OAH 7-2500-19797-2
PUC Docket Nos. E-002/CN-08-509
E-002/CN-08-510
E-002/GS-08-690

ATTACHMENT A

PINGP Study Group Advisory Brief

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September 1, 2009

Richard C. Luis
Administrative Law Judge
Office of Administrative Hearings
P.O. Box 64620
St. Paul, MN 55164-0620

RE: Xcel Energy Prairie Island Nuclear Generating Plant
CON Application for Extended Power Uprate, PUC Docket No. E002/CN-08-509,
Site Permit Application for Extended Power Uprate, PUC Docket No. E002/GS-08690
CON Application for Additional Dry Cask Storage of Nuclear Spent Fuel, PUC Docket No. E002/CN-08-510

Dear Judge Luis:

For more than forty years, I have worked in the field of radiological assessment and monitoring, including evaluation of radiation instrumentation and training in radiation monitoring procedures. I have been involved with commercial Nuclear Power Plants since the days of the Atomic Energy Commission (AEC). I started working at San Onofre Nuclear Generating Station (SONGS) in 1967, then I worked at Diablo Canyon NPP, Farley NPP, Clinton NPS, Seabrook NPP, and Rancho Seco NPP. I have been with the Department of Energy since 1989, first at the Waste Isolation Pilot Plant in Carlsbad, NM then at Los Alamos National Laboratory since 1993. I am currently on the American National Standards Institute (ANSI) committee that is revising ANSI N320, which is radiation monitoring for Nuclear Reactor emergencies. I am also on four other ANSI standard committees (I am chairman of one) plus three International Electro-Technical Commission (IEC) standard committees. I am currently a Staff Health Physicist at the Los Alamos National Laboratory and a Fellow of the Health Physics Society. A copy of my *curriculum vitae* is attached with this letter.

I was contacted by the Prairie Island Nuclear Generating Plant (PINGP) Study Group and asked to advise the group regarding state-of-the-art monitoring of radiation releases at the PINGP. In connection with a presentation on monitoring of radioactive air emissions, which I gave for the Health Physics Society in Minneapolis on July 14, I also met with representatives of the PINGP Study Group and the Minnesota Health Department. I have reviewed portions of the Draft Environmental Impact Statement for the current proceedings involving the PINGP and the 2008 Annual Radiological Environmental Monitoring Program (REMP) Report, which describe the nature, and locations of various monitoring devices for the PINGP. I am also aware that the Prairie Island Indian Community, whose members live immediately adjacent to the PINGP, has requested improved monitoring of radioactive releases at various times and through various media.

In my judgment, there are significant improvements that could be made in radiation monitoring at the PINGP to provide real-time information on releases, more accurate identification of emission plumes and better public access to monitoring data.

Real-time monitoring of radiation emissions outside the plant is important to understand the extent, location and dispersion of releases both for regular operational releases and in the event of an incident. Real-time monitoring within the nuclear plant is likely to advise operators that a release has occurred, but will not provide information regarding the effects of that release outside the plant.

In the case of an independent spent fuel storage installation (ISFSI), the absence of real-time radiation monitoring means that the plant is relying on pressure sensors as the sole method of detecting a leak in spent nuclear fuel storage cases.

Thermoluscent dosimeters (TLDs) are insufficient to provide real-time information. Pressurized ion chamber technology with on-line communication of results is the state-of-the-art method for monitoring releases of gamma radiation, such as that released from spent fuel storage casks. The Department of Energy has a program at the Nevada Test Site where citizens are trained to operate and maintain 29 monitoring locations which consist of equipment for the real-time on-line monitoring of airborne radioactivity, gamma radiation, and meteorological conditions, which has the benefit of reducing costs as well as involving members of the public. This monitoring program is known as the Community Environmental Monitoring Program (CEMP) and is funded by the Department of Energy's National Nuclear Security Administration and administered by the Desert Research Institute.

For emissions to air, best practice is to locate continuous air monitors in a ring around the perimeter of the plant and in an additional outer ring to provide information on the size, location and dispersion of any airborne plume. PINGP air emissions monitors are insufficient in number as well as insufficient to provide real-time information. Sufficiency in the number and location of monitors and correlation with weather (temperature, humidity, wind) information is necessary to assess as well as predict air emissions plumes and dispersion in the environment.

Sampling of surface and ground water, similarly, must be robust and appropriately located to identify the nature, location and dilution of any water-borne plume, as well as conducted in real time. Sampling of Mississippi River water for tritium at a single location is likely to be insufficient to identify any plume of radioactive materials from the PINGP. Tritium is relatively similar to hydrogen, which makes it readily bond with oxygen as tritiated water, which is easily ingested in food and water or absorbed through the skin.

