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MEMORANDUM TO: Brent Clayton, Branch Chief */RA/*  
Environmental Technical Support Branch  
Division of Site and Environmental Reviews

FROM: Jack Cushing, Senior Project Manager  
Environmental Technical Support Branch  
Division of Site and Environmental Reviews

SUBJECT: SUPPLEMENTAL STAFF GUIDANCE FOR CUMULATIVE EFFECTS  
ANALYSIS

Enclosed is the supplemental guidance for the cumulative impact analysis for the new reactor environmental impact statements (EIS). Enclosure 1 directs the staff's cumulative impact analysis associated with the proposed project when considered in the context of other past, present, and reasonably foreseeable future actions. The scope of the section covered by this plan includes guidance on identifying the time frame of the analysis, the geographic area of interest, the baseline for the analysis, and other actions that could contribute to the cumulative impact. The guidance in this section is applicable to all resource areas. If the guidance is applicable to only one resource area it will be so identified. Enclosure 2 directs the staff's cumulative impact analysis for alternative sites.

Enclosures: As stated.

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301-415-1424

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\*See previous concurrence

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## CUMULATIVE IMPACTS OF THE PROJECT AT THE PROPOSED SITE

### REVIEW RESPONSIBILITIES

Primary—Organization responsible for the management of environmental review

Secondary—None

#### I. AREAS OF REVIEW

This guidance directs the staff's cumulative impacts analysis associated with the proposed project when considered in the context of other past present and reasonably foreseeable future actions. The scope of the section covered by this plan includes guidance on identifying the time frame of the analysis, the geographic area of interest, the baseline for the analysis and other actions that could contribute to the cumulative impact. The guidance in this section is applicable to all the resource areas. If the guidance is applicable to only one resource area it will be so identified.

In 2007, the Nuclear Regulatory Commission (NRC) amended 10 CFR 50.10 regarding limited work authorizations (LWA), to allow certain construction activities to commence before a construction permit or combined operating license is issued (72 Fed. Reg. 57416 (2007)). In particular, NRC modified the definition of "construction" to eliminate (a) preparation of a site for construction (clearing, grading, installation of environmental mitigation measures, construction of temporary roads and borrow areas), (b) excavation, (c) erection of support buildings, and (d) building of service facilities (paved roads, parking lots, railroad spurs, sewage treatment facilities, and transmission lines). The activities above, which are considered "preconstruction" activities not under NRC's jurisdiction, are evaluated as part of the cumulative impact analysis.

#### Definitions

*Baseline* is the site is as described in Chapter 2 of the EIS.

*NRC-authorized impacts* are the impacts from NRC authorized-construction activities identified in Chapter 4 and the operational impacts identified in Chapter 5 of the environmental impact statement (EIS).

*Cumulative impact* is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

The preceding cumulative impact definition appears in the regulations of the Council on Environmental Quality (CEQ) implementing the National Environmental Policy Act (NEPA) (40 CFR 1508.7). NRC regulations state that 40 CFR 1508.7 will be used by NRC in implementing NEPA [10 CFR 51.14(b)]. Specifically, cumulative impacts include those resulting from preconstruction, construction, operation, and decommissioning of the proposed nuclear power

plant, and past, present and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.

### Review Interfaces

The reviewer should obtain input from and provide input to the reviewers for the following Chapters:

- Chapter 2. Chapter 2 provides the baseline information for starting the cumulative review. Obtain baseline information from chapter 2.
- Chapters 4, 5 and 6. Obtain direct and indirect impact information, as well as impacts due to preconstruction activities that are not under NRC jurisdiction. The direct and indirect impacts of the proposed action will be considered along with other actions to determine the cumulative impacts. Impacts from preconstruction activities discussed in Chapter 4 that are not under NRC jurisdiction are considered as cumulative impacts.
- Chapter 9 and Chapter 10. Provide cumulative impact characterization of the proposed action to be considered in the alternatives and cost benefit analysis.
- Interface with Environmental Project Manager (EPM). Consult with the EPM on any cumulative impacts characterized as MODERATE or LARGE. Potential mitigation measures and their merits should be discussed for all impact levels.

### Data and Information Needs

For the purposes of this analysis, past actions are those prior to the receipt of the COL application. Present actions are those related to resources from the time of the COL application until the start of NRC-authorized construction of the proposed new units. Future actions are those that are reasonably foreseeable through building and operating the proposed nuclear power reactor(s), including decommissioning. The geographical area over which past, present and future actions could contribute to cumulative impacts is dependent on the type of resource considered.

The following sources are to be searched for information that could be relevant to cumulative effects within the geographic area obtained from the applicant's Environmental Report, Federal, State or local government agencies, and the site audit.

Information about other projects can also be obtained during the scoping meeting from members of the public. Information about other projects may also come to the attention of the reviewer from non-qualified sources such as newspaper articles. However, information from these sources needs to be verified with a qualified source such as a government agency and the verification documented in the project files. The type of data and information needed will be affected by site-specific factors, and the degree of detail should be modified according to the anticipated magnitude of the potential cumulative impacts.

