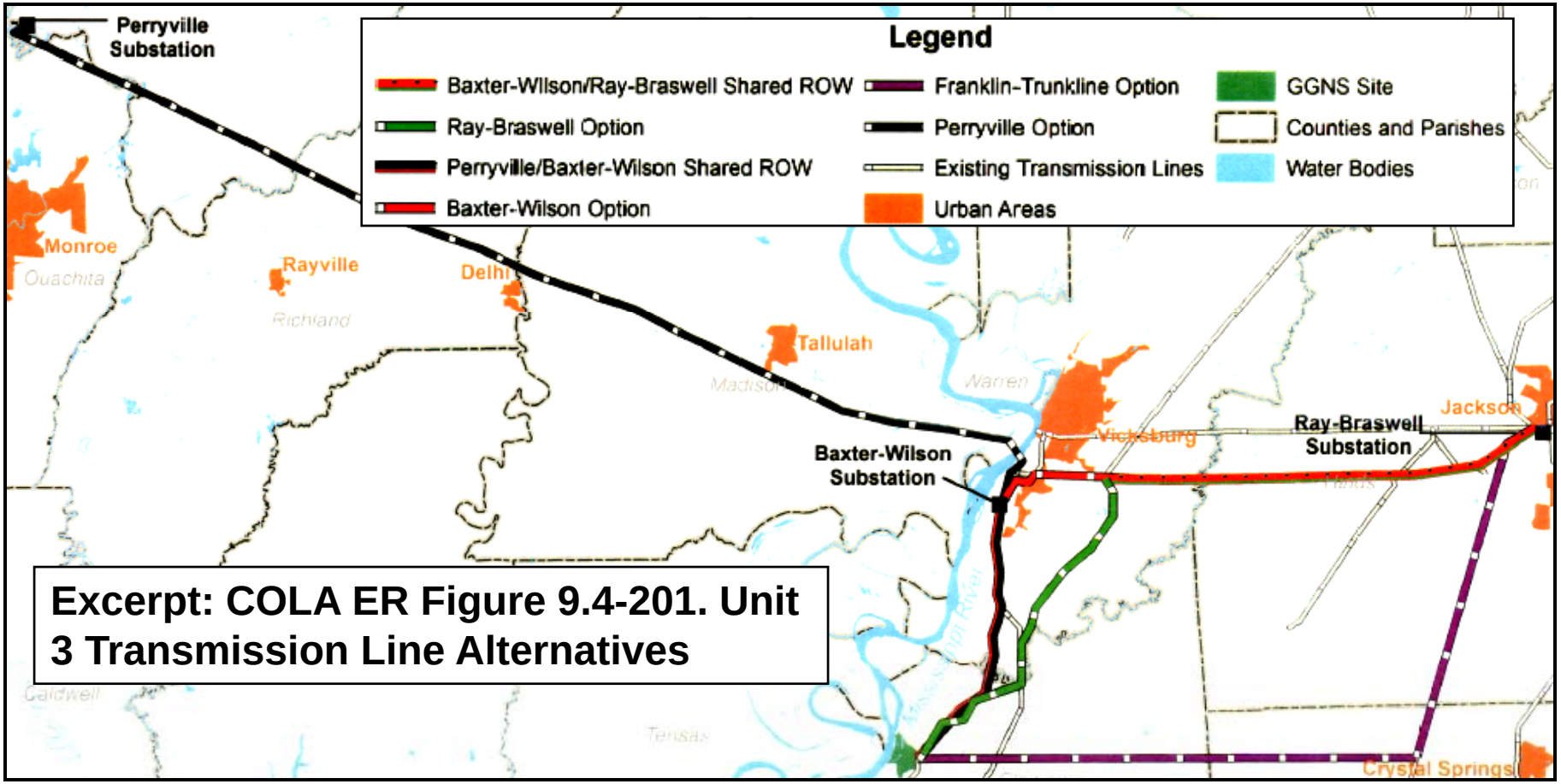
ER Highlights

Chapter 9 – Alternatives

- No-Action; Updated for COL context **(9.1)**
- Alternative Plant &Transmission Systems **(9.4)**
  - Heat dissipation **(9.4.1)** & Circulating water **(9.4.2);** Conclusion: No environ. preferable alternatives
- Transmission System Alternative **(9.4.3)**
  - GGNS site evaluated for 2 units, including selection of "Ray Braswell" line routing (not needed for Unit 1)
  - Four (4) optional transmission routings considered **(COLA ER Figure 9.4-201)**
  - Ray Braswell option evaluated as preferred option for new Unit 3. Conclusion: No environ. preferable alternatives

ER Highlights

Chapter 9 – Alternatives (Cont'd)



Excerpt: COLA ER Figure 9.4-201. Unit 3 Transmission Line Alternatives

ER Highlights

Chapter 10 – Environmental Consequences of the Proposed Action

- Irreversible and Irretrievable Commitments of Resources **(10.2)**
  - In context of COL (ESP assumed no commitment)
  - Irreversible environmental commitments
  - Irretrievable Material Resources – plant materials and uranium
- Relationship Between Short Term Uses and Long Term Productivity of the Human Environment **(10.3)**
  - In context of COL (ESP assumed no use, benefits not evaluated)

ER Highlights

Chapter 10 – Environmental Consequences of the Proposed Action (Cont'd)

- Benefit-Cost Balance **(10.4)** - Deferred at ESP
  - Benefits
    - Monetary
    - Net electrical generation
    - Fuel diversity/energy security/foreign trade
    - Air pollution/emissions avoidance/greenhouse gas
  - Costs
    - Internal – Capital; Operating; Decommissioning
    - External – Land use; Water use; Air emissions; Ecological; Hazardous (radiological and non-radiological) emissions, effluents, and waste; Materials, energy, and uranium; Socioeconomic