Monitoring of groundwater requires a geological survey to site wells so that they identify potential releases. Reviewing elevated tritium findings in wells identified in the PINGP 2008 REMP (particularly P-10 and MW-8 on page E-10), it should be noted that tritium has a half-life of 13 years. Ongoing elevation of tritium may be evidence of an ongoing, rather than a historic release, and elevated tritium levels at various locations may indicate multiple rather than a single release point. Additional assessment and monitoring would assist in identifying the source of tritium releases to groundwater.

I would also note, as I pointed out to members of the PINGP Study Group, that monitoring and assessment should also be designed to ensure that a nuclear power plant is in compliance with 10 C.F. R. 50, Appendix I. The annual limits to any member of the public under this section of the Code of Federal Regulations are 3 millirems/year to the total body or 10 millirems/year to any organ from liquid effluents, 10 millirads/year from gamma radiation or 20 millirads/year from beta radiation due to gaseous effluents; and 5 millirems/year to the total body or 15 millirems/year to any organ (including the skin) from radioactive iodine and radioactive materials in particulate form in effluents to the atmosphere.

The question was asked of me whether the Appendix I exposure limits are doubled or tripled if a nuclear power plant was more than one unit. This is not a correct understanding. The Appendix I exposure limits to protect the public are not doubled or tripled if a nuclear power plant has more than one unit; they apply to the nuclear power reactor within the fence line and its potential effect outside the fence line on members of the public due to radiation exposure. I have included a copy of these regulations with my letter.

I understand that Xcel Energy is proposing to increase both power generation at the PINGP and storage of spent fuel at the PINGP ISFSI. Particularly if these proposals are approved, I would recommend utilization of state-of-the-art technology and real-time monitoring to assess potential emissions and exposures to the public both over time under routine operations and in the event of a non-routine release. I would be available to assist either the PINGP operator, the Health Department or a community oversight group in planning and design to improve radiological monitoring at the PINGP and its ISFSI. My recommendations are as follows:

Air Emissions: Re-evaluate number and locations of PINGP control and indicator locations. Design and implement real-time air effluent monitoring with on-line communication of results. Identify indicator locations in a ring at the perimeter of PINGP and in an outer ring to provide information on dilution concentrations and direction of any airborne plume.

Surface Water Effluent: Design monitoring of effluents in Mississippi River water based on hydrology, identifying multiple indicator locations (current indicator location is at Lock and Dam #2) as well as appropriate control sites. Sample on a daily basis using automatic samplers and send a composite to lab for monthly analysis.

Ground Water Contamination: Review appropriateness of control and indicator ground water monitoring locations based on plant operations, geological survey, drinking water well sites. Design and implement a system that includes real-time monitoring for alpha, beta and gamma radiation and tritium and on-line information on results.

Gamma Radiation: Design and implement real-time gamma radiation monitoring program using pressurized ion chamber technology with on-line communication of results and citizen assistance in checking equipment. Site indicator locations in a ring at the perimeter of ISFSI and in an outer ring, in addition to existing TLD monitors. Best practice is to co-locate the gamma radiation monitoring equipment with the air effluent monitoring equipment.

General:

- Implement a program sampling natural vegetation near the plant perimeter in addition to specific food samples.

- Ensure that the emergency plan for PINGP includes air emissions monitoring for population centers as well as more proximate locations.
- Evaluate need for additional shielding for ISFSI to reduce gamma radiation.

I would be pleased to work with the PINGP operator, the Minnesota Health Department, or a community oversight group, if one is established in these proceedings, to address radiological monitoring issues. I can provide assistance in developing the monitoring program either as an independent contractor working for any of the three principals or as a consultant to whichever radiation instrument company is chosen to supply any monitoring equipment. I am familiar with the instrumentation company referenced in the Prairie Island Indian Community Brief, Technical Associates, and would be willing to work with that monitoring equipment provider or any other appropriate firm that is selected in this process.

I would be pleased to answer any questions you might have. Please do not hesitate to contact me.

Sincerely,

James T. Voss

James T. Voss
Certified Health Physicist

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Education:

Porterville College, Porterville, California - 1961 -1963
Fresno College, Fresno, California - 1963 – 1965
Brigham Young University - 1965 – 1967
University of Utah - 1965 – 1967
Chemical Engineering studies

Career Experience:

State of California Highway Transportation Department – Weighmaster, Surveyor, Materials Testing Specialist - 1962 – 1965

US Army Chemical Corps (CBR – Chemical, Biological, Radiological Division) – Chemical Engineer, MOS 01G20 - 1965 – 1967

Southern California Edison Company – Chemistry and Radiation Protection Specialist – 1967 – 1982

Diablo Nuclear Power Plant - Chemistry and Environmental Specialist, Level 2 Startup Engineer - 1982 – 1984

Farley Nuclear Power Plant – Chemistry Specialist - 1985

Clinton Power Station – Chemistry and Environmental Specialist, - 1986 – 1987

Racho Seco Nuclear Power Plant – Technical Procedure Writer – 1988

Westinghouse Corporation at Waste Isolation Pilot Project – Senior Health Physics Specialist, Level 2 Startup Engineer - 1989 – 1993

