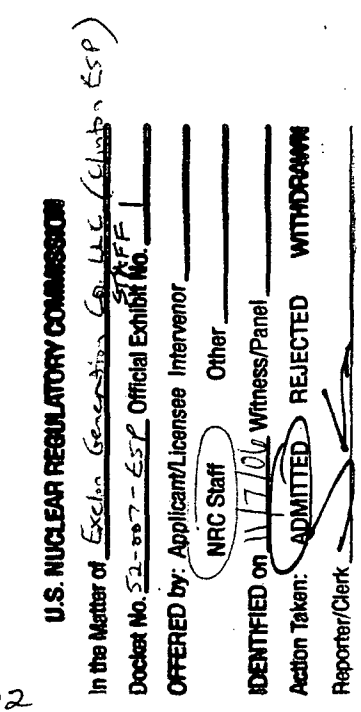
RAS 12562

Clinton Early Site Permit Hearing

Safety Review

Joelle Starefos
Senior Project Manager
NRC Office of New Reactors



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SECY-02

Staff Conclusions

- *. . . the EGC ESP site characteristics comply with the requirements of 10 CFR Part 100 . . . with the limitations and conditions proposed by the staff in this SER [NUREG-1844] . . .*

- *. . . taking into consideration the site criteria contained in 10 CFR Part 100, a reactor(s), having characteristics that fall within the parameters for the site, and which meets the terms and conditions proposed by the staff in this SER, can be constructed and operated without undue risk to the health and safety of the public.*

- *. . . issuance of the requested ESP will not be inimical to the common defense and security or to the health and safety of the public.*

Joelle Starefos

Exelon ESP Application

- Exelon's application includes:
  - A description of the site
  - A safety assessment of the site
  - Proposed major features of an emergency plan

Joelle Starefos

Regulations and Guidance

- 10 CFR §52.18
  - Standards for review of applications

- Review Standard RS-002
  - Processing Applications for Early Site Permits
    - NUREG-0800 – Safety Standard Review Plan
    - NUREG-1555 – Environmental Standard Review Plan

Joelle Starefos

NRC Safety Evaluation

- Geography and demography of the site
- Nearby industrial, transportation and military facilities
- Industrial security
- ESP quality assurance measures
- Radiological effluent release dose consequences from normal operation

Joelle Starefos

NRC Safety Evaluation

- Site hydrology
- Site geology, seismology, and geotechnical engineering
- Site meteorology
- Accident analyses
- Emergency planning

