

UNITED STATES NUCLEAR REGULATORY COMMISSION
R.E. GINNA NUCLEAR POWER PLANT, LLC
DOCKET NO. 50-244
R.E. GINNA NUCLEAR POWER PLANT
FINAL ENVIRONMENTAL ASSESSMENT AND
FINDING OF NO SIGNIFICANT IMPACT
RELATED TO THE PROPOSED LICENSE AMENDMENT
TO INCREASE THE MAXIMUM REACTOR POWER LEVEL

AGENCY: U.S. Nuclear Regulatory Commission (NRC or Commission)

SUMMARY: The NRC has prepared a final Environmental Assessment as part of its evaluation of a request by R.E. Ginna Nuclear Power Plant, LLC (Ginna LLC) for a license amendment to increase the maximum steady state power level at the R.E. Ginna Nuclear Power Plant (Ginna) from 1520 megawatts thermal (Mwt) to 1775 Mwt. This represents a power increase of approximately 16.8 percent, which is considered an extended power uprate (EPU). As stated in the NRC staff's position paper dated February 8, 1996, on the Boiling-Water Reactor Extended Power Uprate Program, the NRC staff will prepare an environmental impact statement if it believes a power uprate will have a significant impact on the human environment. The NRC staff did not identify any significant impact from the information provided in the licensee's EPU application for Ginna Station or the NRC staff's independent review; therefore, the NRC staff is documenting its environmental review in an environmental assessment. Also, in accordance with the position paper, the final Environmental Assessment and finding of no significant impact is being published in the *Federal Register*.

The NRC published a draft Environmental Assessment and finding of no significant impact on the proposed action for public comment in the *Federal Register* on April 12, 2006 (71 FR 18779). One set of comments was received on the draft Environmental Assessment from the New York State Department of Environmental Conservation (NYSDEC) by letter dated May 12, 2006 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML061370627). The comments are discussed in the paragraphs below.

Some of the comments provided by the NYSDEC were clarifications and corrections to the draft Environmental Assessment (see comment a, b, c, d, and e in the NYSDEC letter). Based on these comments, the NRC revised the appropriate sections of the final Environmental Assessment. In comment “f,” NYSDEC indicated “based on review of historical data, staff would not characterize impingement and entrainment rates as ‘minimal,’ but would describe them as ‘lower than most similar sized electrical generating facilities in New York State.’” The NRC only evaluates environmental impacts at the site and surrounding area that could be affected by the proposed EPU at the facility. Rather than comparing the impacts with other perhaps similar facilities, the NRC staff looks at the overall impact of the affected resource, i.e., aquatic species in Lake Ontario. Our conclusion of “minimal” should be interpreted as not having a noticeable impact on the long-term sustainment of aquatic species in Lake Ontario due to entrainment and impingement. This action may have no impact to aquatic species in other parts of New York State; therefore, our analysis does not make such comparison. The comment is noted, but no changes were made to the Environmental Assessment based on this comment.

The NYSDEC comments “g and h” raised concerns regarding possible unknown synergistic effects of physical and thermal stresses to the cold water species alewife and three-spine stickleback impinged in the Ginna fish return system under the proposed EPU conditions. In addition, NYSDEC recommended the discussion on the fish return system include references

to the 316(b) Phase II rule developed by the Environment Protection Agency (EPA). This regulation established Federal requirements applicable to the location, design, construction, and capacity of cooling-water intake structures at existing facilities that exceed a threshold value for water withdrawals. The draft Environmental Assessment did include a discussion on how the new performance standards are designed to significantly reduce impingement and entrainment losses resulting from plant operation, and any site-specific mitigation would result in less impact due to continued plant operation. Currently, the Ginna State Pollutant Discharge Elimination System (SPDES) permit modification application is under technical review by NYSDEC. The SPDES permit modification application incorporated the requirements listed in Subpart J of the EPA 316(b) Phase II rule. Also, Ginna LLC has begun some studies required for compliance with the EPA 316(b) Phase II rule. The NRC staff agrees that implementation of technologies and/or operational procedures required by the EPA 316(b) Phase II rule, with authority delegated to NYSDEC, would further minimize impingement and entrainment losses of all aquatic species (including alewife and three-spine stickleback) at Ginna, under proposed EPU conditions. The comment did not provide any new information; therefore, no changes were made to the Environmental Assessment.

NYSDEC comment “i” stated that the draft Environmental Assessment did not address “potential impacts to early life stages of fish entrained into the discharge plume.” Entrainment applies specifically to aquatic organisms (i.e. early life stage fish and shellfish) that are small enough to pass through a plant’s intake debris screens, travel through the cooling system, and be exposed to heat, mechanical and pressure stresses, and possibly biocidal chemicals before being discharged back to the body of water. Early life stage fish (eggs and larvae) not entrained by the plant, but in the nearby water column of Lake Ontario within or near the discharge plume under the proposed conditions, would not be significantly impacted. Ginna is not adjacent to or near habitat features or spawning/nursery areas preferred by or important to

local fish. As indicated by NYSDEC, the temperatures injurious to alewife eggs are limited to a small area of the thermal plume (at the mouth of the discharge canal).

