CURE COMMENTS on the Scope of Environnmental Review: For Uprate Dockets: E002-08-509 and GS-08-690; Dry Cask CoN Docket E002-CN-08-510. And referencing the NRC docket for Relicensing the Prairie Island Nuclear Generating Plant, DG-1149.

Executive Summary

The American Planning Association, in an amicus brief to the court in an EPA proceeding, recently described the burdens that local governments are already bearing and will continue to bear, with the progression of climate change impacts. NARUC in a memorandum and resolution, recently outlined the impacts of past failures and future uncertainties in the funding and licensing of a centralized federal storage facility for the nation's high level nuclear waste. These two factors constitute the larger framework in which the cumulative effects and connected/cumulative actions - represented by the Xcel applications now before the Nuclear Regulatory Commission and the Public Utilities Commission – must be analyzed.

In our comments we outline our proposals for the scope and provide rationale for:

I. A full and complete **Cumulative Effects** analysis, based upon the 4 **Connected Actions** of relicensing, the extended plant capacity uprate, siting for the extended baseload capacity, and the expansion of the Independent Spent Fuel Storage Installation (ISFSI) at Prairie Island and cask requirements through decommissioning (an additional connected action). The EIS analysis shall necessarily not be limited to the 5 connected actions noted above

II. Analysis of **futures scenarios** involving climate change, DNR and Corps plans, and other factors in water level and allocations and their effects upon the temperature, ecology and carrying capacity of the Ms. River and Lake Pepin – as identified by commenting parties, the advisory task force, and other members of the public. The analysis should also consider water requirements of the 2 coal plants (totaling @600MW) near Alma, @45 miles downstream.

III. Identification and analysis of the potential social, economic and environment impacts of federal and/or utility *funding or program curtailments* -- both for long term storage and oversight of stranded nuclear wastes from operations & decommissioning.

IV. Explanation and analysis of **Incomplete and Missing Information** regarding future storage scenarios – timelines, terms and conditions -- including monitoring and maintenance provisions; and <u>funding</u> for long term at reactor site storage and oversight -- beyond 30 years after plant closure.

V. The EIS scope should require the development of several **"Combined Resource" Alternatives**; a strategy which is named but not fleshed out in Appendix J. We will recommend two, based upon Xcel's resource planning documents. Our NRC comments include these among several other proposals.

VI. **Alternative Sites and Storage Strategies:** Scope should compare alternative storage strategies in light of these factors; particularly, the scope should include pool safety and integrity under increased the increased heat and capacity demands of the uprate fuel. **Alternative sites should be considered.**

VII. **Baselines** and identification of **mitigation strategies** to provide for:

A. Baseline information:

i. historic **air and water emissions**,

ii. **cancer statistics** for counties identified in the application;

iii. current **groundwater analysis** re: state statutory requirement

iv. historic **summary of plant 'incidents'** involving unintentional releases, with specific data, for inclusion in cumulative effects analysis.

B. **Current standards** for acceptable exposure limits, on site, and off site.

C. **Emissions dispersal and tracking**:

i. technology, tools and mapping;

ii. suggested programs;

iii. identify collaborations to develop and implement such programs;

iv. consider provisions for ongoing funding of such programs.

D. **Monitoring and Measuring**. As comments at the public hearing suggest, confidence and mental well being are enhanced by ongoing monitoring and testing. As are planning and ongoing mitigation efforts. These programs are essential and funding should be provided over the long term to develop and maintain such programs.

E. **Informing and involving** affected/responsible/interested local governments in strategic planning and implementation of long term storage provisions – as they define that involvement. Reference: **116D.02.**

VIII. **No-Action Alternative**. The no-action alternative should include the identification and a full analysis of benefits to PIIC and downriver communities, as PIIC suggested in their comments. Xcel's analysis in Appendix E relies almost wholly upon the economics of jobs. While this is a critical factor for Red Wing, Red Wing is not the only municipality that is impacted by PING operations. The no-action alternative should specifically compare the effects of removal of all the waste from PI by 2045 to the land

use, as well as environmental implications of indefinitely stranded waste at the reactor site -- under the relicensing scenario.

Local Land Use and Community Life: In its description of local and county land use plans, Xcel acknowledges the local economics of the natural resource base of the Hiawatha River Valley. The tourist economy -- associated with the Great River Road -- is key to the economic interests of the Lake Pepin communities on both sides of the river. Local community and promotional seasonal events and festivals are keyed to predictable cycles of freeze-thaw, fish ecology, water quality, quantity and fruit and other local product production. The ecology and economy - the social and natural environments - of the Hiawatha River Valley are interconnected and interdependent.

MEPA: Minnesota Environmental Policy Act, **116D.03,** requires a fully interdisciplinary approach to these interconnections. **We do not agree with the conclusion in the EAW that the effects of the project are entirely within the footprint of the existing PI plant**. **And that local land use plans are not affected**. Xcel's ER document names counties on both sides of the river. (See our NRC comments). The scope of "affected environments" should, at least, be extended to the south edge of Lake Pepin. County and municipal (Red Wing) sustainability initiatives are potentially affected; water and river ecology management plans are affected by accidental and cumulative emissions, including thermal emissions; water resource management plans of DNR, PCA, BOWSR, Mississippi and boundary water area commissions may also be affected .

PIIC: The Prairie Island Indian Community (PIIC) because of their government status, NRC Memorandum of Understanding, third party statutory standing --- as well as cultural and spiritual traditions and the economic and residential constraints of legally designated (reservation) lands -- should receive special consideration in the EIS scope and analysis. **CURE supports the comments of the Prairie Island Indian Community**.

The argument for connected actions and necessity of related cumulative effects analysis is affirmed by the proposed approach to environmental review of the combined dockets. We hope that our comments will assist OES in attending to this critical analysis. We appreciate OES's proactive efforts to make the environmental review draft scope and relationship between the proceedings, clear to the public and affected parties. We also commend OES's preparation and prompt execution of PUC provision for an advisory task force.

These comments refer to several documents that are not appended, but should be readily available in DOC archives and, on one instance, legislative archives. If we can be of further assistance in tracking down these documents, please let us know. We wish to incorporate, by reference, and to consolidate our comments to the NRC

scope under the scope of environmental review for the PUC dockets/OES E. They are attached.

Sincerely,
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Postscript: *Our analysis and recommendations are based upon CURE's participation (1998-2008) in Xcel Integrated Resource Planning Dockets; CURE's involvement in legislation, litigation, and regulatory proceedings from 1995-2005 involving operations and dry cask storage at Prairie Island; CURE's participation in the Nuclear Waste Strategy Coalition which advocates for funding and implementation of a federal central storage solution; CURE's involvement in legislative stakeholder groups, coalition advocacy, and regulatory proceedings on distributed generation, C-BED and other dispersed generation strategies to optimize Minnesota community benefits and economic participation in the rapidly evolving renewable energy industry. CURE also petitioned in 1998, for PUC to direct Xcel to develop a **conversion plan for the Prairie Island site**. This was included as an appendix to the subsequent IRP.