Los Alamos National Laboratory – Radiation Protection Specialist – 1993 – 1998

Los Alamos National Laboratory – Certified Health Physicist – 1998 - present

Awards and Honors

Named a “Fellow” of the Health Physics Society in 2006

Certified as a Health Physicist by the ABHP in 1998

Technical Abilities:

Radiological Assessment
Procedure and Training Developer
Radiation Instrumentation Developer/Evaluator
Startup Engineer
Technical Trainer
Technical Writer

Professional Associations:

Health Physics Society
American Board of Health Physics
National Registry of Radiation Protection Technologists
American National Standards Institute Writing Committee
International Electro-Technical Commission Writing Committee
Health Physics Society Laboratory Accreditation Assessment Committee
Department of Energy Health Physics Instrument Committee (HPIC) and Air Monitoring Users Group (AMUG)

Recent Publications:

LA-UR-97-1345 "Comparison of Continuous Air Monitor Utilization: A Case Study" with J. C. Rodgers and J. J. Whicker (also published in "Radiation Protection Management," Dec. 1997

LA-UR-99-6750 "Los Alamos Radiation Monitoring Notebook"

LA-UR-00-2311 "Placement of Continuous Air Monitors in PF-4 Plutonium Laboratories: Consensus Findings and Recommendations" with J. J. Whicker, et. al.

LA-UR-00-2584 "Los Alamos Radiation Monitoring Notebook" updated February 2001

LA-UR-00-4236 "A Method for Radon and Thoron Discrimination," 2000

LA-UR-01-1001 "Automated Survey Method for Upstream Segregation of Transuranic Waste" with R. Marshall and Amy Wong, 2001

LA-UR-01-1511 "A Novel Design for a Portable Continuous Air Monitor," 2001

LA-UR-02-1670 "Future Directions in Air Monitoring at Los Alamos National Laboratory," 2002

LA-UR-02-7145 "A New Design for Portable Radiation Survey Instrumentation," 2002

Participation on ANSI Standards writing committees

ANSI N13.56, “Sampling and Monitoring Releases of Airborne Radioactivity in the Workplace of Nuclear Facilities,” Chairperson J. J. Whicker

ANSI N323C, “Radiation Protection Instrumentation Test and Calibration – Air Monitoring Instruments,” Co-chairs M. Hoover and M. Johnson

ANSI N317 (revision), “Performance Criteria for Instrumentation Used for In-Plant Plutonium Monitoring,” Chairperson C. Olson

ANSI N42.33, “Portable Radiation Detection Instrumentation for Homeland Security,” Chairperson M. Cox

ANSI N13.38, “Selection and Use of Portable Neutron Radiation Protection Instrumentation for Dose Equivalent Determination,” Chairperson J. T. Voss

Participation on IEC Standards writing committees

Technical Committee No. 45: Nuclear Instrumentation
Sub-Committee 45A: Environmental Radiation Protection Instrumentation
Sub-Committee 45B: Radiation Protection Instrumentation

IEC Standards Titles
“Installed Radiation Monitors for the Detection of Radioactive and Special Nuclear Materials at National Borders”

“Dose Rate Measurement Devices”

“Radiation Protection Instrumentation – Portable Photon Contamination Meters and Monitors”

Revision of “Equipment for Monitoring of Alpha, Beta or Gamma-Emitting Radionuclides in Liquid Effluents and Surface Water”

“Airborne Instrumentation for Measurement of Terrestrial Gamma Radiation”

“Radon and Radon Decay Product Measuring Instruments”

“Instrument and Control System (I&C) of Interim Storage and Final Repository of Nuclear Fuel and Waste”

Sec. Appendix I to Part 50--Numerical Guides for Design Objectives and Limiting Conditions for Operation To Meet the Criterion ``As Low as is Reasonably Achievable'' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents

SECTION I. Introduction. Section 50.34a provides that an application for a construction permit shall include a description of the preliminary design of equipment to be installed to maintain control over radioactive materials in gaseous and liquid effluents produced during normal conditions, including expected occurrences. In the case of an application filed on or after January 2, 1971, the application must also identify the design objectives, and the means to be employed, for keeping levels of radioactive material in effluents to unrestricted areas as low as practicable. Sections 52.47, 52.79, 52.137, and 52.157 of this chapter provide that applications for design certification, combined license, design approval, or manufacturing license, respectively, shall include a description of the equipment and procedures for the control of gaseous and liquid effluents and for the maintenance and use of equipment installed in radioactive waste systems.

Section 50.36a contains provisions designed to assure that releases of radioactive material from nuclear power reactors to unrestricted areas during normal conditions, including expected occurrences, are kept as low as practicable.