Comment “j” states NYSDEC has received reports of bald eagle sightings in the Wayne County area over the past 3 to 4 years. The reports include observations of first-year immature birds, which indicate bald eagle nesting sites could be closer to the Ginna site than originally analyzed. In addition, NYSDEC states the closest verified nest is located in the Northern Montezuma Wildlife Management Area, approximately 30 miles away from the Ginna site. The NRC staff spoke with the staff of the U.S. Fish and Wildlife Service, Montezuma National Wildlife Refuge office, who verified there are nesting sites in the southern area of the refuge and possibly in the northern area. Based on this new information, the NRC staff believes bald eagle nesting sites are closer (30 miles) to the Ginna site than originally analyzed (55 miles). However, the staff believes the conclusion that the bald eagle will not likely be impacted by the proposed EPU, is still valid, and no changes to the Environmental Assessment are warranted.

NYSDEC also expressed concerns on possible radiological impacts to threatened and endangered species due to the proposed EPU. EPA standards (40 CFR Part 190, 40 FR 23420) concluded that environmental radiation standards developed by the nuclear power industry are adequate to protect the overall ecosystem. At this time, there is no evidence that there is any biological species sensitive enough to warrant a greater level of protection than that which is determined to be adequate for man. As a result of the proposed EPU, the radiation levels in many plant areas are expected to increase up to approximately 17%. The radiological impacts section of the Environmental Assessment provides a detailed analysis of potential impacts related to radiation. The NRC staff concluded all radiological doses were below regulatory limits and found no significant impact due to the proposed EPU.

ENVIRONMENTAL ASSESSMENT

Plant Site and Environs:

Ginna is located 6 km (4 mi) north of Ontario, New York, in the northwest corner of Wayne County and on the south shore of Lake Ontario. The immediate area around Ginna is rural, with the city of Rochester approximately 32 km (20 mi) to the west and Oswego, New York, 64 km (40 mi) to the east-northeast. The plant consists of one unit equipped with a nuclear steam supply system supplied by Westinghouse Electric Corporation, which uses a pressurized-water reactor (PWR) and a once-through cooling system for turbine exhaust condenser cooling and as the ultimate heat sink.

Identification of the Proposed Action:

By letter dated July 7, 2005 (ADAMS Accession No. ML051950123), Ginna LLC proposed an amendment to the operating license for Ginna to increase the maximum steady state power level by approximately 16.8 percent, from 1520 MWt to 1775 MWt. The change is considered an EPU because it would raise the reactor core power level by more than 7 percent above the currently licensed maximum power level. This proposed action would allow the heat output of the reactor to increase, which would increase the flow of steam to the main turbine-generator. This would result in the increase in production of electricity and the amount of waste heat delivered to the condenser, resulting in an increase in the temperature of the water being discharged into Lake Ontario.

The Need for the Proposed Action:

Ginna LLC estimates the proposed action would result in approximately 85 additional megawatts-electric (MWe) being generated. This additional electricity generation could power approximately 95,000 homes and would contribute to meeting the goals and recommendations of the New York State Energy Plan. The EPU could be implemented for approximately one-fifth of the cost to construct two small (50-MWe) natural gas combustion turbine units, as

recommended by the New York State Energy Planning Board, and would not cause the environmental impacts that would occur from construction of new power generation facilities to meet the region's electricity needs.

Environmental Impacts of the Proposed Action:

At the time of issuance of the operating license for Ginna, the NRC staff noted that any activity authorized by the license would be encompassed by the overall action evaluated in the Final Environmental Statement (FES) for the operation of Ginna, which was issued March 1973. In addition, in February 2004, the NRC published its Supplemental Environmental Impact Statement (SEIS), NUREG-1437 Supplement 14, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 14, Regarding R.E. Ginna Nuclear Power Plant - Final Report," which evaluated the environmental impacts of operating Ginna for an additional 20 years. In the SEIS, the NRC determined that the adverse environmental impacts of license renewal would not be so great that preserving the option of license renewal for energy-planning decision makers would be unreasonable. This Environmental Assessment summarizes the radiological and non-radiological impacts in the environment that may result from the EPU.

NON-RADIOLOGICAL IMPACTS

Land Use Impacts:

The potential impacts associated with land use for the proposed action include impacts from construction and plant modifications. The impacts from construction due to the proposed EPU are minimal. No expansion of roads, parking lots, equipment storage areas, or transmission facilities and no new building construction is anticipated to support the proposed EPU. Volumes of industrial chemicals, fuels, or lubricants are not expected to increase substantially, and would not require additional onsite storage space.

