

RAS 12563



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OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

Results of NRC Staff Environmental Review

in the Matter of

Exelon Generation Company, LLC Early Site Permit for Clinton ESP Site

U.S. Nuclear Regulatory Commission
November 7 – 9, 2006

U.S. NUCLEAR REGULATORY COMMISSION

In the Matter of Exelon Generation Co. LLC (Clinton ESP)

Docket No. 52-007-ESP Official Exhibit No. STAFF 2

OFFERED by: Applicant/Licensee Intervenor _____

NRC Staff Other _____

IDENTIFIED on 11/8/06 Witness/Panel _____

Action Taken: ADMITTED REJECTED WITHDRAWN

Reporter/Clerk _____

SECY-02



Thomas J. Kenyon
Senior Environmental Project Manager
U.S. Nuclear Regulatory Commission

Eva Eckert Hickey
Team Leader
Pacific Northwest National Laboratory



Introduction

- Discuss proposed action
- Describe the environmental review process
- Discuss the results of staff's review
- Discuss key issues
- Discuss staff's conclusions



Proposed Action

- **Proposed Federal Action**
 - Issuance of an early site permit (ESP) for the Exelon ESP site for one additional nuclear unit that has characteristics that fall within the plant parameter envelope.
- **Purpose and Need**
 - To provide stability in the licensing process by addressing safety and environmental issues before plants are built, rather than after construction is completed.



NRC Regulatory Basis

- Early Site Permit (ESP)
 - 10 CFR Part 52, Subpart A
 - Standards for review - 10 CFR 52.18

- Combined License (COL)
 - 10 CFR Part 52, Subpart C



What is an Early Site Permit?

- An NRC decision regarding whether the proposed site is suitable for construction and operation of a nuclear power plant or plants
- Site preparation and limited construction activities allowed with an approved site redress plan
- Staff performs both environmental and safety reviews



