

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
ATOMIC SAFETY AND LICENSING BOARD

In re: License Renewal Application

Docket Nos. 50-282 and
50-306

Submitted by

Nuclear Management Company, LLC
PINGP, Units 1 and 2

**Prairie Island Indian Community's
Notice of Intent to Participate and Petition to Intervene**

Filed on August 18, 2008

I. INTRODUCTION

The Prairie Island Indian Community in the State of Minnesota (“Community,” “Tribe,” or “Petitioner”), by and through attorney Philip R. Mahowald, the Community’s General Counsel, petitions to intervene and requests the U.S. Nuclear Regulatory Commission (“NRC” or “Commission”) to grant an adjudicatory hearing on the Nuclear Management Company LLC’s (“applicant”) application for renewal of its license to operate Units 1 and 2 of the Prairie Island Nuclear Generating Plant (PINGP). The Community files this petition pursuant to the notice of opportunity for a hearing published at 73 Fed. Reg. 34335 (June 17, 2008), Section 189a of the Atomic Energy Act (“AEA”) [42 U.S.C. § 2239(a)], and 10 C.F.R. § 2.309.

II. BACKGROUND

The Prairie Island Indian Community is a Federally recognized Indian Tribe organized under The Indian Reorganization Act, 25 U.S.C. § 476, and is governed under the terms of a Constitution and Bylaws adopted by tribal members on May 23, 1936, and approved by the Secretary of the Interior on June 20, 1936, as amended (the “Constitution and Bylaws”). Article IV, Section 1 of the Constitution provides that the Community Council (sometimes referred to as the Tribal Council) shall be the governing body for the Prairie Island Indian Community. The Tribal Council is comprised of five elected tribal members, and is the duly elected body and the only entity authorized to act or speak on behalf of the Prairie Island Indian Community. All five members of the Tribal Council reside within approximately five (5) miles of the PINGP. The Tribal Council has the authority under the Constitution and Bylaws to promote the general welfare of the Community by regulating the conduct of trade and the use and disposition of property upon the Reservation.

The Prairie Island Indian Reservation is located approximately 40 miles southeast of the Twin Cities of Minneapolis - St. Paul and near the cities of Red Wing and Hastings, Minnesota. It is located on Prairie Island at the confluence of the Vermillion and Mississippi rivers. The size of the reservation (lands held in trust by the United States for the benefit of the Community) now totals approximately 1,900 acres, including approximately 290 acres recently transferred from the Army Corps of Engineers, known as Parcel D. *See* Declaration of Philip R. Mahowald (“Mahowald Declaration”), Exhibit A. In addition, the tribe owns approximately 680 acres in fee. The Community is approximately 600 yards directly north of the PINGP. *Id.*

There are 767 enrolled members of the tribe; approximately 250 reside on or near the Reservation. The Community owns and operates Treasure Island Resort and Casino, the largest employer in Goodhue County, which employs approximately 1,500 people. The Resort and Casino includes a 250-room hotel and convention center that is currently being expanded to include an additional 230 rooms. The Treasure Island Resort and Casino offers gaming, dining, live entertainment, a 95-space RV park, and a 137-slip marina to accommodate visitors arriving by the Mississippi River. The marina attracts many hundreds of visitors during the summer months. On any given day during the year, there may be more than 8,000 visitors to the reservation.

The Community is concerned that the renewal of the PINGP license may result in a detrimental effect to the health and safety of Community members and pose a risk to visitors to the reservation. In addition, the renewal of the license may have a detrimental effect on the environment in which the Community is situated. Of vital importance to the Community are the protection of burial mounds and other areas of cultural, historical, or spiritual significance that were, or may be, affected by the operation of PINGP. Consequently, the Community is putting forth several contentions to ensure that the license renewal conforms to NRC safety and environmental regulations and other applicable law.

The Community is deeply concerned about the general lack of attention given to the Community in the Environmental Report (ER) of the PINGP License Renewal Application. Overall, the ER minimizes the presence of the Tribe, the tribal population, and tribal resources. For example, although the Tribe is mentioned in the PINGP site features in Section 2.1.2, Section 2.1 of the ER, “General Site Description,” makes no

mention of the Community but does mention other governmental units. No detail is provided on Community land holdings, home sites, and population. Figure 2.1-2 of the ER does not correctly show the Community's lands. Exhibit A to the Mahowald Declaration correctly shows tribal lands. Other examples of the lack of data on the Community in the ER include information on Community demographics, including population growth, and the tourist population related to the Community's casino, hotel, and marina operations; information on Community land use planning activities (although the land use plans of other governmental units) in the vicinity of the site were evaluated. This general lack of attention to the Community has caused the Community to pay more attention to the evaluation of various impacts in the ER, rather than waiting to determine whether the NRC draft Environmental Impact Statement (EIS) eventually corrects these deficiencies.

III. ARGUMENT

A. The Community's Petition Is Timely.

The notice of opportunity of hearing was published on June 17, 2008 (73 Fed. Reg. 34335). The notice specified that the written request for hearing or petition for leave to intervene must be filed within 60 days after the date of publication of the Federal Register Notice. Under the Commission's regulations regarding the computation of time in 10 C.F.R. section 2.306, this petition is timely filed within 60 days of the notice of opportunity of hearing.

B. Petitioner Has Standing to Request an Adjudicatory Hearing and to Intervene.

The Community is located immediately adjacent to the PINGP, literally across the street. Although the Community can meet the traditional criteria in 10 C.F.R. Section 2.309(d)(1)(ii)-(iv) for determining standing, the Community also has standing based on the proximity presumption. The “proximity presumption,” whereby a petitioner is presumed to have standing to intervene without the need to specifically plead injury, causation, and redressability, applies if the petitioner lives within fifty miles of the nuclear reactor. The Community’s proximity immediately adjacent to the PINGP should be determinative of the Community’s standing to participate in this proceeding. See, e.g., Entergy Nuclear Operations, Inc. (Indian Point Nuclear Generating, Units 2 and 3), LBP-08-13, at 5 (2008); Florida Power and Light Co. (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-01-6, 53 NRC 138, 146-50 (2001) (applying the presumption in an operating license renewal proceeding).

C. Contentions

1. THE ANALYSIS OF HISTORICAL AND ARCHAEOLOGICAL RESOURCES IN SECTION 4.1.6 OF THE ENVIRONMENTAL REPORT (PAGES 4-54 TO 4-56) IS INCOMPLETE BECAUSE IT DOES NOT CONTAIN INFORMATION SUFFICIENT TO MAKE AN ACCURATE ASSESSMENT OF WHETHER ANY HISTORIC OR ARCHAEOLOGICAL PROPERTIES WILL BE AFFECTED BY THE PROPOSED LICENSE RENEWAL AND DOES NOT COMPLY WITH 10 C.F.R. 51.53(c)(3)(ii)(K).

10 C.F.R 51.53(c)(3)(ii)(K) requires the applicant for license renewal to include in the ER an assessment of whether any historic or archaeological properties will be affected by the proposed project. The purpose of this requirement is to enable the NRC to meet its responsibilities under the National Historic preservation Act. 16 U.S.C. 470-

470w-6. The obligation to comply with the National Historic Preservation Act rests with the federal agency, in this case the NRC. However, the important starting point for NRC compliance is an accurate assessment of these historic and archaeological resources by the license applicant.

As noted in the NRC Environmental Standard Review Plan:

[t]he purpose of the historic and archaeological resources assessment is to ensure that such resources that are considered eligible for inclusion in the National Register of Historic Place are not adversely affected by proposed activities related to refurbishment. Historic and archeological resources may include prehistoric or historic archaeological sites, historic properties, districts and landscapes, as well as traditional cultural properties that may have significance for Native American tribes.

U.S. Nuclear Regulatory Commission, “Standard Review Plans For Environmental Reviews For Nuclear Power Plants Supplement 1: Operating License Renewal,” October 1999 (NUREG-1555, Supplement 1) at page 3.3.6-3. These traditional cultural properties are central to the core beliefs and value system of the Community. It is also sometimes difficult for other cultures to understand the reverence that tribal entities such as the Community have for these cultural properties. Therefore, it is of critical importance that the license applicant undertakes a comprehensive and careful assessment of these resources. It is also important that the applicant take adequate measures to ensure that these properties are not disturbed, as well as taking steps to ameliorate the impacts of past disturbances.