V. ALTERNATIVES SCOPE

This segment of our comments demonstrate that Xcel's alternatives analysis for the Prairie Island relicensing, cask storage, and uprate is out of synch with the company's larger vision and realization about what it will take to be survive and thrive as a 21st century energy provider. It is not reasonable to limit the scope of alternatives to those that NRC considers 'reasonable' from the perspective of the federal licensing process. NRC is not involved in the economics or investment choices that are the sole prerogative of state public utilities commissions and their regulated utilities.

Given the enormous transformation in the energy business that is being driven by global climate change, efficiency and other federal, state and utility initiatives – it would be unreasonable and imprudent for the EIS to limit alternatives to the single source alternatives provided in Appendix E. Limiting alternatives to single source alternatives (called "reasonable alternatives"). Because of the unknown terms, conditions and impacts of indefinite storage at Prairie Island, of wastes from relicensing (missing information analysis), it is reasonable for the record to consider, at least, alternatives under development in Xcel's most recent resource plan.

WHAT: We recommend including alternative development strategies-- under the category of **Combined Resources.** Xcel lists Combined Resources in Appendix E alternatives analysis for these dockets-- but does not discuss or develop this category of alternative. We recommend that Xcel be directed to develop at least 2 Combined Resource alternative scenarios. We have provided several options in our discussion, based upon our analysis of Xcel's resource planning documents and the

current situation. Specifically, we will refer to the 2002 resource plan, report supplements, and 2003 legislative testimony on the wind-gas alternative, and cite the following:

- Xcel's 2008-2022 Integrated Resource Plan, and
- The December, 2007 Renewable Energy Plan.

WHY: One of the effects of continued operations at Prairie Island, is that **the waste generated during the relicensing period, has no place to go. It has no place in a queue, no authorization to go to Yucca Mountain, and no federal plan or funding for permanent off site storage or disposal.** The environmental, social and economic implications of the stranding of high level nuclear waste, indefinitely or permanently, at the reactor site puts an additional burden on the EIS scope & analysis of alternatives. The EIS alternatives scope must therefore engage in something more than a perfunctory regulatory review of the alternatives identified by Xcel in Appendix E. The EIS scope should encompass and subsequently analyze, *at least*, key approaches and specific strategies from Xcel's 2008-2002 Integrated Resource Plan (IRP), as discussed below.

WHO: The ALJ and Commission must assign development of additional alternatives scoped in the EIS to Xcel. The practice of assigning the burdens of development of alternatives other than those identified by Xcel in Appendix E, to intervening parties is unreasonable and not in the public interest – in the set of docket proceedings to which the scope applies -- for the following reasons:

- There is little capacity and no (intervenor) funding in either the non profit or public sectors to take on the development of alternatives for these dockets. Interested and affected local governments do not have the expertise to do so;

- Xcel is uniquely qualified and has already invested resources to develop alternatives that are explicit or implicit in the 2008-2022 IRP and the December 2007 Renewable Energy Plan;

- The Prairie Island Community is most impacted by the effects of continued operations at Prairie Island. This includes, without question and in the testimony of community members -- the indefinite stranding of large amounts of nuclear waste the reactor site. The Community is also the only local entity with funding that could be used to develop alternatives. Because of the provisions of a compen-sation agreement, over 10 years ago, they are barred by Xcel from doing so. This disadvantages not only the PIIC, but other local governments and the general public interest in a full development of the record of alternatives for nuclear operations at Prairie Island.

- The alternatives development is vital to supporting the **economically based decision making authority** of the PUC on the matter of dry cask storage, uprate, and continued operations at Prairie Island. This authority is the

state's primary authority in nuclear matters. *The record, analysis and decisions of the Minnesota Public Utilities Commission, is the foundation of the state's right to regulate in nuclear matters.*

XCEL RESOURCE PLANNING CONTEXT: Xcel is providing significant leadership in the development and integration of new technologies to meet both the challenges and opportunities of a "Next Generation Energy", carbon constrained world.

a) Xcel has taken a lead on Smart Grid Technologies, with the Bouder, Co. pilot, white paper and other initiatives;

b) They have participated in, and made commitments to the DR transmission ("sweet spot") study, which will contribute to the identification of potential system benefits, including opportunities to mitigate and optimize natural gas resources, and Smart Grid applications. The integration of dispersed and distributed resource also contributes to load management and development of other ancillary services;

c) Xcel's IRP confirms that it is moving ahead with the Commission's order to study potential applications of DG technologies (p. 10-3) and has hired Summit Blue Consulting to identify and match technologies and customer bases and develop a recommended portfolio from which Xcel can promote installations in a systematic and timely way. This strategy helps to mitigate future baseload resource needs.

d) The 2007 Xcel Renewable Energy Action plan (p. 46—47) confirms Xcel's commitment *to secure approximately one-third of incremental wind resources required for RES compliance from C-BED providers.* The action plan targets key markers, including:

i. Providing for pass through of some interconnection related costs;
ii. Working with MISO to support timely interconnection;
iii. Development of an effective standard contract, and improving PPA and queue strategies;
iv. Exploring financing partnership models that include Xcel as a potential equity investor;
v. Working with the state and other partners to improve turbine access and encourage siting of wind related manufacturing in Minnesota.

e) Xcel's IRP elaborates in Appendix E, on an aggressive and integrated **Wind Storage Research and Experiment** initiative. They are already testing the capcity of a particular (NaS) battery technology to firm wind, *enabling a shift of wind-generated energy from off-peak to on-peak availability* (E-2).

f) **Wind to Hydrogen** Demonstration project: From E-5 through E-10, describes a unique project undertaken by Xcel and NREL to *analyze and compare hydrogen production from wind power and the electric grid*…and…*explore new synergies for hydrogen as an energy storage medium and a transportation fuel.*

No baseload needs: Xcel's 2008-2022 IPR identifies Intermediate and Peaking Resources as the best match current resource plan needs (7-3) *These results support the conclusion that our (2015?) need is no longer a base load need. Instead our new Plan determines intermediate and peaking resources are the best incremental selections for our system*. [NB: This conclusion assumes the baseload capacity at Prairie Island]

Xcel's Combined Resource Strategy: Xcel anticipates that carbon constraints and the addition of more wind to the system will require the backing down of some baseload carbon resources. They are preparing for the need for greater flexibility in combining resources, particularly wind and natural gas. Point 4 summarizing Xcel's strategy for New Resources in the 2008-2022 IRP (7-1), states:

- *We propose to maximize the efficiency and minimize the cost of new natural gas facilties and associated transmission by* ***developing energy campuses*** *that combine natural gas and wind generating facilities, make the best use of transmission investments and can help support a future, local biogas market.*

The Energy Campus Concept (7-11): In order to flexibly support significant amounts of intermediate and peaking generation, as the main strategy for the IRP period, Xcel finds that development needs to be timely and efficient. To this end, Xcel develops the concept of "energy campuses" at select locations. These facilities would accommodate 6-8 combustion turbines (simple or combined cycle), phased over time. Locations would be selected for access to transmission, preferably that is already reserved for wind. These campuses are anticipated to *provide significant savings in capital costs, operations, maintenance and fuel delivery – compared to traditional, single-unit installations* (7-12). The campuses could provide flexible and quick back up to system contingencies– without committing ratepayers or Xcel shareholders to massive central station investments that might undermine the economic advantage of DSM and efficiency initiatives – while lowering capital and operating costs through coordination.