The resource areas to be evaluated for cumulative impacts are generally the same as the ones evaluated in chapters 4 and 5. However, if the evaluation for a resource area in chapters 4 and

5 determined no impact to that resource from the action, then that specific resource area does not need to be evaluated for cumulative impact. For each resource area for which there is a direct or indirect impact:

- Identify the geographic area and time period to be considered in evaluating cumulative impacts.
- Develop information on the impacts of the proposed action relevant to cumulative impacts within the identified geographic area.
- Identify plans by the applicant for mitigation of adverse cumulative impacts, or modification of alternatives to avoid, minimize, or mitigate cumulative impacts.

## II. ACCEPTANCE CRITERIA

Acceptance criteria for the summary of cumulative impacts associated with the proposed activities are the following:

- 10 CFR 51.10(a) with respect to NRC policy to voluntarily take account, subject to certain conditions, of the regulations of CEQ implementing NEPA. The CEQ regulations specify that an environmental impact statement (EIS) discuss cumulative impacts [40 CFR 1508.25(c)(3)].
- 10 CFR 51.45 with respect to the need to discuss cumulative impacts in an environmental report.
- 10 CFR 51.75 with respect to the need to discuss cumulative impacts in an EIS.
- 40 CFR 1508.25 and 10 CFR 51.14(b) with respect to the scope of an EIS and consideration of the cumulative impacts of connected, cumulative, and similar actions.

Regulatory positions and specific criteria to meet the regulations identified above are as follows:

- Regulatory Guide 4.2, Rev. 2, *Preparation of Environmental Reports for Nuclear Power Stations* (NRC 1976) with respect to the inclusion in an application of an assessment of (1) cumulative and projected long-term effects from the point of view that each generation is trustee of the environment for each succeeding generation, and (2) any cumulative buildup of radionuclides in the environment.

## Technical Rationale

The technical rationale for evaluating cumulative impacts associated with the applicant's proposed activities is discussed in the following paragraph.

Evaluation of the proposed action includes identification and evaluation of potential cumulative impacts associated with plant construction and operation. This review results in a summary of the potential cumulative impacts and the staff's characterization of the impacts using the NRC's SMALL, MODERATE, LARGE terminology for each resource.

### III. REVIEW PROCEDURES

The introductory paragraph below describes the process used to perform the cumulative analysis for the proposed project and can serve as general introductory paragraph for the EIS.

The National Environmental Policy Act (NEPA) requires a Federal agency to consider the cumulative impacts of proposals under its review. Cumulative impacts may result when the environmental effects associated with the proposed action are overlaid or added to temporary or permanent effects associated with past, present and reasonably foreseeable future projects. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time. When evaluating the potential impacts of [insert proposed units and name of site] proposed by [insert name of applicant] in its application for a combined license(s) (COL(s)) [reference application], the U.S. Nuclear Regulatory Commission (NRC) staff [and identify any cooperating agencies, e.g., U.S. Army Corps of Engineers (USACE) staff, if no cooperating agencies then leave out any discussion of cooperating agencies] considered potential cumulative impacts on resources that could be affected by the construction, preconstruction, and operation of [identify size, type, and number of reactors] at the [XXX] site. Cumulative impacts result when the effects of an action are added to or interact with other past, present, and reasonably foreseeable future effects on the same resources. For the purposes of this analysis, past actions are those prior to the receipt of the COL application. Present actions are those related to resources from the time of the COL application until the start of NRC-authorized construction of the proposed new units. Future actions are those that are reasonably foreseeable through building and operating proposed [insert name of proposed unit(s)] including decommissioning. The geographical area over which past, present and future actions could contribute to cumulative impacts is dependent on the type of resource considered and is described below for each resource area. The [use "review team" if a cooperating agency is involved. Use "staff" if no cooperating agency is involved] considered, among other things, cumulative effects of proposed [insert name of unit(s)] with current

operations at [if co-located with existing power plant identify that plant].

The approach for this environmental impact statement (EIS) is outlined in the following discussion. To guide its assessment of environmental impacts of a proposed action or alternative actions, the NRC has established a standard of significance for impacts based on guidance developed by the Council on Environmental Quality (CEQ) (40 CFR 1508.27). The three significance levels established by the NRC – SMALL, MODERATE, or LARGE – are defined as follows:

SMALL – Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.

MODERATE – Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

LARGE – Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

The impacts of the proposed action, as described in Chapters 4 and 5, are combined with other past, present, and reasonably foreseeable future actions in the vicinity of [insert name of proposed site] that would affect the same resources impacted by proposed [insert name of proposed unit(s)], regardless of what agency (Federal or non-Federal) or person undertakes such actions. These combined impacts are defined by CEQ as “cumulative” in Title 40 of the Code of Federal Regulations (CFR) 1508.7 and include individually minor but collectively significant actions taking place over a period of time. It is possible that an impact that may be SMALL by itself could result in a MODERATE or LARGE cumulative impact when considered in combination with the impacts of other actions on the affected resource. Likewise, if a resource is regionally declining or imperiled, even a SMALL individual impact could be important if it contributes to or accelerates the overall resource decline.

The description of the affected environment in Chapter 2 serves as the baseline for the cumulative impacts analysis, including the effects of past and ongoing present actions. The incremental impacts related to the construction activities requiring NRC authorization (10 CFR 50.10(a)) are described and characterized in Chapter 4 and those related to operations are described in Chapter 5. These impacts are summarized for each resource area in the sections that follow. The level of detail is commensurate with the significance of the impact for each resource area.