Some plant modifications would be required to implement the proposed action. The modifications are listed in Table 4-1 of Ginna EPU, Supplemental Environmental Report (ER), submitted by Ginna LLC on July 7, 2005. The most significant modification to be conducted would be replacement of the high-pressure turbine rotor. Major modifications completed in the last 10 years that contribute to the increased power opportunities at Ginna are the re-tubing of the main condenser (1995), the replacement of the steam generators with an increased size design (1996), and replacement of the reactor vessel head (2003). None of the plant modifications listed above or in Table 4-1 of the ER will result in any changes in land use.

Historic and archeological resources should not be affected by the proposed EPU, because there are no modifications to land use. The proposed EPU would not modify land use at the site significantly over that described in the FES and NUREG-1437 Supplement 14. Therefore, the NRC staff concludes that the land use impacts of the proposed EPU are bounded by the impacts previously evaluated in the FES and NUREG-1437 Supplement 14.

Transmission Facility Impacts:

The potential impacts associated with transmission facilities for the proposed action include changes in transmission line corridor right-of-way maintenance and electric shock hazards due to increased current. The proposed EPU would not require any physical modifications or changes in the maintenance and operation of existing transmission lines, switchyards, or substations. Ginna LLC's transmission lines right-of-way vegetation management would not change. There would be no change in voltage, but there would be an increase in the current flowing through the transmission facilities.

The National Electric Safety Code (NESC) provides design criteria that limit hazards from steady-state currents. The NESC limits the short-circuit current to ground to less than 5 milliamperes. The increase in current passing through the transmission lines is directly associated with the increased power level of the proposed EPU. In addition, the increased

electrical current passing through the transmission lines would cause an increase in the electromagnetic field strength.

Based on information provided in the ER, the transmission lines at Ginna would continue to meet the applicable NESC recommendations for electric-field induced shock under the proposed EPU. Therefore, the risk of shock from the offsite transmission lines would not be expected to increase significantly over the current impact.

The impacts associated with transmission facilities for the proposed action would not change significantly over the impacts associated with current plant operations. There would be no changes to current transmission line right-of-way operation and maintenance practices; no physical modifications to the transmission lines, switchyards, or substations; and electric current passing through the transmission lines would increase slightly. Therefore, the NRC staff concludes that there would be no significant impacts associated with transmission facilities for the proposed action.

Water Use Impacts:

Potential water use impacts from implementation of the proposed action would include hydrological alterations to Lake Ontario. Ginna uses a once-through condenser cooling system drawing water from Lake Ontario through a submerged offshore intake. Water used to cool the turbine condenser is discharged into the discharge canal. The heated water enters Lake Ontario at the shoreline. Total nominal flow of water for turbine condenser cooling and most secondary systems (i.e. service water and fire protection) is approximately 354,600 gallons per minute (gpm).

Lake Ontario serves as a principal water source for several local water supply systems in New York State's Monroe and Wayne Counties. All water required for plant operation, except potable water, is withdrawn from Lake Ontario. The rate of withdrawal would not increase as a result of the EPU. Therefore, operation of Ginna would not affect the availability

of surface water. Groundwater is not used in plant operations; therefore, there are no impacts from onsite groundwater use. The NRC staff concludes that the proposed EPU would not have a significant impact on water use.

Discharge Impacts:

Surface water and wastewater discharges to Lake Ontario from the plant are regulated by the State of New York via a SPDES Permit (Number NY-0000493), effective February 1, 2003 - February 1, 2008. This permit is reviewed and renewed by the NYSDEC. It is expected that the EPU would increase the temperature of the water discharged to Lake Ontario as well as the thermal discharge plume, which would require modifications to the current SPDES permit.

The current SPDES permit allows a 28 °F rise in temperature of the discharge water over the ambient temperature of the lake water, and a maximum 320-acre mixing zone. The current permit also limits the discharge temperature to 102 EF. During current operating conditions, the difference between plant discharge temperature and ambient lake temperature is approximately 20 °F in the summer months, and 28 °F during the winter months. The larger temperature difference, which occurs in the winter months, is due to recirculation of heated water from the discharge canal to the greenhouse inlet forebay to assist in maintaining inlet water temperature and eliminating ice that may form in the inlet forebay. Under proposed EPU operating conditions, the difference in temperature would be approximately 25 °F and 35 °F in summer (i.e., intake temp > 45 EF) and winter (i.e., intake temp # 45 EF) months, respectively. In addition, the discharge temperature would at times exceed the current SPDES permit limits (102 °F) to an upper limit of 106 EF.

The current SPDES permit limit for the Ginna thermal discharge plume mixing area is 320 acres. In 2004, Ginna LLC commissioned studies to determine the effect of the proposed EPU on water temperatures, temperature distribution in near-field and far-field areas associated

with the discharge, and to assess the impacts on aquatic species. According to the information calculated by the near-field plume model (CORMIX) and far-field hydrodynamic and thermal model (ECOM), under existing plant operating conditions, the thermal plume mixing area is less than 300 acres in summer and winter months. An increased mixing zone of 360 acres from the point of discharge on a daily basis (24 hours) would be needed to support operation under the proposed EPU operating conditions. The discharge environmental impacts of the proposed EPU conditions are described in the "Impacts to Aquatic Biota" section of the ER.

