

Attachment 3

GEH Morris Supplement to Applicant's Environmental Report

December 2019

Supplement to Applicant's Environmental Report

**General Electric Hitachi Nuclear Energy
Morris Operation
Independent Spent Fuel Installation (ISFSI)
Application for Renewed ISFSI Site-Specific License**

December 27, 2019

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Acronyms and Abbreviations

ACHP	Advisory Council on Historic Preservation
ACS	American Community Survey
AEC	Atomic Energy Commission
ALARA	as low as reasonably achievable
BWR	boiling water reactor
CEQ	Council on Environmental Quality or Council
CFR	Code of Federal Regulations
CISF	consolidated interim storage facility
CSAR	Consolidated Safety Analysis Report
DNPS	Dresden Nuclear Power Station
DOE	U.S. Department of Energy
EA	environmental assessment
EPA	Environmental Protection Agency
ER	environmental report
ESA	Endangered Species Act
Exelon	Exelon Generation Company LLC
GE	General Electric Company
GEH	General Electric Hitachi Nuclear Energy Americas LLC
GEIS	generic environmental impact statement
HIC	High Integrity Container
IDNR	Illinois Department of Natural Resources
IEPA	Illinois Environmental Protection Agency
ISFSI	Independent Spent Fuel Storage Installation
LLRW	low-level radioactive waste
MFRP	Midwest Fuel Recovery Plant
MO	Morris Operation
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NMSS	Office of Nuclear Materials Safety and Safeguards
NRC	U.S. Nuclear Regulatory Commission
NRHP	National Register of Historic Places
OCA	Owner Controlled Area
SHPO	State Historic Preservation Officer
TEDE	Total Effective Dose Equivalent
TLD	thermoluminescent dosimeter
USC	United States Code
USCB	U.S. Census Bureau
USGS	U.S. Geological Survey
USFWS	U.S. Fish and Wildlife Service
WCS	Waste Control Specialists LLC

1 INTRODUCTION

1.1 PURPOSE AND NEED FOR PROPOSED ACTION

The U.S. Nuclear Regulatory Commission (NRC) licenses the operation of independent spent fuel storage installations (ISFSIs) for storing power reactor spent fuel and associated radioactive materials. NRC issues licenses in accordance with the Atomic Energy Act of 1954 (42 United States Code [USC] 2011, et seq.) and NRC implementing regulations (10 Code of Federal Regulations [CFR] Part 72). In May 1982, NRC granted the General Electric Company (GE) Materials License No. SNM-2500 for the operation of an ISFSI at Morris in Grundy County, Illinois.

The ISFSI provides interim storage for spent nuclear fuel that had been accepted by GE and stored in the fuel storage basins of the former Midwest Fuel Recovery Plant (MFRP). By contract, the U.S. Department of Energy (DOE) has the ultimate responsibility for the permanent disposition of the spent fuel stored at the ISFSI. Interim storage for the spent fuel was necessary because there was no operational DOE facility for permanent disposal or storage for irradiated spent nuclear fuel at the time GE stopped development of the MFRP. Extended operation of the ISFSI is necessary, since GE-Hitachi Nuclear Energy Americas LLC (GEH) must be able to store spent fuel in a safe manner pending disposition in the Federal repository.

1.2 PROPOSED ACTION

The proposed action is to renew the site-specific license, SNM-2500, for the ISFSI. The purpose for the proposed action is to extend the NRC authorization for operation of the ISFSI and allow GEH to continue to maintain safe storage of the spent fuel until it can be transported offsite. The current site-specific license will expire on May 31, 2022. GEH proposes to extend the ISFSI license for 20 years beyond the current site-specific license term, through May 2042, in accordance with 10 CFR 72.42.

1.2.1 Licensing History

The GEH facility was originally designed in 1964 as a spent fuel reprocessing plant named the MFRP. The facility was licensed by the Atomic Energy Commission (AEC) for the receipt and storage of spent nuclear fuel in December 1971, and storage of spent fuel began in December 1972. On August 23, 1974, the AEC terminated the MFRP Construction Permit No. CPCSF-3 but reissued Materials License No. SNM-1265 for receipt and storage of spent nuclear fuel. At that time, the facility became known as the Morris Operation. In December 1975, Materials License No. SNM-1265 was revised and reissued to permit the receipt and storage of up to 750 metric tons uranium of spent fuel. On May 4, 1982, the NRC issued Materials License No. SNM-2500 (the current operating license) pursuant to 10 CFR Part 72. Issuance of the license constituted renewal of the authorization for spent fuel storage activities at the Morris Site for a 20-year term with an expiration date of May 31, 2002. In 2000, GEH filed an application for renewal of the SNM-2500 license for an additional 20 years (GE 2000). On December 21, 2004, the NRC renewed the license for a 20-year term with an expiration date of May 31, 2022. The renewal of SNM-2500 incorporated amendments to the license through Amendment 12, which modified the license to authorize storage of only the spent fuel currently in inventory. There are

no plans to receive additional spent fuel or replace any currently in inventory at Morris Operation ().

In 2007, NRC approved Amendment 13 to transfer the GE license to GEH. The newly formed entity, GEH, acquired ownership of the Morris Operation ISFSI and assumed responsibility for the operation and maintenance of the Morris facility (NRC 2007).

In June 2013, GEH submitted a license amendment request to modify the Technical Specifications regarding submittal of annual environmental reports in accordance with regulatory requirements along with miscellaneous editorial changes. Amendment 14 to the license was approved in April 2015. NRC concluded the amendment was eligible for a categorical exclusion as it only changed recordkeeping, reporting, or administrative procedures or requirements and did not involve a change in the design or operation of the facility (NRC 2015a).

In February 2017, GEH submitted a license amendment request proposing minor clarifying administrative changes to the license. The proposed changes added descriptions of authorized materials and physical forms currently onsite and described in the Consolidated Safety Analysis Report (CSAR). Amendment 15 to the license was approved in June 2017. NRC concluded the request was administrative in nature and eligible for a categorical exclusion (NRC 2017a).

1.2.2 Operations

The GEH-MO CSAR contains a detailed description of the facility. The fuel storage facility includes two interconnected water-filled basins with cranes, water treatment system, and other facilities required to store irradiated fuel underwater for an indefinite period. Fuel storage equipment in the basins is designed to protect the integrity of fuel rods during seismic or meteorological events. Special procedures and isolation can be provided for storage of damaged or leaking fuel. Security measures are in effect to protect the facility against unauthorized access. Although intended for interim storage only, based on the storage system environment and aging management, non-replaceable components (concrete basin and basin liner) allow safe storage of the fuel for an extended period of time. (GEH 2012, Section 1.1)

The sand filter building, a principal part of the plant ventilation system, is east of the main building, which houses the fuel storage facilities. All air exhausted from the fuel storage areas and from supporting areas in the main building is passed through the sand filter, sampled, and vented to the atmosphere via the 300-ft-tall stack located southeast of the main building. Attached to the sand filter building is the emergency equipment building. Other prominent structures on the site include a utility and service building; a shop and warehouse building; the administration building; a water tower; and a cask service building. (GEH 2012, Section 1.2.2.2)

Site facilities as they exist today are the result of using original buildings, where possible, and rearranging or adding new buildings, where necessary. There are no planned major changes to the facility structures, utility systems, or waste management systems during the proposed license renewal term. Installation of a small solar photovoltaic farm on the GEH property is expected to be completed to augment the previous source for offsite power. Other minor changes due to maintenance requirements or the upgrading of facility systems may occur to comply with applicable regulations. Environmental monitoring, radiation monitoring and protection, and facility maintenance and operations will continue to be performed.

Due to the delay in establishing a permanent federal repository, the spent nuclear fuel at the GEH-MO ISFSI will be stored onsite for an extended period. The ISFSI will be subject to aging management activities to ensure the continued integrity of the spent fuel and plant structures, systems, and components during the ISFSI license renewal term. The aging management programs are summarized in Appendix A of the license renewal application.

The onsite GEH staff currently performs daily activities associated with the operation of the ISFSI, which primarily involve security, routine maintenance, and monitoring. No major changes in staffing levels are anticipated during the license renewal term. The facility requires little maintenance beyond periodic surveillance. Small amounts of low-level radioactive waste are generated during operations at the ISFSI site and accumulated pending shipment offsite.

1.3 ENVIRONMENTAL REPORT SUPPLEMENT SCOPE AND METHODOLOGY

GEH has prepared this supplemental environmental report (ER) as part of its application to the NRC to renew the site-specific ISFSI license in accordance with the following NRC regulations:

- 10 CFR Part 72, Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste, 72.42, Duration of License; Renewal, and 72.34, Environmental Report
- 10 CFR Part 51, Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions, 51.60, Environmental Report-Materials Licenses

NRC regulation 10 CFR 72.42 provides for ISFSI license renewal, and regulation 72.34 requires an application to include an ER that meets the requirements of 10 CFR 51 Subpart A. In Subpart A, 10 CFR 51.60 requires that the ER be a separate document entitled “Supplement to Applicant’s Environmental Report” and specifies ER contents. The regulation focuses on presenting any significant environmental change from the previously submitted ER.

In determining what information to include in the ISFSI ER supplement, GEH has relied on guidance provided in NUREG-1748 (NRC 2003). GEH also considered the guidance in NUREG-1927 (NRC 2016a). During preapplication discussions in November 2018, the NRC staff noted that although NUREG-1927 is not intended to be used for the review of renewal applications for wet storage facilities, it still contains guidance that is relevant to the renewal application for the GEH-MO ISFSI. The NRC guidance in NUREG-1927 indicates that license renewal is not an exercise in re-licensing and is not intended to impose requirements beyond those that were met by the facility when it was initially licensed. GEH assembled a team to review the ER submitted with the previous ISFSI license renewal application (GE 2000) and NRC’s subsequent environmental analysis (NRC 2004a), to identify areas that require updating to meet the expectations of NUREG-1748, and to evaluate whether any significant changes have occurred during the current licensing period or if significant changes are anticipated during the renewal term. To perform this review, GEH utilized staff members who are knowledgeable of the Morris site and ISFSI operations. GEH references material in the previous ISFSI ER (GE 2000) and NRC Environmental Assessment (NRC 2004a) that remains valid throughout this document.

Table 1-1 was prepared to verify conformance with the regulatory requirements. The table indicates which ER supplement section provides responsive information.

Table 1-1. Environmental Report Section(s) that Respond(s) to License Renewal Environmental Regulatory Requirements

Regulatory Requirement	Responsive ER Section(s)
10 CFR 72	Entire Document
10 CFR 51.60(a)	Entire Document
10 CFR 51.45(a)	Entire Document
10 CFR 51.45(b) statement of purpose	1.1 Purpose and Need for the Proposed Action
10 CFR 51.45(b) description of proposed action	1.2 Proposed Action
10 CFR 51.45(b) affected environment	3.0 Affected Environment
10 CFR 51.45(b)(1) impact of proposed action	4.0 Environmental Impacts
10 CFR 51.45(b)(2) adverse environmental effects	4.0 Environmental Impacts
	6.0 Environmental Measurement and Monitoring
	7.1 Unavoidable Adverse Impacts
10 CFR 51.45(b)(3) alternatives to proposed action	2.0 Alternatives to the Proposed Action
10 CFR 51.45(b)(4) short term use and long term productivity	7.3 Short-Term Use, Maintenance, and Enhancement of Long-Term Productivity
10 CFR 51.45(b)(5) irreversible and irretrievable commitments	7.2 Irreversible and Irretrievable Resource Commitments of Resources
10 CFR 51.45(c) alternatives for reducing or avoiding effects	4.0 Environmental Impacts
	5.0 Mitigation Measures
10 CFR 51.45(d)	1.4 Applicable Regulatory Requirements, Permits, and Required Consultations

1.4 APPLICABLE REGULATORY REQUIREMENTS, PERMITS, AND REQUIRED CONSULTATIONS

Continued operation of the GEH-MO ISFSI does not require any additional permits, licenses, or approvals other than the renewal of the NRC operating license. Table 1-2 lists the authorizations and consultations that are related to the NRC renewing the site-specific ISFSI license. This section discusses the consultations in more detail.