The specific resources that could be affected by the incremental effects of the proposed action and other actions in the same geographical area were assessed. This assessment includes the impacts of construction and operation of the proposed new units as described in Chapters 4 and 5; impacts of fuel

cycle, transportation, and decommissioning as described in Chapter 6; and impacts from past, present, and reasonably foreseeable Federal, non-Federal, and private actions that could affect the same resources affected by the proposed actions.

The NRC staff visited the [insert name of site] from [insert dates]. The staff then used the information provided in the Environmental Report, RAI responses, information from other Federal and State agencies, and information gathered during the visits to the [insert name of site] to evaluate the cumulative impacts of building and operating two new nuclear power plants at the site. To inform the cumulative analysis, the staff researched Environmental Protection Agency (EPA) databases for recent EISs within the State, used an EPA database for permits for water discharges in the geographic area to identify water use projects, and used the [insert any government databases used to identify future projects e.g., www.recovery.gov website to identify projects in the geographic area funded by the American Recovery and Reinvestment Act of 2009 (Public Law 111-5)]. Other actions and projects that were identified during this review and considered in the NRC staff’s independent analysis of the potential cumulative effectiveness are described in Table [x]. [This is the end of the model language for the introductory paragraph.]

Steps to perform the resource specific analysis

The resources to be evaluated for cumulative impacts are the same ones evaluated in chapter’s 4, 5, and 6 and listed in Table 1 below. A table similar to Table 1 should be used to summarize the impacts at the end of the cumulative chapter in the EIS for the proposed site. The specific subcategories in each resource area will depend upon the importance of these subcategories in defining the cumulative impacts of the proposed action, and may be different between projects.

**Table 1 Cumulative Impact** on Environmental Resources, Including the Impacts of Proposed Unit(s)

Resource Category	Impact level
<b>Land-Use</b>	
<b>Water-Related</b>	
Surface Water Use	
Groundwater Use	
Surface Water Quality	
Groundwater Quality	
<b>Ecology</b>	
Terrestrial Ecosystems	
Aquatic Ecosystems	
<b>Socioeconomic</b>	



Physical Impacts  
Demography  
Economic Impacts on the Community  
Infrastructure and Community Services  
Aesthetics and Recreation

**Environmental Justice**

**Historic and Cultural Resources**

**Air Quality**

**Nonradiological Health**

**Radiological Health**

**Severe Accidents**

**Fuel Cycle, Transportation, and Decommissioning**

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The reviewer's analysis should identify and evaluate the potentially adverse cumulative impacts associated with the proposed plant. Each cumulative impact is to be discussed in proportion to the significance of the impact attributed to the proposed plant. The reviewer should take the following steps:

- 1) At the beginning of each resource section (or subsection as needed), the reviewer summarizes the NRC increment as discussed in Chapters 4 and 5. Use the following words:

The description of the affected environment in Chapter 2 serves as the baseline for the cumulative impact assessments in this resource area. As described in Section [4.X], the impacts of NRC-authorized construction activities on [resource area] would be [SMALL, MODERATE or LARGE], [and state whether or not further mitigation would be warranted]. As described in Section 5.1, the NRC staff concludes that the impacts of operations on [resource area] would also be [SMALL, MODERATE or LARGE] and [state whether or not further mitigation would be warranted]. The combined impacts from construction and preconstruction were described in Section 4.X.X and determined to be [SMALL, MODERATE or LARGE]. In addition to the impacts from construction, preconstruction, and operations, the cumulative analysis also considers other past, present, and reasonably foreseeable actions that could affect [insert name of resource].

- 2) Identify the geographic area to be considered in evaluating cumulative impacts for each resource and ecological component. For each resource area the reviewer needs to define the geographical area of interest analyzed for this resource and provide a brief explanation of how and why the area of interest was selected (e.g., 50-mile radius around site with special consideration for the affected counties for socioeconomics; all major watersheds/water bodies affected by this action for aquatic resources). Each resource area will be different, as resources have different impact areas. The geographic boundaries used in evaluating cumulative impacts for a resource should be the same as the one used in

chapters 4 and 5. The reviewer needs to use their professional judgment to set the geographic area of interest. It is likely to be different for different resources and sites.

- a) CEQ guidance recommends applying natural ecological or socio-cultural boundaries (CEQ 1997). Possible geographic areas that could be used to determine the appropriate geographic area for a cumulative impact analysis are in Table 2-2 of the CEQ Guidance. EPA guidance recommends that the scope include geographical areas that sustain the resources of concern, but not be extended to the point of becoming unwieldy (EPA 1999).
  - b) Geographical proximity to the proposed action should be considered but is not a decisive factor for including other actions. Jurisdictional borders are sometimes useful in defining the geographical area of interest for resource areas such as land use and some socioeconomic areas, however, this approach may not be applicable for defining the geographical area for ecological resources such as aquatic ecology.
- 3) The time frame for analyzing cumulative impacts to the resources are defined as follows:

Past time frame is prior to the receipt of the COL application.

Present time frame is from the time of the COL application until the start of NRC-authorized construction of the proposed new unit(s).

Future time frame is from the start of NRC-authorized construction of the proposed new units through building and operating of the proposed new unit(s) including decommissioning.