SECTION II. Guides on design objectives for light-water-cooled nuclear power reactors licensed under 10 CFR part 50 or part 52 of this chapter. The guides on design objectives set forth in this section may be used by an applicant for a construction permit as guidance in meeting the requirements of Sec. 50.34a(a), or by an applicant for a combined license under part 52 of this chapter as guidance in meeting the requirements of Sec. 50.34a(d), or by an applicant for a design approval, a design certification, or a manufacturing license as guidance in meeting the requirements of Sec. 50.34a(e). The applicant shall provide reasonable assurance that the following design objectives will be met.

A. The calculated annual total quantity of all radioactive material above background \1\ to be released from each light-water-cooled nuclear power reactor to unrestricted areas will not result in an estimated annual dose or dose commitment from liquid effluents for any individual in an unrestricted area from all pathways of exposure in excess of 3 millirems to the total body or 10 millirems to any organ.

\1\ Here and elsewhere in this appendix background means radioactive materials in the environment and in the effluents from light-water-cooled power reactors not generated in, or attributable to, the reactors of which specific account is required in determining design objectives.

B.1. The calculated annual total quantity of all radioactive material above background to be released from each light-water-cooled nuclear power reactor to the atmosphere will not result in an estimated annual air dose from gaseous effluents at any location near ground level which could be occupied by individuals in unrestricted areas in excess of 10 millirads for gamma radiation or 20 millirads for beta radiation.

2. Notwithstanding the guidance of paragraph B.1:

(a) The Commission may specify, as guidance on design objectives, a lower quantity of radioactive material above background to be released to the atmosphere if it appears that the use of the design objectives in paragraph B.1 is likely to result in an estimated annual external dose from gaseous effluents to any individual in an unrestricted area in excess of 5 millirems to the total body; and

(b) Design objectives based upon a higher quantity of radioactive material above background to be released to the atmosphere than the quantity specified in paragraph B.1 will be deemed to meet the requirements for keeping levels of radioactive material in gaseous effluents as low as is reasonably achievable if the applicant provides reasonable assurance that the proposed higher quantity will not result in an estimated annual external dose from gaseous effluents to any individual in unrestricted areas in excess of 5 millirems to the total body or 15 millirems to the skin.

C. The calculated annual total quantity of all radioactive iodine and radioactive material in particulate form above background to be released from each light-water-cooled nuclear power reactor in effluents to the atmosphere will not result in an estimated annual dose or dose commitment from such radioactive iodine and radioactive material in particulate form for any individual in an unrestricted area from all pathways of exposure in excess of 15 millirems to any organ.

D. In addition to the provisions of paragraphs A, B, and C above, the applicant shall include in the radwaste system all items of reasonably demonstrated technology that, when added to the system sequentially and in order of diminishing cost-benefit return, can for a favorable cost-benefit ratio effect reductions in dose to the population reasonably expected to be within 50 miles of the reactor. As an interim measure and until establishment and adoption of better values (or other appropriate criteria), the values $1000 per total body man-rem and $1000 per man-thyroid-rem (or such lesser values as may be demonstrated to be suitable in a particular case) shall be used in this cost-benefit analysis. The requirements of this paragraph D need not be complied with by persons who have filed applications for construction permits which were docketed on or after January 2, 1971, and prior to June 4, 1976, if the radwaste systems and equipment described in the preliminary or final safety analysis report and amendments thereto satisfy the Guides on Design Objectives for Light-Water-Cooled Nuclear Power Reactors proposed in the Concluding Statement of Position of the Regulatory Staff in Docket-RM-50-2 dated February 20, 1974, pp. 25-30, reproduced in the annex to this appendix I.

SECTION III. Implementation. A.1. Conformity with the guides on design objectives of Section II shall be demonstrated by calculational procedures based upon models and data such that the actual exposure of an individual through appropriate pathways is unlikely to be substantially underestimated, all uncertainties being considered together. Account shall be taken of the cumulative effect of all sources and pathways within the plant contributing to the particular type of effluent being considered. For determination of design objectives in accordance with the guides of Section II, the estimations of exposure shall be made with respect to such potential land and water usage and food pathways as could actually exist during the term of plant operation: Provided, That, if the requirements of paragraph B of Section III are fulfilled, the applicant shall be deemed to have complied with the requirements of paragraph C of Section II with respect to radioactive iodine if estimations of exposure are made on the basis of such food pathways and individual receptors as actually exist at the time the plant is licensed.

2. The characteristics attributed to a hypothetical receptor for the purpose of estimating internal dose commitment shall take into account reasonable deviations of individual habits from the average. The applicant may take account of any real phenomenon or factors actually affecting the estimate of radiation exposure, including the characteristics of the plant, modes of discharge of radioactive materials, physical processes tending to attenuate the quantity of radioactive material to which an individual would be exposed, and the effects of averaging exposures over times during which determining factors may fluctuate.