The PINGP site is laden with these traditional cultural properties. The applicant discusses the assessment of archaeological and historic resources in Section 4.16.2 of the ER. The applicant states that it “is aware . . . that the site vicinity and the surrounding environs have significant potential for containing cultural resources.” ER at page 4-56.

In addition, the applicant's contractor, The 106 Group Ltd. ("106 Group") performed a cultural resources assessment of a study area that included the entire area within the PINGP site. *See* ER, Exhibit A, Section 2.1.1 at p. 3. It is important to note, however, that The 106 Group stated in its summary that no construction activities were planned during the relicensing period, *id.* at p. 14, which calls into question whether The 106 Group was aware of applicant's plans to construct several temporary buildings, office space for construction workers, a decontamination building, warehouses, related infrastructure and other facilities related to the steam generator replacement project for Unit 2, *see* ER at 4-55.

The 106 Group assessment did not involve any fieldwork, but rather involved a review of the collected site files, reports, maps, and other literature. In the results section of the report, the 106 Group states:

Despite the construction of the PINGP and associated features, there remains *undisturbed land* within the study area. Because of the remaining areas of the study area are in proximity to significant bodies of water and appear to be undisturbed, they are considered to have inherently very high potential to contain intact precontact archaeological sites. Further there is also the potential for finding intact burials because four precontact mound sites, some of which have yielded human remains, have been recorded in the study area.

The 106 Group, Ltd., Cultural Resources Assessment for the Prairie Island Nuclear Generating Plant, Goodhue, Minnesota, January 2008 (ER, Exhibit A, Section 4.0 at 10) (emphasis added). However, the applicant never mentions this conclusion on the high potential for significant sites in the ER. The 106 Group's conclusion strongly suggests the need to do a "field assessment" of these potential resources, even in previously disturbed areas, before any construction activity is undertaken at the site.

The applicant intends to rely on a procedure, “Excavation and Trenching Controls,” to protect any historic or archaeological resources that have been previously identified or inadvertently discovered. ER at 4-54. The ER notes that the site Environmental Coordinator “is responsible for determining if proposed land disturbing activity will occur in the vicinity of a culturally significant site, and if so,” should consult with the SHPO to mitigate potential impacts. However, it is unclear whether the Environmental Coordinator has any qualifications or expertise to make such judgments as to whether culturally-significant material is at risk. In addition, it places this decision in the timeframe of ongoing construction activity, where the pressure to proceed with the work is great. Although the applicant’s letter to the State of Minnesota Historic Preservation Officer (“SHPO”), ER, Attachment D, states that any discovery of archaeological materials will be assessed by a professional archaeologist, the initial decision is left in the hands of the Environmental Coordinator who may have no expertise in this area.

The ER identifies one major activity, the steam generator replacement for PINGP Unit 2, as a major refurbishment activity. The applicant reaches the conclusion that these refurbishment activities will not have an impact on cultural resources because this project will occur on previously disturbed lands. See ER at Section 4-55. This conclusion is faulty because it is not disclosed exactly where construction activities for the steam generator replacement project will occur. In Figure 2 of The 106 Group report, there appear to be both previously disturbed and undisturbed areas identified immediately adjacent to the PINGP. More specificity is needed to identify precisely where on the *previously disturbed lands* these construction activities will take place.

Moreover, an additional activity, the expansion of the Independent Spent Fuel Storage Installation (“ISFSI”) at the PINGP site to accommodate the additional spent fuel produced during the license renewal term, was not analyzed by The 106 Group for its potential impact on cultural resources. On May 16, 2008, the applicant filed a Certificate of Need (CON) application with the Minnesota Public Utilities Commission (PUC) requesting the use of an additional 35 dry casks (increasing from 29 to 64) to support license renewal. In the CON application, the applicant states that the current ISFSI, currently under an NRC license to store up to 48 casks until the year 2013, would need to be expanded to accommodate the 16 additional casks needed if the license term were renewed, for a total of 64 casks through the relicensing period. The applicant’s CON filing further states that an additional 34 dry casks will be needed after the plant is decommissioned, for a total of 98 dry casks. This will necessitate doubling the size the ISFSI. The applicant anticipates constructing two new concrete storage pads adjacent to the south of the existing storage pads. As The 106 Group stated in its report, “if undertakings are proposed during the course of the operating license, an appropriate [area of potential effect] should be determined in consultation with the SHPO.” ER, Exhibit A, Section 5.3 at p. 14. The ER does not contain any discussion of how this expansion might affect archeological or historic resources and consequently is incomplete and not in compliance with 10 C.F.R. Section 51.53(c)(3)(ii)(K).

The Community does not believe that the applicant’s excavation procedure, nor its assurances that the activities associated with the steam generator replacement for Unit 2 will not adversely affect cultural resources, is an adequate substitute for a “cultural resources protection plan,” based on an on-site cultural resources survey. The plan

would, among other things: identify previously discovered cultural resources areas, as well as those areas on the PINGP site that have a high potential for the discovery of cultural resources; identify any construction and other activities that may occur because of renewal of the license including the expansion of the ISFSI; and ensure that these activities do not take place on or near the cultural resources areas by designating them as “no construction zones.” It is only through such a survey and plan that the NRC will have the information necessary from the applicant to ensure that its responsibilities under the National Historic Preservation Act will be met.

The Community is particularly concerned that such a plan be developed because of the desecration of significant cultural resources during the construction of the original units at PINGP, without any notification or consultation with the Community. Among other things,

- NSP described the pre-construction archaeological work as a “salvage program.” Salvage archaeology refers to archaeological survey and excavation carried out in areas about to be destroyed by construction. *See* Mahowald Declaration, Exhibit B.
- Burial mounds located on and adjacent to the proposed location of the cooling towers were excavated. According to one NSP document, “Some mounds contained one body, a few had many successive burials.” *See* Mahowald Declaration, Exhibit C at 17.
- The archaeologist hired by NSP to conduct the salvage operation apparently borrowed a large trenching machine and operator from NSP to speed up parts of the study. *See* Mahowald Declaration, Exhibit B.
- The archaeologist hired by NSP used a mechanical grader to strip the upper 60 centimeters of a 15 meter by 20 meter area at the Bartron village site that was previously undisturbed, thereby destroying over a thousand years of recent history of the Community and its ancestors in that area. *See* Mahowald Declaration, Exhibit D at 2.

- Original field notes, maps or other reports from prior excavations are missing or incomplete. *Id.*

The Community hopes that problems like these in the past can be avoided in the future.

2. THE SEVERE ACCIDENT MITIGATION ALTERNATIVES (SAMA) ANALYSIS DOES NOT ACCURATELY REFLECT DECONTAMINATION AND CLEAN UP COSTS ASSOCIATED WITH A SEVERE ACCIDENT AT THE PRAIRIE ISLAND SITE AND, THEREFORE, THE SAMA ANALYSIS UNDERESTIMATES THE COST OF A SEVERE ACCIDENT AND IS NOT IN COMPLIANCE WITH 10 C.F.R. §51.53(c)(3)(ii)(L).

The Environmental Report (ER) is required to include “a consideration of alternatives to mitigate severe accidents.” 10 C.F.R. §51.53(c)(3)(ii)(L). That severe accident mitigation alternatives (“SAMA”) analysis depends upon a reasonable estimation of the costs of a severe accident in order to have a base-line to measure the benefits of proposed mitigation measures. The SAMA analysis for PINGP Units 1 and 2, as presented in Section 4.17 and Attachment F of the ER, used the MELCOR accident consequences code system, version 2 (“MACCS2”) to calculate the costs of a severe accident at the PINGP site. ER Section F.3.

However, instead of the outdated decontamination cost figure contained in the MACCS2 code, the SAMA analysis for PINGP should incorporate the analytical framework contained in the 1996 Sandia National Laboratories report concerning site restoration costs (hereinafter the “Site Restoration” study or report). *See* D. Chanin and W. Murfin, *Site Restoration: Estimation of Attributable Costs from Plutonium-Dispersion Accidents*, SAND96-0957, Unlimited Release, UC-502, (May 1996). The Licensing Board in the Indian Point License Renewal Proceeding considered the Site Restoration Study, as well as articles examining the cost consequences of a nuclear accident in the New York metropolitan area, in its decision to admit a contention based on the Site

Restoration Study. See Entergy Nuclear Operations, Inc. (Indian Point Nuclear Generating, Units 2 and 3), LBP-08-13, at 64 (2008) (hereinafter, “Entergy Order”).