- a) The past time frame is the point in time prior to the receipt of the COL application. This could include the time at which a certain land-use was established, or an even more historical baseline that represents the pre-disturbance conditions. Defining a historical baseline can be complicated considering the variability of natural cycles in ecosystems. The rate of human-induced change in the ecosystem can be used to judge a perceived change from a historical baseline. The availability of data often determines how far back and to what extent past effects are examined. Certain types of data may be available for extensive periods in the past while other data may be available only for shorter periods of time. Due to lack of data, the analysis of past effects is usually qualitative (CEQ 1997). In many cases, discussion of the past actions may entail a brief paragraph telling the story of how the resource has evolved to its current condition.

Example - Historically, the site and vicinity was a combination of wetlands, forests, and agricultural lands. Agriculture was the dominant land use in the region since the 1890s. Residential development in [Name of City or Cities] began in the early 1900s, and increased steadily in [YEAR] when the [NAME] Company built the [NAME] Energy Complex in [NAME OF CITY, STATE]. The general trend over the past few decades has

been an increase in residential areas, roads, utilities, and businesses and a decrease in wetlands, forests, and agricultural lands

- b) The present time frame is the shortest time frame and should capture any ongoing actions listed in Table 1. Many of the resource areas measure the environment as it currently exists. These measurements capture the cumulative impact to the resource from the past and present projects and should be part of the baseline for the resource in chapter 2.
  - c) The future time frame captures the reasonably foreseeable future actions. The reasonably foreseeable future actions include those future actions listed in Table 2. The reviewer then needs to add the impact from the proposed project and any other actions that could have an impact on the resource to arrive at a cumulative analysis.
- 4) Identify past, present, and known future Federal, non-Federal, and private actions that could have meaningful cumulative impacts with the proposed action. The following sources are to be searched for information that could be relevant to cumulative effects within the geographic area identified:
- a) the applicant's Environmental Report
  - b) EISs from the U.S. EPA's NEPA website describing direct, indirect, and cumulative effects within the geographic area (NEPAssist)
  - c) Government websites identifying potential future actions such as [www.recovery.gov](http://www.recovery.gov)
  - d) State department of transportation and environmental protection websites
  - e) Information provided by the applicant, other government agencies, Site audits at the proposed and alternative sites
  - f) Local and County land use development planning documents

Future cumulative impacts should be reasonably foreseeable during the time-frame of construction, operation, and decommissioning of the proposed plant. When considering future actions, the following may fall under the definition of reasonably foreseeable:

- (1) Actions unrelated to the project but which have been approved by the proper authorities, have submitted license/permit applications, or which may not require approval of a regulating agency, but for which procurement contracts have been signed.
- (2) Actions conditioned upon approval of the project under review.

Actions that are *not* reasonably foreseeable are those that are based on mere speculation or conjecture, or those that have only been discussed on a conceptual basis. Future actions that do not fall under the definition of reasonably foreseeable, but could potentially take place as indicated by trending in the vicinity or less formal communications, may be addressed in a general manner. The reviewer should acknowledge that various industrial, commercial, recreational, or residential developments are likely to occur in the area, but absent of specific

proposals to a government agency, or evidence of a signed procurement contract, the impacts of such actions should not be included in the EIS.

If the proposed plant is located on the site of one or more existing unit(s), consider the combined impacts of the new plant construction on existing plant operations, and combined impacts when both plants are operating. If the plants have cooling towers that will be in close proximity to each other and will operate simultaneously, it is appropriate to consider the cumulative effects of all the cooling towers.

The level of detail available for each action will vary, but some of the following information may be helpful in adequately analyzing the cumulative effects: location, size, facilities and supporting infrastructure, environmental releases, lifetime of the action, workforce (temporary and permanent), frequency of use, transportation routes, approvals/permits required. Other information sources for identifying other actions include site visits, land use maps and aerial photos, interviews as needed with the appropriate permitting agency, residents, businesses, development plants, and other environmental assessments or environmental impact statements.

Following the above guidance the person assigned will develop a table listing the significant projects that could contribute to the cumulative impact. See the example below:

**Table 2** Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Analysis

Project Name	Summary of Project	Location	Status
<b>Energy Projects</b>			
[identify projects other than the proposed project] XXX Unit 1	[provide short summary of project] XXX Unit 1 consists of one XXX-MW(e) nuclear power generating plant.	[describe location in relation to proposed project]  <1 mi north of proposed site	[provide status] <sup>(a)</sup>  XXX Unit 1 is currently operational and is licensed to continue operations through XXXX
Hydroelectric Station	14-MW(e) hydroelectric plant		Operational <sup>(d)</sup>
XXX Natural gas Plant	71-MW(e) natural gas electric generating plant	about 2 mi south of proposed project	Operational
XXX Coal Plant	460 MWe Coal Plant	About 7 mi south of the proposed plant on XX River	Operational
XX Nuclear Station	Two pressurized water reactors	About 52 mi north	Proposed new nuclear plant. Operation would begin in 2021
Transmission Lines	Various transmission lines currently exist throughout region	Throughout region	Currently existing as well as the potential for additional transmission