Existing permits associated with the operation of the GEH-MO include the Illinois Environmental Protection Agency (IEPA) Water Pollution Control Permit (2019-EO-64003, IEPA 2019) for operation of the holding pond and wastewater lagoons. The IEPA-issued permit will be renewed periodically in accordance with applicable regulations over the period of extended operation. GEH-MO also periodically seeks authorization for import of low-level radioactive waste to the Texas Waste Disposal Compact to support disposal of waste at the Waste Control Specialists LLC (WCS) facility in Andrews, Texas.

Table 1-2. Environmental Authorizations for GEH-MO ISFSI License Renewal

Agency	Authority	Requirement	Remarks
NRC	Atomic Energy Act (42 USC 2011, et seq.)	ISFSI License Renewal	ER Supplement submitted in support of license renewal application
U.S. Fish and Wildlife Service (USFWS)	Endangered Species Act (ESA) Section 7 (16 USC 1536)	Consultation	Requires federal agency issuing license to consult with USFWS if the action may affect species listed under the ESA
Illinois Department of Natural Resources (IDNR)	National Historic Preservation Act Section 106 (16 USC 470f)	Consultation	Requires federal agency issuing a license to consider cultural impacts and consult with State Historic Preservation Officer (SHPO)

1.4.1 Threatened and Endangered Species Consultation

Section 7 of the Endangered Species Act (16 USC 1531 et seq.) requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of species that are listed, or proposed for listing, as endangered or threatened. Depending on the type of action and potential effects involved, the Act requires consultation with the USFWS regarding effects on terrestrial and freshwater species, and with the National Marine Fisheries Service (NMFS) regarding effects on anadromous and marine species. USFWS and NMFS have issued joint procedural regulations at 50 CFR Part 402, Subpart B, that address consultation. USFWS maintains the joint list of threatened or endangered species at 50 CFR Part 17.

A federal agency is not required to consult with the USFWS and/or NMFS if it determines an action will not affect listed species or designated critical habitat. The agency is required to

consult if it determines that the action may affect listed species or critical habitat, even if the effects are expected to be beneficial. If the agency determines that the action is not likely to adversely affect listed species or critical habitat, it can request the concurrence of the USFWS and/or NMFS with that determination. Therefore, whether and how the NRC may choose to consult with USFWS and NMFS will depend upon the determination as to potential effect. As discussed in Sections 3.6 and 4.3, the GEH expects that there will be a “no-effect” determination. The NRC may choose to solicit comments from the IDNR regarding species listed in Illinois prior to renewing the ISFSI license.

1.4.2 Historic Preservation Consultation

Section 106 of the National Historic Preservation Act (16 USC 470 et seq.) requires federal agencies having the authority to license any undertaking to consider the effect of the undertaking on historic properties and to afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment on the undertaking, prior to the agency issuing the license. ACHP regulations provide for the SHPO to have a consulting role (36 CFR 800.2). To initiate the Section 106 process, the federal agency must determine whether the proposed federal action is an undertaking as defined in the regulations and, if so, whether it is a type of activity that has the potential to cause effects on historic properties (36 CFR 800.3). If the undertaking is a type of activity that does not have the potential to cause effects on historic properties, assuming such historic properties were present, the agency has no further obligations under Section 106.

Section 2.0 of the previous license renewal ER indicates there are no significant cultural resources located near the GE-MO facility (GE 2000). In Section 4.1.7 of the 2004 environmental assessment (EA), NRC states that sites of local historical interest are located far enough away to not be affected by activities under either the proposed action or the no-action alternative. Therefore, NRC concluded neither alternative would result in any adverse effects to cultural or historical resources. (NRC 2004a) As discussed in Sections 3.9 and 4.3 of this ER supplement, GEH has not identified new information regarding historical sites or cultural resources in the vicinity of the MO facility that would alter that conclusion.

The proposed action, to continue operation of the ISFSI, would not involve any new disturbance that would have the potential to affect cultural resources. Nonetheless, the NRC may choose to solicit comments from the Illinois SHPO while conducting its environmental review of the proposed action to renew the ISFSI license.

2 ALTERNATIVES TO THE PROPOSED ACTION

2.1 NO-ACTION ALTERNATIVE

Under the no-action alternative, the NRC would not renew the site-specific license for the GEH-MO ISFSI. The operating license would expire on May 31, 2022, at which time GEH would no longer be able to store spent fuel at the ISFSI. GEH would need to remove the stored fuel from the ISFSI, transport the fuel to another licensed storage facility, and decommission the fuel storage facility associated with SNM-2500. There is no federal repository or other federal disposition path available for the spent fuel presently stored under SNM-2500; therefore, the no-action alternative is not a reasonable alternative.

2.2 OTHER ALTERNATIVES

An evaluation of other alternatives to the renewal of the GEH-MO ISFSI license is provided in the following sections.

2.2.1 Ship Fuel to an Offsite Interim Storage Facility

Commercial entities have expressed interest in establishing a consolidated interim storage facility (CISF) for away-from-reactor storage of spent nuclear fuel. Development of a CISF would require a specific license from the NRC. Two facilities at locations in the southwestern U.S., the Eddy-Lea Alliance facility in New Mexico (Holtec 2015) and the WCS facility in Andrews County, Texas (WCS 2015), have been proposed. Holtec International submitted its application for the Eddy-Lea Alliance facility in March 2017 (Holtec 2017). NRC expects to complete the review of the Holtec application by March 2021 (NRC 2019a). WCS submitted a license application for a CISF in April 2016 (WCS 2016), but later requested that NRC suspend its review of the application. In 2018, WCS requested that NRC resume its review. NRC expects to complete the review of the WCS application by May 2021 (NRC 2019b). Because the availability of a CISF for spent fuel in time (by 2022) to eliminate the need for the MO ISFSI license renewal is unlikely, shipment of the spent fuel to an offsite facility is not a reasonable alternative.

2.2.2 Ship Fuel to a Permanent Federal Repository

GEH and NRC intend for storage at the MO ISFSI to be an interim action pending availability of a federal repository. There is uncertainty regarding when or whether a federal repository will be licensed, and the schedule under which it might be available to accept spent fuel shipments impacts the necessity for the GEH-MO ISFSI site-specific license renewal. The repository schedule drives the ISFSI schedule; the longer it takes for the repository to begin accepting spent fuel shipments, the longer the ISFSI must store spent fuel.

In response to recommendations by the Blue Ribbon Commission on America's Nuclear Future (BRC 2012), DOE identified a strategy to implement storage capabilities within the next 10 years and to engage in a consent-based siting process and begin to conduct preliminary site investigations for a geologic repository (DOE 2013). DOE's goal is to have a repository sited by 2026, the site characterized and the repository designed and licensed by 2042, and the repository constructed and operational by 2048 (DOE 2013). The earliest that DOE anticipates availability

of a geologic repository to accept spent nuclear fuel is the year 2048. Therefore, shipment of spent fuel to a permanent repository is not a viable alternative to the MO ISFSI license renewal.

3 AFFECTED ENVIRONMENT

3.1 SITE LOCATION

The GEH-MO facilities are located on a property of about 327 acres owned by GE in Goose Lake Township, Grundy County, Illinois, near the confluence of the Kankakee and Des Plaines Rivers. The owner controlled area (OCA)¹ fence encloses 15 acres, which is surrounded by an additional 312 acres of GE property. At the time of the previous ISFSI license renewal, GE owned approximately 892 acres. Four parcels totaling approximately 565 acres were sold by GE in 2013 (Grundy County 2019a). Those parcels were located south of the current MO site boundary.

The OCA houses the Main Process Building containing the storage basins. In addition, the OCA encompasses numerous other buildings, structures, and transportation facilities including the Administration Building, Warehouse Building, Utility Service Building, Process Building, Cask Service Facility, Cladding Vault, Low-Activity Waste Vault, Sand Filter, and ventilation exhaust stack. A rail spur is located in the northwest portion of the OCA that services the Cask Service Facility and the Cask Receiving Area of the Process Building. Immediately north of the OCA is a parking lot and warehouse.

The MO site is located at 41°22'53" N latitude, 88°16'32" W longitude; about 15 air miles southwest of Joliet and about 50 miles southwest of the Chicago, Illinois - Gary, Indiana area. Aurora is located about 25 miles north, and Kankakee is about 25 miles to the southeast. Morris, the county seat of Grundy County, is about 7 miles to the west. Interstate Highway 55 (I-55) is about 4 miles east, and Interstate Highway 80 (I-80) is about 5 miles to the north. Figures 3-1 and 3-2 depict the general site location and neighboring structures and activities. Figure 3-3 shows the layout of the MO site, specifically the OCA. Figure 3-4 provides a view of the ISFSI surroundings.

MO site boundaries and surrounding lands and waters are shown in Figure 3-2. The property's northern and eastern boundary is defined by E. Collins Road. The Illinois and Kankakee Rivers are separated from the property to the north and east by lands of Exelon Generation Company, LLC's (Exelon's), Dresden Nuclear Power Station (DNPS) and related facilities, and a privately owned plot of about 50 acres. The canals connecting the DNPS to its cooling pond run parallel to the eastern boundary of the site between E. Collins Road and Dresden Road. A small residential area is located beyond the DNPS canals, along the west bank of the Kankakee River. To the south, the property is bordered by open land that is privately owned. Other lands bordering the property include industrial areas to the northwest, and Goose Lake Prairie State Natural Area adjacent to the property to the west.

¹ Note the OCA is a historic designation used at the Morris site and is not equivalent to the controlled area defined in 10 CFR 20. GEH maintains control of the approximately 327 acres that GEH owns around the OCA. Access to the site is controlled by gates. The property is enclosed by an agricultural fence with posting advising unauthorized persons not to trespass beyond the fence barrier.