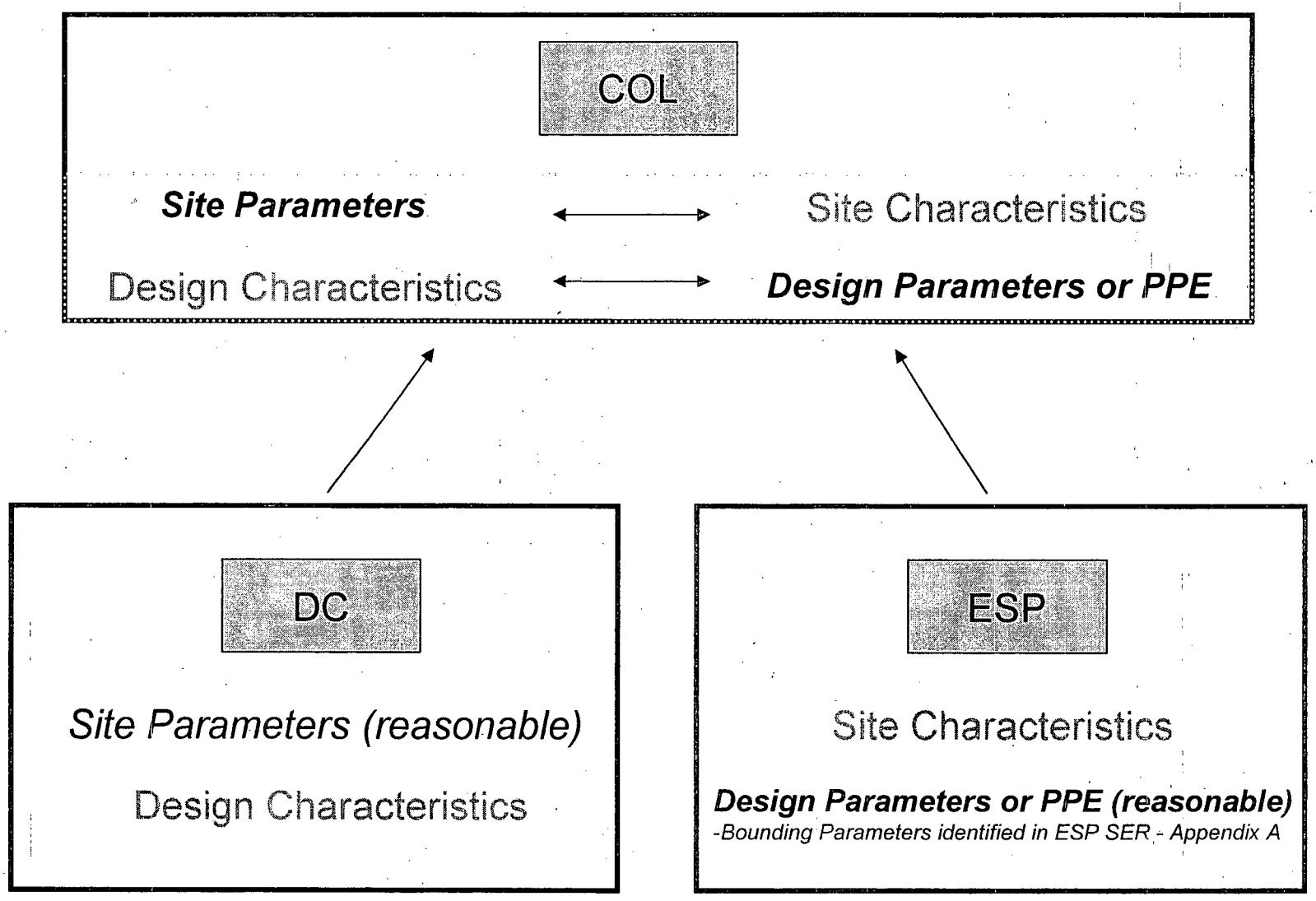
Joelle Starefos

Plant Parameter Envelope

- 10 CFR Parts 52 and 100 that apply to an ESP, do not require an ESP applicant to provide specific design information