By letters dated March 8, April 2, July 29, October 18, November 18, 2005, January 12, and March 15, 2006, Ginna LLC submitted a permit modification request to NYSDEC regarding an increase in the Ginna Station Outfall 001 discharge temperature limit, intake-discharge ΔT , and the size of the mixing zone to accommodate the proposed EPU conditions described above. The NYSDEC sets limits on and regulates the amount of heat discharged to Lake Ontario. Approval from the NYSDEC for these SPDES Permit modifications is currently pending.

Based on information provided in the ER and NUREG-1437 Supplement 14, the NRC staff has determined the thermal discharge environmental impacts to Lake Ontario under the proposed EPU conditions would not be significant.

Impacts on Aquatic Biota:

The potential impacts to aquatic biota from the proposed action include impingement, entrainment, thermal discharge effects, and impacts due to transmission line right-of-way maintenance. Aquatic organisms that are caught on a plant's intake debris screens made of mesh are considered impinged. The term entrainment applies to aquatic organisms (i.e. fish and shellfish) that are small enough to pass through a plant's intake debris screens and travel through the cooling system and be exposed to heat, mechanical, and pressure stresses and possibly biocidal chemicals, before being discharged back to the body of water. Ginna has

intake and discharge structures on Lake Ontario. The aquatic species evaluated in this Environmental Assessment are in the vicinity of the Ginna intake and discharge structures.

Ginna LLC monitors entrained and impinged species as required by the current NYSDEC SPDES Permit. In 2004, Ginna LLC commissioned a biological assessment to analyze the effects of increased water temperature and mixing zone associated with the proposed EPU on Lake Ontario. The assessment included potential impacts to impingement and entrainment rates associated with the proposed EPU.

The most prominent fish species located in the shoreline area of Lake Ontario near Ginna are smallmouth bass, spottail shiner, American eel, alewife, yellow perch, threespine stickleback, brown trout, rainbow smelt, lake trout and rainbow trout. Ginna LLC reviewed these ten fish populations, which were identified by the NYSDEC as the "Representative Identified Species," (RIS) occurring in the vicinity of Ginna. For the purpose of this Environmental Assessment, the identical ten fish species were reviewed.

Impingement and entrainment monitoring at Ginna has been investigated since the 1970's. Based on this historical data and requirements of the SPDES Permit, impingement and entrainment rates at Ginna are minimal, and according to the ER no significant adverse impact on the RIS populations would result due to the increased discharge temperatures. These conclusions are based on the following: (1) Ginna is not adjacent to or near habitat features or spawning/nursery areas preferred by or important to local fish populations; (2) cooler areas for refuge are readily available to fish that enter the cooling water discharge; (3) the thermal plume under proposed EPU conditions would generally extend no more than 1 to 3 feet below the surface, providing a zone of passage for fish; (4) Ginna does not have any known incidents of cold shock to aquatic biota and cold shock incidents for the RIS would be minimized due to gradual shutdown and reduction procedures in cooling water temperature; (5) fish will avoid portions of the lake that exceed their thermal preferenda; and (6) any impinged fish exposed to

elevated temperatures (above their thermal preferenda) in the fish return system will be exposed only for a short duration (20-50 seconds). After reviewing the information presented in the ER, the NYSDEC SPDES permit modification demonstration submittal, and NUREG-1437 Supplement 14, the NRC staff concludes that the impact of the proposed EPU on aquatic biota would not be significant.

As discussed in the transmission facility impacts section of this Environmental Assessment, transmission line right-of-way maintenance practices would not change. Therefore, the NRC staff concludes that the impact of the proposed action to aquatic biota would not be significant.

On July 9, 2004, EPA published a final rule in the *Federal Register* (69 FR 41575) addressing cooling water intake structures at existing power plants whose flow levels exceed a minimum threshold value of 50 million gallons per day (gpd). The rule is Phase II in the Environmental Protection Agency's (EPA's) development of 316(b) regulations that establish national requirements applicable to the location, design, construction, and capacity of cooling water intake structures at existing facilities that exceed the threshold value for water withdrawals. The national requirements, which are implemented through National Pollutant Discharge Elimination System (NPDES) permits, minimize the adverse environmental impacts associated with the continued use of the intake systems. In the case of Ginna, the SPDES permit is equivalent to the NPDES permit. Licensees are required to demonstrate compliance with the Phase II performance standards at the time of renewal of their NPDES permit. Licensees may be required as part of the NPDES renewal to alter the intake structure, redesign the cooling system, modify station operation, or take other mitigative measures as a result of this regulation. The new performance standards are designed to reduce significantly impingement and entrainment losses due to plant operation. Any site-specific mitigation would result in less impact due to continued plant operation.