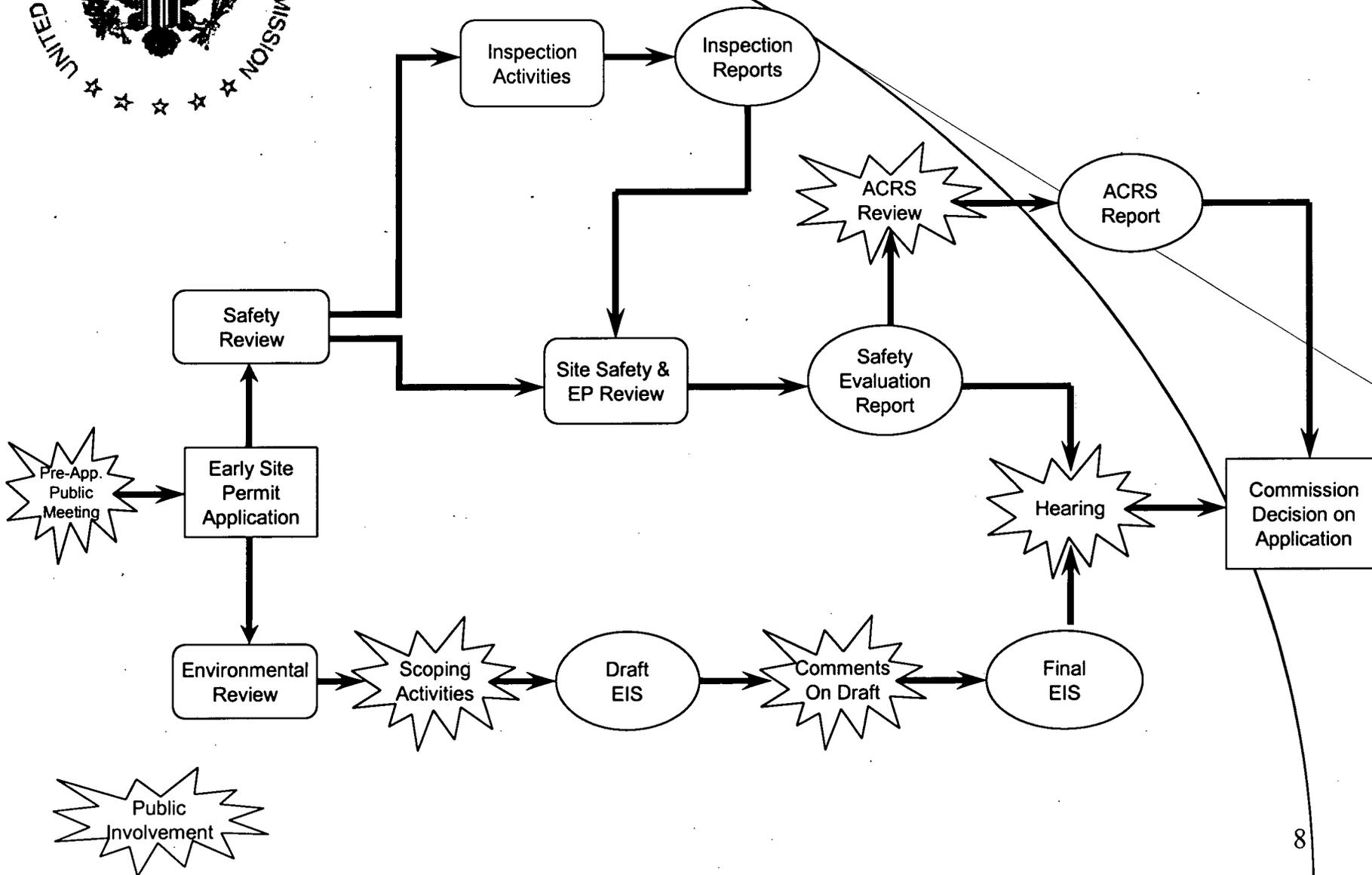
Differences in Review Approach

- Environmental Review
 - National Environmental Policy Act
 - Consider impacts to environment
 - Reasonably foreseeable impacts

- Safety Review
 - Atomic Energy Act
 - Protect health & safety of public
 - Conservative analyses



Early Site Permit Review Process





Examples of Differences

- Meteorology review
 - Typical vs. adverse dispersion conditions

- Hydrology review
 - Impacts on the environment vs. impacts on the plant

- Difference between reactor designs
 - ABWR vs. AP1000



Final Environmental Impact Statement

- FEIS addresses:
 - Results of NRC staff analysis
 - Possible mitigation measures
 - Environmental impacts of the proposed action
 - Whether an obviously superior alternative site exists
 - NRC staff's recommendation re: the proposed action



Potential Unresolved Issues in an ESP Environmental Review

- Certain issues may not be resolved at the ESP stage:
 - Regulations exclude certain issues at ESP stage
 - Need for power
 - Alternative energy sources
 - Lack of specific design information
 - Unable to reach conclusions based on assumptions provided by Exelon
- All matters required for ESP issuance sufficiently addressed.



Post-ESP Evaluation Approach

- Finality for ESP issues provided under 10 CFR 52.39
- Deferred issues will be addressed at COL or CP review stage
- COL or CP Review Process
 - Independent evaluation
 - New and significant information
 - Statements considered by Staff listed in Appendix K of FEIS will be verified