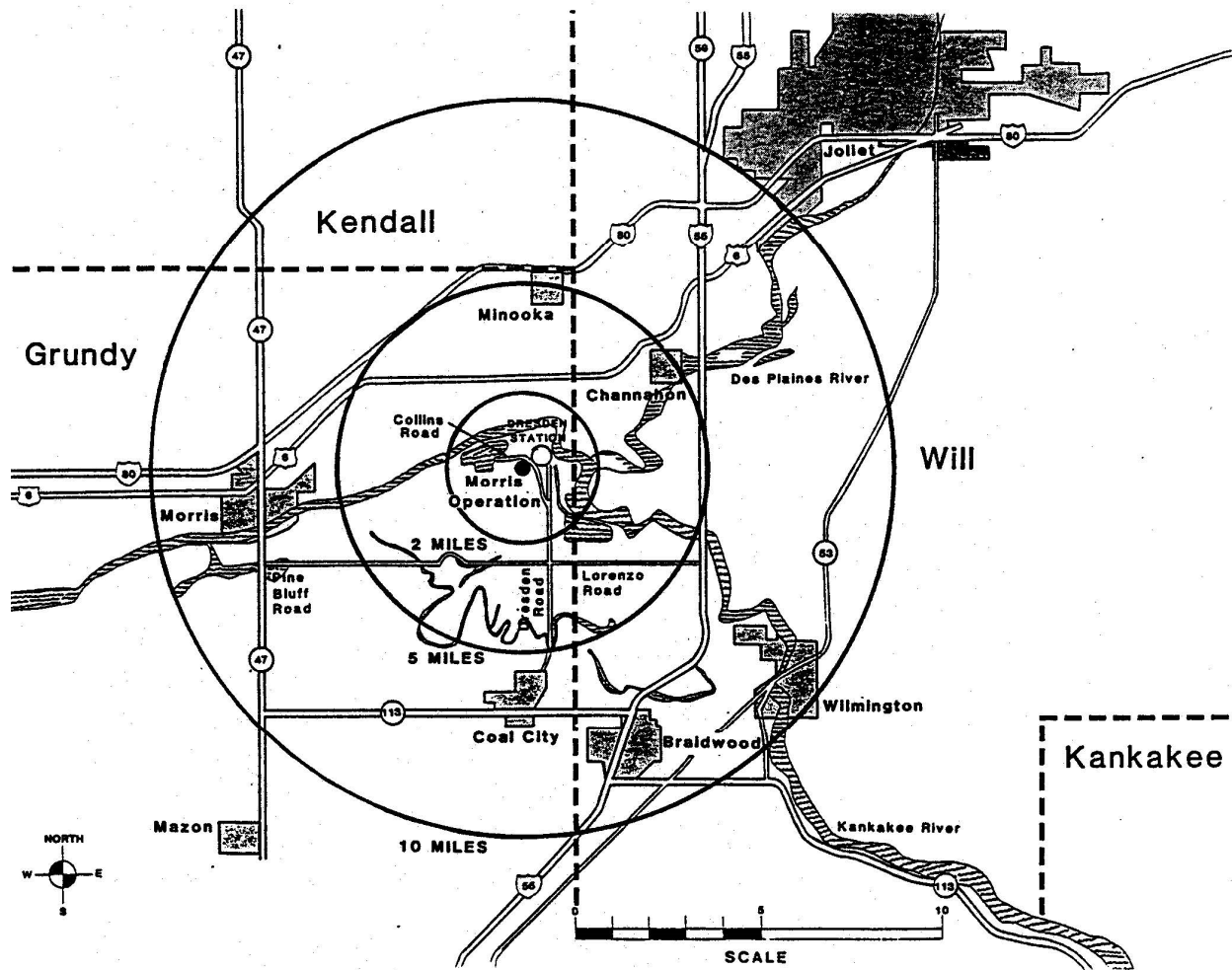


Figure 3-1. GEH-MO Location

Figure 3-2. GEH-MO Site Vicinity

Figure 3-3. GEH-MO ISFSI Layout

Figure 3-4. View of GEH-MO Facility (Looking North)

3.2 LAND USE

The distribution of land use in the vicinity of the Morris site remains essentially as described in Section 3.5 of the EA (NRC 2004a). Changes in land use are summarized below.

Collins Station, a former gas-fired electric generating station located approximately 5 miles southwest of the GEH-MO site, was closed and decommissioned in 2004. The complex was completely demolished, and the site restored for eventual redevelopment (ADC 2019). Heidecke Lake, which served as the cooling pond for Collins Station, continues to be managed by IDNR for fishing and hunting as the Heidecke Lake State Fish and Wildlife Area (IDNR 2018a).

The GEH property consists of undeveloped land, the OCA, and the parking area adjacent to E. Collins Road. At the time of the previous ISFSI license renewal, GE owned approximately 892 acres at the MO site. As discussed in Section 3.1, GEH sold four parcels totaling approximately 565 acres at the southern end of the MO site in 2013. Portions of this undeveloped land were leased for agricultural use while under GE ownership (NRC 2004a, Section 4.1.2). The land continues in agricultural use under the current ownership (Grundy County 2019a). A lease agreement permits limited farming and beef cattle grazing on the GEH-owned property outside the OCA (GEH 2012, Section 3.2.2.3).

GEH has also leased approximately 15 acres at the northeast corner of the MO site adjacent to E. Collins Road for development of a solar farm. The solar farm will supply electricity for the MO facility, augmenting its previous source of offsite power. The solar farm will be dedicated to powering MO, so transmission connection with the regional power grid will not be required. While this portion of the MO site is identified as farmland for tax purposes, the land is zoned for industrial use (Grundy County 2019b).

GEH-MO is adjacent to several industrial sites and is generally in a developing industrial area along the Illinois Waterway. However, most of the suitable industrial sites are already developed and Goose Lake Prairie State Park occupies most of the remaining land south of the river.

Grundy County developed a Comprehensive Plan including a vision for future land use. The land use surrounding GEH-MO continues as primarily industrial and parks and open space. Residential use occurs along the Kankakee River and in the finger lakes area to the south of the site. (Grundy County 2014, p. 90)

Will County prepared a Land Resource Management Plan (last updated in 2011) to guide development in the County over the next 20 years. The Plan identifies the portion of the County west of the GEH-MO and south of the Des Plaines River as rural area. Small neighborhoods and subdivisions along the river make up the Kankakee River Corridor. The Plan's design for the rural area and Kankakee River Corridor is to preserve the land pattern while allowing reasonable opportunities for growth. New development in the river corridor should respect the scale and character of the existing development (small, river-oriented housing areas) and be compatible with the surrounding rural areas. The area north of the Des Plaines River is identified as suburban communities. For the suburban communities land use type, which is identified as the northern half of the County, the Plan also calls for preserving this land use pattern while encouraging and managing mixed residential and commercial growth. (Will County 2011, pp. 5-12, 25-26)

3.3 TRANSPORTATION

Transportation conditions relative to the ISFSI site are the same as reported in Section 1.6 of the previous license renewal ER and Section 3.1 of the 2004 EA. Transportation routes near the site are shown on Figures 3-1 and 3-2. The site is within approximately 5 miles of two major interstate highways (I-55 and I-80) and is served by a railroad spur with access to mainline rail service. GEH-MO is located on E. Collins Road, a paved county road. Access to the interstate highways continues to be via county roads and state highways.

Four mainline railroads pass through the area: the Burlington Northern-Santa Fe, the CSXT, Union Pacific, and Canadian National (IDOT 2018). The GEH-MO site is served by a rail siding that was formerly part of the Elgin, Joliet and Eastern Railroad. The rail siding is now part of the Wisconsin Central railroad whose parent company is Canadian National (77 FR 34125).

Also, as discussed in the 2004 EA (NRC 2004a, Section 3.4.2) the Illinois River north of the GEH-MO site is part of the Illinois Waterway which extends from the Mississippi River to Lake Michigan. An agreement with Commonwealth Edison provides for access to the Illinois River through the DNPS site; however, no docking facility has been developed (GEH 2012, Sections 1.2.1 and 3.2.4.5).

There are no airports within 8 miles of the site. The closest major airports are Chicago O'Hare International Airport and Chicago Midway Airport, situated approximately 50 and 40 miles, respectively, to the north and northeast of the site (GEH 2012, Section 3.3.3).

3.4 GEOLOGIC CONDITIONS

GE conducted a significant amount of research related to site geology and potential seismic hazards to support the original MFRP licensing. The research included evaluation of regional geology, site geology, surface faulting, seismicity, maximum earthquake potential, and stability of subsurface materials/foundations. Applicable results from those evaluations are summarized in the original ER for the MFRP (GE 1972, Section III-3.0) and Section 3.7 of the CSAR (GEH 2012). Exploration of the site's substructure, as well as actual excavation for construction of the MFRP confirmed the rock is sound at all depths with no evidence of active faults. All main building foundations and below-grade vault and basin structures are set in bedrock to ensure high structural integrity for these facilities (GEH 2012, Section 1.2.1.2). This ER supplement focuses on any new or revised information that warrants updating of the ER documentation related to geology and seismology.

Historical data shows that seismic events in the vicinity of the MO site are rare and characterized by fairly low intensities and magnitudes (GEH 2012, Section 3.7.4). Most earthquakes in Illinois occur in the southern portion of the state near the New Madrid fault. Figure 3-5 presents a seismic risk map for the United States. The MO site area lies well within an area with the next lowest hazard rating according to the U.S. Geological Survey. This is consistent with the conclusions of the NRC staff in Section 3.3.2 of the previous EA (NRC 2004a) based on the seismic risk mapping at that time.

Following the earthquake on March 11, 2011 at the Fukushima Daiichi nuclear power plant, NRC inspected the Morris facility as part of the agency's effort to consider the lessons of the accident for nuclear facilities and require enhancements as appropriate. NRC inspectors reviewed

Figure 3-5. Seismic Hazard Map (USGS 2014)

scenarios such as station blackout, seismic, tornado, flood, and fire. The staff found that the fuel would not melt as a result of these events due to its limited heat load (NRC 2015b, p. 12). During that NRC inspection a calculation for the expansion gate #4 of the spent fuel pool was not available. As described in Section A.16 of the CSAR, GEH recently completed a structural evaluation for expansion gate #4 of the spent fuel pool and concluded no modification is required.

3.5 WATER RESOURCES

Water resources in the GEH-MO vicinity are fully described in the previous license renewal ER (GE 2000) and associated NRC EA (NRC 2004a). The reader is directed to these documents for additional information on water use and water quality.

The ISFSI uses no surface water, and no liquid waste is discharged from the facility (GEH 2012, Section 1.4.5). Sanitary waste is piped to lagoons just outside (south) of the OCA. Some stormwater leaves the facility via open ditches and ultimately enters the Kankakee River (GEH 2012, Section 1.4.5).

Virtually all groundwater used by municipalities and industrial facilities in the area of the GEH-MO site is withdrawn from the Cambrian-Ordovician Aquifer (NRC 2004a, Section 3.4.1). The GEH-MO facility has installed a single deep well into the Aquifer that is equipped with a 100 gpm submersible pump (GEH 2012, Section 3.6.2.1). This well supplies all the facility's potable, sanitary, and fuel storage basin makeup water and is available for fire-fighting. Studies conducted by GE have shown ample water is available for operations and groundwater withdrawals have negligible impact on aquifer performance (GEH 2012, Sec. 3.6.2.1).

The EA for License Renewal (NRC 2004a) reported that groundwater withdrawals for all activities on the GEH-MO site averaged approximately 430 gallons per day (gpd) in 2002, and that these withdrawals had a small impact on groundwater and surface water in the area of the site. The GEH-MO facility currently withdraws approximately 200 gpd for demineralized water makeup, and another 200 gpd for potable, sanitary, and miscellaneous uses, essentially the same rate of withdrawal as reported previously.

GEH has installed eight monitoring wells around the Main Process Building and samples these wells quarterly. The goal of the sampling is to ensure that sampling results meet compliance criteria for both tritium and beta-emitting radionuclides. If significant trends or anomalies in sample results are identified by a radiation protection specialist, the results are brought to the attention of the Safety Committee, which takes appropriate action. Analyses from quarterly sampling of the onsite wells for the past 5 years did not identify tritium concentrations in excess of minimum detectable quantities. Analyses for gross beta resulted in concentrations well below compliance limits specified in the MO procedures.

3.6 ECOLOGICAL RESOURCES

In a 2004 EA assessing potential impacts of continuing operations at the MO site, the NRC indicated that Goose Lake Prairie State Park (now Goose Lake Prairie State Natural Area) and its natural communities were the ecological resources of chief concern. This 2,537-acre nature preserve contains one of the largest remnants of native prairie left in Illinois (IDNR 2018b). While the Goose Lake Prairie State Natural Area supports a diverse assemblage of prairie plants and animals, it is especially important as a breeding area for wading birds (e.g., American bittern, least bittern), marsh-dwelling waterbirds (e.g., Virginia rail, king rail, common gallinule), and grassland songbirds (e.g., Henslow's sparrow, grasshopper sparrow, sedge wren) (Audubon 2013). In recognition of its importance to breeding marshland and prairie birds, the Goose Lake Prairie State Natural Area was named an Important Bird Area by the Audubon Society (Audubon 2013). The Goose Lake Prairie is also an important wintering area for waterfowl and birds of prey including the rough-legged hawk and short-eared owl (Audubon 2016).