B. If the applicant determines design objectives with respect to radioactive iodine on the basis of existing conditions and if potential changes in land and water usage and food pathways could result in exposures in excess of the guideline values of paragraph C of Section II, the applicant shall provide reasonable assurance that a monitoring and surveillance program will be performed to determine:

1. The quantities of radioactive iodine actually released to the atmosphere and deposited relative to those estimated in the determination of design objectives;

2. Whether changes in land and water usage and food pathways which would result in individual exposures greater than originally estimated have occurred; and

3. The content of radioactive iodine and foods involved in the changes, if and when they occur.

SECTION IV. Guides on technical specifications for limiting conditions for operation for light-water-cooled nuclear power reactors licensed under 10 CFR part 50 or part 52 of this chapter. The guides on limiting conditions for operation for light-water-cooled nuclear power reactors set forth below may be used by an applicant for an operating license under this part or a design certification or combined license under part 52 of this chapter, or a licensee who has submitted a certification of permanent cessation of operations under Sec. 50.82(a)(1) or Sec. 52.110 of this chapter as guidance in developing technical specifications under Sec. 50.36a(a) to keep levels of radioactive materials in effluents to unrestricted areas as low as is reasonably achievable.

Section 50.36a(b) provides that licensees shall be guided by certain considerations in establishing and implementing operating procedures specified in technical specifications that take into account the need for operating flexibility and at the same time assure that the licensee will exert his best effort to keep levels of radioactive material in effluents as low as is reasonably achievable. The guidance set forth below provides additional and more specific guidance to licensees in this respect.

Through the use of the guides set forth in this section it is expected that the annual release of radioactive material in effluents from light-water-cooled nuclear power reactors can generally be maintained within the levels set forth as numerical guides for design objectives in Section II.

At the same time, the licensee is permitted the flexibility of operations, compatible with considerations of health and safety, to assure that the public is provided a dependable source of power even under unusual conditions which may temporarily result in releases higher than numerical guides for design objectives but still within levels that assure that the average population exposure is equivalent to small fractions of doses from natural background radiation. It is expected that in using this operational flexibility under unusual conditions, the licensee will exert his best efforts to keep levels of radioactive material in effluents within the numerical guides for design objectives.

A. If the quantity of radioactive material actually released in effluents to unrestricted areas from a light-water-cooled nuclear power reactor during any calendar quarter is such that the resulting radiation exposure, calculated on the same basis as the respective design objective exposure, would exceed one-half the design objective annual exposure derived pursuant to Sections II and III, the licensee shall: \2\

\2\ Section 50.36a(a)(2) requires the licensee to submit certain reports to the Commission with regard to the quantities of the principal radionuclides released to unrestricted areas. It also provides that, on the basis of such reports and any additional information the Commission may obtain from the licensee and others, the Commission may from time to time require the license to take such action as the Commission deems appropriate.

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1. Make an investigation to identify the causes for such release rates;
2. Define and initiate a program of corrective action; and
3. Report these actions as specified in Sec. 50.4, within 30 days from the end of the quarter during which the release occurred.

B. The licensee shall establish an appropriate surveillance and monitoring program to:

1. Provide data on quantities of radioactive material released in liquid and gaseous effluents to assure that the provisions of paragraph A of this section are met;
2. Provide data on measurable levels of radiation and radioactive materials in the environment to evaluate the relationship between quantities of radioactive material released in effluents and resultant radiation doses to individuals from principal pathways of exposure; and
3. Identify changes in the use of unrestricted areas (e.g., for agricultural purposes) to permit modifications in monitoring programs for evaluating doses to individuals from principal pathways of exposure.

C. If the data developed in the surveillance and monitoring program described in paragraph B of Section III or from other monitoring programs show that the relationship between the quantities of radioactive material released in liquid and gaseous effluents and the dose to individuals in unrestricted areas is significantly different from that assumed in the calculations used to determine design objectives pursuant to Sections II and III, the Commission may modify the quantities in the technical specifications defining the limiting conditions in a license to operate a light-water-cooled nuclear power reactor or a license whose holder has submitted a certification of permanent cessation of operations under Sec. 50.82(a)(1).

SECTION V. Effective dates. A. The guides for limiting conditions for operation set forth in this appendix shall be applicable in any case in which an application was filed on or after January 2, 1971, for a construction permit for a light-water-cooled nuclear power reactor under this part, or a design certification, a combined license, or a manufacturing license for a light-water-cooled nuclear power reactor under part 52 of this chapter.

B. For each light-water-cooled nuclear power reactor constructed pursuant to a permit for which application was filed prior to January 2, 1971, the holder of the permit or a license, authorizing operation of the reactor shall, within a period of twelve months from June 4, 1975, file with the Commission:

1. Such information as is necessary to evaluate the means employed for keeping levels of radioactivity in effluents to unrestricted areas as low as is reasonably achievable, including all such information as is required by Sec. 50.34a (b) and (c) not already contained in his application; and
2. Plans and proposed technical specifications developed for the purpose of keeping releases of radioactive materials to unrestricted areas during normal reactor operations, including expected operational occurrences, as low as is reasonably achievable.