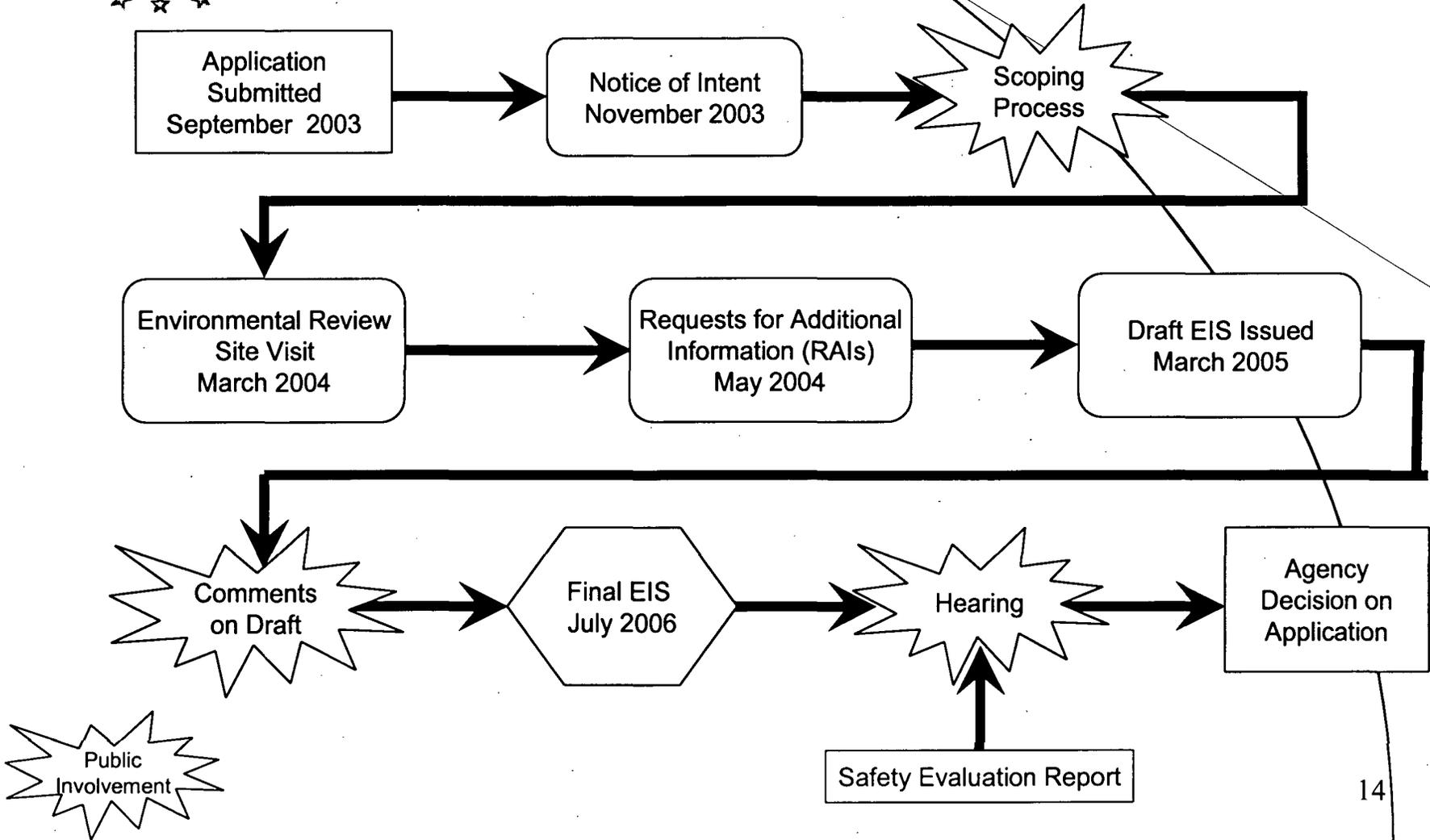


Regulatory Review Guidance

- Review Standard RS-002
Processing Applications for Early Site Permits
- NUREG-1555
Environmental Standard Review Plan
- NUREG-0800
Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants



Environmental Review Process





Eva Eckert Hickey

Staff Scientist

- PNNL Team Lead
- Technical Expertise:
 - Radiological impacts
 - Non-radiological impacts
 - Uranium fuel cycle



How Impacts are Quantified

- NRC-defined impact levels:
 - **SMALL**: *Effect is not detectable or too small to destabilize or noticeably alter any important attribute of the resource*
 - **MODERATE**: *Effect is sufficient to alter noticeably, but not destabilize, important attributes of the resource*
 - **LARGE**: *Effect is clearly noticeable and sufficient to destabilize important attributes of the resource*
- Reflects Council on Environmental Quality regulations and guidance for NEPA analyses



Exelon's Plant Parameter Envelope (PPE)

- What is a PPE?
 - A surrogate for actual design parameters used because a design has not yet been selected
 - A set of values of plant design parameters that the applicant believes bounds the design characteristics

- Which reactor types are the basis for Exelon's PPE?
 - Five light-water reactors
 - Two gas-cooled reactors