The 2004 NRC EA reported that Goose Lake Prairie State Park “provided nesting habitat for endangered and threatened species of birds such as the upland sandpiper (*Bartramia longicauda*) and Henslow's sparrow (*Ammodramus henslowi*).” The upland sandpiper was classified as Endangered by the Illinois Endangered Species Protection Board at the time the EA was prepared, and Henslow's sparrow was classified as Threatened. As of November 2019, the upland sandpiper retained its Endangered classification, but the Henslow's sparrow had been de-listed due to a range expansion in Illinois and state-wide increases in numbers of breeding pairs (IDNR 2009).

The 2004 NRC EA listed one bird (bald eagle), one insect (Hines emerald dragonfly), and three vascular plants (Mead's milkweed, lakeside daisy, leafy prairie clover) as federally listed species occurring in Grundy and Will counties but asserted that none of these species was found on or near the GEH-MO site. A November 2019 IPaC review (USFWS 2019) indicated that ten federally listed plant and animal species and one candidate species (an insect) “are known or expected to be on or near” the project area, defined as a 5-mile radius of the GEH-MO facility (Table 3-1).

Although these species may have been observed in prairie and marshland habitats south and west of the GEH-MO site, none has been observed on the site proper, which contains no natural habitats and is subject to constant disturbance. The GEH-MO site lies next to a busy road (E. Collins Road) that provides access to DNPS (across the road from GEH-MO) and two nearby chemical plants (both approximately 1 mile to the northwest).

The Illinois Endangered Species Protection Board maintains and periodically updates the Illinois List of Endangered and Threatened Species and publishes lists of these endangered and threatened species by county (IDNR 2018c). The GEH-MO site lies in eastern Grundy County, a mile from Will County, so GEH obtained lists of state-protected species from both counties for possible consideration in this analysis. The 95 state-listed species that have been recorded in Grundy and Will counties are included as Appendix A. Nine of these state-listed species, all birds, have been documented at Goose Lake Prairie State Natural Area: king rail, common

Table 3-1. Federal and State Listed Species with a Potential to Occur near the GEH-MO Site

Common Name	Scientific Name	Federal Status	State Status
Mammals			
Indiana bat	<i>Myotis sodalis</i>	E	LE
Northern long-eared bat	<i>Myotis septentrionalis</i>	T	LT
Reptiles			
Eastern massasauga (rattlesnake)	<i>Sistrurus catenatus</i>	T	LT
Freshwater Mussels			
Sheepnose mussel	<i>Plethobasus cyphus</i>	E	LE
Insects			
Hine's emerald dragonfly	<i>Somatochlora hineana</i>	E	LE
Rattlesnake-master borer moth	<i>Papaipema eryngii</i>	C	---
Rusty patched bumble bee	<i>Bombus affinis</i>	E	LE
Flowering plants			
Eastern prairie fringed orchid	<i>Platanthera leucophaea</i>	T	LT
Lakeside daisy	<i>Hymenoxys herbacea</i>	T	LT
Leafy prairie-clover	<i>Dalea foliosa</i>	E	LE
Mead's milkweed	<i>Asclepias meadii</i>	T	LT

T = Threatened, E = Endangered, C = Candidate, LE = Illinois Endangered, LT = Illinois Threatened
Sources: USFWS 2019, IDNR 2018c

gallinule, upland sandpiper, American bittern, least bittern, osprey, Northern harrier, short-eared owl, and loggerhead shrike (IDNR 2001; NRC 2004a; Audubon 2013; Audubon 2016). Bald eagles, protected under the Bald and Golden Eagle Protection Act, are regularly observed in the Goose Lake Prairie State Natural Area, especially in winter (Havera and Kruse 1988; Audubon 2016). These ten protected avian species are associated with grasslands, wetlands (wet prairies, marshes), and open water (rivers, lakes, impoundments) and do not forage, roost, or nest around industrial sites like the MO facility.

3.7 METEOROLOGY, CLIMATOLOGY, AND AIR QUALITY

Meteorology, climate, and air quality conditions in the vicinity of the ISFSI remain essentially as described in the ER (GE 2000, pp. 28-30) and Section 3.2 of the EA (NRC 2004a). Section 3.4 of the CSAR also provides detail on the regional climate and meteorology.

The climate of Illinois is typically continental, with cold winters and warm humid summers. There are frequent short-term fluctuations in temperature, humidity, cloud cover, wind speed and direction. Winds are controlled primarily by storm systems and weather fronts that move eastward and northeastward through the area. Southeasterly and easterly winds usually bring mild and wet weather. The southerly winds are warm and showery while westerly winds are dry with moderate temperatures. Winds from the northwest and north are usually cool and dry. With

the exception of tornadoes, there are no severe weather extremes in the area. (GEH 2012, Section 3.4)

The Illinois state climatologist issued 30-year averages, known as climate normals, for various Illinois stations for 1981-2010 including Channahon Dresden Island located approximately 1 mile north of GEH-MO. The coldest monthly mean temperature was 23.2°F in January and the highest was 73.7°F in July. The average high temperature of the 30-year period was 84.4°F and 15.6°F was the average low temperature. Annual rainfall averaged 36.5 inches and annual snowfall averaged 19.8 inches. (ISC 2019)

Severe weather conditions can also occur in the area. For the period January 1, 2000, through July 31, 2019, the following number of days with severe events was recorded in Grundy County (NOAA 2019):

- Hail – 32 days;
- Tornadoes – 7 days (10 separate tornado events; strongest was EF3 on the Enhanced Fujita Scale);
- Thunderstorm Wind above 50 knots – 63 days (1 day with winds above 70 knots);
- Blizzard – 4 days;

The site is in the Metropolitan Chicago Interstate Air Quality Control Region (40 CFR 81.14). Grundy County's air quality is in attainment for all criteria pollutants with the exception of 8-hour ozone in portions of the County. Aux Sable Township (north of the Illinois River) and Goose Lake Township (where the ISFSI is located) are designated nonattainment areas for 8-hour ozone (2008) and 8-hour ozone (2015) (EPA 2019).

The MO facility was designed to contain and confine radioactive materials within the building and vault structures. As a result of this design the continued storage of spent nuclear fuel would, as in the past, emit only insignificant quantities of pollutants in its gaseous effluents.

The primary air emission from the facility is via the 300-ft-tall exhaust stack. Effluent air is sampled weekly between the main stack and the sand filter to demonstrate the offsite concentrations do not exceed 10 CFR Part 20 limits. The primary effluent is krypton-85, which has been released at a rate of 0.92 to 1.7 curie per year for the last five reported years (2014-2018) (GEH 2015, 2016, 2017, 2018, 2019a). Radiological air emissions from GEH-MO are further discussed in Section 4.2.2.

Nonradiological air emissions from the facility include monthly testing of the stand-by electrical generator when the generator is operated for about one hour. This stand-by diesel generator would also be placed into service in the event offsite electrical power is interrupted and would operate until offsite power is restored. (GE 2000, p. 13) The stand-by diesel generator exhaust does not require a permit under the Illinois Rules and Regulations on Air Pollution since the stand-by diesel generator is operated only on an infrequent, intermittent basis. There are no plans to add air sources for operation of the facility during the license renewal term and GEH-MO will continue to operate the facility's diesel generator in compliance with applicable regulations. The

testing and potential intermittent use of the stand-by electrical generator would contribute only negligibly to Grundy County's air pollutant level.

In addition, air emissions result from employee vehicles and delivery vehicles. GEH-MO has a small staff and requires few deliveries for its continued storage operations.

3.8 NOISE

Sections 3.1 and 3.2 of the 2004 EA contain detailed information about the site and surrounding land uses, which represent both existing noise sources and potential receptors of noise associated with the ISFSI. Section 3.2 of this ER provides updated information about land use conditions, and Section 3.11 provides updated information about communities near the site. The closest residences are the Thorsen cottages along the Kankakee River approximately 0.5 mile east of the site. Although primarily part-time residences, the development does include some permanent residences. The permanent residents represent the closest potential sensitive noise receptors.

GEH-MO is no longer receiving spent fuel. Activities associated with spent fuel management take place inside buildings. Audible noise directly attributable to operation of the ISFSI is generally limited to occasional vehicle traffic to and from the ISFSI during routine operations and maintenance activities. DNPS employs a substantially larger workforce and represents the majority of vehicle traffic in the immediate vicinity. The DNPS mechanical draft cooling towers are located just north of E. Collins Road. These cooling towers represent potential sound sources and are located closer to the residences along the Kankakee River. Exelon constructed an earthen berm to attenuate cooling tower noise (Exelon 2003, p. E.3-6). Given the scale of the DNPS facility and proximity to the residential area, the noise experienced by the residents would be dominated by sound sources associated with DNPS rather than GEH-MO.

3.9 HISTORICAL AND CULTURAL RESOURCES

Previous environmental reviews researched available information on local historical and cultural resources and considered the potential effects of the construction and operation of the ISFSI on those resources (GE 1972, pp. III-2-1, IV-3-2; GE 2000, pp. 25, 38; NRC 2004a, pp. 2-9, 4-4, 6-1). These reviews provide the basis for the present review, which also included checks of the online Illinois Archaeological Site GIS (Illinois State Museum 2019), the Historic Architectural Resources GIS (Illinois Historic Preservation Agency 2019), and the National Register of Historic Places (National Park Service 2019). Online research determined that Grundy County lacks a historical commission and does not appear to maintain a register of locally important historical sites.

Earlier environmental reviews report that there have been no archaeological investigations and no sites recorded within the ISFSI (GE 1972, p. III-2-1; GE 2000, p. 25; NRC 2004a, pp. 2-9). The Illinois Archaeological Site GIS confirms the absence of studies and sites within the facility (Illinois State Museum 2019). The archaeological GIS records nine archaeological sites within 1 mile of the facility. None has been evaluated for eligibility to the National Register of Historic Places.

There are five prehistoric Native American archaeological sites within 1 mile of the ISFSI: 11GR2 to the northeast; 11GR391 and 11GR392 to the southeast; 11GR453 to the south; and 11GR457 to the northwest. The first of these sites, 11GR2, was recorded early in the twentieth

century and is among a large group of habitation sites representing frequently visited camping places, hamlets, and/or villages lining the Illinois River bottomlands. The last site, 11GR457, is an isolated find of two non-diagnostic artifacts, probably debris from stone tool manufacture or maintenance. The remaining three sites are lithic scatters of modest extent, probably representing short-term prehistoric camps or processing stations (Illinois State Museum 2019).

There are also four historic period archaeological sites within 1 mile of the ISFSI, 11GR461, 11GR462, 11GR463, and 11GR464, all situated northwest of the ISFSI. The first three sites appear to represent low-density field scatters: fragments of pottery, glass, or other debris incidentally spread onto the ground during agricultural operations. Limited available information makes it impossible to characterize Site 11GR464 beyond noting that its type is categorized as “Other,” and no artifacts were collected from it (Illinois State Museum 2019).