The Site Restoration study analyzed the expected financial costs for cleaning up and decontaminating a mixed-use urban land and Midwest farm and range land. This study, which was commissioned by the U.S. Department of Energy, estimated the activities likely to be involved in the decontamination of an accident involving the dispersal of plutonium. Although the Site Restoration study analyzed a scenario in which plutonium from a nuclear weapon is dispersed as a result of an accident resulting from a fire or non-nuclear detonation of the weapon’s explosive trigger device, the study’s methodology and conclusions to estimate decontamination costs are directly applicable to the SAMA analysis in the ER.

The Site Restoration study recognized that it is extremely difficult to clean up and decontaminate small radioactive particles (i.e., particles ranging in size from a fraction of a micron to a few microns). See Site Restoration Study 96-0957, at 5-7. Such small-sized particles adhere more readily to objects and become more easily lodged in small cracks, crevices, masonry, fabric, or grass and other vegetation. *Id.* at 5-7 to 5-10. The study examined the costs for extended remediation for mixed-use urban land (defined as having the national average population density of 1,344 persons/km²), Midwest farmland, arid western rangeland, and forested area.

The Site Restoration study recognized that earlier estimates (such as those incorporated within the MACCS codes) of decontamination costs are incorrect because they examined fallout from the nuclear explosion of nuclear weapons that produce large particles and high mass loadings (i.e., particles ranging in size from tens to hundreds of

microns). *Id.* at 2-9 to 2-10, 5-7. As stated in SAND 96-0957, “[d]ata on recovery from nuclear explosions that have been publicly available since the 1960’s appear to have been misinterpreted, which has led to long-standing underestimates of the potential economic costs of severe reactor accidents.” *Id.*, at 2-10.

The Site Restoration study recognized that:

In comparing the numbers of cancer health effects that could result from a plutonium-dispersal accident to those that could result from a severe accident at a commercial nuclear power plant, it is readily apparent that the health consequences and costs of a severe reactor accident could greatly exceed the consequences of even a “worst-case” plutonium-dispersal accident because the quantities of radioactive material in nuclear weapons are a small fraction of the quantities present in an operating nuclear power plant.

Id. at 2-3 to 2-4. The cultural and economic impacts on the Prairie Island Indian Community, including the impact on the tourist industry associated with the Treasure Island Casino and Resort stemming from the stigma effects of the dispersion of radioactive material, would likely be staggering. All of these costs must be accounted for in the SAMA analysis.

Areas within the PINGP Emergency Planning Zones have different population densities and property values than those examined in the Site Restoration report. Accordingly, as part of its analysis, the ER should revise the site restoration results for the area surrounding PINGP, incorporate the property values appropriate to the unique area of the Prairie Island Indian Community and associated Treasure Island complex, and ensure that the resulting financial costs are expressed in present value (in 2008, 2009 and 2010 dollars) and future value (until 2035, the likely term of any renewed operating license).

The economic model found in the Site Restoration study is currently available to the applicant from the DOE Scientific and Technical Information Service [www.osti.gov]. The results from this readily available model, as updated and revised for the PINGP site, should be included in the ER and in any SAMA analysis conducted as part of this license renewal proceeding.

3. THE INFORMATION AND ANALYSIS IN THE ER ON ENDANGERED AND THREATENED SPECIES IS INADEQUATE AND INCOMPLETE AND DOES NOT COMPLY WITH 10 C.F.R. SECTION 51.53(c)(3)(ii)(E).

The NRC regulations in 10 C.F.R. 51.53(c)(3)(ii)(E) require the applicant to assess the impact of refurbishment and other license renewal-renewal-related construction activities on important plant and animal habitats. The applicant is also required to assess the impact of the proposed action (i.e., license renewal) on threatened or endangered species in accordance with the Endangered Species Act (ESA). The petitioner believes that the ER is deficient with respect to the Higgins eye pearly mussel, a federally-listed endangered species, and with regard to an analysis of the impacts of transmission lines on the mortality of any threatened or endangered avian species.

a. Higgins eye pearly mussel

The ER, on page 2-15, notes that the Higgins eye Pearly mussel (“Higgins eye”) is listed as an endangered species by both the US Fish and Wildlife Service (US FWS) and the Minnesota Department of Natural Resources (MN DNR). The applicant confirms in the ER Higgins eye has been recorded in Goodhue and Dakota counties. *Id.* The ER states that there are on-going efforts to re-introduce the Higgins eye (meaning it was there before) in both Pool 3 and 4 of the Mississippi River. It should be noted that the Community is part of these restoration efforts, along with the U.S. Fish and Wildlife

Service and the Minnesota DNR and that the restoration area is located 0.5 mile upstream of the PINGP's intake (ER at 4-25).

According to the US FWS:

[t]he current range for the Higgins eye mussel is about 50 percent of its historic distribution, which extended as far south as St. Louis, Missouri, and in several additional tributaries of the Mississippi River. The Higgins eye pearlymussels depend on deep, free-flowing rivers with clean water. Much of their historic habitat was changed from free-flowing river systems to impounded river systems. This resulted in different water flow patterns, substrate characteristics, and host fish habitat and movement that affects how the Higgins eye feed, live, and reproduce. To reproduce, male Higgins eye release sperm into the river current and downstream females siphon in the sperm to fertilize their eggs. After fertilization, the females store the developing larvae (glochidia) in their gills until they're expelled into the river current. Some of the glochidia are able to attach themselves to the gills of host fish, where they develop further. After a few weeks, the juvenile mussels detach from the gills of the fish and settle on the river bottom, where they can mature into adult mussels and possibly live up to 50 years. The sauger, walleye, yellow perch, largemouth and smallmouth bass, and freshwater drum are considered suitable hosts for Higgins eye glochidia.”

See www.fws.gov/midwest/endangered/clams/higginseye/higgins_fs.html.

The applicant, in Section 4.7 of the ER (Threatened and Endangered Species) notes that impacts to threatened and endangered species is a Category 2 issue and that site-specific assessment would be required to determine whether continued plant operations or refurbishment would be affected. There is very little discussion or analysis of the impact of license renewal on the Higgins eye in the ER. Section 4.3 of the ER, “Entrainment of Fish and Shellfish,” discusses efforts to reduce the entrainment of fish and shellfish in early life stages by using a fine-mesh screen with the cooling water intake (best available technology). However, impacts to the Higgins eye from current PINGP operations are not discussed in this section, either in regard to entrainment or to any other potential impact on the Higgins eye from current or extended operation of the facility. The ER does include a conclusory statement on page 4-15 that the “any environmental

impact from the entrainment fish and shellfish in early life-stages at PINGP are SMALL and does not require further warrant mitigation”

In its review of endangered species (Section 4-7), the applicant states that “[r]enewal of the PINGP license is not expected to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of any critical habitat.” ER at 4-27. No information, relative to impacts, other than the statement that “some larval *higginsii* will be carried downstream into the power plant’s intake screen house” is provided. ER at 4-25. In the absence of information, it is difficult to determine how the applicant has reached this conclusion in regard to the Higgins eye. No quantification of losses or further assessment, is provided, as required by 10 C.F.R. § 51.53(c)(3)(ii)(E). These conclusory statements do not meet the requirement that “the applicant shall assess the impact of the proposed action on threatened or endangered species in accordance with the Endangered Species Act (10 C.F.R. § 51.53(c)(3)(ii)(E).

b. Avian mortality from transmission lines

Section 3.1.6.3 of the ER (Avian Mortality)” discusses avian mortalities that have resulted from the collisions from transmission lines. The applicant noted that over a five year period (1973 – 1978), 453 bird carcasses representing 53 species were found along portions of the transmission lines from PINGP. Sixty-four percent of those carcasses were found along the 2,500 foot east-west portions of the transmission lines. About one-half of these transmission lines are on the boundary that separates the tribe’s land (east-west boundary separating Sections 5 and 32, T113N, R15West) from the applicant’s property. The applicant provided no information regarding species composition for this

period, nor any data to definitely indicate that avian mortality has been not reduced since the five year period of the study. Therefore, the petitioner cannot ascertain the impact on any endangered or threatened species.