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Combined Generation Technologies and Replacement Alternatives

a. <u>Wind-Gas Replacement Plan</u>: The history of replacement planning for the various contingencies for continued operation of the PINGP is extensive, complex and occasionally contentious. There are a number of limiting factors in the reasonable development of a trajectory of cost effective alternatives, including:

a. The need to justify preferred alternatives in resource planning and Certificates of Need proceedings;
b. The practice of assuming purchase power costs as a primary replacement strategy throughout at least the period of time it would take (beyond plant closure) to build a new baseload plant;

c. Resistance to contingency planning and discussion of viable alternatives during periods where ongoing operations are not threatened;
d. Strategic withdrawal of resource plans, particularly the 2002 resource plan, after the 2003 legislature extended storage at Prairie Island; and
e. Variable cost and supply in the natural gas markets.

The record and resource planning discussions consistently show that the *combination* of gas and wind is the most economical alternative to nuclear baseload. Xcel's 2002 resource plan and February 5th testimony to The Regulated Industries Committee in 2003 fully discussed and analyzed this alternative. The wind-gas alternative was also analyzed for the Monticello CoN.

The *combined* wind-gas alternative for Prairie Island should compare new gas, and existing gas resource scenarios. This alternative was proposed in the prehearing conference for the Monticello proceeding but not carried out. The Monticello alternatives record assumes new gas generation.

In the Prairie Island gas-wind alternatives analysis, Xcel should describe how using existing gas resources to 'firm' wind, and using wind to 'back down' (conserve) existing and refurbished gas plant resources -- would work. And DOC should evaluate it.

2. <u>Conversion of PINGP site to an "Energy Campus" and Experimental Station:</u>
This alternative challenges Xcel to *combine* the innovative storage, flexible generation, and hydrogen initiatives in their 2008-2022 Integrated Resource Plan -- on a single "Energy Campus". The "Energy Campus" phraseology itself suggests an application that combines learning, teaching, testing, and multiple generation opportunities. It would be located at one of the most strategic points in Xcel's grid system, which itself would provide a set of resources to fold into the experimental and generating station.

One assumption we make in this proposal is that the grid structure at Prairie Island is a primary resource and that it does not make economic or energy sense for Xcel to abandon the Prairie Island site as a working "station" – or for commentators to suggest that they do so. A second observation that we make, is that Xcel's gas alternative, to replace

Prairie Island's capacity with two 600MW gas turbines is incompatible with the strategies and goals of the 2008-2022 Integrated Resource Plan. It would site these gas turbines elsewhere, thus requiring additional infrastructure investments and support, such as transmission.

Xcel ties the Energy Campus concept to the benefits of using smaller, flexible modular installations to support intermediate and peaking power (and *provide significant savings in capital costs, operations, maintenance and fuel delivery* –

compared to traditional, single-unit installations, 7-12). **Xcel's Prairie Island Gas Conversion Plan** supplement to the 1998-2000 resource planning cycle used a similar approach, but involved full replacement of the PI capacity. Combining an Experimental Station to test and implement developing technologies – with a working generation campus would provide Xcel with an opportunity to test and finance resource integration at another level altogether.

The Prairie Island Energy Campus and Experimental Station could:

a. Draw and target significant research and development grants;
b. Provide a locus for collaboration and innovation;
c. Become a center for energy storage research, development and testing;
d. Allow Xcel to test, analyze and compare hydrogen production from wind power and the electric grid;
e. Explore new synergies for hydrogen as an energy source medium and a transportation fuel;
f. Provide a flexible baseload natural gas resource, that can be combined with wind resources;
g. Provide for generation of hydrogen, utilizing off-peak grid resources;
h. Provide a testing ground for use of hydrogen as a fuel supplement or replacement for the site's gas turbines;
i. Provide consistent support of the electric grid via off peak storage of hydrogen, and hydrogen production for vehicle use (E-8)
j. Create the state's first hydrogen 'fueling station';
k. Provide a destination for equipment components for producing and storing hydrogen from Xcel/NREL's Boulder Colorado project (which Xcel will be moving to a different location when the project is completed E-9)
l. Provide significant environmental benefits both in the work it does, and by creating an alternative to the generation of waste that has no where to go.
m. Provide for oversight of waste from the initial license period and potential R&D around waste management and futures.
n. Create a new tourist attraction for the Hiawatha Valley, thus complimenting rather than threatening the region's economy.

"This is a societal and infrastructure design challenge of how we build a new energy future."
--Timothy den Herder Thomas*, Cooperative Energy Futures*

"The combination of climate change and the collapse of the credibility of our financial institutions, constitutes an investment crisis...We need to become entrepreneurs creating the energy innovations that provide investors with the avenue to sustainable infrastructure" -- Ralph Jacobson, *Innovative Power Systems, Inc.*

VI. ALTERNATIVE SITES AND STORAGE STRATEGIES

The EIS, under the 4410 rules requires that one or more alternatives of each of the following types be included in the EIS – or that a concise explanation be provided as to why it is missing. From 4410.2300 G:
A. Alternative sites
B. Alternative Technologies
C. Modified Designs or Layouts (gas)
D. Modified Scale and Magnitude
E. And alternatives incorporating reasonable mitigation measures identified through comments received during the comment periods for EIS scoping or for the draft EIS.

A. Alternative sites: The draft scoping document includes a listing of "Matters not within the scope of the EIS", at page 11. The explanation given is that NRC has sole jurisdiction over whether and how much fuel is stored on site at nuclear power plants.

If this were true, a number of state proceedings, PUC and legislative decisions – not to mention litigation and negotiation – would never have taken place. Prairie Island has been the focus of a number of such deliberations and actions, particularly over the course of the last 15 years:
a) The state reracking decision in 1978;
b) The second state reracking decision in 1982;
c) The Certificate of Need to PUC for dry casks, filed in 1988 in which PUC limited the number of casks to 17; the ALJ had recommended denial of casks based upon the fact that there was no place for the waste to go, and no timeline for removal;
d) The legal appeal went to the court of appeals, which reversed the Commissions decision and agreed with the filing parties that it was only the legislature that, under state statute, had authority to permanently site nuclear waste.
e) The PUC went to the legislature for ratification in 1994. The resulting "Prairie Island" law not only limited cask storage, but placed a number of conditions upon it based upon the state's authority of economic regulation.