Impacts on Terrestrial Biota:

The potential impacts to terrestrial biota from the proposed action would be due to transmission line right-of-way maintenance. As discussed in the transmission facility impacts section of this Environmental Assessment, transmission line right-of-way maintenance practices would not change for the proposed action. Therefore, the NRC staff concludes that there are no significant impacts to terrestrial plant or animal species associated with transmission line right-of-way maintenance for the proposed action.

Impacts on Threatened and Endangered Species:

Potential impacts to threatened and endangered species from the proposed action include the impacts assessed in the aquatic and terrestrial biota sections of this Environmental Assessment. These impacts include impingement, entrainment, thermal discharge effects, and impacts due to transmission line right-of-way maintenance for aquatic species, and impacts due to transmission line right-of-way maintenance for terrestrial species.

There are four animal and two plant species listed as threatened or endangered under the Federal Endangered Species Act within Wayne County, New York. These species are the bog turtle (*Clemmys mühlenbergii*), bald eagle (*Haliaeetus leucocephalus*), piping plover (*Charadrius melodus*), Indiana bat (*Myotis sodalis*), small-whorled pogonia (*Isotria medeoloides*), and prairie fringed orchid (*Plantanthera leucophaea*). There are no records of any of these species on the Ginna site. The nearest designated critical habitat is for piping plover (*C. melodus*), which lies 90 miles from the Ginna site on the eastern shore of Lake Ontario. No critical habitat or known occurrences of bog turtle (*C. mühlenbergii*), Indiana bat (*M. sodalis*), small-whorled pogonia (*I. medeoloides*), and prairie fringed orchid (*P. leucophaea*) have been reported within the Ginna site vicinity or within the transmission lines right-of-way. However, bald eagles (*H. leucocephalus*) are occasionally observed in the vicinity, usually during spring migration. The nearest known bald eagle nesting site is approximately 30 miles

southeast of the Ginna site, near Montezuma National Wildlife Refuge. It is not likely that the bald eagles would be impacted by the EPU because the birds are transient and do not nest at the Ginna site.

There are no Federally listed threatened or endangered aquatic species listed under the Endangered Species Act in the vicinity of Ginna or Wayne County, New York. There are two State-listed aquatic species known to occur in Wayne County: pugnose shiner (*Notropis anogenus*) and lake sturgeon (*Acipenser fulvescens*). However, neither species has been reported in the vicinity of Ginna. Therefore, the NRC staff concludes that there is no effect to threatened and endangered species associated with the proposed EPU based on the information provided in the ER, NUREG-1437 Supplement 14, and the staff's own independent review.

Social and Economic Impacts:

Potential social and economic impacts due to the proposed EPU relate to potential changes to the size of the workforce at Ginna. The NRC staff has reviewed the information provided by Ginna LLC regarding socioeconomic impacts. Ginna LLC is a major employer in the community with approximately 436 people employed on a full-time basis and 167 long- and short-term contractors employed on a regular basis.

In January 2005, Ginna LLC, which acquired the plant in June 2004, entered into a payment agreement with the Town of Ontario, the Wayne County School District, and Wayne County as opposed to paying sales and property taxes. The agreement in place is a Payment In-Lieu of Taxes Agreement (PILOT). Under this agreement, Ginna's assessed value is set at \$260,000,000. Annual payments in equal amounts will be paid to tax jurisdictions in an amount equal to the assessed value multiplied by the real property tax rate established by each tax jurisdiction for the applicable tax year. Estimates of what amounts are to be paid through 2009 can be found in Chapter 5 of the Ginna EPU ER.

Ginna LLC and its personnel contribute directly and indirectly to the surrounding communities of the plant. Taxes collected under the PILOT agreement are used to fund schools, police and fire protection, road maintenance, and other municipal services. In addition, Ginna LLC personnel and contractors contribute indirectly to the tax base by paying sales and property taxes, state income tax, and hotel and meal taxes.

The proposed EPU would not significantly affect the size of the Ginna workforce. Most EPU modifications were performed during the Spring 2005 Refueling Outage, with the remaining modifications scheduled to be completed during the 2006 Refueling Outage. During a regularly scheduled refueling outage, the workforce at Ginna increases by approximately 534 persons on average. The workforce needed for the 2006 Refueling outage will require additional workers above the usual 534 persons average. The supplemental workers are not expected to adversely affect area housing availability, transportation services, or the public water supply due to the short period of the demand.

The NRC staff expects that granting the EPU as proposed would improve the economic viability of Ginna, ensuring that it would continue to contribute positively to the surrounding communities.

As discussed above, granting the EPU as proposed would have little direct socioeconomic impact to the local and regional economies. Therefore, the NRC staff concludes that there are no significant social or economic impacts for the proposed action based on information in the ER and NUREG-1437 Supplement 14.