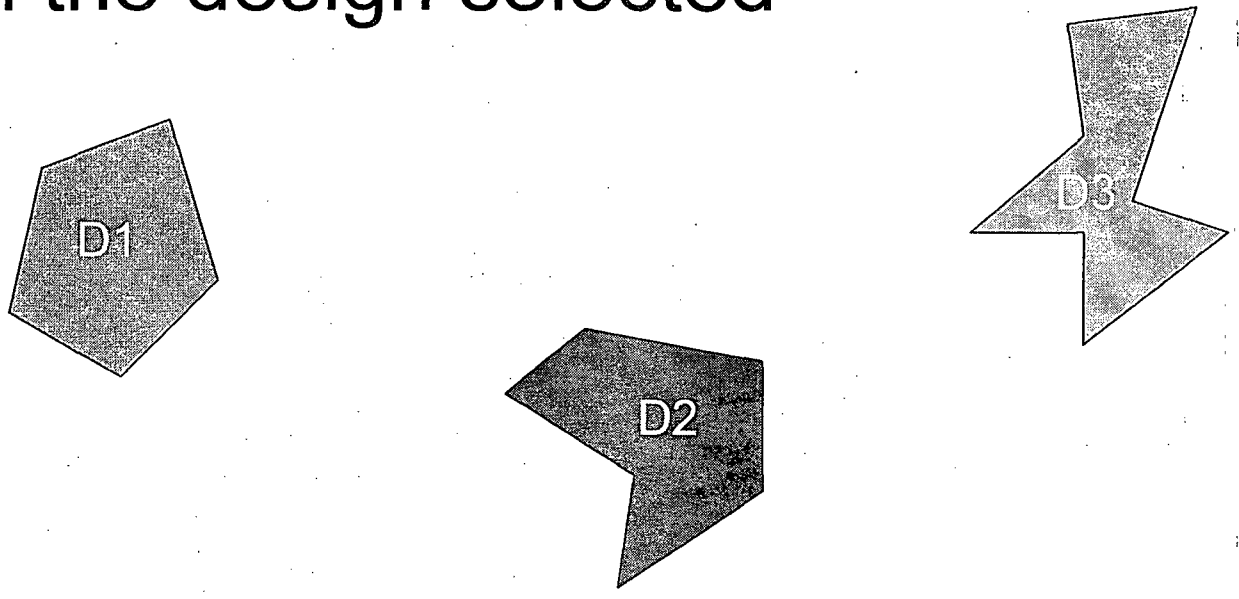
- However, some design information may be required to address 10 CFR §52.17(a)(1)

Joelle Starefos


COL
Site Parameters
Site Characteristics
Design Characteristics
Design Parameters or PPE
DC
Site Parameters (reasonable)
Design Characteristics
ESP
Site Characteristics
Design Parameters or PPE (reasonable)
-Bounding Parameters identified in ESP SER - Appendix A

Plant Parameter Envelope

- Design characteristics will differ depending upon the design selected



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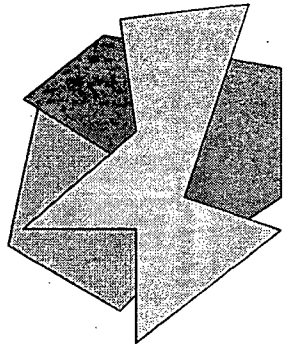
Plant Parameter Envelope

- When different designs are considered together there would be a limiting set of design parameters that would envelop, or bound, the selected designs



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Plant Parameter Envelope

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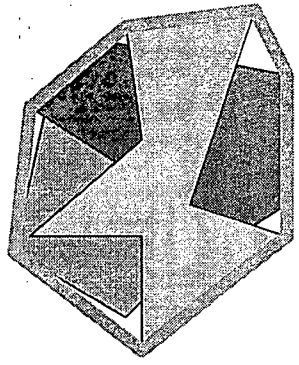

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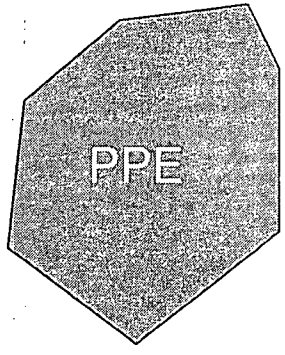
Plant Parameter Envelope

- This describes the Plant Parameter Envelope, or PPE, that may be used in an Early Site Permit application