Finally, there was the 1995 Goodhue County siting exercise, in which the state directed Xcel, as one of the terms of the Prairie Island law, to *site the waste from Prairie Island away from the reactor site.* Xcel submitted an application to the EQB, which was vetted through a Citizen's Site Advisory Task Force (no Certificate of Need). They also

forwarded an application for the site to the Nuclear Regulatory Commission The NRC application for the Florence Township, Goodhue County site was withdrawn by Xcel after intervention by state legislators. (A similar application with few variants, was subsequently submitted to NRC for the Skull Valley interim storage facility.)

Summary: While it is true that NRC has final jurisdiction over the maximum amount and conditions of waste to be stored on site, the state is not without authority to

limit or require that the utility move the waste. This is not a preemption issue but is a function of

the authority of the state to regulate economic considerations and impacts to ratepayers. Limits & conditions have historically been placed on waste storage.

Environmental Review of On Site Storage: As NUREG 1092 traces, the only environmental review (EIS) that has ever been done by NRC for on site waste storage was in the mid1970's. The DEIS/EIS for Yucca Mountain, while it evaluates the impacts of the no-action alternative – if the DOE program fails – avoids evaluating the impacts of leaving the waste at reactor sites around the country. The DEIS/EIS analysis assumes regional sites.

CURE submits that, while it is a contentious thing to consider, the scope should not bar consideration of alternative sites for nuclear waste storage, away from the reactor, the PPIC, and the Mississippi River floodplain. The relevant "new information" (re: the GEIS for relicensing) is that waste generated during the relicensing period, has no where to go.

B Alternative Technologies - Nuclear Waste Storage Technologies. The draft scoping document also includes Storage Technologies under "Matters not within the Scope of the EIS". Again, there is precedent in state law, one example of which is that the Prairie law required the use of multi-purpose canisters when they became available, so that casks could be transported to Yucca Mountain, should it become available, without the necessity of unloading old fuel rods from storage casks, and reloading them into smaller transportation casks. The state could, for instance, require that a hot box be placed at Prairie Island-- to facilitate cask maintenance and transfer without using the pool – as a condition of the CoN. This set of alternatives should be developed in the EIS. The state cannot license casks, but it can evaluate current and future storage conditions and direct the regulated utility to invest or negotiate particular storage strategies.

1. **Cask storage technology analysis** should grapple with the following unresolved factors, in addition to factors raised by other parties.
   a. If there is no queue or plan for waste from relicensed reactors, should they be put into multiple-use canisters or thicker storage canisters for long term storage?
   b. What is the permitted and practical life of cask storage (2001 EPRI report, states a maximum of 100 years; DOE DEIS, from 50 to 100 years)?
   c. What are relative advantages of vertical or horizontal storage; and how does the angle affect long term integrity of deteriorating materials, and future transfer of rods from one container or facility to another.
   d. How will at reactor site storage be regulated, managed and monitored beyond the current 60 year authority of NRC, wherein the site must be restored.

2. **Mitigation of risks of stranded waste, and indefinite at reactor site storage:** Please consider the relative costs and advantages to hardened on site storage, including pool and cask site with bunkered casks (in concrete) or below gradient with a hardened cover to protect the exposed exterior wall and roof of the pool.

3. **Establish a timeline for pool storage**, and how maintenance of casks and transfer of cask materials will be done after the pool is shut down.

EIS Preparation, 116D.04, subd. 2a: "Review and confirm" (referencing the EAW) is not analysis.

The purpose of an EIS is analysis: *The environmental impact statement shall be an analytical…document which describes the proposed action in detail, analyzes its significant environmental impacts, discusses appropriate alternatives…and their impacts, and explores methods by which adverse environmental impacts of an action could be mitigated*

PUBLIC COMMENTS: On NRC Environmental Review of Relicensing of The Prairie Island Nuclear Generating Plant (PING); and Xcels Environmental Report (ER) – Operating License Renewal Stage PING (NMC), Units 1 and 2, Docket No. 50-282 and 50-306, License Nos. DPR-42 and DPR-60.

DG-1149

To: Rulemaking, Directives and Editing Branch,
Office of Administraton, U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

From: Kristen Eide-Tollefson, Healingsystems@earthink.net,
P.O. Box 130, Frontenac, MN 55026 651-345-5488

Dear Sir,

I am using the CEQ EIS guidelines to frame my comments. My oral comments can be found in the evening transcript for the Red Wing public hearings. The outline of my comments is as follows:

I. Affected Environments
II. Interdisciplinary Approach
III. Connected Actions and Cumulative Effects
IV. Baselines
V. Recommended Alternatives
VI. Mitigation and Monitoring
VII. Additional Citations

Thank you for your attention to my comments to the scope of environmental review.

Kristen Eide-Tollefson

Sec. 1502.15 Affected environment.The environmental impact statement shall succinctly describe the environment of the area(s) to be affected or created by the alternatives under consideration. The descriptions shall be no longer than is necessary to understand the effects of the alternatives. Data and analyses in a statement shall be commensurate with the importance of the impact, with less important material summarized, consolidated, or simply referenced. Agencies shall avoid useless bulk in statements and shall concentrate effort and attention on important issues. Verbose descriptions of the affected environment are themselves no measure of the adequacy of an environmental impact statement.

I. Affected Environment. Defining the scope of the affected environment is the foundation of the EIS. The defining of the affected environment either adequate captures, or inadequately constrains considerations in the EIS. This act of defining and describing, impacts interested and affected communities and persons. It is important to interested and potentially affected communities and persons, to be included in the scope and to have their economic, social and natural resource bases identified. See also **IV. BASELINES.**

The scope of the description of the affected environment should not be constrained by the requirement for succinctness in the description itself. Succinctness of description refers to length, not to content.

Prairie Island: The description of the affected environment should adequately describe the social, environmental, economic and health situation of the Prairie Island Indian Community. Xcel's ER is inadequate in this description.
Neighboring Communities/Counties: The scope should also adequately describe the social, environmental, economic and health characteristics of the affected counties listed in Xcel's ER under 2.6.

Xcel's discussion of the Area Economic Base under 2.6 in its ER is entirely inadequate to describe the affected social, economic and natural environments of the directly affected river communities in the listed counties.

2.9 adequately describes planning concerns for Goodhue County. The county is increasingly looking to the special characteristics of its natural resource base to define its identity and guide future planning. Many of these resources are sensitive

and require special consideration and planning treatment. The entire river valley ledge is highly susceptible to groundwater contamination. Surface water protections are increasingly important as well, as noted in 2.8.

50 Mile impact zone: In addition, the NRC EIS should also either describe or say why it does not consider communities/counties within the 50 mile potential impact radius of the plant. Communities are very aware of this radius.

Hiawatha Valley: The EIS should particularly concern itself with the affected environment -- the environmental, social, economic and natural resource bases -- that are common to the river communities, across and downriver from Prairie Island. The ecologies and economies of the river valley communities are deeply interconnected -both between the shores and along the Great River Road which runs along both sides of the river, Wisconsin (Hwy 35) and Minnesota (Hwy 61).