Review of the Historic Architectural Resources GIS (Illinois Historic Preservation Agency 2019), and the National Register of Historic Places (NRHP) (National Park Service 2019) found eight properties or districts currently listed on the National Register in Grundy County:

- Coleman Hardware Company Building (NRHP No. 94000980), 8.0 miles west of the ISFSI;
- Dresden Island Lock and Dam Historic District (NRHP No. 04000164), 1.1 mi north-northwest;
- Illinois and Michigan Canal (NRHP No. 66000332), which crosses Grundy County east to west on the right bank of the Illinois River and is a minimum of 1.3 miles northeast of the ISFSI;
- Mazon Creek Fossil Beds (NRHP No. 97001272), 6 miles southwest;
- Morris Downtown Commercial Historic District (NRHP No. 05001603), 7.8 miles west;
- Morris Wide Water Canal Boat Site (NRHP No. 99001708), 6.8 miles west;
- White and Company's Goose Lake Stoneware Manufactory (NRHP No. 98000982), 3.4 miles southwest; and
- White and Company's Goose Lake Tile Works (NRHP No. 98000976), 3.3 miles southwest.

Two of these properties, the Illinois and Michigan Canal and Mazon Creek Fossil Beds are also listed as National Historic Landmarks. Both are mentioned several times in the Grundy County Comprehensive Plan of 2014 as notable examples of locally-important historical sites (Grundy County 2014).

In neighboring Will County, other than the Illinois and Michigan Canal, which originates in the county, the nearest National Register properties are in the town of Wilmington, 8.5 miles southeast of the ISFSI. These properties are the Eagle Hotel (NRHP No. 94000021) and the Small-Towle House (NRHP No. 04000419).

Hundreds of unevaluated properties, mostly dwellings, are inventoried by the Historic Architectural Resources GIS in Grundy and Will counties (Illinois Historic Preservation Agency 2019). Within 3 miles of the ISFSI, 12 such properties occur. Ten are located in Will County and lack detailed online information. They appear to be rural dwellings recorded in the 1970s. The remaining two properties, in Grundy County, are Goose Prairie State Park (HARGIS No. 304487), 0.65 miles west to 3.5 miles southwest of the ISFSI, and the Aux Sable Lock & Aqueduct (AKA Channahon Youth Development Center, HARGIS No. 304475) 3.0 miles northwest of the ISFSI.

The previous environmental review (GE 1972, Section III-2.0) reports the presence of a historic period stone wall paralleling E. Collins Road for approximately 300 feet to the east of the OCA. That document suggests the wall might be a local historical site but provides no discussion. Based on recent (ca. 2018) aerial imagery on the Grundy County GIS Property Viewer, the wall is still extant. There are no records of documentation or assessment of the wall in the Illinois Archaeological Site GIS (Illinois State Museum 2019) or the Historic Architectural Resources GIS (Illinois Historic Preservation Agency 2019).

The previous environmental review (GE 1972, Section III-2.0) also notes six places in Grundy County of “some local interest:” “the Grundy County Jail, which was built in 1876; the Gebhard Brewery, built in 1866; Chief Shab[b]onna's grave; the Governor's Mansion built about 1870; the Hough Log Cabin; and the Illinois and Michigan Canal....” The canal has already been mentioned above in the discussion of properties on the National Register. Various online sources were consulted to determine the current status of the other places:

- Grundy County Jail: formerly located directly south of the County Courthouse, the old jail demolished ca. 1975 prior to construction of the present county jail (IDOC 2018, p. 3);
- Gebhard Brewery: buildings are vacant but still extant (Herald-News 2015 and Bing Maps and Google Earth imagery ca. 2017);
- Chief Shabbona's grave: maintained in Evergreen Cemetery, Morris (Find-a-Grave 2019);
- Governor's Mansion: unidentified—not evidently represented in online records;
- Hough Log Cabin: now called the Cragg Cabin, this relocated and reconstructed or restored building now stands in Goose Lake Prairie State Natural Area (Grundy ILGW 2015; Solari 2019).

3.10 VISUAL RESOURCES

The GEH-MO site stands on a plateau (at 532.5 ft elevation) above the Kankakee River (GEH 2012, Section 1.2.1.3). The OCA consists of a cluster of non-descript reinforced concrete and steel buildings and pre-fabricated steel buildings (all dull gray or a faded sky-blue) surrounded by a security fence. From a visual perspective, the two most noticeable features of the ISFSI are a 125-ft-tall water tower (white tank with blue pedestal) and a 300-ft-tall exhaust stack. Surrounded by prairie (marshes, grasslands, scattered shrubs and hardwood trees), the larger

GEH-MO buildings are visible from most sections of the main thoroughfare in the area, E. Collins Road, except where screened by trees.

Visual impacts of projects are often assessed in terms of “key observation points” from which the project/site may be viewed (Sullivan et al. 2018). Key observation points may be hilltops or highways that overlook a project site or they may be sensitive areas, such as parks and nature preserves. The most important observation point(s) in this instance are those associated with Goose Lake Prairie State Natural Area, which lies immediately west/southwest of the GEH property (see Figure 3-2). Of particular concern is the area of the park where interpretive trails, photo blinds, and picnic shelters are located, approximately 2 miles southwest of the GEH-MO site. Viewed from the west or southwest, from the perspective of a visitor to Goose Lake Prairie State Natural Area, the GEH-MO facility is dwarfed or obscured by the collection of buildings and structures that constitute the much-larger DNPS, with industrial facilities that occupy more than 250 acres and include two 310-ft-tall exhaust stacks (Exelon 2003). The DNPS property lies immediately across E. Collins Road from the GEH-MO site. By virtue of its size and location, DNPS dominates the viewshed from vantage points in every compass direction.

3.11 DEMOGRAPHY AND SOCIOECONOMICS

3.11.1 Demography

3.11.1.1 Resident Population

In the environmental review for the previous license renewal, the NRC staff provided population estimates based on 1990 census population data within 5 miles and 50 miles of the site (NRC 2004a, Section 3.7.1). GEH has updated the population for the 50-mile radius using U.S. Census Bureau (USCB) 2010 census data. The population distribution has been estimated in 16 directional sectors, each direction consisting of 22.5°, and in 10 concentric bands. Population estimates have been projected in 10-year increments from 2010 to 2050, covering the period of extended ISFSI operation. Growth rates have been calculated for each county, based on 2010 census data and 2018 population estimates. Population projections by decade to 2050 have been performed assuming the rate of increase from 2010 to 2018 remains constant.

For this analysis, GEH used a growth rate derived from 2010 decennial census and 2018 census estimate data because between 2000 and 2010, the United States experienced a major economic recession. Large investments in sub-prime real estate lending ultimately led to a large-scale decline in economic productivity. In the Midwest, many localities experienced population declines, including some counties in Illinois. Cook County (Chicago), the largest county in the 50-mile region, experienced a 3.4 percent decline in population from 2000 to 2010. Table 3-2 presents historical population data for the counties that fall within a 50-mile radius of the GEH site.

Table 3-2. Decennial Populations and 2018 Population Estimates, by County, within 50 Miles of MO Site

		Population			
County	State	1990 ^a	2000 ^a	2010 ^b	2018 Estimate ^b
Bureau	Illinois	35,688	35,503	34,978	32,993
Cook	Illinois	5,105,067	5,376,741	5,194,675	5,180,493
DeKalb	Illinois	77,932	88,969	105,160	104,143
DuPage	Illinois	781,666	904,161	916,924	928,589
Ford	Illinois	14,275	14,241	14,081	13,264
Grundy	Illinois	32,337	37,535	50,063	50,972
Iroquois	Illinois	30,787	31,334	29,718	27,604
Kane	Illinois	317,471	404,119	515,269	534,216
Kankakee	Illinois	96,255	103,833	113,449	110,024
Kendall	Illinois	39,413	54,544	114,736	127,915
LaSalle	Illinois	106,913	111,509	113,924	109,430
Lee	Illinois	34,392	36,062	36,031	34,223
Livingston	Illinois	39,301	39,678	38,950	35,761
McLean	Illinois	129,180	150,433	169,572	172,828
Marshall	Illinois	12,846	13,180	12,640	11,534
Ogle	Illinois	45,957	51,032	53,497	50,923
Putnam	Illinois	5,730	6,086	6,006	5,740
Will	Illinois	357,313	502,266	677,560	692,310
Woodford	Illinois	32,653	35,469	38,664	38,463
Lake	Indiana	475,594	484,564	496,005	484,411
Newton	Indiana	13,551	14,566	14,244	14,011

Sources:

^a USCB 2001

^b USCB 2019

These results indicate that the population within 50 miles of the MO site will be slow growing, increasing from 7,114,414 in 2010 to an estimated 7,256,549 in 2050. Figures 3-6 through 3-9 illustrate the locations of the sectors and the 2010 and projected 2050 populations (Tetra Tech 2019a). Table 3-3 presents population projections by radial bands.