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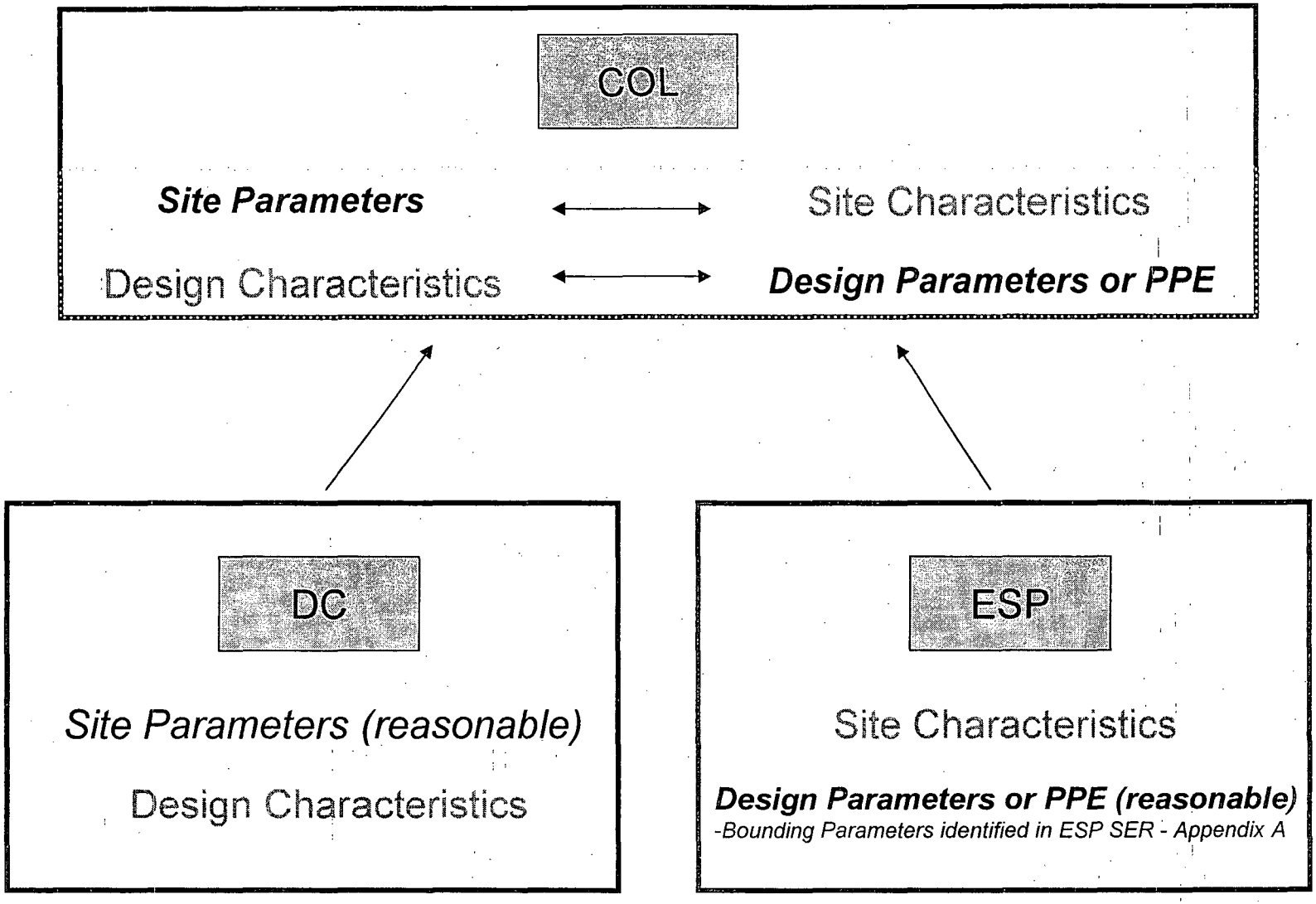
Plant Parameter Envelope

- The complete set of plant parameter values describes the site-facility interface
- NRC Staff reviewed PPE values and found them to be reasonable
- NRC Staff identified certain PPE values as bounding parameters

Joelle Starefos


COL
Site Parameters
Site Characteristics
Design Characteristics
Design Parameters or PPE
DC
Site Parameters (reasonable)
Design Characteristics
ESP
Site Characteristics
Design Parameters or PPE (reasonable)
-Bounding Parameters identified in ESP SER - Appendix A