Area Economy: The area's economy is based in large part on tourism, recreational fishing and other water resource attractions. These economies are year round, and are affected by water quality, ice qualities and other features of the river/lake ecology. The scope of affected environments should extend to the southern end of Lake Pepin at least.

Some of the important common features of the Hiawatha Valley can be found in materials on:

- Hiawatha Valley Partnership
  www.nextstep.state.mn.us/res_detail.cfm?id=2380 - 14k
- The Great River Road, http://www.mnmississippiriver.com/
- The Mississsippi River
  Commissionhttp://www.mvd.usace.army.mil/mrc/index.php,
- Mississippi River Regional Planning Commission -http://www.mrrpc.com/;
- Minnesota Mississippi River Parkway Commission
  www.mn**mississippiriver**.comCarol.Zoff@dot.state.mn.us; and the
- Mississippi Valley Partners business literature.
  http://www.city-image.com/index.php?page=Mississippi-Valley-Partners

Natural resource and waters information, is available fromthe Department of Natural Resources (Lake City office), and other commenting agencies.

Sec. 1502.6 Interdisciplinary preparation Environmental impact statements shall be prepared using an inter- disciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts (section 102(2)(A) of the Act)...

II. Interdisciplinary approach. Evaluation of the interdependence of the local river community economies and ecologies -- the natural and "human environments" -- requires a fully interdisciplinary approach (see also connected actions and cumulative effects). The affected river communities should be extended, at least, to the southern border of Lake Pepin, which is directly impacted by PI.

Special characteristics of PIIC: Analysis must in particular include the effects of the continued operation of the plant and expansion of the ISFSI upon the special characteristics of the of the Native American community at Prairie Island. This includes effects upon spiritual traditions, traditional diet, medicines, psychological well being and other categories, as defined by the Prairie Island Indian Community.

Sec. 1508.8 Effects."Effects" include(a) Direct effects, which are caused by the action and occur at the same time and place.(b) Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems. Effects and impacts as used in these regulations are synonymous. Effects includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial.

Sec. 1508.14 Human environment."Human environment" shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment. (See the definition of "effects" (Sec. 1508.8).) This means that economic or social effects are not intended by themselves to require preparation of an environmental impact statement. When an environmental impact statement is prepared and economic or social and natural or physical environmental effects are interrelated, then the environmental impact statement will discuss all of these effects on the human environment

Sec. 1508.25 Scope: connected, cumulative and similar actions. Scope consists of the range of actions, alternatives, and impacts to be considered in an environmental impact statement. The scope of an individual statement may depend on its relationships to other statements (Secs.1502.20 and 1508.28). To determine the scope of environmental impact statements, agencies shall 3 types of actions, 3 types of alternatives, and 3 types of impacts. They include:

(a) **(a) Actions** (other than unconnected single actions) **which may be connected actions,** which means that they are closely related and therefore should be discussed in the same impact statement. **Actions are connected if they: (i) Automatically trigger other actions which may require environmental impact statements. □(ii) Cannot or will not proceed unless other actions are taken previously or simultaneously. □(iii) Are interdependent parts of a larger action and depend on the larger action for their justification.□□**

(b) **Cumulative actions,** which when viewed with other proposed actions have cumulatively significant impacts and should therefore be discussed in the same impact statement.

(c) **Similar actions**, which when viewed with other reasonably foreseeable or proposed agency actions, have similarities that provide a basis for evaluating their environmental consequencies together, such as common timing or geography. An agency may wish to analyze these actions in the same impact statement. It should do so when the best way to assess adequately the combined impacts of similar actions or reasonable alternatives to such actions is to treat them in a single impact statement

(d) **(b) Alternatives**, which include:i. No action alternative.ii. Other reasonable courses of actions.iii. Mitigation measures (not in the proposed action).

(e) **(c) Impacts, which may be: (1) Direct; (2) indirect; (3) cumulative.**

Sec. 1508.7 Cumulative impact."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.

III. Connected Actions and Cumulative Effects: There are at least 4 pending actions which constitute connected actions and have cumulative effects upon these interdependent systems. These are identified below, and should be analyzed accordingly. We will need to depend upon the expertise of others to clarify the relationship of these actions to the 3 types of actions, impacts and alternatives listed in 1508.25, and addressed in the handbooks. The following chart gives an example: www.seeda.co.uk/RES_for_the_South_East_2006-2016/docs/AnnexF-031106.doc -

The scope of these particular comments should not limit definition and analysis of cumulative impacts, nor the definition and scope of the connected actions. They are merely a starting point which the affected and interested local governments should expand upon.Please confirm that there will be an opportunity in the comment process for these affected communities to address cumulative effects and connected, cumulative and/or similar actions as defined in Sec. 1508.25. Please clarify how that will work.

A. Connected, Cumulative or Similar Actions affected by the PING application. Environmental review under NEPA requires that the potential impacts of related actions present or future, and their **cumulative effects**, be described and analyzed. These actions need not be permitted by the same agency. The following actions, specifically, are connected to the relicensing of Prairie Island and will be reviewed by both state and federal governments.

Our argument is that the timing of these reviews and the "departmentalization" of the actions is harmful, and blocks adequate EIS analysis of these federal actions, and undermines adequacy of the SER for relicensing. The connected, cumulative and/or similar actions listed below need to be evaluated as connected/cumulative or similar actions and their cumulative effects upon the affected environments must be evaluated. All are dependent upon and interconnected with the NRC relicensing review and permit:

1. UPRATE – Certificate of Need Extended Power Uprate – PUC Docket E002/Cn-08-509. Without the extended license there will be no uprate. The license renewal safety review and aging reactor review MUST consider the cumulative effects of the uprate temperatures and pressures upon: a) the safety of the aging reactor, over time, and b) the cumulative environmental and socio-economic effects of increased temperatures on the ecology of the lake; c) new fuel types; d) additional emissions (if any) and timing and frequency of those emissions; e) other concerns raised by other parties, particularly the Prairie Island Indian Community (PIIC).

Scenarios: These assessments should be done for various water level scenarios on the ecology of the lake, and consider potential cumulative effects of warming temperatures (global climate change), with heat and emission factors from the uprate. Climate change effects, including temperature and water, are likely within the period of relicensing. This analysis should expand upon water demand, quality and shortage concerns for the area in addressing these scenarios.

2. Site Permit Extended Power Uprate – PUC Docket Eoo2/GS-08-690. Without relicensing, there would be no site permit process. And it is the location of the uprate, at the PI facility, that creates the context for the connected actions and their cumulative effects upon the affected environments.

3. Additional Dry Cask Storage Certificate of Need PUC Docket E002/CN-08-510. Additional dry cask storage is needed to accommodate waste from relicensed reactors. There is no federal plan for this waste. It is therefore, reasonably speaking, beyond the reach of the confidence decision, regardless of its wording. Even if NRC judges, as it must, the adequacy of the confidence ruling, this does not eliminate the need to address the effects, as connected/cumulative/similar actions in the EIS.