Figure 3-6. 2010 Population by Sector within 5 Miles of the GEH-MO Site

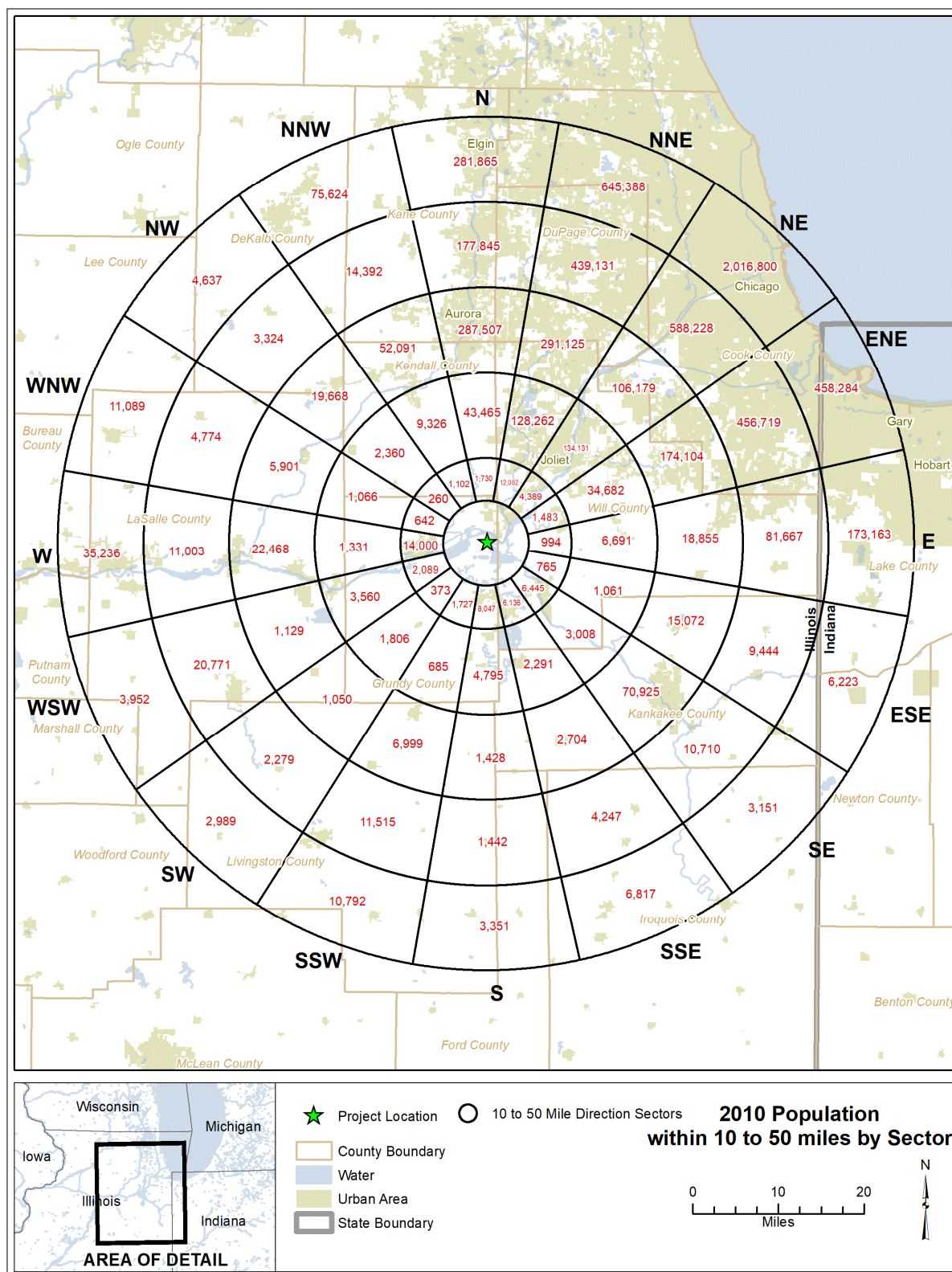


Figure 3-7. 2010 Population by Sector within 10 to 50 Miles of the GEH-MO Site

Figure 3-8. 2050 Population by Sector within 5 Miles of the GEH-MO Site

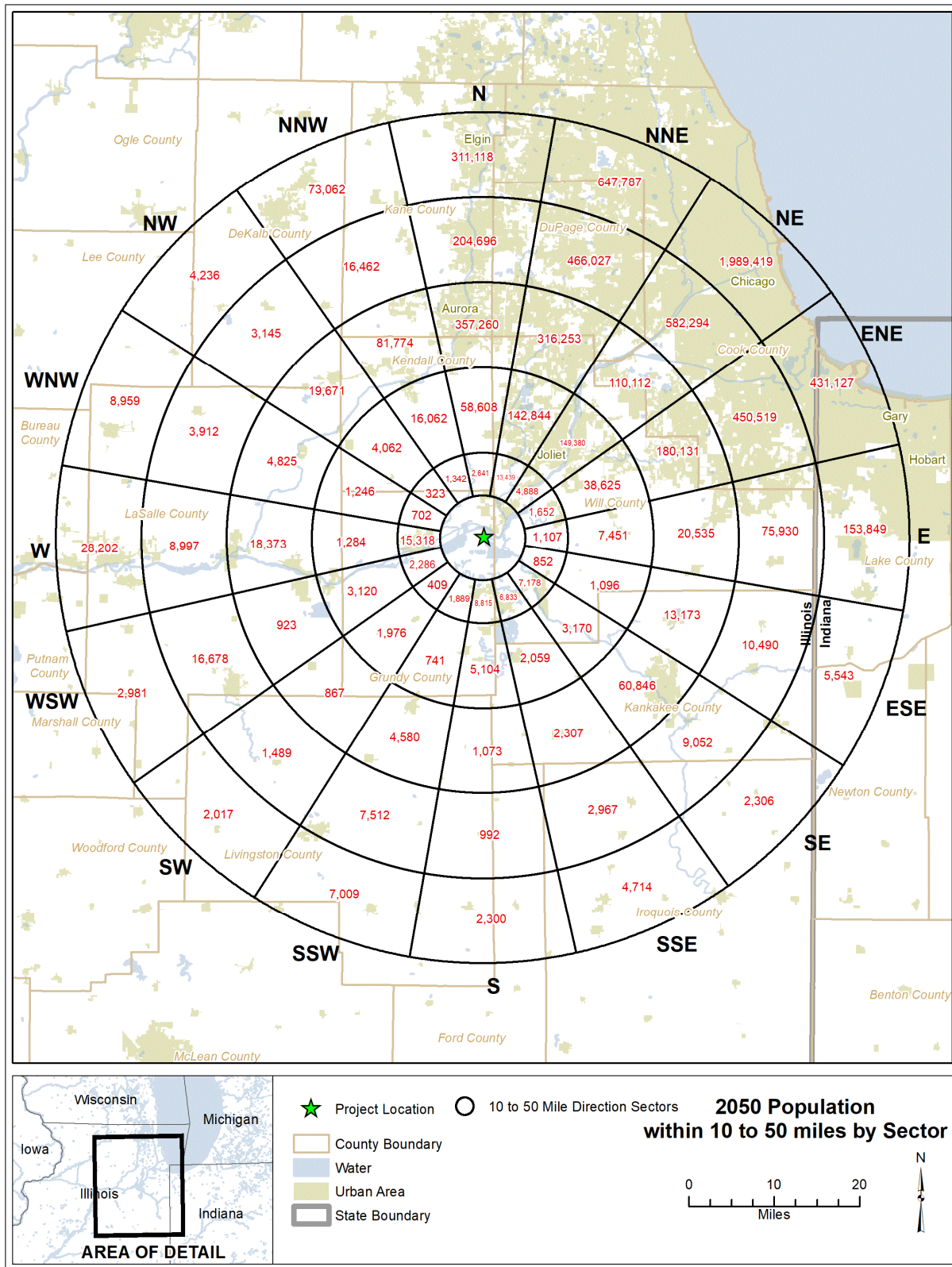


Figure 3-9. 2050 Population by Sector within 10 to 50 Miles of the GEH-MO Site

Table 3-3. Population Estimates within 50 miles of the GEH-MO Site by Radial Distance

Radius (miles)	Population				
	2010	2020	2030	2040	2050
<1	55	56	57	59	60
1-2	2,142	2,195	2,249	2,305	2,362
2-3	4,617	4,732	4,849	4,969	5,092
3-4	7,003	7,168	7,338	7,511	7,688
4-5	5,756	5,900	6,047	6,198	6,352
5-10	62,265	64,006	65,818	67,704	69,673
10-20	378,518	391,681	405,722	420,735	436,828
20-30	1,077,205	1,101,745	1,128,991	1,159,208	1,192,703
30-40	1,837,492	1,842,269	1,847,814	1,854,115	1,861,163
40-50	3,739,361	3,721,480	3,704,749	3,689,140	3,674,628
Total	7,114,414	7,141,233	7,173,634	7,211,943	7,256,549

Source: Tetra Tech 2019a

Within a 5-mile radius of the MO site, the population was 19,574 in 2010 and is projected to be 21,554 by 2050. While the population in the immediate vicinity of the site remains relatively small, there has been some growth in the villages of Minooka and Channahon, 4 to 6 miles northeast of the site. In 2000, Channahon and Minooka's populations were 7,344 and 3,971, respectively (USCB 2000). The 2018 populations of Channahon and Minooka are 13,086 and 11,352, respectively (USCB 2018a). Residential development in the two villages has expanded south to meet the previously existing residential areas along the northern bank of the Des Plaines River.

Within the 50-mile radius of the MO site, most of the population can be found in the northeast sectors, in and around the cities of Joliet (about 15 miles northeast, in Will County), and the city and suburbs of Chicago (30-50 miles northeast, in Cook and DuPage Counties). The Illinois section of the Chicago-Naperville-Elgin, IL-IN-WI Metropolitan Statistical Area has a 2017 population of 8,677,754 (USCB 2018b).

3.11.1.2 Transient Populations

In addition to census-derived population estimates presented in Figures 3-6 through 3-9 and Table 3-3, there are transient populations associated with workplaces, seasonal housing, and recreational areas in the vicinity of the MO site. Transient populations were addressed in the original MFRP ER (GE 1972, Section III-1.2), NRC's 2004 EA (NRC 2004a, Section 3.7.1), and GEH's CSAR (GEH 2012, Section 3.2.3).

Less than a mile to the east of the MO site, there is a cluster of about 30 cottages (known as the Thorsen cottages) on the west shore of the Kankakee River. They are primarily rental properties, catering to area visitors. On the east shore of the Kankakee River, just over a mile from the MO site, there are a couple of hundred residences, both permanent and temporary.

There are a number of larger industrial sites in the region. Adjacent to the MO site, to the north, is the DNPS. Most of DNPS' permanent workforce resides in Will and Grundy Counties. On a staggered 24-month schedule (for two nuclear units), the DNPS workforce increases by

approximately 600 during refueling outages (Exelon 2003, Section 3.4). Just over a mile northwest of MO site are the Reichhold and Aeropres (chemical) manufacturing facilities. Just over 3 miles northwest is a cluster of chemical plants. Just south of those is the Northfield Block Company. About 5 miles northeast, lies the Exxon Mobil plant. Over the last 20 years, some of the industrial sites within a 5-mile radius have changed ownership, however, their locations and footprints are roughly unchanged.

Much of the land, south of the MO site, continues to be used in agricultural production. However, limited seasonal variation in population associated with farming is expected due to the use of mechanized harvesting techniques.

The area's state parks, preserves, and reserves, are relatively unchanged and continue to host visitors. They include the Goose Lake Prairie State Natural Area, adjacent to the MO site, and the Des Plaines State Fish and Wildlife Area, 2 miles east. Boating and fishing continue to occur along the area's numerous rivers and lakes, notably, the Kankakee, Illinois, and Des Plaines Rivers, and Heidecke and Goose Lakes.

3.11.2 Environmental Justice

On February 11, 1994, the President signed Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" which directs all Federal agencies to develop strategies for considering environmental justice in their programs, policies, and activities. Environmental justice is described in the Executive Order as "identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." On December 10, 1997, the Council on Environmental Quality (the Council or CEQ) issued, "Environmental Justice Guidance under the National Environmental Policy Act" (CEQ 1997). The Council developed this guidance to, "...further assist Federal agencies with their National Environmental Policy Act (NEPA) procedures."

In 2003, the NRC issued guidance in NUREG-1748 for Office of Nuclear Materials Safety and Safeguards (NMSS) staff conducting environmental justice reviews for proposed actions as part of NRC's compliance with NEPA (NRC 2003, Appendix C). NRC guidance was used in determining the minority and low-income composition in the environmental impact area.

3.11.2.1 Methodology and Analysis

The 2000 MO ER (GE 2000) did not address environmental justice. However, in its 2004 EA (NRC 2004a, Section 3.7.2), the NRC did. In this ER supplement, GEH is providing an updated environmental justice analysis. Accordingly, GEH considered information requirements for environmental justice determinations in NUREG-1748 (NRC 2003, Appendix C). The guidance document also contains a methodology for identifying the locations of minority and low-income populations of interest. The guidance suggests that a 4-mile radius could reasonably be expected to contain the area of potential effect and that the state and county are considered the appropriate geographic areas for comparative analysis. USCB demographic data provide the necessary information on race, ethnicity, and poverty.

GEH used ArcGIS®² Desktop 10.3 software and USCB American Community Survey (ACS) 5 Year Summary data for 2013-2017 to determine minority and low-income characteristics by block group within 4 miles of the ISFSI site. A census block group is a geographic unit used by the USCB that is between the census tract and the census block. GEH included a block group if any part of its occupied area fell within 4 miles of the site. A total of 10 block groups were identified within the 4-mile radius of the MO site. Consistent with NRC guidance, GEH defined the geographic areas for comparative analysis as the state of Illinois and the counties of Will and Grundy, Illinois. Block groups were analyzed separately against their respective county's data and those of the state of Illinois.

3.11.2.2 Minority Populations

NMSS guidance defines minority categories as: American Indian or Alaskan Native; Asian; Native Hawaiian or other Pacific Islander; African American (not of Hispanic or Latino origin); some other race; and Hispanic or Latino ethnicity (of any race) (NRC 2003, Appendix C). There is also a "Multiracial" category. This includes individuals that identify themselves as more than one race.

The guidance also indicates that a block group has a significant minority population if either of the following two conditions is met:

- The minority population of the block group or environmental impact area exceeds 50 percent of the total population for that census block group.
- The minority population percentage of the environmental impact area is significantly greater (typically at least 20 percentage points) than the minority population percentage in the geographic areas chosen for comparative analysis.