Clinton Early Site Permit Hearing

Site Hydrology

Goutam Bagchi
Senior Level Advisor
NRC Office of Nuclear Reactor Regulation

Regulations

- Contents of application [10 CFR §52.17 (a)(1)(v) and (vi)]
- Hydrologic siting factors [10 CFR §100.20 (c)]
- Hydrologic seismic considerations [10 CFR §100.23 (d) (4)]
- General design criteria relating to siting – natural hazards and cooling water [10 CFR Part 50, Appendix A, GDC 2 and 44]

Hydrologic Setting

- Site elevation and flooding hazard
- Upstream and downstream reservoirs
- Hydrologic characteristics that affect plant design
  - Maximum flood elevation and coincident wave action
  - Ultimate heat sink (UHS) adequacy under sediment deposition and icing
  - Ground water elevation
  - Ground water pathways
  - Local site area flooding under intense precipitation

Staff Review Activities

- Staff review activities:
  - Site visit
  - Independent staff verification and analyses
    - Reservoirs near site
    - Lake icing
    - Clinton Lake watershed area
    - Probable Maximum Precipitation (PMP)
    - Local PMP
    - Probable Maximum Flood
    - Waves induced by sub-aerial landslides
    - Low water level – drought conditions and forced and induced evaporation

Goutam Bagchi

Staff Conclusions

- ESP site is above the lake flood level
- There is reasonable assurance of UHS adequacy, if needed for selected reactor design
- Hydrologic site characteristics are identified
- Hydrology permit conditions are specified
  - Hydraulic gradient towards radwaste facility, away from the lake
  - Radwaste facility design to prevent liquid radioactive release
  - Monitor hydraulic gradient
- Hydrologic COL Action Items are identified
- Applicable regulations are met

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Clinton Early Site Permit Hearing

Site Geology, Seismology, and Geotechnical Engineering

Dr. Clifford Munson
Senior Geophysicist
NRC Office of Nuclear Reactor Regulation

Clinton Early Site Permit Hearing

- Requirements and Guidance
- Regional and Site Geology
- Vibratory Ground Motion
- Site Subsurface Materials
- Staff Conclusions

Dr. Clifford Munson

Regulations and Guidance

- Investigate geologic and seismic characteristics [10 CFR §100.23(c)]
- Determine Safe Shutdown Earthquake (SSE) ground motion [10 CFR §100.23(d)]
- Determine potential for surface deformation [10 CFR §100.23(d)]
- Regulatory Guide 1.165

Dr. Clifford Munson

Regional and Site Geology

- Staff confirmed thorough description
  - Regional geologic history, structure, tectonics
  - Local site geologic characteristics
- Staff reviewed
  - Investigation for local pre-historic earthquakes
  - Conclusion of no evidence for local moderate to large earthquake

Dr. Clifford Munson

Vibratory Ground Motion

- Staff reviewed characterization of 3 major seismic zones
  - New Madrid
  - Wabash Valley
  - Central Illinois Basin
- Staff verified adequacy of controlling earthquakes
- Staff reviewed response of site soils to ground motion

Dr. Clifford Munson

Vibratory Ground Motion (cont.)

- Applicant used ASCE Standard 43-05 to determine SSE
- Staff formed advisory task group for review of ASCE Standard 43-05 performance-based approach
  - Additional six months of review
  - Detailed review of method
  - Independent confirmation of SSE

Dr. Clifford Munson

Site Subsurface Materials

- Staff visited site to observe field explorations
- Staff reviewed properties of subsurface soil and rock
- Staff verified similarity between CPS and ESP site soil properties
- Staff verified adequacy of field investigations and laboratory testing

Dr. Clifford Munson

Staff Conclusions

- Applicant provided thorough characterization of geology, seismology, soil properties
- Applicant appropriately characterized seismic sources for safe shutdown earthquake (SSE)
- ASCE Standard 43-05 provides an acceptable alternative to RG 1.165 for SSE
- ESP site is acceptable from geological and seismological standpoint
- Applicable regulations met