In addition, no explanation was offered in the ER as to why avian mortality was so high at the PINGP, other than to quote a statement on page 3-13 from the NRC generic Environmental Impact Statement on License Renewal that “no relatively high collision mortality is known to occur along transmission lines associated with nuclear power plants in the United States other than the Prairie Island Plant in Minnesota.” U.S. Nuclear Regulatory Commission, Generic Environmental Impact Statement for License Renewal of Nuclear Plants, NUREG-1437 Vol. 1 (1996) at 46.

There is no mention whatsoever that the PINGP sits in the Mississippi River flyway. The Mississippi River is recognized as a Globally Important Bird Area and migratory "Flyway" for birds. See Couleeaudubon.org. 2006. “Mississippi Flyway Birding Festival.” Available at: http://www.couleeaudubon.org/festival06_checklist.html. The Mississippi flyway is heavily utilized because it is uninterrupted by mountains or hills that would interfere with the movements of migrating birds. See Birdnature.com. 2008. “North American Migration flyways.” Available at: www.birdnature.com/flyways.html. The Upper Mississippi River and associated ecosystem is very important to birds that are year-round residents and those who are migratory. About 40% of all North American waterfowl use the river as a migratory flyway, and 326 species of birds (about 1/3 of all species in North America) use the river corridor as a flyway in their spring and fall migrations. The Mississippi River is a well-known migration corridor for millions of waterfowl, including dabbling ducks,

canvasbacks, and scaup that pass through this flyway annually. *See Ducks Unlimited. 2008. "Upper Mississippi River."* Available at: <http://www.ducks.org/conservation/initiative19.aspx>. Also, the bottomland forests provide wintering and migration habitat for mallards, black ducks, wood ducks, northern pintails and Canada geese. *Id.* Parts of the Mississippi River also provide habitat for breeding and wintering birds such as the bald eagle. *See USGS. 2007. "About the Upper Mississippi River System."* Available at: http://www.umesc.usgs.gov/umesc_about/about_umrs.html.

The associated floodplain forests and wetlands of the Upper Mississippi River have become increasingly important because of losses of these habitats throughout the upper Midwest. Higher species abundance is found in the floodplain as opposed to adjacent upland, and many species, such as the prothonotary warbler, brown creeper, yellow-billed cuckoo, yellow-bellied sapsucker and great flycatcher, show a clear preference for floodplain forest. *See* http://www.umesc.usgs.gov/terrestrial/migratory_birds/mknutson_5002534.html. A study done in 1993 found 150 species of birds between Pools 4-8 during spring migration and 20% of these were neotropical migratory birds. *Id.* A few declining species such as the red-shoulder hawk, cerulean warbler, Louisiana waterthrush, northern waterthrush, and prothonotary warbler are dependent on these forests. *Id.* Because of the importance of the Mississippi flyway, resource management and other human activities within the flyway should be conducted carefully to protect the health of this important ecosystem and the birds and other wildlife that depend on it.

Prairie Island and PINGP are also right in the middle of the Vermillion River and Lower Cannon River Important Bird Area. This is an area of high biodiversity significance within Minnesota harboring diverse bird communities unique to the Upper Mississippi River. This is one of the top 4 sites in Minnesota for rare forest birds and it contains the highest number of records for two special concern species-- the Red-shouldered Hawk and Cerulean Warbler (Dunevitz 2001). A total of 33 Species of Greatest Conservation Need (SGCN) birds have been documented on the site by the Minnesota Biological Survey, and there is potential to document many more. (Dunevitz, H. 2001. An evaluation of the ecological significance of the Vermillion Bottoms and Lower Cannon River area. Unpublished report. MN Department of Natural Resources).

Section 4.7 of the ER (Threatened and Endangered Species) offers no information or analysis relative to possible impacts from the continued operation of the PINGP on any threatened or endangered migratory bird species, as required by C.F.R. 51.53(c)(3)(ii)(E). The petitioner believes that because of the PINGP's location within the Mississippi River flyway and the past high incidence of avian mortalities, there is a possibility that threatened or endangered species may be impacted by continued operation of the plant. It

The avian mortality discussion in the ER is deficient on other grounds apart from the lack of information on potential impacts to threatened or endangered species. The ER states that "very few bird carcasses have been observed at PINGP or along associated transmission lines since 1978, but systematic searches or formal avian collision studies have not been conducted." ER at 3-13. The absence of systematic searches or formal studies on a known problem cannot be reconciled with the applicant's adoption of the conclusion in the 1996 NRC GEIS that "avian collisions with transmission lines did not

significantly reduce species populations, and bird collisions with transmission lines associated with license renewal would not cause long-term reduction in bird populations, and this, collision mortality is of small significance.” ER at 3-13.

The ER mentions that the applicant has entered into a Memorandum of Understanding (MOU) with the US Fish and Wildlife Service (FWS) in 2002 to establish policies and procedures for dealing with migratory birds that may be on applicant’s property and for the development of an Avian Protection Plan. The MOU further states that an Avian Protection Plan will be developed; as of April 2008 the plan has not been developed. ER at 3-13.

4. APPLICANT’S ENVIRONMENTAL REPORT FAILS TO CONSIDER THE DISPARATE IMPACT OF HIGHER THAN AVERAGE CANCER RATES AND OTHER ADVERSE HEALTH IMPACTS IN THE ADJACENT MINORITY POPULATION.

The ER fails to consider the impact of the proposed license renewal of the PINGP on the Prairie Island Indian Community. The specific issue of fact and law to be controverted is whether applicant’s Environmental Report sufficiently assesses the health impacts of radionuclide emissions from the PINGP. *See* 10 C.F.R. 2.309(f)(1)(i). This issue is also within this proceeding’s scope. 10 C.F.R. 2.309(f)(1)(iii),(f)(2)(for issues under NEPA, petitioner shall file contentions base upon the ER).

Even though radiation exposure to the public during the license renewal term is a Category 1 issue which generally cannot be challenged, the Community presents “new and significant” evidence indicative of higher-than-average cancer incidence and other adverse health consequences among people living near the PINGP. In addition to the evidence that was submitted in the Indian Point proceeding through Declaration of Joseph J. Mangano, there are other recent studies that collectively establish a higher incidence

rate of cancer and a higher cancer mortality rate for populations such as the Community residing proximal to nuclear facilities. Moreover, these studies expose significant environmental justice issues because the Community potentially represents a specific minority area with higher than expected cancer rates.

A number of studies have reported elevated rates and/or risks for cancer experienced by populations residing proximal to nuclear facilities. In particular, elevated rates of leukemia have been observed among populations in England (Gardner MJ, Hall AJ, Downes S, et al., "Follow-up of children born to mothers resident in Seascale, West Cumbria (birth cohort)," *BMJ* 1986;295:822-827), Spain (Silva-Mato A, Viana D, Fernandez-SanMartin MI et al., "Cancer risk around the nuclear power plants of Trillo and Zorita (Spain)," *Occup Environ Med* 2003;60:521-527), and Germany (Hoffmann et al, 2007; Spix C, Schmiedel S, Kaatsch P et al., "Case-control study on childhood cancer in the vicinity of nuclear power plants in Germany 1980-2003," *European Journal of Cancer* 2008; 44:275-284). The most recent of the above studies involving populations residing in the vicinity of 16 German nuclear power plants are among the methodologically strongest studies that have to date been completed. And with respect to the Community, these studies are also consistent with previous studies that found that Native Americans in general, and Native Americans in Minnesota in particular, had higher cancer incidence rates and higher cancer mortality rates. *See Annual Report to the Nation on the Status of Cancer, 1975-2004, Featuring Cancer in American Indians and Alaska Natives*, which is available at <http://www3.interscience.wiley.com/cgi-bin/fulltext/116330621/PDFSTART>; *Cancer in Minnesota, 1988-2002*, published by the Minnesota Department of Health, available at

<http://www.health.state.mn.us/divs/hpcd/cdee/mcss/camn2005index.html>, at 74; and *Minnesota Cancer Facts and Figures 2006*, published by the American Cancer Society, http://www.cancerplanmn.org/Minnesota_Cancer_Facts_and_Figures.html, at 13-14.

The KiKK study included all 16 large reactor locations where 20 nuclear power plants (NPPs) in Germany were in operation during the 24 year period of study (1980 - 2003). See Mahowald Declaration, Exhibit E.