There are a number of related actions that reach beyond the current license and relicensing period that involve decommissioning, long term storage of wastes at the reactor site, and an unspecified set of scenarios including federal actions (take title; regional interim storage etc) that impact the affected communities and local governments. While we have no illusions that we will significantly change the way in which NRC has delt with this issue in the past, there are specific impacts that we would like addressed in the EIS that have to do with future funding, land use, and responsibility for at reactor site waste management. These socio-economic factors directly affect local governments, and it is not reasonable that they should not be addressed at the point of relicensing. Others may have other requests.

Commitment of Resources: Local governments have ultimate responsibility for the safety and well being of their communities. They must define and defend their interests, as it relates to any actions or non-actions affecting their economic, social and natural environments. The lack of resolution of the storage issue, in the context of NRC extension of uprate, license and cask storage permits, creates significant burdens for these local governments, including but not limited to PIIC. These impacts include lobbying, time, money and expertise needed to provide adequate local oversight of the issues and respond to utility, state and federal initiatives.

Local Government impacts: Most importantly, where these local governments are unable or unwilling to commit resources to provide for the representation and defense of these interests, the intention of NEPA for public involvement, and a number of other NRC, state and federal principles – is undermined.

Funding scenarios: Like NRC, the ability of local governments to 'do their job' depends upon funding. Should NRC's or DOE's funding continue to be reduced, or should fail – or their ability to perform adequately to their mandate be undermined by funding shortages, the primary burdens for protecting the safety and well being of the affected communities falls to their local government. It is in the context of the cumulative effects of current, and future actual and potential failures of funding (this includes Yucca Mountain) for the NRC/DOE mandates related to waste management, that the unresolved waste issue must be addressed in the EIS. See:

www.naruc.org/Resolutions/Nuclear%20Waste%20Disposal.pdf

Xcel's responsibility: While Xcel, under the federal waste contract, is responsible for the waste until the federal government takes it, Xcel has provided for no mechanisms to ensure the responsible management, monitoring, or funding of indefinite storage; nor has Xcel done contingency planning in the event of federal funding shortages or failure. In fact, Xcel has continued to claim in related dockets that the waste storage is temporary and that their responsibility is subordinate to that of the federal government, despite the clear terms of the contract title. Neither PUC, nor NRC, nor DOE has addressed this gap in responsibility. And none of the 'responsible' entities has provided a reasonable set of factors, funding or timeline for the facility and cask replacement recommended by DOE, at each 50 to 100 years.

No-Action: Because there is no federal plan for waste from relicensed reactors, there is no timeline for removal, no specified place for the waste to go, and no known facilities/cask replacement timeline,the cumulative effects of indefinite storage should be assessed.

Deterioration factor impacts line up for PI: The engineering studies for the Yucca Mountain D/EIS use 3 factors to evaluate the vulnerability of the designated regions to the effects of the no action (indefinite at reactor site storage) alternatives: proximity to populations, amount of precipitation, and the freeze thaw cycle, which are the primary factors in cask and facility deterioration rates. All three of these factors are present at Prairie Island.

Impact on commitment of resources, land use: The waste from the original license period is scheduled (in the YM queue) to be gone @2045. At this point the casks with waste from the initial license period/ISFSI will be between 40 and 50 years old. According to the Yucca Mountain DEIS timeline, this is also the point at which breakdown of containment could begin. The pool will be @ 70 years old.

With the casks gone, the site could be restored as early as @2045. If the plant is relicensed, then the site cannot be restored. Because it is so close to the business and residential environments of PIIC, the condition of the site will affect the quality of the environment in which they are doing business and residing. Indefinite storage creates an unacceptable level of unknowns and will not only deprive the Community of a restored environment, but will require expenditures related to due diligence and necessary vigilance in overseeing and responding to conditions at the storage site. These burdens threaten the quality of life and economic vitality of present and future generations.

NEPA requirements: While NRC Rules allows these actions to be analyzed in a vacuum, NEPA and CEQ rules (arguably) do not. These actions can have significant, ongoing and cumulative effects upon the economies and ecologies, security and health of the area; and particularly upon future generations.

IV.BASELINES[7.Defineabaselineconditionfortheresources,ecosystems,and humancommunities.]. The following baselines (at least) need to be established for the assessment of cumulative impacts, and to allow for meaningful monitoring of the affected environment into the future. These comments should in no way limit the work of EIS analysts, or the types and numbers of baselines to be established. Baselines need to be identified and represented in an accessible way; the data and analysis should be understandable to community members and local officials.

A. Groundwater baseline: Minnesota statute provides parameters for groundwater protection, that require a baseline to be established.

116C.76 NUCLEAR WASTE DEPOSITORY RELEASE INTO GROUNDWATER.

Subdivision 1. Radionuclide release levels. Radioactive waste management facilities for spent nuclear fuel or high-level radioactive wastes must be designed to provide a reasonable expectation that the undisturbed performance of the radioactive waste management facility willnot cause the radionuclide concentrations, averaged over any year, in groundwater to exceed:

(1) five picocuries per liter of radium-226 and radium-228;

2) 15 picocuries per liter of alpha-emitting radionuclides including radium-226 and radium-228, but excluding radon; or

(3) the combined concentrations of radionuclides that emit either beta or gamma radiation that would produce an annual dose equivalent to the total body of any internal organ greater than four millirems per year if an individual consumed two liters per day of drinking water from the groundwater.

Subd. 2. Disposal restricted. The location or construction of a radioactive waste management facility for high-level radioactive waste is prohibited where the average annual radionuclide concentrations in groundwater before construction of the facility exceed the limits in subdivision 1.

Subd. 3. Protection against radionuclide release. Radioactive waste management facilities must be selected, located, and designed to keep any allowable radionuclide releases to the groundwater as low as reasonably achievable.

History: 1986 c 425 s 11

Epri: "Groundwater Protection Guidelines for Nuclear Power Plants, 2008."www.epriweb.com/public/000000000001016099.pdf

B. Historic cancer rates for Goodhue, Dakota, Peirce, and Wabasha Counties through 2006. We have been unable to access these statistics.

C.Thermal conditions south of PI to the southern border of Lake Pepin.

D. Fish populations south of PI to the southern border of Lake Pepin

In addition, the following information would be useful to local communities in understanding the 'baseline' trajectory and flux of emissions/releases over time. Without historic information, current information can be unduly alarming, and difficult to evaluate:

1. Air emission releases (See CURE comments), historic, through 2007

2. Thermal discharges, historic through 2007
3. Effluent discharges – type, timing and frequency, historic through 2007
4. Tritium discharges, historic through 2007.

Table1-5.Stepsincumulativeeffectsanalysis(CEA)
tobeaddressedineachcomponentofenvironmentalimpactassessment(EIA)

Scoping
1.**Identifythesignificantcumulativeeffectsissuesassociatedwiththe proposedactionanddefinetheassessmentgoals.**

2.Establishthegeographicscopefortheanalysis.