Concluding Statement of Position of the Regulatory Staff (Docket-RM-50-2) guides on design objectives for light-water-cooled nuclear power reactors

A. For radioactive material above background \1\ in liquid effluents to be released to unrestricted areas:

\1\ ``Background,'' means the quantity of radioactive material in the effluent from light-water-cooled nuclear power reactors at a site that did not originate in the reactors.

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1. The calculated annual total quantity of all radioactive material from all light-water-cooled nuclear power reactors at a site should not result in an annual dose or dose commitment to the total body or to any organ of an individual in an unrestricted area from all pathways of exposure in excess of 5 millirems; and

2. The calculated annual total quantity of radioactive material, except tritium and dissolved gases, should not exceed 5 curies for each light-water-cooled reactor at a site.

3. Notwithstanding the guidance in paragraph A.2, for a particular site, if an applicant for a permit to construct a light-water-cooled nuclear power reactor has proposed baseline in-plant control measures \2\ to reduce the possible sources of radioactive material in liquid effluent releases and the calculated quantity exceeds the quantity set forth in paragraph A.2, the requirements for design objectives for radioactive material in liquid effluents may be deemed to have been met provided:

\2\ Such measures may include treatment of clear liquid waste streams (normally tritiated, nonaerated, low conductivity equipment drains and pump seal leakoff), dirty liquid waste streams (normally nontritiated, aerated, high conductivity building sumps, floor and sample station drains), steam generator blowdown streams, chemical waste streams, low purity and high purity liquid streams (resin regenerate and laboratory wastes), as appropriate for the type of reactor.

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a. The applicant submits, as specified in Sec. 50.4, an evaluation of the potential for effects from long-term buildup on the environment in the vicinity of the site of radioactive material, with a radioactive half-life greater than one year, to be released; and

b. The provisions of paragraph A.1 are met.

B. For radioactive material above background in gaseous effluents the annual total quantity of radioactive material to be released to the atmosphere by all light-water-cooled nuclear power reactors at a site:

1. The calculated annual air dose due to gamma radiation at any location near ground level which could be occupied by individuals at or beyond the boundary of the site should not exceed 10 millirads; and

2. The calculated annual air dose due to beta radiation at any location near ground level which could be occupied by individuals at or beyond the boundary of the site should not exceed 20 millirads.

3. Notwithstanding the guidance in paragraphs B.1 and B.2, for a particular site:

a. The Commission may specify, as guidance on design objectives, a lower quantity of radioactive material above background in gaseous effluents to be released to the atmosphere if it appears that the use of the design objectives described in paragraphs B.1 and B.2 is likely to result in an annual dose to an individual in an unrestricted area in excess of 5 millirems to the total body or 15 millirems to the skin; or

b. Design objectives based on a higher quantity of radioactive material above background in gaseous effluents to be released to the atmosphere than the quantity specified in paragraphs B.1 and B.2 may be deemed to meet the requirements for keeping levels of radioactive material in gaseous effluents as low as practicable if the applicant provides reasonable assurance that the proposed higher quantity will not result in annual doses to an individual in an unrestricted area in excess of 5 millirems to the total body or 15 millirems to the skin.

C. For radioactive iodine and radioactive material in particulate form above background released to the atmosphere:

1. The calculated annual total quantity of all radioactive iodine and radioactive material in particulate form from all light-water-cooled nuclear power reactors at a site should not result in an annual dose or dose commitment to any organ of an individual in an unrestricted area from all pathways of exposure in excess of 15 millirems. In determining the dose or dose commitment the portion thereof due to intake of radioactive material via the food pathways may be evaluated at the locations where the food pathways actually exist; and

2. The calculated annual total quantity of iodine-131 in gaseous effluents should not exceed 1 curie for each light-water-cooled nuclear power reactor at a site.

3. Notwithstanding the guidance in paragraphs C.1 and C.2 for a particular site, if an applicant for a permit to construct a light-water-cooled nuclear power reactor has proposed baseline in-plant control measures \3\ to reduce the possible sources of radioactive iodine releases, and the calculated annual quantities taking into account such control measures exceed the design objective quantities set forth in paragraphs C.1 and C.2, the requirements for design objectives for radioactive iodine and radioactive material in particulate form in gaseous effluents may be deemed to have been met provided the calculated annual total quantity of all radioactive iodine and radioactive material in particulate form that may be released in gaseous effluents does not exceed four times the quantity calculated pursuant to paragraph C.1.

\3\ Such in-plant control measures may include treatment of steam generator blowdown tank exhaust, clean steam supplies for turbine gland seals, condenser vacuum systems, containment purging exhaust and ventilation exhaust systems and special design features to reduce contaminated steam and liquid leakage from valves and other sources such as sumps and tanks, as appropriate for the type of reactor.