The distance between the children's homes and the power plants was precisely determined to within 25 meters. The main questions posed by the study were: "Do children under five years of age more frequently develop cancer when living near a nuclear power plant?" and "is there a negative distance trend?" (In other words: is the risk greater the nearer the child lives to the plant?) The results showed not only a 60% increase in the cancer rate and a 117% increase in leukemia in infants within the 5 km radius, but also a significant increase in the risk of cancer and leukemia the closer one lived to the nuclear power plant. *Id.*

In the second part of the study, which covered a shorter period of time and a selection of diagnoses (leukemia, lymphomas and tumors of the central nervous system), it was tested whether other risk factors (confounders) could have had any appreciable effect on the main result of the study - the negative distance trend. This proved not to be the case for any of the studied risk factors. The proximity of residence to the nuclear power plant remains the only plausible explanation at this time.

Recently, results were also reported for a comprehensive meta-analysis concerning leukemia in children living near nuclear power plants contained in 17 international studies carried out in Germany, Spain, France, Japan and North America

during the period between 1984 and 1999. *See* Baker PJ, Hoel DG, “Meta-analysis of standardized incidence and mortality rates of childhood leukemia in proximity to nuclear facilities,” *European Journal of Cancer Care* 2007; 16:355-363. Distance dependent increased risks of 14%-21% for leukemia in children under nine years of age were observed. When age was expanded to include the population up to 25 years of age, an increased probability of morbidity of 7-10% and increased mortality of 2-18% were observed.

Taken together, these studies are consistent with the hypothesis that children who live near nuclear power plants develop cancer and leukemia more frequently than those living further away.

If emissions have been correctly measured by monitoring the areas surrounding nuclear installations, as has been claimed by both the NPP operators and the regulatory authorities, then either the currently accepted calculation models for determining radiation exposure of local residents are incorrect, or the biological effects of incorporated radionuclides have been badly underestimated, at least for young children and embryos (human fetuses).

The indications over many years that there are increased levels of morbidity near to NPPs are given added support by results of the KiKK study. The possibility of an increased risk for older children and adults living near NPPs cannot be ruled out. It is important to point out that the radiation health standards established by BEIR VII are consistent with the above research findings regarding both cancer and non-cancer health outcomes given any level of low dose exposures. Furthermore, the BEIR VII committee also concludes “that the current scientific evidence is consistent with the hypothesis that

there is a linear, no-threshold dose-response relationship between exposure to ionizing radiation and the development of cancer in humans.” In other words, there exists general consensus on the radiation health risks by exposure and living near NPPs. Consequently, the most effective mitigation of such risks will rely on either 1) avoiding the area surrounding the plant, or 2) reducing the nuclear energy operational level, or 3) implementing risk management options based on the mechanistic understanding of cancer or non-cancer epidemiology.

5. APPLICANT’S ENVIRONMENTAL REPORT CONTAINS A SERIOUSLY FLAWED ENVIRONMENTAL JUSTICE ANALYSIS THAT DOES NOT ADEQUATELY ASSESS THE IMPACTS OF THE PINGP ON THE ADJACENT MINORITY POPULATION.

Under NEPA, the purpose of an environmental justice review is to insure that the Commission “considers and publicly discloses environmental factors peculiar to minority or low-income populations that may cause them to suffer harm disproportionate to that suffered by the general population. *See System Energy Resources, Inc.* (Early Site Permit for Grand Gulf ESP Site), CLI-05-4, 61 NRC 10, 13 (2005). The goals of NEPA are to inform federal agencies and the public about the environmental effects of proposed projects. *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 339 (1989). The ER fails to consider the disparate impacts of the PINGP on the adjacent minority population. As discussed above, the studies cited in Contention 4 expose significant environmental justice issues because the Community potentially represents a specific minority area with higher than expected cancer rates. The relicensing of the PINGP has a disparate impact on the Community.

The National Cancer Institute has previously found that American Indians have high rates of cancer, despite the overall decline of cancer nationally. Specifically in the

northern plains, cancer rates for lung, colon, uterine, kidney, and non-hodgkin lymphoma were between 25 to nearly 50% higher than the national average. *See Annual Report to the Nation on the Status of cancer, 1975 – 2004, featuring cancer in American Indians and Alaska Natives.* David K. Espy, MD et. Al, Vol.110 Issue 10, pages 2119 -2152, Oct 15 2007. Studies of American Indians in Minnesota have revealed similar findings. *Cancer in Minnesota, 1988-2002*, published by the Minnesota Department of Health, found that “the overall cancer incidence rate in Minnesota is highest among American Indians and blacks,” and that “American Indians also have the highest incidence rate among females. *Cancer in Minnesota, 1988-2002*, at 74. Likewise, the *Minnesota Cancer Facts and Figures 2006*, published by the American Cancer Society, found that the cancer incidence rate among American Indian men in Minnesota was 23 percent higher than for non-Hispanic white men, while their mortality rate was 41 percent higher. *Minnesota Cancer Facts and Figures 2006*, at 13. The overall cancer incidence among American Indian women in Minnesota was seven percent higher than that of non-Hispanic white women, but their cancer mortality rate was 54 percent higher. *Id.* at 14.

The ER does not adequately acknowledge the minority community near the PINGP or assess the impact of the facility on them. There are significant, adverse environmental impacts that will result from the relicensing of the PINGP that will fall disproportionately on the minority population of the Community.

6. THE LICENSE RENEWAL APPLICATION DOES NOT INCLUDE AN ADEQUATE PLAN TO MONITOR AND MANAGE THE EFFECTS OF AGING FOR CONTAINMENT COATINGS, WHOSE INTEGRITY IS DIRECTLY RELATED TO PLANT SAFETY AND THE PERFORMANCE OF THE EMERGENCY CORE COOLING SYSTEMS

10 C.F.R. 54.4(a)(2) requires that the scope include “All nonsafety-related systems, structures, and components whose failure could prevent satisfactory accomplishment of any of the functions identified in paragraphs (a)(1)(i), (ii), or (iii) of this section.”

NMC states that it has “replaced the containment sump strainers (containment sump B strainers) in both Units in response to the GSI-191 concerns. The replacement containment sump B strainers are the subject of an AMR as documented in Section 3.2. PINGP does not credit coatings inside the containment to assure that the intended functions of coated structures and components are maintained. The contribution of coatings to containment debris is event driven and is not related to aging. Therefore, those coatings do not have an intended function. In addition, the issue is not related to the 40-year term of the current operating license; and therefore, is not a TLAA.” LRA at page 2.1-8. However, in separate correspondence to the NRC responding to Generic Letter 2004-02, NMC carefully describes how the containment inservice inspection program provides a means to check the condition of coatings as a potential source of debris that could block the sump recirculation strainers. *See, e.g.*, Nuclear Management Company, LLC (NMC) Response to Generic Letter 2004-02, “Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors,” for the Prairie Island Nuclear Generating Plant, dated August 31, 2005, ML052440054.

The license renewal review guidance in Table 3.5-2 of NUREG-1801 describes reliance on existing aging management programs, including the “Protective Coating Monitoring and Maintenance Program.” The Generic Aging Lessons Learned report (NUREG-1801) describes the potential for system fouling resulting from the failure of protective coatings, as a source of debris.

In an audit of the license renewal program, the NRC’s Inspector General [OIG-07-A-15 September 6, 2007] described a weakness in the program associated with a failure to consider operating experience during the review of the Oconee LRA, “casting doubt on the efficacy of Oconee’s aging management program for coatings.” OIG at p. 22.

The clear safety function of the containment coatings is to retain their integrity during plant operation to preclude a significant source of debris in the containment sump, and programs exist to monitor and maintain such coatings, which operating experience has shown will degrade over time.

Therefore, the containment coatings should be included in the scope of license renewal, and the applicable aging effects should be appropriately managed.

7. THE PINGP LICENSE RENEWAL APPLICATION DOES NOT INCLUDE AN ADEQUATE PLAN TO MONITOR AND MANAGE THE EFFECTS OF AGING DUE TO EMBRITTLEMENT OF THE REACTOR PRESSURE VESSELS AND THE ASSOCIATED INTERNALS.