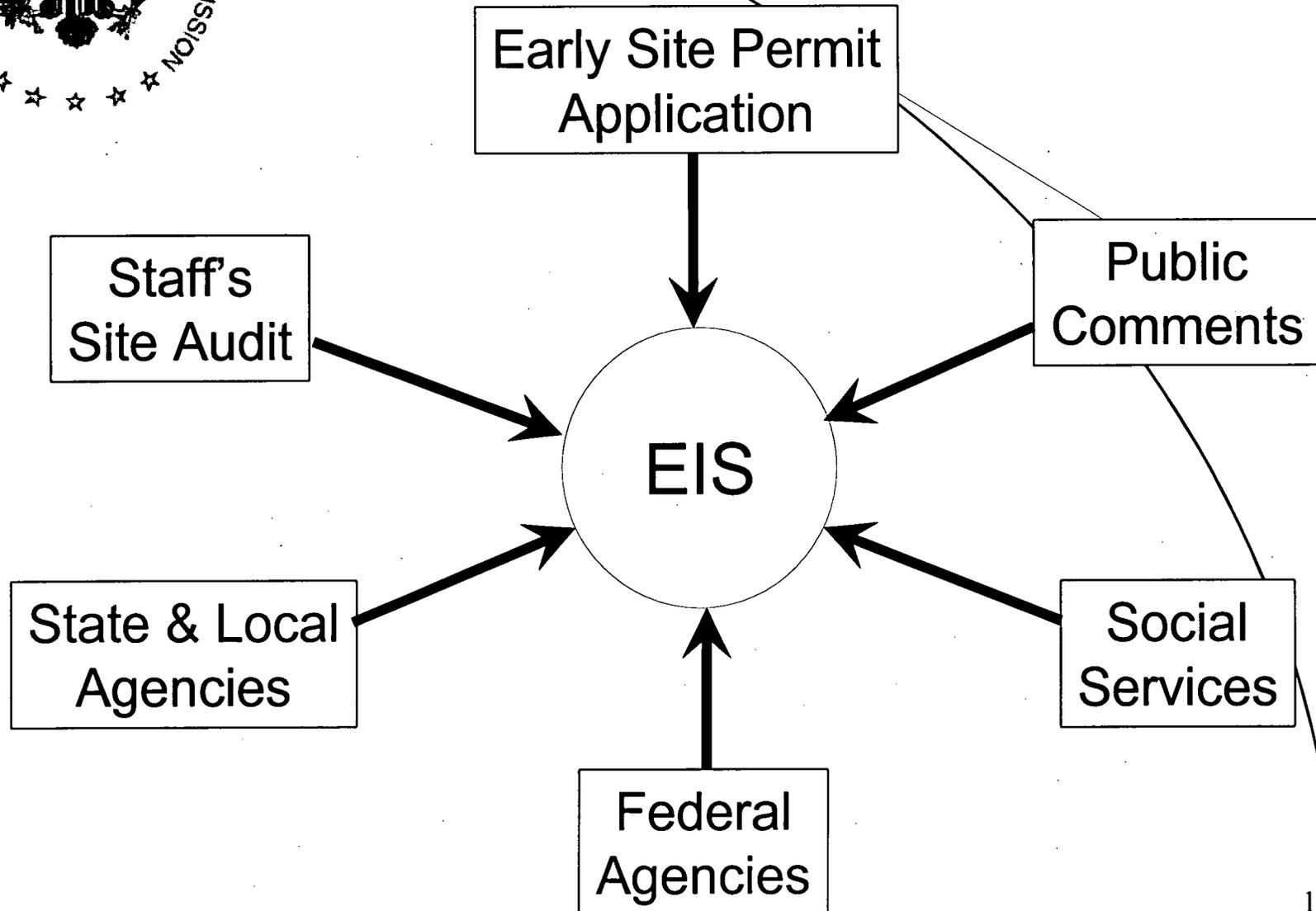


Review of PPE

- Staff did not review PPE values for “correctness”
- Staff used judgment to determine if Exelon provided sufficient detail for assessment
- Staff considered the PPE values to be bounding

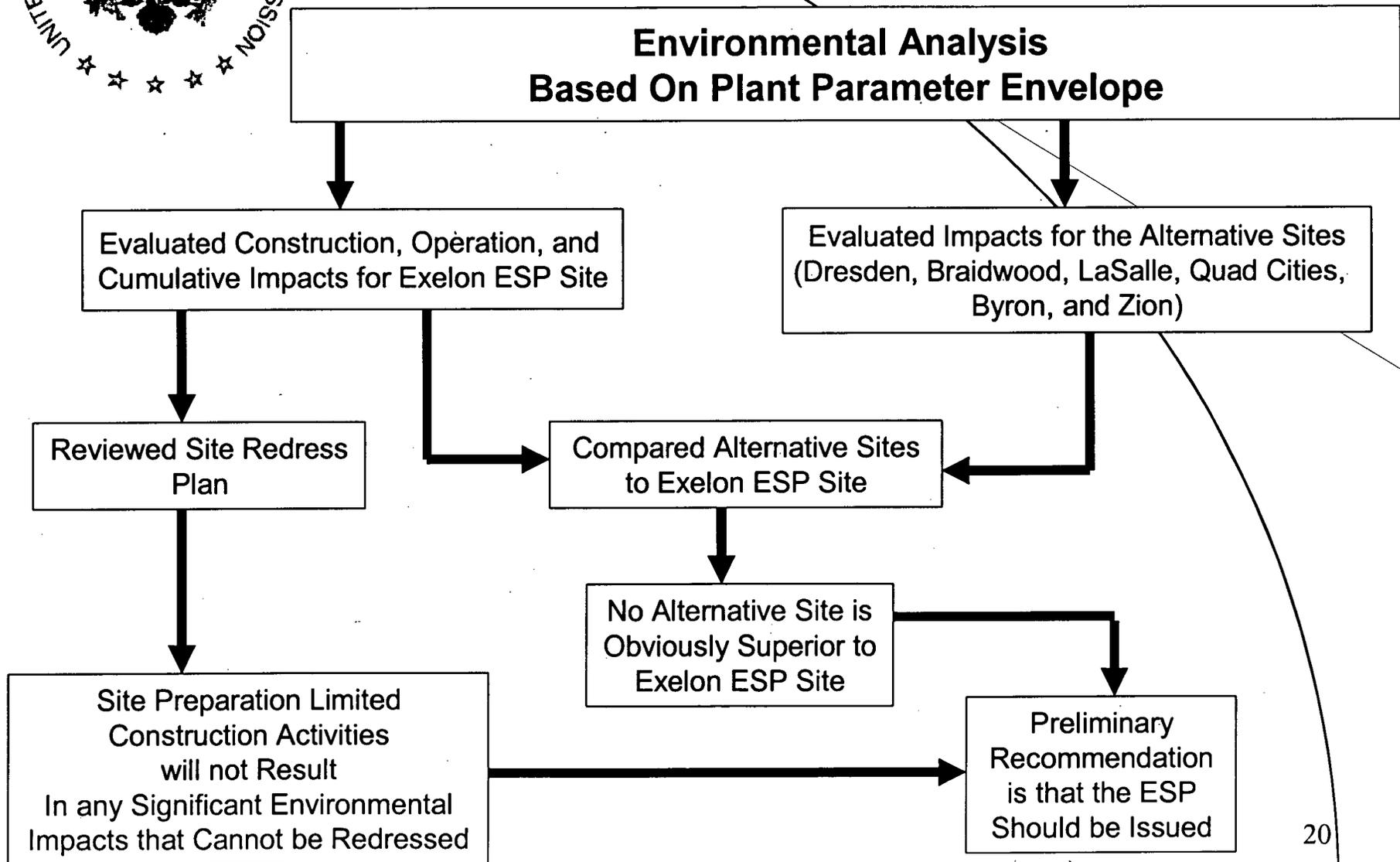


Information Gathering





Analysis Approach





Environmental Impacts of Construction and Operation

- Land Use
- Air Quality
- Water Use and Water Quality
- Terrestrial and Aquatic Resources
- Threatened or Endangered Species
- Socioeconomic Resources
- Environmental Justice
- Historic and Cultural Resources
- Human Health