[40 FR 19442, May 5, 1975, as amended at 40 FR 40818, Sept. 4, 1975; 40 FR 58847, Dec. 19, 1975; 41 FR 16447, Apr. 19, 1976; 42 FR 20139, Apr. 18, 1977; 51 FR 40311, Nov. 6, 1986; 61 FR 39303, July 29, 1996; 72 FR 49507, Aug. 28, 2007]

OAH 7-2500-19797-2
PUC Docket Nos. E-002/CN-08-509
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E-002/GS-08-690

ATTACHMENT B

PINGP Study Group Advisory Brief

UNIVERSITY OF MINNESOTA

Twin Cities Campus

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September 1, 2009

Richard C. Luis
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RE: Xcel Energy Prairie Island Nuclear Generating Plant
Certificate of Need Application for Extended Power Uprate
Site Permit Application for Extended Power Uprate
Certificate of Nee Application for Additional Dry Cask Storage of Nuclear Spent Fuel

Dear Judge Luis:

On May 8, 2009, the Saint Anthony Falls Laboratory (SAFL) sent a letter to Mr. William Storm, Office of Energy Security, suggesting that the SAFL play a role in the process of considering expanded generation at the Prairie Island Nuclear Generating Plant (PINGP) by designing a system to provide state of the art water quantity and water quality monitoring. We suggested that our most recent experience, nationally and internationally, involves in situ real-time measurements in aquatic environments with wireless data transfer and assessment over the Internet.

This real-time data assessment is crucial in quantifying the impact of the range of emissions of power plants in the environment. The new technology provides data transparency and can be made readily available to the public, policy makers, and plant operators.

Since we submitted this letter, members of the PINGP Study Group have followed up with our laboratory and have provided us information from the Draft Environmental Impact Statement, the NPDES Permit for the PINGP and correspondence from the Minnesota Department of Natural Resources (MDNR) that identifies the nature of thermal and environmental monitoring presently being conducted and some issues of concern. We are also aware that the Prairie Island Indian Community has requested that our laboratory be engaged by Xcel Energy to evaluate, design and implement a program for real-time monitoring of thermal discharges from the PINGP affecting the Mississippi River and Lake Pepin.

Particularly, since Xcel Energy is proposing to increase thermal discharge and water utilization at the PINGP through its power uprate, we would strongly recommend that any approval of the uprate be conditioned on monitoring designed to provide state-of-the-art information on the impacts of the PINGP and the proposed thermal discharge increase and water drawdown increase on the Mississippi River and Lake Pepin.

We would emphasize that thermal discharge can have significant impacts on an aquatic environment and can reduce dissolved oxygen that impacts aquatic species. Thermal impacts on ice cover can affect fish and other aquatic species as well as presenting a public safety hazard due to thin ice. As documented in correspondence from the MDNR, cold shock events can result in fish mortality and open cycle operation of the PINGP may increase risks to aquatic species. Monitoring must be designed based on current and accurate hydrology and with a sufficient number of sampling locations to accurately identify thermal discharge impacts.

In light of these concerns, the Saint Anthony Falls Laboratory proposes to design and specify state-of-the-art technology to perform real-time monitoring and assessment of the following in connection with the PINGP summarized as follows:

- Monitor and map the thermal discharge plume.
- Monitor dissolved oxygen concentrations in the River and Lake Pepin and identify areas of concern.
- Monitor the volume and temperature of river water withdrawn and discharged during open and closed cycle operations.
- Design models to forecast the nature and locations of impacts from thermal discharges.
- Provide data and assistance to MDNR and WDNR for timing and site selection for fish counts and other biological evaluation.
- Monitor /warn of "cold shock" events.
- Monitor and report Lake Pepin ice conditions as an aid in forecasting impacts on fish and other aquatic life and public safety.
- Evaluate the impact of "open cycle" operation of the PINGP on the River environment.

We have reviewed the Prairie Island Indian Community's proposal for thermal discharge monitoring and sampling in the Tribe's Initial Brief filed August 24, 2009 and believe that the proposal is reasonable, appropriate and consistent with our summary scope of work proposed above.

The SAFL offers its expertise and technical services to Xcel Energy, the PINGP operator, and to Minnesota Government Agencies as an independent entity on a contractual basis. We would welcome the opportunity to provide additional information on how we could contribute to this process.

Please contact us with any questions or comments.

Sincerely,

Fotis Sotiropoulos, Ph,D
Director, St. Anthony Falls Laboratory

OAH 7-2500-19797-2
PUC Docket Nos. E-002/CN-08-509
E-002/CN-08-510
E-002/GS-08-690

ATTACHMENT C

PINGP Study Group Advisory Brief

Minnesota Department of Natural Resources
500 Lafayette Road • St. Paul, MN • 55155-40

Minnesota
DEPARTMENT OF NATURAL RESOURCES

August 21, 2009

Bill Storm, Project Manager
Minnesota Department of Commerce
85 7th Place East, Suite 500
St Paul, MN 55101- 2198

RE: Xcel Energy Prairie Island Nuclear Generating Plant Proposed Uprate and Dry Cask Storage
Final Environmental Impact Statement
PUC Site Permit Docket Number: E002/GS-08-690

Dear Mr. Storm:

The Minnesota Department of Natural Resources (MDNR) has reviewed the Prairie Island Nuclear Generating Plant (PINGP) Final Environmental Impact Statement. We are providing comments in reference to EIS Chapter 1- Extended Power Uprate and Chapter 3- Comments and Responses.