As demonstrated in the declaration of Richard T. Lahey, Jr., Ph.D., submitted in support of a comparable contention associated with the license renewal application for Indian Point, “embrittlement of the RPVs and their associated internals is one of the most important age-related phenomena that the USNRC must consider in its review of Entergy’s relicensing application. Failure to carefully consider the effects of

embrittlement could result in a meltdown of the core and a release of a significant amount of radiation subsequent to various accident scenarios.” Lahey Declaration, ¶ 6.

PINGP and Indian Point are both Westinghouse reactor designs of comparable vintage. While PINGP is a two-loop plant and Indian Point is a four-loop plant, the reactor vessel designs are sufficiently similar that the issues raised in the Lahey Declaration are applicable to PINGP.

Like the Indian Point LRA, the PINGP LRA does not include any mention that it took embrittlement into account when it assessed the effect of transient loads. As Dr. Lahey stated, “[e]ven more significantly, Entergy's failure to discuss how embrittled RPVs and RPV internal structures and components would respond to the highly transient severe decompression shock loads associated with a [design basis accident] DBA [loss of coolant accident] LOCA is a very serious omission from its relicensing application.” Lahey Declaration, ¶ 15. In other words, brittle components cannot withstand shock loads well, and when the shock loads change dramatically, the embrittled components may fail. This, in turn, could mean that the plant could not maintain a coolable geometry of the core. The core could then melt, which would release a significant amount of radiation and possibly cause “a breach of the lower head of the RPV, which would represent a serious challenge to the integrity of the containment structure.” Lahey Declaration, ¶ 16.

Metals in a pressurized water nuclear reactor need to deform without experiencing failure. Lahey Declaration, ¶ 10. When neutrons bombard metals in the core, which occurs during nuclear fission, those metals can become embrittled. *Id.* When metals become embrittled, they may fail when they are faced with a thermal shock event. *Id.* ¶ 11. In other words, embrittled metals cannot withstand the thermal shock loads.

Experiments have demonstrated that when metals fail in a nuclear power plant, particularly the metals that are in the RPV and the internals closest to the core (e.g., those located in the belt-line region), the core may not be able to maintain a “coolable geometry” and it may melt. *Id.* ¶ 15. The result could be a release of a significant amount of radiation and perhaps breach “the lower head of the RPV, which would represent a serious challenge to the integrity of the containment structure.” *Id.* ¶ 16.

The PINGP LRA describes the reactor vessel surveillance program in Sections A2.34 and B2.1.34. The scope of this program has been enhanced, as follows: A requirement will be added to the program to ensure that all withdrawn and tested surveillance capsules, not discarded as of August 31, 2000, are placed in storage for possible future reconstitution and use. Parameters Monitored/Inspected: A requirement will be added to the program to ensure that in the event spare capsules are withdrawn, the untested capsules are placed in storage and maintained for future insertion. It is not clear from this description whether PINGP Units 1 & 2 have adequate standby surveillance capsules to support the calculated fluence projections described in WCAP-14040-NP-A and Regulatory Guide 1.190 for the period of extended operation.

Moreover, the PINGP analysis and data referenced in the LRA demonstrate that the reactor internals in PINGP Units 1 and 2 will experience embrittlement, but applicant has not presented any experiments or analysis to justify that the embrittled RPV internal structures will not fail and that a coolable core geometry will be maintained for a design-basis loss of coolant accident.

8. THE PROGRAM FOR MANAGING PRIMARY STRESS CORROSION CRACKING FOR NICKEL-ALLOY COMPONENTS FAILS TO COMPLY WITH 10 C.F.R. § 54.21(a)(3).

10 C.F.R. § 54.21(a)(3) requires: “For each structure and component identified in paragraph (a)(1) of this section, demonstrate that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation.”

Sections A2.27, A2.28, B.2.1.27, and B2.1.28 describe an aging management program to address the aging of nickel-alloy components susceptible to primary water stress corrosion cracking (PWSCC). The program described in Section B2.1.27 simply states: “For the Nickel-Alloy Nozzles and Penetrations Program, PINGP is providing a commitment to the following activities for managing the aging of nickel-alloy components susceptible to primary water stress corrosion cracking: 1. comply with applicable NRC orders, and 2. implement applicable NRC Bulletins, Generic Letters, and staff-accepted industry guidelines. The related program description in B2.1.28 describes a condition monitoring program that implements “the requirements of the NRC First Revised Order EA-03-009, “Issue of Order Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors,” dated February 20, 2004 (Order).”

The LRA also refers to the NRC’s interim staff guidance, as follows: “LR-ISG-19B Proposed Aging Management Program XI.M11-B, Nickel-Alloy Base-Metal Components and Welds in the Reactor Coolant Pressure Boundary. The NRC License Renewal website indicates this ISG is under NRC development. The Nuclear Energy

Institute and EPRI - Materials Reliability Program (MRP) are to develop an augmented inspection program for NUREG-1801, AMP XI.M11-B.”

The program requirements imposed by order in EA-03-009 resulted from a series of incidents of degradation of the reactor pressure vessel upper and lower heads, specifically those events described in NRC Bulletin 2003-02, “Leakage From Reactor Pressure Vessel Lower Head Penetrations And Reactor Coolant Pressure Boundary Integrity.” The order imposed specific inspection requirements to compensate for weaknesses in the established vessel inspection programs based on the ASME Code. The order was subsequently revised after many licensees requested relaxations in the rigorous inspection requirements.

In response to the imposition of specific requirements to manage PWSCC aging effects, including those associated with nickel-alloy components and welded connections, the industry promised to develop an augmented inspection program as part of the Electric Power Research Institute “Materials Reliability Program” (MRP). The NRC had to impose the requirements in EA-03-009 because of previous reliance on industry initiatives to address PWSCC aging effects.

The LRA program commitment to do whatever the NRC tells them to do does not demonstrate the effectiveness of an aging management program. The LRA violates 10 C.F.R. § 54.21(a)(3) because it does not address all ten elements of an effective aging management program for PWSCC aging effects on nickel-alloy components and welds.

9. THE AGING MANAGEMENT PROGRAMS CONTAINED IN THE LICENSE RENEWAL APPLICATION VIOLATES 10 C.F.R. §§ 54.21 AND 54.29(a) BECAUSE IT DOES NOT PROVIDE ADEQUATE INSPECTION AND MONITORING FOR CORROSION OR LEAKS IN ALL BURIED SYSTEMS, STRUCTURES, AND COMPONENTS THAT MAY CONVEY OR CONTAIN RADIOACTIVELY-CONTAMINATED WATER OR OTHER FLUIDS AND/OR MAY BE IMPORTANT FOR PLANT SAFETY.

The aging management programs proposed in the license renewal application for PINGP are inadequate because: (1) it does not provide for adequate inspection of all systems, structures, and components that may contain or convey water, radioactively-contaminated water, and/or other fluids; (2) there is no adequate leak prevention program designed to replace such systems, structures, and components before leaks occur; and (3) there is no adequate monitoring to determine if and when leakage from these systems, structures, and components occurs. These systems, structures, and components include underground pipes and tanks.

10 C.F.R. § 54.21 requires that the applicant demonstrate that for each system, structure, and component included within the scope of Part 54 the effects of aging will be adequately managed for the period of extended operation. 10 C.F.R. § 54.21 specifically includes “piping” as one of the systems, structures and components included within Part 54. These pipes – whether by design or a structural or system failure within the nuclear power station – may contain radioactive water. Some of these piping systems work in conjunction with the essential service water system to convey heat from the reactor coolant system to the ultimate heat sink. Plant specific probabilistic risk assessments (PRAs) have shown that the loss of the essential service water system may be a significant contributor to the potential for a core damage accident. See NRC Information Notice 2007-06 (ML062840608).

Weaknesses in the aging management programs that are relied on for the detection of corrosion or leaks in underground buried pipes and tanks could endanger public health and safety. Recent events have demonstrated that various aging piping systems have experienced leaks and/or corrosion. These leaks and corrosion threaten the integrity of such systems and compromise their ability to perform their intended function; that is to maintain sufficient integrity to prevent the uncontrolled release of radioactivity to the environment. *See* NRC report entitled “Liquid Radioactive Release Lessons Learned Task Force Final Report,” dated September 1, 2006 (ML062650312).