3.Establishthetimeframefortheanalysis.

4.Identifyotheractionsaffectingtheresources,ecosystems,and humancommunitiesofconcern.

DescribingtheAffected Environment
5.**Characterizetheresources,ecosystems,andhumancommunities**
Environment**identifiedinscopingintermsoftheirresponsetochangeand capacitytowithstandstresses.**

6,Characterizethestressesaffectingtheseresources,ecosystems,and humancommunitiesandtheirrelationtoregulatorythresholds,

7.Defineabaselineconditionfortheresources,ecosystems,and humancommunities.

DeterminingtheEnvironmental
8.**Identifytheimportantcause-and-effectrelationshipsbetweenhuman**
Consequences**activitiesandresources,ecosystems,andhumancommunities.**

9.Determinethemognitudeandsignificanceofcumulativeeffects.

10.Modifyoraddalternativestoavoid,minimize,ormitigatesignificant cumulativeeffects.

11.Monitorthecumulativeeffectsoftheselectedalternativeandadapt management.
http://orf.od.nih.gov/Environmental+Protection/NEPA/EnvironmentalAssessments.htm

V. Recommended Alternatives:

1. Replacement Option: Combined technologies, specifically wind paired with existing/refurbished gas facilities, should be the primary baseload alternative evaluated by Xcel. Xcel's gas fleet is aging. Its assessment of refurbishment should maximize opportunities for gas/wind combinations, optimizing flexible use of these facilities and avoiding the costs and climate impacts of new gas plants.

2. Conversion option: An energy and R&D park at Prairie Island, would be a conversion option for the PI site and plant. It would utilize existing equipment, add modular generation and take advantage of the transmission at PI. Hydrogen could be generated during off peak hours and PI could become a hydrogen fueling and

experimental station, among other R&D projects. This would bring an alternative selection of high paing 'green' jobs into the area, develop new capacities and provide opportunities to capture funding opportunities as new federal energy initiatives unfold.

1502.22 - Incomplete or unavailable information.

When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking.

(a) If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the environmental impact statement.

(b) If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the environmental impact statement: (1) A statement that such information is incomplete or unavailable; (2) a statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment; (3) a summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment, and (4) the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of this section, reasonably foreseeable includes impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.

(c) The amended regulation will be applicable to all environmental impact statements for which a Notice of Intent (40 CFR 1508.22) is published in the Federal Register on or after May 27, 1986. For environmental impact statements in progress, agencies may choose to comply with the requirements of either the original or amended regulation.

While the "foreseeable future" is difficult to define with nuclear waste, the scope of incomplete and missing information regarding the fate of waste from relicensed reactors is significant. There is no rational plan, no maintenace or facility replacement schedule for relicensed reactors at Monticello or Prairie Island. There is no contingency planning; no scenario development. The missing information is not only factual, but procedural. This situation should be described, and elaborated, under this section of the EIS.

VI. 1508.20 Mitigation and Monitoring:

Mitigation includes:
(a) Avoiding the impact altogether by not taking a certain action or parts of an action.
(b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
(c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
(d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
(e) Compensating for the impact by replacing or providing substitute resources or environments.

From the perspective of a planning commission member in a downriver community that is part of the affected environment of the PING, the most useful kind of mitigation to consider in conjunction with relicensing the plant, is an exploration of long term joint stakeholder mechanisms would allow affected communities and local governments to participate meaningfully in the ongoing decisions involving PING. Several references are included below.

"Stepwise approach to decision-making for long term radioactive waste".
www.nea.fr/html/rwm/reports/2004/nea4429-stepwise.pdf

"Uncertainty, innovation, and dynamic sustainable development (applied to nuclear waste)" Lenore Newman School of Environment and Sustainability, Victoria, B.C., Canada V9B 5Y2(e-mail: lenore.newman@royalroads.ca)
http://ejournal.nbii.org/archives/vol1iss2/0501-001.newman.html

VII. Citations: The following set of citations from CEQ rules is included for the benefit of other public commentators. For NRC, the inclusion of these sections creates a framework of our expectations regarding the importance and scope of connected/cumulative effects analysis (CEA). We have used primarily CEQ references since this is the standard that NRC uses:

Table 1-2 Principles of Cumulative Effects Analysis
http://ceq.hss.doe.gov/nepa/ccenepa/sec1.pdf

Cumulative Impacts are causedbytheaggregateofpast,present,andreasonablyforeseeablefutureactions.
Theeffectsofaproposedactiononagivenresource,ecosystem,andhumancommunityincludethepresentand futureeffectsaddedtotheeffectsthathavetakenplaceinthepast.Suchcumulativeeffectsmustalsobeaddedto effects(past,present,andfuture)causedbyallotheractionsthataffectthesameresource.

2.Cumulativeeffectsarethetotaieffect,Inciudingbothdirectandindirecteffects,onagivenresource, ecosystem,andhumancommunityofailactionstaken,nomat?erwho(federai,nonfederal,orprivate)hastakentheactions.
Individualeffectsfromdisparateactivitiesmayadduporinteracttocauseadditionaleffectsnotapparentwhen lookingattheindividualeffectsoneatatime.Theadditionaleffectscontributedbyactionsunrelatedtotheproposec actionmustbeincludedintheanalysisofcumulativeeffects.

3.Cumulativeeffectsneedtabeanalyzedintermsofthespecificresource,ecosystem,andhumancommunitybeingaffected.
Environmentaleffectsareoftenevaluatedfromtheperspectiveoftheproposedaction.Analyzingcumulativeeffects requiresfocusingontheresource,ecosystem,andhumancommunitythatmaybeaffectedanddevelopingan adequateunderstandingofhowtheresourcesaresusceptibletoeffects.

4.ItISnotpracticaltoanalyzethecumulativeeffectsofanactionontheuniverse;theilstofenvironmentaleffectsmustfocusonthosethataretrulyme aningful.
Forcumulativeeffectsanalysistohelpthedecisionmakerandinforminterestedparties,itmustbelimitedthrough scopingtoeffectsthatcanbeevaluatedmeaningfully.Theboundariesforevaluatingcumulativeeffectsshouldbe expandedtothepointatwhichtheresourceisnolongeraffectedsignificantlyortheeffectsarenolongerofinterest toaffectedparties,

5.Cumulativeeffectsonagivenresaurce,ecosystem,andhumancommunityarerarelyalignedwithpoiiticaloradministrativeboundaries.**.**
Resourcestypicallyaredemarcatedaccordingtoagencyresponsibilities,countylines,grozingallotments,orother administrativeboundaries.Becausenaturalandsocioculturalresourcesarenotusuallysoaligned,eachpolitical entityactuallymanagesonlyapieceoftheaffectedresourceorecosystem.Cumulativeeffectsanalysisonnatural systemsmustusenaturalecologicalboundariesandanalysisafhumancommunitiesmustuseactualsociocultural boundariestoensureincludingalleffects,

6.Cumulativeeffectsmayresuitfromtheaccumulationofsimliareffectsorthesynergisticinteractionof differenteffects.
Repeatedactionsmaycauseeffectstobuildupthroughsimpleaddition(moreandmoreofthesametypeofeffect), andthesameordifferentactionsmayproduceeffectsthatinteracttoproducecumulativeeffectsgreaterthanthesum oftheeffects.