Summary:

The EPU, if implemented as proposed, would not result in a significant change in non-radiological impacts in the areas of land use, water use, thermal discharges, terrestrial and aquatic biota, transmission facility operation, or social and economic factors. No other

non-radiological impacts were identified or would be expected. Table 1 summarizes the non-radiological environmental impacts of the proposed EPU at Ginna.

Table 1: Summary of Non-Radiological Environmental Impacts

Land Use	No significant land use modifications are expected.
Transmission Facilities	No physical modifications to the transmission lines; lines meet shock safety requirements; no changes to right-of-ways including vegetation management; small increase in electrical current and magnetic field.
Water Use	No physical modifications to intake structure; no increased rate of withdrawal; no water use conflicts.
Discharge	Increase in water temperature and mixing zone to Lake Ontario; application to increase SPDES permit discharge temperature and plume acreage submitted to New York State, decision pending.
Aquatic Biota	No adverse impact will occur to the RIS populations due to the following: Ginna Station is not near preferred/important spawning areas; cooler areas for refuge are readily available; thermal plume under proposed conditions would extend approximately 1 to 3 feet below the surface; cold shock incidents would be minimal due to gradual shutdown and reduction procedures; fish avoid areas that exceed their thermal preferenda; impinged species exposed to elevated temperatures (above thermal preferenda) will be exposed only for a short duration (20-50 seconds); EPU would have no additional impact on entrained species.
Terrestrial Biota	No change in transmission line maintenance; EPU would have no additional impact on terrestrial plant or animal species.
Threatened and Endangered Species	Six Federally listed species in Wayne County; No species have been identified on the Ginna site; EPU would have no effect on species.
Social and Economic	No significant change in size of Ginna Station work force required for plant operation; small increase in work force required for spring 2006 refueling outage to implement remaining plant modifications. EPU would have no effect on socioeconomics.

RADIOLOGICAL IMPACTS

Radioactive Waste Stream Impacts:

Ginna uses waste treatment systems designed to collect, process, and dispose of gaseous, liquid, and solid wastes that might contain radioactive material in a safe and controlled

manner such that discharges are in accordance with the requirements of Part 20, "Standards for Protection Against Radiation," and Part 50, "Domestic Licensing of Production and Utilization Facilities," Appendix I, of Title 10 of the *Code of Federal Regulations* (10 CFR).

These radioactive waste streams are discussed in the FES. The methodology used in scaling the increase of radioactive content under the proposed EPU conditions were based on techniques in NRC's Calculations of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Pressurized Water Reactors (PWR-GALE code), NUREG-0017, Revision 1. The proposed EPU would not result in any physical changes to the gaseous, liquid, or solid waste systems.

Gaseous Radioactive Waste and Offsite Doses:

During normal operation, the gaseous effluent treatment systems process and control the release of gaseous radioactive effluents to the environment, including small quantities of noble gases, halogens, tritium, and particulate material. The gaseous waste management systems include the offgas system and various building ventilation systems. The Ginna Base Case Average Dose, an annual average dose from 1999 through 2003 to extrapolated 100-percent plant operating capacity, was less than 1 millirem (mrem) per year. Ginna LLC predicts that gaseous radioactive effluents would linearly increase as a result of the proposed EPU, approximately 17 percent. Even with a 17-percent increase from the peak dose of less than 1 mrem per year, the dose would still remain well below the regulatory standards in 10 CFR Part 50, Appendix I. Therefore, the increase in offsite dose due to gaseous effluent release following the EPU would not be significant.

Liquid Radioactive Waste and Offsite Doses:

During normal operation, the liquid effluent treatment systems process and control the release of liquid radioactive effluents to the environment such that the doses to individuals offsite are maintained within the limits of 10 CFR Part 20 and 10 CFR Part 50, Appendix I. The

liquid radioactive waste systems are designed to process the waste and then recycle it within the plant as condensate, reprocess it through the radioactive waste system for further purification, or discharge it to the environment as liquid radioactive waste effluent in accordance with State and Federal regulations. Ginna LLC predicts the offsite dose from liquid effluents would increase linearly, approximately 17 percent. The increase would not increase the volume of liquid radioactive waste, but the radioactivity levels in the reactor coolant. Even with an increase, the maximum annual total body and organ doses (all pathways) would be well below the regulatory standards contained in 10 CFR Part 50, Appendix I, as well as the doses bounded by the FES. Therefore, the NRC concludes that the increase in offsite dose due to liquid effluent release following the EPU would not be significant.

Solid Radioactive Wastes:

The solid radioactive waste system collects, processes, packages, and temporarily stores radioactive dry and wet solid wastes prior to shipment offsite and permanent disposal. Ginna produces dry active waste (paper, plastic, wood, rubber, glass, floor sweepings, cloth, metal), sludge, oily waste, bead resin and filters. The increase in volume of solid waste would not be linear, because the proposed EPU would neither alter installed equipment performance nor require drastic changes in system operation or maintenance. In recent years (2003-2004), the solid waste volume generated by Ginna has been significantly above the 9-year non-outage average of 2,500 cubic feet, and outage year average of 5,000 cubic feet. This increase in volume is a result of the roof and reactor head replacement projects and mandated security upgrades.