One common aspect of many of these leaks, as described in the NRC report, is that they have been discovered by happenstance and that they usually have gone undetected for an extended period of time thereby permitting increasingly larger amounts of contaminated water to enter the ground (or air) around the facilities. A number of events have occurred where radioactively contaminated water has leaked into the ground from spent fuel pools, underground pipes and potentially from other systems and components, and remained undetected for as long as 12 years. For example:

- August 2004, the owner of the Dresden Nuclear Power Plant in Illinois discovered an underground leak from the condensate storage tank piping. Tritium levels in onsite ground water monitoring wells were as high as 1,700,000 picocuries per liter. A survey of neighboring private wells revealed tritium contamination in at least one well above background levels (approximately 1,000 picocuries per liter). *See* NRC Preliminary Listing of Events Involving Tritium Leaks (Mar. 28, 2006), ML060930382.
- In December 2005, tritium was detected in a drinking water well at a home near the Braidwood Nuclear Plant in Illinois. The “initial evaluation indicated that the tritium in the groundwater was a result of past leakage from a pipe which carries normally non-radioactive circulating water discharge to the Kankakee River, about five miles from the site. Several millions [sic] gallons of water leaked from the discharge pipe in 1998 and 2000.” *See* NRC Preliminary Notification of Event or Unusual Occurrence PNO-RIII-05-016A, “Potential Off-site Migration of Tritium Contamination (Update)” (December 7, 2005), ML053410293.

- In March 2006, a leak was discovered at Palo Verde Nuclear Generating Station in Arizona. *See* NRC Preliminary Notification of Event or Unusual Occurrence, PNO-IV-06-001, “Followup For Tritium Contamination Found In Water Onsite” (March 17, 2006), ML060760584.
- In October 2007, high levels of tritium were detected in the groundwater under the Catawba Nuclear Power Station located in York, South Carolina. At one groundwater monitoring well, the tritium measured 42,000 picocuries per liter. *See* NRC Preliminary Notification of Event or Unusual Occurrence, PNO-II-07-012, “Onsite Groundwater Tritium Contamination” (October 11, 2007), ML073111396.
- That same week, high levels of tritium were discovered in the groundwater at the Quad Cities Nuclear Power Station located in Warrenville, Illinois. The tritium levels measure up to 800,000 picocuries per liter. *See* NRC Preliminary Notification of Event or Unusual Occurrence, PNO-11-08-01 1, “Tritium Leakage” (October 11, 2007), ML 072890262.
- On October 19, 2007, a leak was discovered in piping within the essential service water system that serviced both reactors at the Byron Nuclear Power Station located in Byron, Illinois. *See* NRC Preliminary Notification of Event or Unusual Occurrence, PNO-11I-07-012, “Both Units at Byron Shut Down Due to a Leak in Pipe” (October 23, 2007), ML072960109. The NRC then announced that had begun a special inspection at the Byron Nuclear Power Station to review the circumstances surrounding the corrosion of piping in the equipment cooling water system and subsequent leak in one pipe. “As a result of the leakage, reactor operators shut both reactors down on Friday, Oct. 19, to repair the leak and inspect similar pipes. The pipes carry water from the plant where it is used for cooling of essential safety equipment back to basins under fan-driven cooling towers.” *See* NRC Press Release, 11-07-24, “NRC Begins Special Inspection at Byron Nuclear Station to Review Corrosion and Leakage of Equipment Cooling Water Pipe” (October 23, 2007), ML072960643.
- Similar leaks have been detected at other nuclear power plants in New Jersey (Salem) and Connecticut (Haddam Neck) as well as the spent fuel pool at the Brookhaven National Laboratory on Long Island. *See* NRC Information Notice 2004-05, “Spent Fuel Pool Leakage To Onsite Groundwater,” March 3, 2004; NRC Information Notice 2006-13, “Ground-Water Contamination Due to Undetected Leakage of Radioactive Water,” July 10, 2006; and the General Accounting Office, Information on the Tritium Leak and Contractor Dismissal at the Brookhaven National Laboratory, (GAO/RCED-98-26) November 1997.

The LRA describes the inspection and aging management programs for underground pipes and tanks at PINGP in Appendix A and B. Appendix A, Section

A2.8, “Buried Piping and Tanks Inspection Program,” states that “inspections will be based on opportunities for inspection such as scheduled maintenance work, with at least one inspection occurring within ten years prior to the period of extended operation, and one in each ten-year period thereafter.” LRA at A-5.

Appendix B, Section B2.1.8, describes the “Buried Piping and Tanks Inspection Program.” This section also says that buried components will be inspected when excavated during maintenance, and that “inspections will be based on opportunities for inspection such as scheduled maintenance work, with at least one inspection occurring within ten years prior to the period of extended operation, and one in each ten-year period thereafter. If an opportunity for inspection does not occur within a ten-year period, then a focused inspection of a sample component will be performed prior to the end of that period.”

The future “Buried Piping and Tanks Inspection Program” described for PINGP does not specifically commit to conducting any inspections of buried systems, structures, or components to establish baseline conditions that can be used to ensure the effectiveness of the program. As described in the Hausler Declaration submitted for the Indian Point license renewal, the commitment to a future aging management program for buried pipes and tanks are deficient because they do not provide any evaluation of the baseline conditions of buried systems or their many weld junctures, nor do they provide any support for postulated or “typical” corrosion rates within the facility. *See* Hausler Declaration, ¶¶ 30, 32, 33, 53. The proposed program for PINGP is similarly deficient because it contains no provision for using cathodic protection or other methods to prevent leaks from occurring. Prevention is the best protection against leakage from pipes. *See*

Hausler Declaration, ¶¶ 39-42, 43-49. Nor does the PINGP program commit to comply with the National Association of Corrosion Engineers (NACE) corrosion control standards. *See* Hausler Declaration, ¶ 42.

10. THE LRA VIOLATES 10 C.F.R. §§ 54.21(a) AND 54.29 BECAUSE IT FAILS TO INCLUDE AN AGING MANAGEMENT PLAN FOR EACH ELECTRICAL TRANSFORMER THAT HAS A SAFETY-RELATED FUNCTION.

There are numerous electrical transformers that perform a function described in 10 C.F.R. § 54.4. Transformers function without moving parts or without a change in configuration or properties as defined in that regulation.

Failure to properly manage aging effects applicable to electrical transformers may compromise:

- i. The integrity of the reactor coolant pressure boundary;
- ii. The capability to shut down the reactor and maintain it in a safe shutdown condition; or
- iii. The capability to prevent or mitigate the consequences of accidents, which could result in potential offsite exposures comparable to those referred to in §§ 50.34(a)(1), 50.67(b)(2), or § 100.11 of this chapter, as applicable.

10 C.F.R. § 54.4(a)(1). Moreover, failure to manage the effects of aging applicable to electrical transformers may compromise the ability to cope with a station blackout event required by 10 C.F.R. § 50.63, pursuant to 10 C.F.R. § 54.4(a)(3). In addition, the consequence of failures of electrical transformers may result in accidents beyond the Design Basis Accidents, resulting in exposures to the public exceeding 10 C.F.R. § 100 limits.

Table 2.2-1 of the LRA identifies the Auxiliary Start-up/Standby Transformers within the scope of renewal. However, the electrical commodity groups in Table 2.5-1 do not identify the transformers as part of any of the commodity groups.

Section B2.1.38 of the LRA describes the “Structures Monitoring Program.” The LRA describes one of the enhancements to that program is the addition of several component supports to the inspection program, including component supports for transformers.

Appendix B, Section B2.1.26 of the LRA includes a description of the “Metal-Enclosed Bus Program,” which provides “a condition monitoring program that inspects representative samples of the interiors of non-segregated 4160V phase bus between station offsite source auxiliary transformers and plant buses.” However, Appendix B does not identify an aging management program for the safety-related station transformers.

11. THE PROGRAM FOR MANAGING FLOW ACCELERATED CORROSION (FAC) FAILS TO COMPLY WITH 10 C.F.R. § 54.21(a)(3).

10 C.F.R. § 54.21(a)(3) requires: “For each structure and component identified in paragraph (a)(1) of this section, demonstrate that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation.”