GEH calculated the percentage of a block group's population represented by each minority category for each of the 10 block groups within the 4-mile radius, using the USCB ACS data. GEH, then, calculated the percentage of each minority category in the block group's corresponding state and county. If the percentage of any block group minority category exceeded 50 percent of the total block group population, or exceeded its corresponding state or county percentage by more than 20 percent, it was identified as containing a significant minority population. Table 3-4 provides minority percentages for each of the geographic comparison areas (state and counties). Table 3-5 provides minority percentages for each of the block groups within a 4-mile radius of the GEH-MO site. The results of the analysis indicate that no census block groups within the 4-mile radius have significant percentages of minority populations, as identified above.

3.11.2.3 Low-Income Populations

The NRC guidance defines low-income households based on USCB statistical poverty thresholds (NRC 2003, Appendix C). A block group has a significant low-income population if either of the following two conditions is met:

- The low-income population in the census block group exceeds 50 percent of its total population.

² ArcGIS is a trademark of Environmental Systems Research Institute, Inc.

- The percentage of households below the poverty level in a block group is significantly greater (typically at least 20 percentage points) than the low-income population percentage in the geographic areas chosen for comparative analysis.

GEH divided USCB low-income households in each census block group by the total number of households for that block group to obtain the percentage of low-income households per block group. The same geographic comparison areas were used. Table 3-4 provides low-income percentages for each of the geographic comparison areas (state and counties). If the percentage of any block group low-income category exceeded 50 percent of the total block group population, or exceeded its corresponding state or county percentage by more than 20 percent, it was identified as containing a significant low-income population. The results of the analysis (Table 3-5) indicate that no census block groups within the 4-mile radius have significant percentages of low-income households.

Table 3-4. Minority and Low-Income Percentages, by Geographic Comparison Area

Geographic Area of Comparison	Total Population	Black/ African American	American Indian or Alaska Native	Asian	Native Hawaiian or Other Pacific Islander	Other	Multiracial	Hispanic or Latino Ethnicity	Low-Income Households
State of Illinois	12,854,526	14%	0.23%	5.2%	0.033%	6.0%	2.4%	17%	13%
Grundy County	50,333	1.5%	0.08%	0.77%	0.030%	2.1%	1.4%	9.4%	10%
Will County	687,727	11%	0.18%	5.2%	0.026%	7.0%	2.7%	17%	7.0%

Source: Tetra Tech 2019b

Table 3-5. Minority and Low-Income Percentages, by Block Group

Block Group	Total Population	Black/ African American	American Indian or Alaska Native	Asian	Native Hawaiian or Other Pacific Islander	Other	Multiracial	Hispanic or Latino Ethnicity	Low-Income Households
Block Group 1, Census Tract 1.02, Grundy County, Illinois	5,656	2.9%	0.30%	1.5%	0%	3.0%	2.7%	15%	8.1%
Block Group 1, Census Tract 1.03, Grundy County, Illinois	5,251	2.6%	0%	0.51%	0%	11%	2.1%	16%	7.2%
Block Group 1, Census Tract 7, Grundy County, Illinois	1,287	0%	0%	0%	0%	0%	0%	2.1%	0%
Block Group 1, Census Tract 8833.03, Will County, Illinois	1,249	0%	0%	0%	0%	0%	0.56%	3.8%	0%
Block Group 1, Census Tract 8833.06, Will County, Illinois	3,063	0.72%	0%	0.72%	0%	0%	1.2%	15%	8.6%
Block Group 1, Census Tract 8834.02, Will County, Illinois	936	0%	0.53%	0%	0%	12%	5.1%	20%	12%
Block Group 2, Census Tract 1.03, Grundy County, Illinois	934	0%	0%	6.6%	0%	1.3%	4.8%	21%	0%
Block Group 2, Census Tract 7, Grundy County, Illinois	921	0%	0%	0%	0%	0%	0.33%	4.6%	8.0%
Block Group 2, Census Tract 8833.03, Will County, Illinois	2,331	0%	0%	1.7%	0%	0%	0.47%	1.2%	0%
Block Group 2, Census Tract 8833.06, Will County, Illinois	778	0%	0%	5.0%	0%	0%	6.2%	0%	13%

Source: Tetra Tech 2019b

3.11.3 Socioeconomics

Currently, there is a small workforce at the MO site, within the NUREG–2157, *Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel* (GEIS) range of 20 to 85 operations workers (NRC 2014, Section 3.2). The workforce consists of security personnel and a small operations staff to conduct periodic maintenance, monitoring, and inspections. The nearest population centers, where the majority of current MO workers reside, are the cities of Morris and Joliet, Illinois. The 2018 population estimates of Morris and Joliet are 14,918 and 148,099, respectively (USCB 2018a).

GEH pays property taxes to the Grundy County Tax Collector for the structures and land at the MO site. Table 3-6 presents the most recent property taxes paid by GEH to Grundy County taxing bodies for the MO site. The table also contains Grundy County’s taxing bodies’ total property tax revenues for the same period. GEH’s expectation is that the property tax payments will remain the same or decline immaterially over the remaining life of the facility.

Table 3-6. GEH 2018 Property Tax Payments

Taxing Body	Parcel 03-35-300-002 ^a	Parcel 03-35-400-004 ^a	Parcel 03-35-400-005 ^a	Total Parcel Payments	Total Taxing Body Revenues ^b	Payments as Percent of Total Revenues
Coal City Fire	\$8	\$14,385	\$1	\$14,394	\$3,908,523	0.37%
Coal City Library	\$3	\$4,681	\$0	\$4,684	\$1,271,914	0.37%
Coal City Unit 1	\$56	\$95,870	\$9	\$95,935	\$26,049,158	0.37%
Grundy County	\$13	\$21,466	\$2	\$21,481	\$14,490,876	0.15%
Goose Lake Township	\$0	\$511	\$0	\$512	\$100,695	0.51%
Goose Lake Township Road	\$2	\$3,547	\$0	\$3,549	\$698,549	0.51%
Grundy County EDPA 1 (TIF)	\$425	\$0	\$95	\$520	\$2,424,764 ^c	0.021%
Joliet Junior College 525	\$5	\$8,681	\$1	\$8,687	\$61,513,680	0.014%
Totals	\$512	\$149,141	\$109	\$149,763	\$110,458,161	0.14%

Sources:

^a Grundy County 2019a

^b Grundy County 2019c

^c Grundy County 2019d

3.12 PUBLIC AND OCCUPATIONAL HEALTH

No liquid effluents are released to the environment from operation of the GEH-MO ISFSI. As described in Section 7.3.3 of the CSAR, four potential sources could release radioactive material to ventilation air. These potential sources are:

- Effluent from the Radwaste System evaporator
- Off-gas from defective fuel rods in the basin
- Decontamination activities
- Uranium used in MFRP testing

Most of this material would be captured by the sand filter and some fraction would be exhausted to the stack. (GEH 2012)

Although release of radioactive material in the demisted effluent from the evaporator is possible, such occurrences would be rare and the amount released would be very small. In almost 50 years of fuel storage experience, there has been no apparent leaking of gases from stored fuel. Incidental airborne contamination from decontamination activities could occur. Use of special enclosures ("greenhouses") and other techniques limit such releases to very small amounts, and these activities are infrequent. Natural uranium was used in MFRP testing and some contamination is present within the canyon that could become dislodged and subsequently exhausted via the air tunnel.

Actual measurements of particulate radioactive materials in air exhausted via the stack are made routinely at the MO site. License specification 4.1.1 requires continuous sampling for particulates at a location between the main stack and the sand filter. Samples must be analyzed weekly and the maximum value must not exceed a weekly average of 4×10^{-8} $\mu\text{Ci}/\text{ml}$. GEH estimates exposure from radioactive material released in stack effluents using COMPLY (an Environmental Protection Agency [EPA] software program approved by the NRC). As discussed in Section 3.7, the primary effluent is krypton-85. Annual basin air samples indicate the fuel basin krypton-85 source term ranged from 0.92 to 1.7 Ci per year over the past 5 years.

3.13 WASTE MANAGEMENT

GEH-MO has an IEPA permitted wastewater treatment facility consisting of a 1 million gallon holding pond and two 275,000-gallon lagoons (Permit No. 2019-EO-64003) for its nonradioactive wastewater. The facility is permitted to receive approximately 510 gallons per day of sanitary wastewater, potable and utility water system drainage, compressor condensate, and groundwater intrusion pumpout. There is no surface water discharge from the lagoons. Sludge removed from the facility is disposed of as approved by IEPA. (IEPA 2019)

The radioactive waste management system is split into high and low activity management. Low-activity wastewater such as laundry, sump waste, and decontamination solutions are collected then pumped to an electric evaporator with exhausted via the ventilation system and evaporator bottoms managed as solid waste onsite until enough accumulation for shipping offsite for disposition as low-level radioactive waste (LLRW) in an NRC-licensed facility. The high activity part of the radioactive waste management system dewater basin filter spent resins and returns the water to the basin. Spent resins from the basin filter and cask flush solutions are pumped to a shielded High Integrity Container (HIC). When filled, HICs are dried and shipped offsite for disposal in an NRC-licensed LLRW facility. (NRC 2004a, p. 2-5) The generation rate for LLRW is very low and it can take up to 10 years to fill a HIC. GEH estimates the generation rate for LLRW for 2020 to 2025 will be 100 to 250 cubic feet per year of Class A waste. Class B waste is generated intermittently at a projected rate of 150 cubic feet once in 5 years (GEH 2019b).

At the time the spent nuclear fuel is to be removed from wet storage and packaged for dry storage or transport to a repository (whether under the proposed license renewal term or later), waste would also be generated from those activities and treatment of the wet storage basin water.

The 2004 NRC EA discusses this activity and the radiological impacts (NRC 2004a, Section 4.2).

GEH-MO would also generate non-radioactive, non-hazardous solid waste from its offices, restrooms, staff breakrooms, and maintenance activities. These wastes are collected onsite and disposed of in local and regional facilities permitted to receive such wastes. Universal wastes such as fluorescent light bulbs and batteries are generated at the facility during operations and maintenance activities in low quantities given the size of the facilities, scale of operations, and low numbers of staff. Potentially, low quantities of hazardous waste (e.g., solvents, epoxy paints) could also be generated from maintenance activities.

4 ENVIRONMENTAL IMPACTS

The following sections discuss environmental consequences associated with continued operations of the MO ISFSI. GEH considered the specific resource areas that have potential impacts associated with the ISFSI operations over the extended license term.

On September 19, 2014, the NRC published a revised rule in 10 CFR 51.23, “Environmental Impacts of Continued Storage of Spent Nuclear Fuel Beyond the Licensed Life for Operations of a Reactor” (79 Federal Register 56238-56264). The NRC rule codifies the generic impact determinations in NUREG-2157, *Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel* (NRC 2014). This rule was formerly known as the Waste Confidence Decision and Rule. The revised rule adopts the generic impact determinations made in NUREG-2157 and codifies the NRC’s generic determinations regarding the environmental impacts of continued storage of spent fuel beyond a reactor’s operating license (i.e., those impacts that could occur as a result of the storage of spent fuel at at-reactor or away-from-reactor sites between the time a reactor’s licensed operation ends and a permanent repository becomes available). The updated Continued Storage Rule and NUREG-2157 provide the NEPA analyses of human health and environmental impacts of continued storage of spent fuel beyond the licensed life of a reactor that are needed to support renewal of the GEH-MO ISFSI license.