Other Environmental Impacts Evaluated

- Postulated Design-Basis Accidents
- Postulated Severe Accidents
- Uranium Fuel Cycle and Solid Waste Management
- Transportation of Radioactive Materials
- Decommissioning



Assumptions

- Staff treated certain statements in ER as reliable basis for its conclusions in FEIS
- Items considered are listed in Appendix K of FEIS
 - Table K-1
 - Table K-2
 - Table K-3



Issues Considered Resolved

- Construction Impacts on:
 - Land use
 - Air quality
 - Hydrological alterations
 - Loss of onsite habitat, onsite equipment staging and borrow areas on wildlife habitat; activities on aquatic ecological resources; terrestrial and aquatic Federal listed T&E species
 - Physical impacts (socioeconomics); increases in population, regional economy, tax bases, offsite transportation routes, recreation, housing, public services, and education
 - Historic and cultural resources
 - Environmental justice
 - Radiological and non-radiological health impacts



Issues Considered Resolved

- Operational Impacts on:
 - Land Use
 - Air quality
 - Hydrological alterations
 - Terrestrial ecological impacts of operation including the heat-dissipation system, transmission lines, and right-of-way maintenance; Impacts on aquatic ecosystems; terrestrial and aquatic Federal listed T&E species
 - Physical impacts (socioeconomics); increases in population, regional economy, tax bases, offsite transportation routes, recreation, housing, public services, and education
 - Historic and cultural resources
 - Environmental justice
 - Radiological and non-radiological health impacts (except chronic EMF)



Issues Considered Resolved

- Operational Impacts on:
 - Postulated accidents for LWRs
 - Fuel cycle and transportation for LWRs
 - Cumulative impacts of construction and operation on:
 - Land use
 - Air quality
 - Water use and quality
 - Socioeconomics, historic and cultural resources, EJ
 - Radiological and non-radiological human health (except for chronic EMF)
 - Fuel cycle and transportation for LWRs



Site Redress

- The staff concluded that the potential site-preparation activities described in the site redress plan would not result in any significant adverse environmental impacts that could not be redressed.



Technical Presentations

Water Quality & Use, Hydrology

Lance W. Vail

Senior Research Engineer II

Socioeconomics and Environmental Justice

John A. Jaksch

Staff Scientist

Alternatives and Accidents

James V. Ramsdell

Staff Scientist



Lance W. Vail

Senior Research Engineer II

PNNL

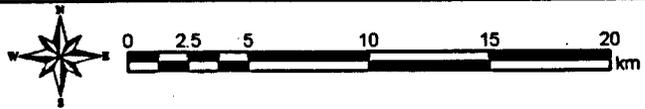
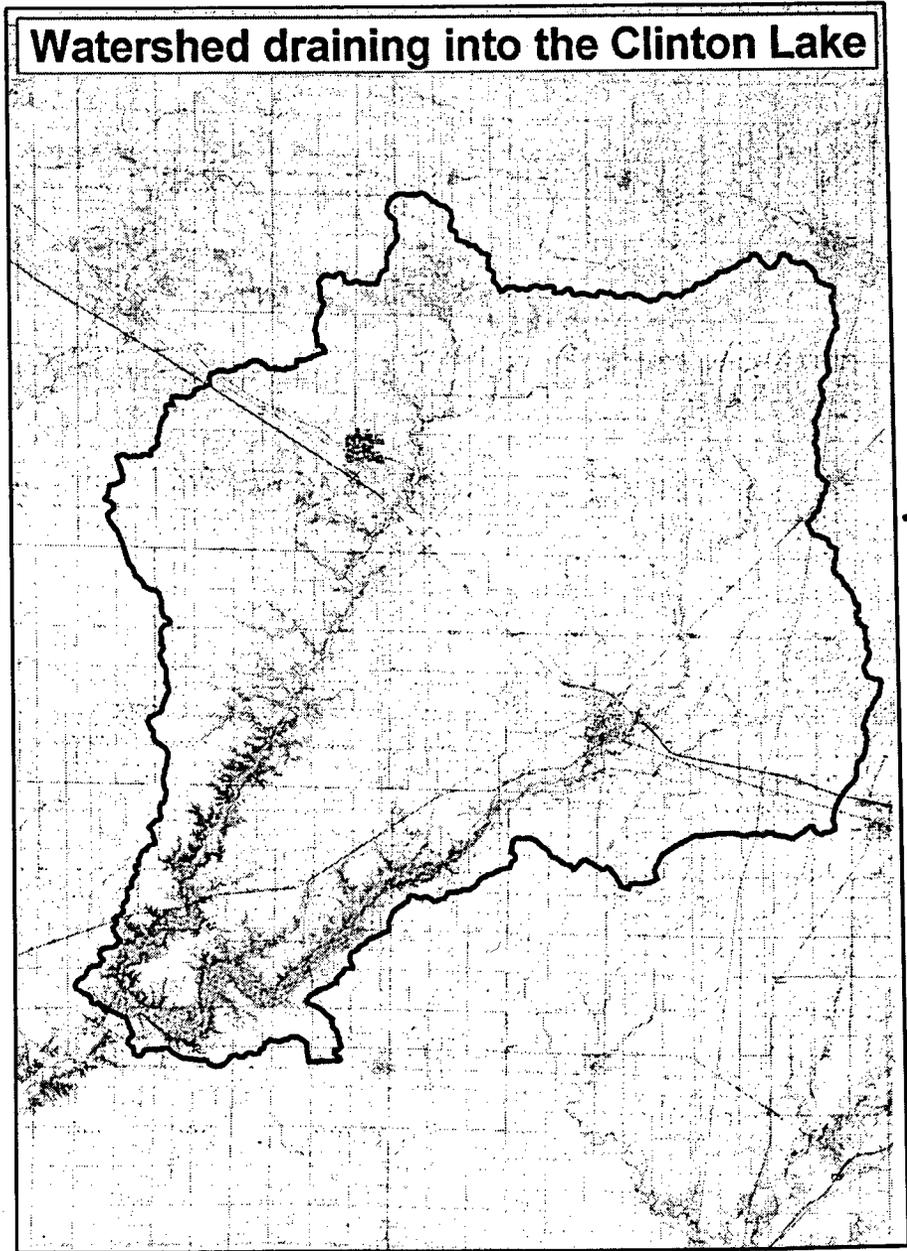
- Technical Expertise:
 - Hydrologic Engineering