Project Name	Summary of Project	Location	Status
	and installation of additional lines would occur if new nuclear plants or other large energy projects are built.		lines to be built
<b>Mining Projects</b>			
XXX Quarry	Products include asphalt aggregate, base material, concrete, and aggregate.	10 mi north of proposed project	Operational
<b>Transportation Projects</b>			
Strategic Corridor System Plan	Strategic system of corridors forming the backbone of the state's transportation system.	State Wide	Planning document with no explicit schedules for projects, however, many strategic corridors coincide with routes which would/could be used for development at the proposed site.
<b>Parks and Aquaculture Facilities</b>			
XXXX Park	7500-acre park	5 mi south of proposed project	Existing park managed by the Department of Natural Resources
Planned Wildlife Management Area	4400-acre wildlife management area	Adjacent to proposed project	Planned development of wildlife management area to be completed by XXX date.
<b>Other Actions/Projects</b>			
City of XXXX	Municipal water withdrawals from the Broad River	About 26 mi southeast	Ongoing
Various hospitals and industrial facilities that use radioactive materials	Medical isotopes	Within 50 mi	Operational in [list counties]
XXX Chemical Plant	Industrial Inorganic Chemicals	About 23 mi north of the propose project on the XXX River	Currently operational
Wastewater Treatment Facility (WWTF)	WWTF currently maintains a non-major National Pollutant Discharge Elimination System (NPDES) permit.	About 12 mi west of propose project	Currently operational

- (a) Source:  
(b) Source:

The above table is only an example. The categories of projects may not occur at all sites and therefore the reviewer is to develop a table of projects that are specific to each site. Some of the projects listed within the table may not be relevant to all resource areas. For example, an aquaculture facility located near the proposed nuclear plant under review may have overlapping impacts with the nuclear facility for aquatic resources, but the two projects would not have

overlapping impacts for air quality, and therefore, would not be appropriate to discuss in the air quality cumulative impact analysis.

Therefore, please refer to the table (i.e. cross-reference the table) in order to reduce repetition. If the reviewer is aware of other projects in the area that should be included in the introductory table of other projects, please inform your team lead and EPM.

- 5) Identify and evaluate the significance and magnitude of cumulative impacts associated with the proposed plant.
  - a) Reviewers should focus on cumulative impact information that is relevant to reasonably foreseeable significant adverse impacts, is essential to a reasoned choice among alternatives, and can be obtained without exorbitant cost (CEQ 2005). Cumulative effects may result from the accumulation of similar effects or the synergistic interaction of different effects (CEQ 1997).
  - b) Reviewers should consider if the proposed action will affect the potential for each resource to sustain itself, taking into account how conditions have changed over time and how they are likely to change in the future.
  - c) When discussing the impacts from the proposed project, summarize in a sentence or two and refer back to Chapters 4 or 5. Describe the impacts but do not use the terms SMALL, MODERATE or LARGE since this information is already provided in the first two paragraphs of each resource-specific analysis. Impact information on the proposed project is presented here so that the reader can easily follow the logic as the impacts from the proposed project are added to the impacts from other projects.

For the discussion of other proposed projects or actions, provide quantitative or qualitative information on the type and magnitude of impact. If quantitative information is not available from other EISs or permit information or other sources, qualitative information can be used. For example, in the air quality analysis, if the permitted levels of emissions from various sources are unknown, the analysis could state that major sources are operating within regulated permits and that the county is in attainment, indicating that the total level of regulated pollutants within the county are within national ambient air quality standards set by EPA. Be sure that the text describing the other projects provides a logical basis for the cumulative conclusion. For some resource areas, other past, and present, projects have been incorporated in the baseline in chapter 2 or in the analysis in Chapters 4 and 5. For example, in water use, the measured value of water flow in the river used as the cooling source would already include the consumptive water use of the upstream users. Another example is in socioeconomics, an economic model of the area may have been used in chapters 4 and 5 that would have included the proposed project along with the economy of the local region. In this situation, ensure that the analysis in Chapter 7 clearly explains how the analysis in Chapters 4 and 5 considered impacts from other projects. As appropriate, include any additional discussion of cumulative impacts that were not described in Chapters 4 and 5.

(d) For each resource area, determine whether the cumulative effect of the proposed action, when overlaid or added to temporary or permanent effects associated with past, present, or reasonably foreseeable future projects, is SMALL, MODERATE, or LARGE.

- 6) Identify any plans by the applicant for mitigation of adverse cumulative impacts, or modification of alternatives to avoid, minimize, or mitigate cumulative impacts. The reviewer should discuss mitigation that may be required by local, state, and federal authorities, including information regarding restoration actions by separate entities, required mitigation of other projects, or voluntary mitigation and enhancement by the entity taking an action.

#### IV. EVALUATION FINDINGS

Wording of the conclusion in the section will depend on whether the impacts are SMALL or MODERATE or LARGE. Use words below:

If impact is SMALL – Provide the reason for the conclusion, then state, “As a result, cumulative impacts of [resource area] would be SMALL, and no further mitigation beyond that described in Chapters 4 and 5 would be warranted.”