Dr. Clifford Munson

Clinton Early Site Permit Hearing

Site Meteorology

R. Brad Harvey
Physical Scientist
NRC Office of Nuclear Reactor Regulation

Regulations

- Climatic Site Characteristics
  - 10 CFR 100.20(c)(2)
  - 10 CFR 100.21(d)
- Atmospheric Dispersion Site Characteristics
  - 10 CFR 100.21(c)

R. Brad Harvey

Climatic
Site Characteristics

- Ambient Air Temperature and Humidity
- Basic (straight-line) Wind Speed
- Tornado
- Winter Precipitation
- Ultimate Heat Sink

R. Brad Harvey

Atmospheric Dispersion Site Characteristics

- Short-Term (Accident Release)
  - Exclusion Area Boundary
  - Low Population Zone
- Long-Term (Routine Release)
  - Site Boundary
  - Receptors of Interest

R. Brad Harvey

Site Meteorology

- Staff conclusions
  - Appropriate meteorological site characteristics are identified
  - Applicable regulations are met

R. Brad Harvey

Clinton Early Site Permit Hearing

Accident Analyses

Jay Lee

Senior Health Physicist

NRC Office of Nuclear Reactor Regulation

Regulation

- Radiological Consequence Evaluation Factors [10 CFR §50.34(a)(1)]

Jay Lee

Evaluation

- Reactor accident source terms
- Selection of design basis accidents
- Design-specific dispersion factors
- Site-specific atmospheric dispersion factors
- Radiological consequence evaluations

Jay Lee

Conclusion

- The Staff concluded that the proposed distances to the EAB and the LPZ outer boundary of the proposed ESP site are adequate to provide reasonable assurance that the radiological consequences of the DBAs would be within the dose consequence evaluation factors set forth in 10 CFR 50.34 (a)(1) for the proposed ESP site.

- Therefore, the Staff further concluded that: (1) the Applicant demonstrated the suitability of the proposed ESP site, in terms of risk to the public health and safety, and (2) the Applicant complied with the requirements in 10 CFR Part 52.17.

Jay Lee

Clinton Early Site Permit Hearing

Emergency Planning

Robert Moody
Senior Emergency Preparedness Specialist
NRC Office of Nuclear Security & Incident Response

Regulations and Guidance

- Physical characteristics
  - Evacuation Time Estimates [10 CFR 52.17(b)(1), 52.18, and Supp. 2 to NUREG-0654 and App. 4 to NUREG-0654]
  - Contacts and arrangements [10 CFR 52.17(b)(3) and Supp. 2 to NUREG-0654]
- Major features plan [10 CFR 50.47(c)(2), 10 CFR 52.17(b)(2)(i), 52.18, Supp. 2 to NUREG-0654]

Robert Moody

Major Features Plan

- The description of the emergency planning zones is acceptable.
- 13 of 14 Planning Standards were acceptable.
- The remaining Planning Standard relates to the descriptions of two emergency facilities.
  - These facilities will receive a detailed review at the COL stage.

Robert Moody

Conclusions

- The staff concluded that no significant impediments to the development of emergency plans were identified.
- 13 of 14 Planning Standards were found to be acceptable.
- The staff will review the complete and integrated emergency plans for the proposed site at the COL stage.

Robert Moody

NRC Staff Conclusions

- The staff concludes that the EGC ESP site characteristics comply with the requirements of 10 CFR Part 100, "Reactor Site Criteria," with the limitations and conditions proposed by the staff in this SER for inclusion in any ESP that might be issued.

- The staff concludes that, taking into consideration the site criteria contained in 10 CFR Part 100, a reactor(s), having characteristics that fall within the parameters for the site, and which meets the terms and conditions proposed by the staff in this SER, can be constructed and operated without undue risk to the health and safety of the public.

- The staff also concludes that issuance of the requested ESP will not be inimical to the common defense and security or to the health and safety of the public.

NUREG-1844; May 2006; page 19-1