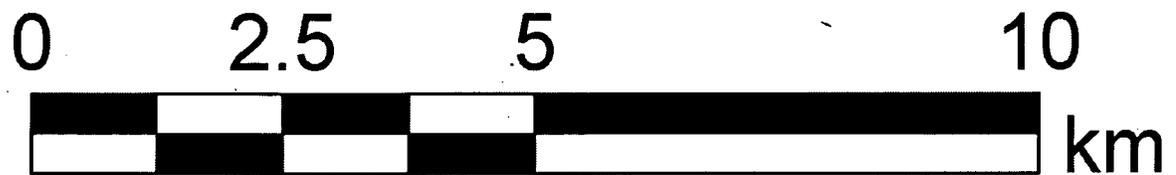
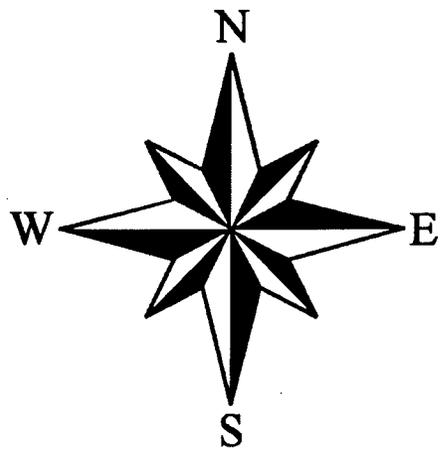
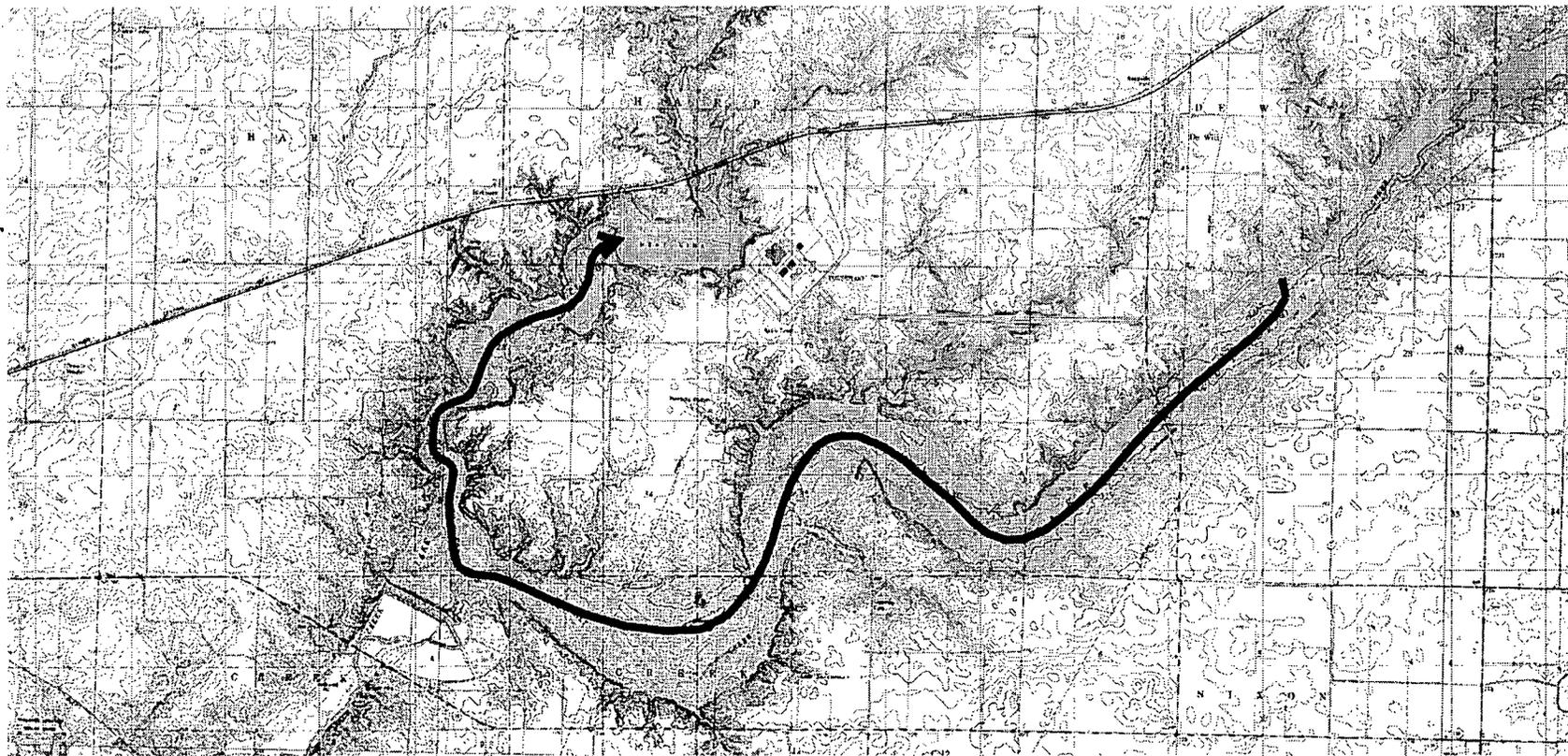
- Technical Review Areas:
 - Hydrologic Alterations
 - Water Use
 - Water Quality