If impact is MODERATE or LARGE - Summarize why the basis for the conclusion (the full explanation should be provided in the preceding analysis). For example, the principal contributor to the MODERATE or LARGE rating could be due to the proposed project (construction, preconstruction, or operations), the current conditions (i.e., the current degraded state of the resource), or other current and/or reasonably foreseeable projects. In the next paragraph, state the NRC-incremental impact and provide a discussion as to whether the NRC-authorized activity is a significant contributor to MODERATE or LARGE impact. Sufficient information should be provided to show whether the NRC-authorized activity caused the cumulative impact to go from SMALL to MODERATE or MODERATE to LARGE. For example if the NRC-authorized increment is SMALL, but the impacts from preconstruction, the existing condition, or other projects are the principal contributors to the MODERATE rating, state this. Another possibility could be that there are several projects (including the proposed project) that are all individually minor, but when considered together result in a MODERATE or LARGE impact (e.g. there is not one project that is the principal contributor). For other than a SMALL impact, discuss if, and to what, extent the NRC authorized impact contributes to the other than SMALL impact.

#### V. IMPLEMENTATION

The method described in this guidance should be used by the staff in evaluating conformance with NRC requirements, except in those cases in which the applicant proposes an acceptable alternative for complying with specified portions of the requirements.

#### VI. REFERENCES

10 CFR 51.70, “Draft environmental impact statement – general.”

10 CFR 51.10, "Purpose and scope of subpart; application of regulations of Council on Environmental Quality."

10 CFR 51.14, "Definitions."

10 CFR 51.45, "Environmental report."

10 CFR 51.75, "Draft environmental impact statement-construction permit, early site permit, or combined license."

40 CFR 1508, "Terminology and Index."

U.S. Nuclear Regulatory Commission (NRC). 1976. *Preparation of Environmental Reports for Nuclear Power Stations*. Regulatory Guide 4.2, Rev. 2, Washington, D.C.

Council on Environmental Quality (CEQ). 1997. *Considering Cumulative Effects under the National Environmental Policy Act*.

Council on Environmental Quality (CEQ). 2005. Memorandum from James L. Connaughton, Chairman CEQ, to Heads of Federal Agencies regarding "Guidance on the Consideration of Past Actions in Cumulative Effects Analysis."

Environmental Protection Agency (EPA) 1999. Consideration of Cumulative Impacts in EPA Review of NEPA Documents. EPA Publication 315-R-99-002

Environmental Protection Agency (EPA). 2008. *§309 Reviewers Guidance for New Nuclear Power Plant Environmental Impact Statements*. EPA Publication 315-X-08-001

Duke Energy Corp. (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Units 1 and 2), CLI-02-14, (2001).

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## CUMULATIVE IMPACTS OF THE PROJECT AT ALTERNATIVE SITES

### REVIEW RESPONSIBILITIES

Primary—Organization responsible for the management of environmental review

Secondary—None

#### I. AREAS OF REVIEW

This guidance directs the staff's the cumulative impacts analysis associated with the proposed project and other past, present, and reasonably foreseeable future actions. The scope of the section covered by this plan includes guidance on identifying the time frame of the analysis, the geographic area of interest, the baseline for the analysis and other actions that could contribute to the cumulative impact at alternative sites. The guidance in this section is applicable to all the resource areas. If the guidance is applicable to only one resource area it will be so identified. The methodology for performing cumulative analysis at alternative sites is generally the same as performing the analysis at the proposed site. The difference is the proposed site has the baseline analyzed in chapter 2, the construction impacts analyzed in Chapter 4, and the operations impacts analyzed in chapter 5, and for alternative sites the complete site analysis is done in Chapter 9 of the environmental impact statement (EIS). The same resource areas are evaluated for alternative site as the proposed site with the exception of nuclear fuel cycle and decommissioning). The impacts described in Chapter 6 of this EIS (e.g., nuclear fuel cycle; decommissioning) would not vary significantly from one site to another given the following assumptions:

- Alternative sites and the proposed site are in low-population areas,
- The same reactor design (therefore, the same fuel cycle technology, transportation methods, and decommissioning methods) is used for all of the sites.

As such, these impacts would not differ between the sites and would not be useful in the determination of whether an alternative site is environmentally preferable to the proposed site. For this reason, these impacts are not discussed in the evaluation of the alternative sites.

The alternatives sites are evaluated using reconnaissance-level information.

Reconnaissance-level information is information that is available from the applicant, governmental, Tribal, commercial, and/or public sources, when reviewing alternative sites.<sup>a</sup> Reconnaissance-level information does not normally require the collection of new data or field studies. Reconnaissance-level information does not normally require the collection of new data or field studies.

The NRC's regulation, implementing the National Environmental Policy Act (NEPA), requires that the applicant submit an environmental report (10 CFR 51.45). Specifically, 10 CFR 51.45(b)(3) requires the ER to include a discussion of alternatives sufficiently complete to aid

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<sup>a</sup> ESRP section 9.3 specifies the sources of information.

the Commission in developing and exploring, pursuant to Section 102(2)(E) of NEPA appropriate alternatives to recommended course of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources.

The NRC has determined that reconnaissance-level information as described in Regulatory Guide (RG) 4.2, Preparation of Environmental Reports for Nuclear Power Stations and NUREG-1555 is adequate for analyzing alternative sites. Reconnaissance-level information is not the same level of detail that is required for the proposed site. The reason for the different level of information needed for alternative sites is that for the alternative sites, the staff needs only the level of information relevant to reasonably foreseeable significant impacts essential to a reasoned choice among alternatives. The “reasoned choice” is whether or not an alternative site is environmentally preferable or obviously superior to the proposed site.