Under the proposed EPU conditions, any increase in volume of solid waste would be due to increases in disposal of bead resins and filters. This increase would not be significant, although the amount of radioactivity in the waste would linearly increase. Even with such increases, Ginna LLC expects the results would remain below the generation volumes and

doses in the FES. Therefore, the NRC concludes that there would be no significant impact to offsite dose due to solid waste disposal following the EPU.

In-Plant Radiation Doses:

The proposed EPU would increase in-plant radiation dose rates linearly with the increase in core power level, by approximately 17 percent. These higher doses rates would not be expected to increase the annual average collective occupational doses more than 17 percent. Ginna LLC performed an analysis of the expected increased levels of radiation in the following four areas at Ginna: Areas near Reactor Vessel, In-Containment Areas Adjacent to the Reactor Coolant System, Areas near Irradiated Fuels and Other Irradiated Objects, and Areas outside Containment where the Radiation Source Is Derived from the Primary Coolant. Plant programs and administrative controls, such as conservatism used in the original design basis reactor coolant system source terms, conservatism used in designing plant shielding requirements, and the Ginna Station Radiation Protection Program would ensure that occupational doses would be maintained within regulatory limits of 10 CFR Part 20, with the expected 17-percent increase. Therefore, the NRC concludes that there would be no significant impact to in-plant radiation doses.

Direct Radiation Doses Offsite:

Under the proposed EPU conditions, Ginna LLC predicted the increase to direct radiation doses offsite would be proportional to the uprate percentage increase, approximately 17 percent, from liquid and gaseous releases. Potential offsite doses were calculated using plant core power operating history, 1999-2003, reported gaseous and liquid effluent and dose data from 1999-2003, NUREG-0017 equations and assumptions, and a conservative methodology. The extrapolated and increased offsite dose calculations for the liquid and gaseous effluents were found to be well below the regulatory standards in 10 CFR Part 50,

Appendix I, 40 CFR Part 190 and the FES. Therefore, the NRC staff concludes that there would be no significant impact of offsite direct radiation doses.

Postulated Accident Doses:

As a result of implementation of the proposed EPU, there would be an increase in the source term used in the evaluation of some of the postulated accidents in the FES. The inventory of radionuclides in the reactor core is dependent upon power level; therefore, the core inventory of radionuclides could increase by as much as 17 percent. The concentration of radionuclides in the reactor coolant might also increase by as much as 17 percent; however, this concentration is limited by the Ginna Technical Specifications. Therefore, the reactor coolant concentration of radionuclides would not be expected to increase significantly. This coolant concentration is part of the source term considered in some of the postulated accident analyses. Some of the radioactive waste streams and storage systems evaluated for postulated accidents might contain slightly higher quantities of radionuclides. For those postulated accidents where the source term has increased, the calculated potential radiation dose to individuals at the site boundary (the exclusion area) and in the low population zone would be increased over values presented in the FES.

The NRC's acceptance criteria for radiological consequences analysis using an alternative source term are based on 10 CFR 50.67. Ginna LLC's assessment of new calculated doses following the EPU are well below the NRC regulatory standard described in Regulatory Guide (RG) 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Plants." The NRC staff is reviewing the licensee's analyses and performing confirmatory calculations to verify the acceptability of the licensee's calculated doses under accident conditions. The results of the NRC staff's calculations will be presented in the safety evaluation to be issued with the license amendment, and the EPU will not be approved by NRC unless the NRC staff's independent review of dose calculations under

postulated accident conditions determines that dose is within regulatory limits. Therefore, the staff concludes if the doses from postulated accidents remained within the NRC regulatory limits of 10 CFR Part 50 and RG 1.183, the impacts would be small.

Fuel Cycle and Transportation Impacts:

The environmental impacts of the fuel cycle and transportation of fuels and wastes are described in Tables S-3 and S-4 of 10 CFR 51.51 and 10 CFR 51.52, respectively. An additional NRC generic environmental assessment (53 FR 30355, dated August 11, 1988, as corrected by 53 FR 32322, dated August 24, 1988) evaluated the applicability of Tables S-3 and S-4 to a higher burnup fuel cycle and concluded that there is no significant change in environmental impact from the parameters evaluated in Tables S-3 and S-4 for fuel cycles with uranium enrichments up to 5-weight percent Uranium-235 and burnups less than 60,000 megawatt (thermal) days per metric ton of Uranium-235 (MWd/MTU). Ginna LLC has concluded that the fuel enrichment at Ginna would be increased up to 4.95 percent as a result of the proposed EPU. In addition, the expected core average exposure for the EPU would be approximately 52,000 MWd/MTU, with no fuel pins exceeding the maximum fuel rods limits. Therefore, the environmental impacts of the EPU would remain bounded by the impacts in Tables S-3 and S-4 and would not be significant.