Affected Environment

- Watershed
- Lake
- Downstream of dam
- Groundwater







Heat Dissipation System

- Normal Heat Sink
 - Consumptive water loss
 - Blowdown discharges
 - Alternatives
 - Once-through
 - Wet/dry hybrid
 - Dry
- Ultimate Heat Sink



Construction Impacts

- Surface Water
 - Water Use - SMALL
 - Water Quality - SMALL
- Groundwater
 - Dewatering - SMALL
- External Permit Requirements
 - Clean Water Act 401 and 404
 - NPDES Stormwater



Operational Impacts

- Surface Water
 - Water Use – SMALL/MODERATE
 - Water Quality - SMALL
- Groundwater - SMALL
- External Permit Requirements
 - NPDES
 - 401 Certification



Staff Water Budget Assessment

- Inflow
- Outflow
 - Spill
 - 5 cfs release
 - CPS induced evaporation
 - Plant evaporation
 - Incremental induced evaporation
- Results
 - Lake level
 - Downstream flow



Cumulative Impacts

- Water Use – SMALL/MODERATE
- Water Quality - SMALL



John A. Jaksch, Ph.D.

Staff Scientist

PNNL

- Technical Expertise:
 - Natural resource and environmental economics
 - Benefit-cost analyst
 - Regulatory and policy analysis

- Technical review areas:
 - Socioeconomics
 - Environmental justice



Construction Impacts (Socioeconomic Impacts)

- **Physical impacts** on roads **SMALL** to **MODERATE**
- **Economy and taxes**
 - Impacts are beneficial
 - **SMALL** impacts to most counties in the region
 - Exception is DeWitt County where the impacts could be **MODERATE**
- **Housing**
 - **SMALL** impacts -- adequate rental housing to meet demand in larger cities in the region
 - **MODERATE** impacts -- if workers decide to move to DeWitt, Piatt or Lincoln counties



Station Operation Impacts (Socioeconomic Impacts)

- **Aesthetics** – MODERATE impacts during critical low water years; mitigation may be warranted
- **Economy and taxes**
 - Economy -- beneficially MODERATE impacts to DeWitt, SMALL everywhere else
 - Taxes -- beneficially LARGE DeWitt, SMALL everywhere else
- **Recreation** – MODERATE during critical low water years and/or potential crowding; mitigation may be warranted
- **Housing** – potentially MODERATE, temporary impacts for DeWitt, Logan and Piatt counties



Cumulative Impacts

(Socioeconomic Impacts)

- Most socioeconomic impacts are **SMALL**
- Some exceptions
 - Physical impacts to roads during construction could be **MODERATE**
 - Economic and tax impacts are beneficial and range from **MODERATE** (construction and operation) to **LARGE** (operation), respectively, in DeWitt County
 - Aesthetic and recreation impacts of station operation could be **MODERATE** during critical low water years
 - Housing impacts for construction and operation could be **MODERATE** for DeWitt, Piatt, and Logan counties
- Environmental Justice impacts are **SMALL**



James V. Ramsdell, Jr.