The amount of reconnaissance-level information available will vary on each project and by resource area within each project. The amount and detail of reconnaissance-level information increases at each stage of the site selection process from identifying candidate areas, to candidate sites, to alternative sites. In all cases the amount of information must be sufficient based on the expert judgment of the reviewer to make the required determination for each step.

Among the alternative sites there will be varying amounts of information available. The reviewer does not need all sites to have the same level of information. Rather, the reviewer needs the alternative sites to have sufficient information to determine if an alternative site is environmentally preferable to the proposed site.

From the guidance in RG 4.2, quoted below it is clear that reconnaissance-level information is not the same level of detail that is required for the proposed site.

RG 4.2 states:

The applicant is not expected to conduct detailed environmental studies at alternative sites; only preliminary reconnaissance-type investigations need be conducted. Neither is it expected that detailed engineering design studies will be made for all alternative plants or that detailed transmission route studies will be made for all alternatives<sup>b</sup>.

The reviewer should determine that environmental descriptions for the alternative sites are adequate to assess environmental impacts of plant construction and operation, and that the basic sources of information described in Section 9.3 of the ESRP have been used to provide these data. The reviewer should determine if all sources of information reasonably available to the reviewer and providing useful environmental description data

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<sup>b</sup> While detailed engineering studies are not required for alternative sites, sufficient information is needed about the site layout for the staff to make a reasoned choice among the alternatives. For example, a general plant layout on the site in relation to any wetlands and showing the location of cooling water intake and discharges.

were used. The reviewer should determine whether the reconnaissance-level information used throughout the site-selection process was complete enough and of sufficient depth commensurate with the level of screening to support the decisions that were made. If the information needed is not available then the reviewer should develop a request for additional information (RAI).

Cooperating Agencies may have a need for a greater level of detail for alternative sites, especially in the area for which they have regulatory responsibility. The project manager should coordinate with a cooperating agency and the applicant to ensure that a sufficient level of detail is provided to serve the needs of both agencies.

### Data and Information Needs

The data sources and information needs will be similar to the proposed site, only using reconnaissance level information.

## II. ACCEPTANCE CRITERIA

Acceptance criteria for the summary of cumulative impacts associated with the proposed activities are the following:

- 10 CFR 51.10(a) with respect to NRC policy to voluntarily take account, subject to certain conditions, of the regulations of CEQ implementing NEPA. The CEQ regulations specify that an environmental impact statement (EIS) discuss cumulative impacts [40 CFR 1508.25(c)(3)].
- 10 CFR 51.45 with respect to the need to discuss cumulative impacts in an environmental report.
- 10 CFR 51.75 with respect to the need to discuss cumulative impacts in an EIS.
- 40 CFR 1508.25 and 10 CFR 51.14(b) with respect to the scope of an EIS and consideration of the cumulative impacts of connected, cumulative, and similar actions.

Regulatory positions and specific criteria to meet the regulations identified above are as follows:

Regulatory Guide 4.2, Rev. 2, *Preparation of Environmental Reports for Nuclear Power Stations* (NRC 1976) with respect to the inclusion in an application of an assessment of (1) cumulative and projected long-term effects from the point of view that each generation is trustee of the environment for each succeeding generation, and (2) any cumulative buildup of radionuclides in the environment.

### Technical Rationale

The technical rationale for evaluating cumulative impacts associated with the applicant's proposed activities is discussed in the following paragraph:

Evaluation of the proposed action includes identification and evaluation of potential cumulative impacts associated with plant construction and operation. This review results in a summary of the potential cumulative impacts and the staff's characterization of the impacts using the NRC's SMALL, MODERATE, LARGE terminology for each resource

### III. REVIEW PROCEDURES

The introductory paragraph below describes the process used to perform the cumulative analysis for the proposed project at the alternative site and can serve as general introductory paragraph for the EIS.

On [XXX Date] [the staff or the review team as appropriate] visited the [insert number of alternative sites] alternative sites and collected and analyzed reconnaissance-level information for each of the alternative sites (NRC XXX) [insert reference to site visit report]. The [the staff or the review team as appropriate] then used the information provided in the environmental report, RAI responses, and information from other Federal and State agencies, and information gathered during the site visits to each alternative site to evaluate the cumulative impacts of building and operating a new nuclear power plant at those sites. The analysis therefore includes the impacts of NRC-authorized construction and operation as well as potential impacts associated with other actions affecting the same resources. Cumulative impacts occur when the effects of an action are added to or interact with other effects in a particular place and within a particular time; as a result, the cumulative impact assessment entails a more extensive and broader review of possible effects of the action beyond the site boundary.

The cumulative analysis for the impacts at the alternative sites was performed in the same manner as discussed in Chapter 7 of the EIS for the proposed site except, as specified in ESRP 9.3 (NRC 2000), the analysis was conducted at the reconnaissance level for the alternative sites. To inform the cumulative analysis, the [the staff or the review team as appropriate] researched EPA databases for recent EISs within the State; used an EPA database for permits for water discharges in the geographic area to identify water-use projects; and used [insert any government databases used to identify future projects e.g., [www.recovery.gov](http://www.recovery.gov) to identify projects in the geographic area funded by the American Recovery and Reinvestment Act of 2009]. The [the staff or the review team as appropriate] developed tables of the major projects near each alternative site that were considered relevant in the cumulative analysis. The [staff or the review team as appropriate] used the information to perform an independent evaluation of the direct and cumulative impacts of the proposed action at the

alternative sites to determine if one or more of the alternative sites were environmentally preferable to the proposed site.