7.Cumulativeeffectsmaylastformanyyearsbeyondthelifeoftheactionthatcausedtheeffects.
Someactionscausedamagelastingfarlongerthanthelifeoftheactionitself(e.g.,acidminedrainage,radioactive wastecontamination,speciesextinctions).Cumulativeeffectsanalysisneedstoapplythebestscienceand forecastingtechniquestoassesspotentialcatastrophicconsequencesinthefuture.

B.Eachaffected resource, ecosystem,andhumancommunitymustbeanalyzedintermsofhecapacity

toaccommodateadditionaleffects,basedonitsowntimeandspaceparameters.
Analyststendtothinkintermsofhowtheresource,ecosystem,andhumancommunitywillbemodifiedgiventhe action'sdevelopmentneeds.Themasteffectivecumulativeeffectsanalysisfocusesonwhatisneededtoensurelong-termproductivityorsustainabilityoftheresource.

Table 1-4 Types of Cumulative Effects

Insimplestterms,cumulativeeffectsmaysynergistic-wherethenetadversecumulative arisefromsingleormultipleactionsandmayeffectisgreaterthanthesumoftheindividual resultinadditiveorinteractiveeffects.Interac-effects.Thiscombinationoftwokindsof tiveeffectsmaybeeithercountervailing—actionswithtwokindsofprocessesleadstofour wherethenetadversecumulativeeffectisIessbasictypesofcumulativeeffects(Table1-3;see thanthesumoftheindividualeffects-rPetersonetal.1987forasimilartypology).

Type1— Additive -Repeated"additive"effectsfroma singleproposedproiect.
Example:Constructionofanewroadthrougha nationalpark,resultingincontinualdrainingof roadsaltontonearbyvegetation.

Type2– Interactive -Stressorsfromasinglesourcethatinteract withreceivingbiotatohavean"interactive" (nonlinear)neteffect.
Example:Organiccompounds,includingPCBS,that biomagnifyupfoodchainsandexertdisproportionate toxicityonraptorsandlargemammals.

Type3– Additive -Effectsarisingfrommultiplesources (proiects,pointsources,orgeneraleffects associatedwithdevelopment)thataffect environmentalresourcesadditively.
Example:Agriculturalirrigation,domestic consumption,andindustrialcoolingactivities thatallcontributetodrawingdowna groundwateraquifer.

Type4- Interactive -Effectsarisingframmultiplesourcesthat affectenvironmentalresourcesinaninteractive(i.e., countervailingorsynergistic)fashion.
Example:Dischargesofnutrientsandheatedwaterto ariverthatcombinetocauseanalgalbloomand subsequentlossofdissolvedoxygenthatisgreater thantheadditiveeffectsofeachpollutant.

Criteria. In determining whether a proposed action will or will not "significantly affect the quality of the human environment," OPDIVs/STAFFDIVs should evaluate the expected environmental consequences of a proposed action by means of the following steps, utilizing the guidance provided in 40 CFR 1508.27:

Step One -- Identify those things that will happen as a result of the proposed action. An action normally produces a number of consequences. For example, a grant to construct a hospital may terminate human services; will involve destruction and construction; will provide a service. Actions may be connected, cumulative, or similar (see 40 CFR 1508.25(a)).

Step Two -- Identify the "human environments" that the proposed action will affect. In accordance with 40 CFR 1508.27, the significance of an action must be analyzed in several contexts, such as society as a whole (human, national), the affected region, the affected interests, and the locality. The significance of an action will vary with the setting of the proposed action. Environments may include terrestrial, aquatic, subterranean, and aerial environments, such as islands, cities, rivers or parts thereof.

Step Three -- Identify the kinds of effects that the proposed action will cause on these "human environments." A change occurs when a proposed action causes the "human environment" to be different in the future than it would have been, absent the proposed action. These changes involve the introduction of various "resources" (including those often characterized as waste).

Example: A decrease in the amount of soil entering a stream; the introduction of a new chemical compound to natural environments.

In addition to organisms, substances, and compounds, the term "resources" include energy (in various forms), elements, structures, and systems (such as a trash collection service in a city). Present environmental impacts and reasonably foreseeable future environmental impacts must be considered.

In identifying changes caused by the proposed action, OPDIVs/STAFFDIVs should identify the magnitude of the changes likely to be caused within smaller and larger "human environments" affected (e.g., part of a city, the whole city, the metropolitan area).

The impacts resulting from the proposed action may be direct, indirect, or cumulative (see 40 CFR 1508.25(c)).

Step Four -- Identify whether these changes are significant. The following points should be considered in conjunction with 40 CFR 1508.8 (effects), 40 CFR 1508.14 (human environment), and 40 CFR 1508.27 ("significantly") in making a decision concerning significance:

- A change in the characterization of an environment is significant (e.g., from terrestrial to aquatic.
- The establishment of a species in or removal of a species from an environment may be significant
- The more dependent an environment becomes on external resources, the larger the magnitude of change (and the more likely it is to be significant);
- The larger the environment under consideration, the lower the amount of change needed before the change may be significant.

The CEQ regulations in 40 CFR 1508.27 describe a number of factors that should be considered in evaluating severity (intensity) of an impact. OPDIVs/STAFFDIVs should consider the cumulative effect of the proposed action. An action may be individually insignificant but cumulatively significant when the action is related to other actions. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

Sec. 1508.27 Significantly.

"Significantly" as used in NEPA requires considerations of both context and intensity:

(a) Context. This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant.

(b) Intensity. This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action. The following should be considered in evaluating intensity:

- Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.
- The degree to which the proposed action affects public health or safety.
- Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.
- The degree to which the effects on the quality of the human environment are likely to be highly controversial.
- The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.
- The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.
- Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.
- The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.
- The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.
- Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

Respectfully submitted,

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About the commentator: Eide-Tollefson served on the MN Environmental Quality

Board Citizen's Site Advisory Committee for the Goodhue Storage Facility exercise in 1995. After the Florence Township sites were eliminated from consideration, she continued to work as a citizen advocate in state regulatory and legislative arenas., submitting numerous comments on integrated resource planning, and other nuclear and energy resource proposals.

In 2006 she graduated from the Humphrey Institute MPA program with a concentration in "Public Engagement in Energy Policy, Planning and Infrastructure Development". She has served on Environmental and legislative stakeholder and advisory committees and from 1999-2003, was active in the Nuclear Waste Strategy Coalition. She is currently a planning commissioner for Florence Township, Goodhue County. She is, however, not an environmental lawyer or professional and must depend upon the expertise of NRC professionals in evaluating and acting upon her comments and recommendations.