The MDNR has previously reviewed and commented on the Draft Environmental Impact Statement (DEIS), the EIS Scoping document and Scoping EAW, and provided an additional letter of clarification on our scoping comment. We note that the Department of Commerce - Office of Energy Security has included or summarized some of this information within the combined final EIS/Site Permit Docket. Both components of this EIS document require specific information describing environmental impacts and the measures necessary to mitigate them, as well as other project related information. Our review of the Chapter 3 comments submitted for the DEIS indicated that a number of commenters were concerned about inadequate discussion of environmental impacts and mitigation. Those expressing that concern included members of the PUC authorized Advisory Task Force, the Prairie Island Study Group, the Prairie Island Indian Community, and the City of Red Wing.

It is our determination that the analysis and description of environmental impacts in Chapter 1 of the Final EIS is insufficient for a large power generating facility that has the potential for negatively affecting the aquatic biota and public use of the Upper Mississippi River. Thermal modeling studies for the river plume have not been summarized under the Human and Environmental Impacts section in the EIS. Chapter 3 (Comments and Responses) does include a response provided by Xcel to comments submitted by MPCA on the DEIS that references thermal modeling. This consists of some brief narrative and tables based on an Xcel thermal performance model for the period April through November. Xcel concluded that there will only be very slight incremental temperature increases in the river during this period, and that there will be no additional exceedances of permit limitations. We are not aware that this modeling has been provided as an exhibit during the environmental review stages of the uprate project. The result is that reviewers have to accept the conclusions of Xcel, and only if they were able to locate this information in the response document of the EIS.

In addition to identifying human and environmental impacts, the EIS must discuss measures to mitigate those impacts. We find that with the facility uprate and 10% increase in the temperature of the cooling water discharge during the winter period, there are no measures proposed to mitigate the additional thermal loading. The EIS merely states that the existing cooling towers can be used more frequently in the spring and fall and Xcel can de-rate the plant to avoid or minimize exceeding NPDES Permit temperature limitations. The latter operational procedure would only apply to those extreme summer conditions that can occur briefly when there is a convergence of very high air temperature and humidity during a year of drought with low stream flow.

A principal concern for the Department of Natural Resources is the effect of the new thermal discharge regime on the ice cover conditions of Lake Pepin, and the fact that ice conditions are not regulated by or result from violations of the state water quality standards for temperature. The previously referenced thermal performance model did not include the December through March period. This is a period of open cycle operation with no cooling towers in use and, with the uprate, an additional 3 degrees Fahrenheit being discharged to the river. The EIS conveys a summary of our concerns on this issue, but responds with conclusions of the applicant that were based on historical data or studies that are clearly not representative of the upstream 6 miles of the lake which extends into the large embayment near Bay City, Wisconsin. MDNR had previously stated the upstream distance of lake as 5 miles for comment on the DEIS, but this was not considering the Wisconsin Channel and side chute at Catherine Pass. The data referenced by Xcel also does not represent the conditions associated with the thermal discharge of the extended power uprate. With implementation of the Lake Pepin TMDL, this is an extent of the lake that both MDNR and WDNR expect to be restored for aquatic vegetation and greatly improved fish and wildlife values. It is a management responsibility for both DNRs to provide safe access and winter recreational opportunities for this significant extent of the lake.

The ice conditions on the upper 6 miles of Lake Pepin have been impaired since 1983 when modification of the NPDES permit allowed discontinuation of cooling tower use during the winter. Popular fishing destinations downstream of this upper extent of lake, such as major points and bars, have also become hazardous locations. Lake Pepin ice conditions will be further degraded with the uprate unless a more balanced facility design is implemented. This will require partial winter cooling tower use to address the newly proposed increment of heat, and also to address a reasonable fraction of the additional thermal loading that has been characteristic of the discharge since 1983. This change in current operating procedures would need to be based on river and lake studies of temperature and ice conditions.

The Department of Natural Resources is formally requesting that the Public Utilities Commission, as part of the Site Permit, require that a thermal study be conducted to update historical studies conducted by the University of Minnesota- St. Anthony Falls Hydraulic Laboratory (1980&1987). The study would include thermal modeling and review of river temperature data, Landsat photos and past studies. Because ice conditions are not regulated by the NPDES Permit, this matter will need to be addressed by the PUC. We have referenced the need for this study in our comment for the DEIS (5/8/09) and in our clarification letter for scoping comments (2/20/09). We would appreciate the opportunity to consult with the interested parties in the development of the study, and will provide review and evaluation of results.

Thank you for the opportunity to provide comments on the Final EIS. Please contact me at (651) 259-5156 with any questions regarding this letter.

Sincerely,

Randall Doneen
Environmental Review Planning Director