Summary:

The proposed EPU would not significantly increase the consequences of accidents, would not result in a significant increase in occupational or public radiation exposure, and would not result in significant additional fuel cycle environmental impacts based on information provided in the ER and the NRC staff's independent review. Accordingly, the Commission concludes that there are no significant radiological environmental impacts associated with the proposed EPU. Table 2 summarizes the radiological environmental impacts of the proposed EPU at Ginna.

Table 2: Summary of Radiological Environmental Impacts

Gaseous Effluents and Doses	Small dose increase due to gaseous effluents; doses to individuals offsite would remain below NRC limits.
Liquid Effluents and Doses	No significant volume increase in liquid effluent generated would be expected; small increase of radioactive materials in liquid effluent; doses to individuals offsite would remain below NRC limits.
Solid Radioactive Waste	Volume of solid waste increased due to equipment replacement projects and security upgrades; increase in radioactive material would be expected; all increases (volume and dose) within NRC limits.
In-plant Dose	Occupational dose expected to increase by 17 percent overall; would remain within all NRC limits.
Direct Radiation Dose	Increase of 17 percent would be expected; doses would remain below NRC regulatory standards and those in the FES.
Postulated Accidents	Increase in the source term used in the evaluation of postulated accidents. New calculated doses must meet NRC regulations (10 CFR 50.67), which will be confirmed and presented in NRC safety evaluation.
Fuel Cycle and Transportation	Impacts in Tables S-3 and S-4 in 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," are bounding.

Alternatives to Proposed Action:

As an alternative to the proposed action, the NRC staff considered denial of the proposed EPU (i.e., the "no-action" alternative). Denial of the application would result in no change in the current environmental impacts. The plant would continue to operate under its current licensing basis, possibly up to an additional 20 years. However, if the EPU were not approved, other agencies and electric power organizations might be required to pursue other means of providing electric generation capacity to offset future demand. The additional power not supplied by the Ginna site would likely be replaced by demand-side management and energy conservation, purchased power from other electricity providers, other alternative energy sources, or a combination of these options. The environmental impacts associated with the

no-action alternative would also have positive impacts at Ginna (for example, increase in solid waste generation) would be eliminated.

The environmental impacts of alternative sources of producing electrical power are described in the FES and Chapter 8 of NUREG-1437 Supplement 14. Non-nuclear power generation technologies considered were coal-fired and natural-gas fired generation at the Ginna or at an alternative site. The construction and operation of a coal or natural-gas fired plant would create greater negative environmental impacts in areas such as air quality, land use, and waste management, than those identified for the proposed Ginna EPU.

Implementation of the proposed EPU would have less impact on the environment than the construction and operation of a new coal or natural-gas fired plant at an alternative site. In addition, the EPU does not involve environmental impacts that are significantly different from those presented in the 1973 FES for Ginna. Therefore, the NRC staff concludes that the impacts of the no-action alternative would be greater than the impacts of the proposed action based on information in the FES and NUREG-1437 Supplement 14.

Alternative Use of Resources:

This action does not involve the use of any resources not previously considered in the FES and NUREG-1437 Supplement 14.

Agencies and Persons Consulted:

In accordance with its stated policy, on June 26, 2006, the NRC staff consulted with the State of New York official, John Spath, of the Energy Research and Development Authority, regarding the environmental impact of the proposed action. The State official had no additional comments other than those provided in the NYSDEC letter of May 12, 2006.

FINDING OF NO SIGNIFICANT IMPACT

On the basis of the environmental assessment, the Commission concludes that implementation of the action as proposed would not have a significant effect on the quality of

the human environment. Accordingly, the Commission has determined not to prepare an environmental impact statement for the proposed action.

For further details with respect to the proposed action, see the licensee's application dated July 7, 2005, as supplemented by letters dated August 15, September 30, December 6, 9, and 22, 2005, and January 11 and 25, and February 16, March 3 and 24, and May 9 and 19, 2006 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML051950123, ML052310155, ML052800223, ML053480388, ML053480362, ML053640080, ML060180262, ML060960416, ML060540349, ML060810218, ML060940312, ML061350375, and ML061450381, respectively). Documents may be examined, and/or copied for a fee, at the NRC's Public Document Room (PDR), located at One White Flint North, Public File Area O-1F21, 11555 Rockville Pike (first floor), Rockville, Maryland. Publicly available records will be accessible electronically from the Agencywide Documents Access and Management System (ADAMS) Public Electronic Reading Room on the NRC Web site, <http://www.nrc.gov/reading-rm/adams.html>. Persons who do not have access to ADAMS or who encounter problems in accessing the documents located in ADAMS should contact the NRC PDR Reference staff at 1-800-397-4209, or 301-415-4737, or send an e-mail to pdr@nrc.gov.

Dated at Rockville, Maryland, this 26th day of June 2006.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

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