Included are past, present, and reasonably foreseeable Federal, non-Federal, and private actions that could have meaningful cumulative impacts with the proposed action. For the purposes of this analysis, the past is defined as the time period prior to receipt of the COL application. The present is defined as the time period from the receipt of the COL application until the beginning of activities associated with the building the proposed Unit[s 2 and 3]. The future is defined as the beginning of building activities associated with Unit[s 2 and 3], through operation and eventual decommissioning.

The specific resources and components that could be affected by the incremental effects of the proposed action and other actions in the same geographical area were identified. The affected environment that serves as the baseline for the cumulative impacts analysis is described for each alternative site, and includes a qualitative discussion of the general effects of past actions. The geographical area over which past, present and future actions could reasonably contribute to cumulative impacts is defined and is described in later sections for each resource area. The analysis for each resource area at each alternative site concludes with a cumulative impact finding (SMALL, MODERATE, or LARGE). For those cases in which the impact level to a resource was greater than SMALL, the [the staff or the review team as appropriate] also discussed whether building and operating the nuclear units would be a significant contributor to the cumulative impact. In the context of this evaluation, "significant" is defined as a contribution that is important in reaching that impact level determination.

The cumulative impacts are summarized for each resource area in the sections that follow. The level of detail is commensurate with the significance of the impact for each resource area. The findings for each resource area at the [insert name of proposed site] and each alternative site are then compared in Table 9-[x]. The results of this comparison are used to determine if any of the alternative sites are environmentally preferable to the proposed site. If any alternative site is determined to be environmentally preferable, then the [staff or the review team as appropriate] would evaluate whether that alternative site was obviously superior.

The impacts described in Chapter 6 of the EIS (e.g., nuclear fuel cycle; decommissioning) would not vary significantly from one site to another. This is true because all of the alternative sites and the proposed site are in low-population areas and because [the staff or the review team as appropriate] assumes the same reactor design (therefore, the same fuel cycle technology, transportation methods, and decommissioning methods) is used for all of the sites. As such, these impacts would not differ between the sites and would not

be useful in the determination of whether an alternative site is environmentally preferable to the proposed site. For this reason, these impacts are not discussed in the evaluation of the alternative sites.

#### Steps to perform the resource specific analysis

1. Describe the site to set the baseline for the impact analysis. Provide a map showing the site and the region within a 50-mile radius.
2. For each alternative site, develop a table identifying the past, present and reasonably foreseeable projects and other actions using the same methodology that was used to develop the table for the proposed site.
3. Each resource area expert will analyze the impacts (from both building and operating) the propose project at the alternative site. Building impacts include both construction and preconstruction impacts.
4. The first section or paragraph in the resource area will describe the site and the project in relation to the resource being evaluated.
5. The next section will describe the building and operational impacts of the project on the resource. A SMALL, MODERATE or LARGE impact will not be determined for building or operation impacts, because the building and operational impacts will be added to the impacts from other past, present and reasonably foreseeable future actions to determine the cumulative impact for which a SMALL, MODERATE or LARGE impact will be determined.
6. The third section will determine the cumulative impacts by combining the impacts from the project with the actions identified in the table.
7. The fourth section, the summary section, will provide a short basis for the impact level and will for impacts other than SMALL state whether the project would or would not be a significant contributor to the MODERATE or LARGE impact.

#### IV. EVALUATION FINDINGS

Provide a short basis for the impact level. If the cumulative impact level is SMALL state:

Based on the information provided by the applicant and [the staff's or the review team's as appropriate] independent analysis, [the staff or the review team as appropriate] concludes that the cumulative [insert name of resource area] impacts from building and operating the [insert number and type of units] and other existing and planned projects and actions in the geographic area of interest around the [insert name of alternative site] would be SMALL.

For MODERATE or LARGE impact levels, provide short basis for impact level. Then state:

Based on the information provided by the applicant and [the staff's or the review team's as appropriate] independent analysis, the [staff or the review team as appropriate] concludes that the cumulative [insert name of resource area] impacts from building and operating the [insert number and type of units] and other existing and planned projects and actions in the geographic area of interest around the [insert name of alternative site] would be [MODERATE or LARGE]. Building and operating the proposed project at the [insert name of site] [would or would not] make a significant incremental contribution to the impact level.

Provide the impact level to summary table at the end of chapter 9.

## V. IMPLEMENTATION

The method described in this guidance should be used by the staff in evaluating conformance with NRC requirements, except in those cases in which the applicant proposes an acceptable alternative for complying with specified portions of the requirements.

## VI. REFERENCES

10 CFR 51.45, "Environmental report."

10 CFR 51.75, "Draft environmental impact statement-construction permit, early site permit, or combined license."

40 CFR 1508, "Terminology and Index."

U.S. Nuclear Regulatory Commission (NRC). 1976. *Preparation of Environmental Reports for Nuclear Power Stations*. Regulatory Guide 4.2, Rev. 2, Washington, D.C.

Council on Environmental Quality (CEQ). 1997. *Considering Cumulative Effects under the National Environmental Policy Act*.

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