Staff Scientist

PNNL

- Technical Expertise:
 - Atmospheric transport and dispersion

- Technical Review Areas:
 - Meteorology/Air quality
 - Noise/Electromagnetic fields
 - Accidents
 - Alternatives



Accident Analyses

- Design Basis Accidents (Realistic Assessment)
 - ABWR and AP1000 (LOCA, MSLB, Fuel handling, Small line failure)
 - Doses typically 2 orders of magnitude below criteria
- Severe Accidents (ABWR and AP1000)
 - Internally initiated events
 - Probability weighted consequences
 - Severe accident risks are below Commission safety goals
 - Severe accident risks are below current generation reactor risks
- Impact Level for Accidents is **SMALL** for Advanced LWRs



Energy Alternatives

- No-Action Alternative
- Alternatives Not Requiring New Generating Capacity
- Viable Alternatives
- Alternatives Not Considered Viable
- Combination of Alternatives
- Conclusion -- None of the energy alternatives is environmentally preferable to a new nuclear unit at the Exelon ESP Site



Alternative Sites

➤ Staff Review Process

- Guidance
- Review the Environmental Report
- Review Exelon's site selection process
- Site Visits – Braidwood, Byron, Dresden, LaSalle, Quad Cities, and Zion



Alternative Site Evaluation

- Factors Evaluated on a Site-Specific Basis
 - Land availability
 - Water
 - Ecology (transmission line construction, intakes and discharges, endangered species)
 - Socioeconomics (demography, taxes, transportation, aesthetics and recreation, housing) and Environmental Justice
- Factors Considered Generically
 - Air quality
 - Ecology – operation of cooling towers, transmission lines, aquatic except intakes and discharges
 - Socioeconomics (physical impacts, public services, education)
 - Historic and cultural resources
 - Non-radiological health impacts
 - Radiological impacts including postulated accidents



Construction Impacts

Category	Exelon ESP Site	Dresden	Braidwood	LaSalle	Quad Cities	Byron	Zion
Terrestrial Ecology	Small	Small to Large	Small	Small	Small to Large	Small	Small to Large
T & E Species	Small	Small to Large	Small	Small	Small to Large	Small	Small to Large
Infrastructure and Community	Small to Moderate	Small to Moderate	Small to Moderate	Small to Moderate	Small to Moderate	Small to Moderate	Small to Large



Operational Impacts

<u>Category</u>	Exelon ESP Site	Dresden	Braidwood	LaSalle	Quad Cities	Byron	Zion
Water Use	Small (Moderate - low water years)	Small	Small	Small	Small	Small	Small
T & E Species	Small	Small to Large	Small	Small	Small to Moderate	Small	Small to Large
Socioecon. (Physical)	Small (Moderate - low water years)	Small	Small	Small	Small	Small	Small
Infrastructure and Community	Small to Moderate	Small to Moderate	Small to Moderate	Small	Small	Small	Small



Alternative Site Conclusions

- The staff concludes that none of the alternative sites is environmentally preferable to the Exelon ESP Site.
- Because none of the alternative sites is environmentally preferable, the Staff concludes that none of the alternative sites is obviously superior to the Exelon ESP Site.



NEPA Determinations

Thomas Kenyon

- NEPA requires certain determinations be made concerning
 - Unavoidable environmental impacts
 - Irreversible and irretrievable commitment of resources
 - Short-term uses/long-term productivity
 - Cumulative impacts
 - Alternatives to proposed action



Unavoidable Environmental Impacts - ESP

- No unavoidable impacts except impacts resulting from limited site preparation and construction activities.
- Site Redress Plan will achieve an environmentally stable and aesthetically acceptable site for other uses.
- Limited site preparation and construction activities would not result in significant adverse impacts that could not be redressed.



Unavoidable Environmental Impacts – Post-ESP

- Construction
 - Land Use
 - Socioeconomic

- Operation
 - Impacts small

- Impacts could be mitigated



Irreversible and Irretrievable Commitment of Resources

- Site-preparation & construction activities
 - Similar to any major construction project
 - Depends on design

- Operation
 - Uranium



Short-Term Uses/ Long-Term Productivity

- Site-preparation activities
 - Unlikely to affect long-term productivity of the environment



Cumulative Impacts

- Small
- Could be temporary moderate impacts during construction



Conclusions About Alternatives

- While there would be differences in environmental impacts of construction and operation at the six sites, none would be sufficient to determine that any of the alternative sites is environmentally preferable to the Exelon ESP site
- The staff concludes that none of the alternative sites identified is obviously superior to the proposed Exelon ESP site.



Baseline NEPA Determinations

- NRC Staff
 - Used systematic, interdisciplinary review approach
 - Conducted activities and provided information required under section 102(2)(C) & (E) of NEPA
 - Complied with procedural requirements of 10 CFR Part 51



Recommendations

- In light of its findings and conclusions, the Staff's recommendation to the Commission related to the environmental impacts of the proposed action is that the ESP should be issued.
- Permit condition related to Federal Water Pollution Control Act, Section 401 certification process