Section A2.17 and B2.1.17 of the LRA describe the PINGP “Flow-Accelerated Corrosion (FAC) Program.” As described in the LRA, this program “manages loss of material due to flow-accelerated corrosion in piping and components by (a) conducting an analysis to determine critical locations, (b) performing baseline inspections to determine the extent of thinning at these locations, and (c) performing follow-up inspections to confirm the predictions of the rate of thinning, or repairing or replacing components as necessary.” The LRA states that the FAC Program follows the Electric Power Research Institute (EPRI) guidelines in Nuclear Safety Analysis Center (NSAC)-

202L-R2 for carbon steel and bronze components containing high-energy single phase or two phase fluids, and is consistent with the recommendations of NUREG-1801, Chapter XI, Program XI.M17, Flow-Accelerated Corrosion. Apart from this simple assertion of conformance with EPRI guidelines and the generic program description, the LRA does not offer any demonstration that the FAC effects will be adequately managed. In addition, consistent with the EPRI and NRC guidelines, the program is largely based on a computer program known as CHECWORKS, which is used in operating U.S. nuclear power plants to record plant operating experience and predict timing and locations of wall thinning.

This contention is supported by the expert Declaration of Dr. Joram Hopenfeld (November 29, 2007) for the Indian Point license renewal application. As described in Dr. Hopenfeld's declaration, FAC is a pipe wall thinning phenomena in which the thinning rate is accelerated by flow velocity. FAC includes wall thinning by electrochemical corrosion, erosion-corrosion and cavitation-erosion. While the main causes of FAC (turbulence intensity, steam quality, material compositions, oxygen content and coolant pH) have been identified, the behavior of FAC is not completely understood.

Wall thinning is a local phenomenon. Local geometry, local metal composition and local turbulence affect FAC rates. Grooving and the formation of round holes are a manifestation of the interplay between these parameters. Once local corrosion has begun, geometrical changes as they occur may further intensify the local turbulence, thereby increasing FAC in a non-linear rate. The identification of locations where FAC rates are the highest is made difficult by the fact that the local flow velocity and local turbulence

cannot be measured directly. Instead, FAC programs typically rely on thermal hydraulic computer codes such as RELAP to calculate average velocities throughout the plant. Because of this indirect method of determining turbulence, considerable data must be collected over a period of time to ensure that the locations with the highest propensity for FAC are properly identified. If FAC conditions are not properly managed, there can be significant safety risk at nuclear power plants, as demonstrated by operating experience.

For example:

- For example, in a 1986 accident at the Surry nuclear power plant, some areas on the failed feed water pipe elbow were almost completely eroded while adjacent areas were much less affected. The J-tubes on the distribution feed ring exhibited a similar phenomenon. NRC Information Notice No 86-106 “Feedwater Line Break” (December 16, 1986); NRC Bulletin 87-01 “Thinning Pipe Walls in Nuclear Plants” (July 9, 1987).
- In July 2004, FAC in the secondary loop at the Mihama nuclear power plant resulted in the killing of several workers. NRC Information Notice 2006-008, “Secondary Piping Rupture at Mihama Power Station in Japan,” March 16, 2006 (ML 05291008).
- In 1991 and 1993, the feed ring and the J tubes at San Onofre steam generators failed as a result of FAC. NRC Information Notice 1991-019, “Steam Generator Feedwater Distribution Piping Damage,” March 12, 1991 (ML031190553), and Morning Report 5-93-0042, “Steam Generator Feeding Nozzle Through Wall Erosion,” June 15, 1993 (ML020630459).
- In 1997, extraction steam piping ruptured at the Fort Calhoun Station. NRC Information Notice 1997-084, "Rupture of Extraction Steam Piping," December 11, 1997 (ML031050037).

As discussed above, 10 C.F.R. § 54.21(a)(3) requires license renewal applicants to have a program for effectively managing aging. According to the NRC guidelines in NUREG- 1800, Revision 1 (Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants, September 2005), a plant-specific AMP [aging management program should] be evaluated because existing programs may not be

capable of mitigating or detecting wall thinning due to flow-accelerated corrosion. NUREG-1800 at p. 3.1-7. Wall thinning must be monitored or inspected to ensure that the structure and component intended functions will be adequately maintained for license renewal for all design conditions. Sample size and frequency of wall thinning measurements must be conducted in a timely manner so as not to exceed the minimum design thickness of a given component. The LRA should include information that links the parameters to be monitored or inspected to wall thinning, in order to demonstrate that FAC will be adequately managed.

The proposed FAC program is deficient because it relies on the computer code CHECWORKS, without sufficient benchmarking of the operating parameters. In addition, the LRA fails to specify the method and frequency of component inspections or criteria for component repair or replacement. The CHECWORKS computer code is not reliable unless it is adequately benchmarked. This is because of the inherent unpredictability of FAC, as described above. CHECWORKS is based on empiricism (statistics) rather than on a theoretical model. In other words, CHECWORKS is not based on a mechanistic model, but is solely based on a collection of selective data which represents only a fraction of the total flow area. Consequently CHECWORKS must be benchmarked for each component and then updated when plant parameters change. In summary, CHECWORKS can be reliably used to predict pipe wall thinning only so long as: (a) all relevant locations are benchmarked for relevant plant parameters; (b) relevant plant parameters do not change significantly over time; and (c) benchmark data on relevant plant parameters are collected for a sufficiently long period of time. Unless these requirements are satisfied, CHECWORKS is only good for establishing relative

inspection priorities and providing a platform for collecting and evaluating plant data on FAC.

In Dr. Hopenfeld's judgment, for relatively simple geometries and one phase flow in straight pipes where the degree of turbulence is relatively low and stable it would be reasonable to assume that six years of plant operations would be sufficient to benchmark a code for a given set of plant parameters. For complex geometries such as elbows and pipe branching areas where turbulence intensity is considerably higher, less stable and less predictable, a minimum of 10-15 years would be a more appropriate period of benchmarking empirical FAC models.

The description of FAC operating experience in the LRA simply states that they "identified no adverse trends or issues with program performance. Wall thinning has been identified, and the associated components replaced, prior to causing any significant impact to safe operation or loss of intended functions." The LRA does not explain how the FAC program has been benchmarked and it does not provide any explanation of the predictive capability of CHECWORKS when wall thinning was identified.

In 2005, for example, the Advisory Committee on Reactor Safeguard (ACRS) Subcommittee on Thermal Hydraulics, compared CHECWORKS predictions with actual operating data from the Waterford nuclear power plant. The poor correlation between the CHECWORKS predictions and the operating data prompted an ACRS Subcommittee member to comment: "If you look at that data base, you don't really have too much confidence in CHECWORKS." Statement by Dr. F. Peter Ford, transcript of January 26, 2005, meeting of the ACRS Subcommittee on Thermal Hydraulics at 198 (January 26, 2005) (ML050400613).

The limited effectiveness of CHECWORKS to predict wall thinning is further demonstrated in NUREG/CR-6936, “Probabilities of Failure and Uncertainty Estimate Information for Passive Components - a Literature Review,” May 2007. That report documented the service experience with FAC covering two periods, 1976 -1987 and 1988 - 2005. Given that CHECWORKS was released to the industry in 1987, and presuming that all plants have been using it, a comparison of the number of pipe failures in the first period with the number of failures in the second period is a measure of CHECWORK success in predicting FAC. The number of through-wall failures in PWR plants was 89 and 150 during the 1976-1987 and 1988 - 2005 periods, respectively. This represents an annual failure rate of 8 and 8.8, which clearly demonstrates that CHECWORKS is not effective in reducing the number pipe failures. In the period following the publication of NUREG/CR-6936 component failures from FAC continued. During the past three years alone pipe thinning events have occurred at Duane Arnold, Hope Creek, Clinton, Braidwood, LaSalle, Peach Bottom, Palo Verde, Palisades, Catawba, Calvert Cliffs, Kewaunee, Browns Ferry, ANO, and Salem.

The guidance for evaluating the effectiveness of an aging management program, described in the NRC’s Standard Review Plan for License Renewal, NUREG-1800, highlight the importance of acceptance criteria which can be used to determine the need for corrective actions, as well as a methodology for analyzing the results against applicable acceptance criteria. Considering the large uncertainties in CHECWORKS it is important that PINGP clearly describe their basis for concluding that the FAC program will adequately manage FAC, including the acceptance criteria which would define when

a component should be repaired or replaced, the minimum inspection requirements, and the frequency of inspection, pursuant to 10 C.F.R. § 54.21(c).

IV. CONCLUSION

For the foregoing reasons, the Community's contentions should be admitted in their entirety.

Respectfully submitted,

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August 18, 2008