The analysis in NUREG-2157 concludes that the potential impacts of at-reactor storage during the short-term time frame (no more than 60 years after the expiration of the reactor’s license to operate) would be small (NRC 2014, Section 4.20). NRC indicates that the impacts described in NUREG-2157 for at-reactor ISFSIs are representative of impacts for both the GEH-MO and Three Mile Island Unit 2 away-from-reactor ISFSIs (NRC 2014, p. 4-2). In reaching that conclusion, NRC notes that the GEH-MO ISFSI is at the site of a spent fuel reprocessing facility (a production facility) that was constructed, but never operated. Because it was to be a production facility licensed under siting and safety requirements similar to those for reactors (e.g., 10 CFR Part 50, “Domestic Licensing of Production and Utilization Facilities”), the GEH-MO facility is sited and constructed in a manner substantially similar to a reactor spent fuel pool. It is licensed to store 352 pressurized water reactor fuel assemblies and 2,865 boiling water reactor (BWR) fuel assemblies, for a total of about 714 metric tons uranium, which is no more than the licensed capacity of many BWR spent fuel pools. Therefore, NRC concluded the environmental impacts described in the GEIS for at-reactor spent fuel pools are representative of the impacts at the GEH-MO facility (NRC 2014, p. 4-2).

GEH is requesting renewal of the MO ISFSI license through 2042, which is approximately 70 years after fuel was first received by the MFRP. This is well within the 100-year short-term timeframe evaluated in the GEIS. In NUREG-2157, NRC states that disposal of the spent fuel in a DOE repository by the end of the short-term time frame is the most likely outcome (NRC 2014, Section 1.2). As described in the following sections, impacts from the proposed renewal of SNM-2500 are primarily occupational and public health impacts associated with radiological exposure.

NRC determined in the previous renewal of the MO ISFSI license (NRC 2004a, Section 4.7) that “license renewal for continued operation of the GE-Morris facility will not result in a significant

impact to the environment.” In light of NRC’s findings in NUREG-2157 (NRC 2014) and those in the remaining subsections of this chapter, GEH concludes that the conclusions of NRC’s 2004 EA remain unchanged.

4.1 IMPACTS FROM REFURBISHMENT AND CONSTRUCTION

The proposed action does not include refurbishment or new construction. Impacts for construction of the ISFSI were addressed in the original licensing evaluation for the MFRP (GE 1972, Section IV-9.0). As described in Section 1.2.2 of this ER supplement, no refurbishment is planned. Only routine monitoring and maintenance is expected over the proposed 20-year period of extended operation. Therefore, there are no environmental impacts from refurbishment or construction beyond those analyzed in previous environmental reviews for the MFRP.

4.2 OCCUPATIONAL AND PUBLIC RADIOLOGICAL HEALTH IMPACT

The design and operational features of the ISFSI along with the site radiological protection program, mitigate radiological health impacts. Potential occupational and public doses resulting from ISFSI operation are addressed separately below.

4.2.1 Occupational Dose

As discussed in Section 7.3.2 of the CSAR, the radioactive material concentration in the storage basin water results from a balance between the addition rate from stored fuel and the basin cleanup system removal rate. Operating experience gained in storage of irradiated fuel at GEH-MO since early 1972 demonstrates that radioactive material concentration in the basin water can be reliably maintained at personnel exposures that are as low as reasonably achievable (ALARA). GEH has implemented management controls including operating limits for radioactive material concentration in basin water requiring special corrective actions. The gross beta concentration value is 0.02 $\mu\text{Ci/ml}$. If the rate is exceeded, a cleanup campaign is initiated. (GEH 2012, Section 7.5)

NUREG-0713 provides data for the occupational doses from ISFSI operations. Table 4-1 shows the last five reported annual total effective dose equivalent (TEDE) for the GE-Morris facility as presented in NUREG-0713. The table shows exposures that are significantly less than the limits set in 10 CFR 20.1201 for workers (5 rem). The stored spent fuel at the GE-Morris facility will further decay; therefore, low release levels are expected to continue over the license renewal period. Based on historical data, the GE-Morris facility’s continued operation would have a small radiological impact on workers.

Table 4-1. Worker Radiological Exposures from GEH-MO

Year	Number Monitored	Number with Measurable Exposure	Total Collective TEDE (person-rem)	Average Measured TEDE (rem)
2013	20	18	1.533	0.085
2014	23	22	3.192	0.145
2015	23	20	1.102	0.055
2016	26	22	0.579	0.026
2017	21	20	0.631	0.032
Average	23	20	1.407	0.069

Source: NRC 2015c, 2016b, 2017b, 2018, 2019c

4.2.2 Public Dose

Potential exposure to members of the public associated with ISFSI operations is primarily the result of airborne effluent releases. This is due to the fact that no measurable liquid effluents are released and the security boundary maintains enough distance to limit external radiation exposure to members of the public. The release rate of gaseous or airborne effluents is not expected to significantly change over the period of extend operation.

In accordance with 10 CFR 72.44(d)(3) and SNM-2500 license condition 8.2.1, GEH estimates quantities of principal radionuclides released to the environment on an annual basis. GEH also estimates the maximum potential dose to the public resulting from the effluents and direct radiation at the OCA boundary on an annual basis. The calculation is the sum of the doses associated with stack releases, drinking surface water from the sanitary lagoons, consuming water from the onsite wells, and direct radiation at the OCA boundary. Table 4-2 shows the estimated maximum potential dose to the public for the last 5 years.

Table 4-2. Annual Potential Dose to the Public

Year	Maximum TEDE (millirem)
2014	0.70
2015	0.42
2016	0.41
2017	0.38
2018	0.27
Average	0.44

Source: GEH 2015, 2016, 2017, 2018, 2019a

The dose impacts to an individual member of the public are well below the regulatory limits of 100 millirems per year as required by 10 CFR 20.1301. Therefore, the continued operation of the ISFSI would have a negligible radiological impact on the environment and members of the public. It is the goal of GEH to maintain radioactivity in MO effluents and dose to members of the public ALARA in accordance with 10 CFR 20.1101(b).

4.2.3 Cumulative Dose

Cumulative impacts would occur if multiple sources for radiological exposure affect the same population. Exelon calculates the potential cumulative dose from DNPS and GEH-MO activities in its annual effluent reports for DNPS. In the most recent report for 2018 (Exelon 2019), Exelon estimates the maximum combined total body dose from DNPS and GEH-MO activities was 9.12 millirem during 2018, which was 36 percent of the 40 CFR 190 limit of 25 millirem. The maximum combined organ dose from DNPS and GEH-MO activities was 0.0902 millirem during 2018. This was 0.36 percent of the 40 CFR 190 limit of 25 millirem to any organ. The combined thyroid dose was 0.0868 millirem. This was 0.12 percent of the 40 CFR 190 limit of 75 millirem. The cumulative dose impacts of the ISFSI and DNPS operations are small.

4.3 OTHER OPERATIONAL IMPACTS

The routine operation of the ISFSI involves wet storage of spent fuel. Other than inspections and maintenance, the storage operation is passive. There are no liquid effluent discharges. Small amounts of radioactive material will be released via gaseous and particulate effluents.

Accordingly, no impacts are expected other than those from radiation as described in Section 4.2.

NUREG-1748 identifies the types of environmental impacts to be analyzed for a materials license ER (NRC 2003). Each identified discipline or resource area is briefly addressed below. Conclusions drawn from the MFRP ER (GE 1972) and previous ISFSI license renewal ER (GE 2000) and EA (NRC 2004a) are adopted, where available and still appropriate.

Land Use: The land occupied by the ISFSI was committed to industrial use when the MFRP was constructed. The ISFSI is located within the former MFRP developed area and uses existing buildings and plant systems. GEH does not anticipate any construction and no additional land use impacts are expected from continued operation.

Transportation: No significant changes in staffing are anticipated to manage the ISFSI during the term of the renewed license, and no new waste shipments or related activities are expected. Therefore, no impacts to transportation are expected.

Geologic Conditions: Impacts to geology and soils occurred when the MFRP was constructed. No additional impacts to geology or soils are expected from continued operation of the ISFSI.

Water Resources: The ISFSI requires a small amount of water for its operation, and does not discharge effluents to surface or groundwater. Based on the size of the ISFSI work force, minimal sanitary waste is generated. It is disposed in an onsite sanitary waste lagoon. No impact to water resources is expected from continued operation beyond those described in the 2004 EA.

Ecological Resources: Most of the ecological impacts associated with GEH-MO occurred during the MFRP construction, when 15 acres of wildlife habitat were eliminated. NRC staff concluded in the 2004 EA that continued operation of the ISFSI would have small (but undefined) impacts on ecological resources in the areas surrounding the GEH-MO site but no impacts on nearby wetlands and floodplains. Given that no major changes in the GEH-MO facility or its operations are anticipated over the term of the renewed license, GEH-MO concludes that the findings of the 2004 EA are still valid and continued operation of the ISFSI will have only small impacts on ecological resources, including threatened and endangered

species. Therefore, GEH expects that the NRC would make a no-effect determination for the license renewal, in which case consultation with USFWS would not be required.

Air Quality: The level of activity for air emission sources (e.g., vehicles, diesel generator) would remain low. The 2004 EA concluded that the air quality impacts from continued storage operations would not be distinguishable from the nearby industrial sites. Likewise, continued storage under the proposed license renewal term would result in small impacts that are indistinguishable from that of the nearby industrial sites.

Noise: Section 4.1.9 of the 2004 EA concluded the MO facility produces no noise impact on the local environment. Audible noise directly attributable to operation of the ISFSI is generally limited to occasional vehicle traffic to and from the ISFSI during routine operations and maintenance activities. Noise from ISFSI-related activity is likely not noticeable to recreational visitors or residents in the vicinity. Based on these considerations, no adverse noise impact is expected from continued operation of the ISFSI.

Historic and Cultural Resources: No cultural, historical, or archaeological resources listed on or eligible for the National Register of Historic Places occur within 1 mile of the ISFSI. No major demolition activities or new construction is planned for the facility. Continued operation is not expected to affect known cultural, historical, and archaeological resources in the surrounding area.

Visual Resources: Built around 1970, the GEH-MO facility is an established landscape feature, as are the other three heavy-industrial facilities (DNPS, two chemical plants) that stand along E. Collins Road. Dresden Unit 1 (retired in 1978) was built in the 1950s, Dresden Units 2 and 3 in the 1960s. No expansion or modification of the ISFSI is planned that would make the facility any more or less obtrusive visually. Therefore, visual impacts from GEH-MO, which have always been small because of the industrial character of the E. Collins Road area, will continue to be small over the license renewal term.

Demography and Socioeconomics: Any changes to the local economy as a result of the construction and operation of the ISFSI occurred when the MFRP was constructed. NRC concluded the ISFSI workforce would not be of sufficient size to affect the socioeconomic characteristics of the local area (NRC 2004a, Section 4.1.8). No socioeconomic impacts are expected from continued operation beyond those described in the 2004 EA.

The minority and low-income populations (Section 3.11.2) are located more than 4 miles away from the ISFSI—beyond the range of any public dose effects. Furthermore, in its *GEIS for Continued Storage of Spent Nuclear Fuel* (NRC 2014), the NRC determined that overall human health and environmental impacts from construction and away-from-reactor spent fuel storage during a short-term timeframe are small across all resource areas, except for air quality, terrestrial resources, aesthetics, historic and cultural resources, and socioeconomic and traffic conditions. Based on the impact analyses in its GEIS, the NRC concluded that any impacts experienced by populations in the region would not be disproportionately high or adverse for any population. Therefore, minority or low-income populations are not expected to experience disproportionately high and adverse impacts during this timeframe (NRC 2014, Section 5.3.1). There are no site-specific conditions associated with extended operation of the MO ISFSI that would alter NRC's generic conclusion.

Public and Occupational Health: Radiological public and occupational health is addressed in Section 4.2. Nonradiological occupational health effects at the ISFSI are managed through GEH's safety and health program. No adverse nonradiological health impact is expected from continued operation of the ISFSI.

Waste Management: There are no planned major changes to facility waste management systems. GEH would continue to operate the sanitary wastewater lagoons in compliance with an IEPA permit. GEH would also continue to operate its radioactive wastewater system and manage the solid radioactive waste generated from ISFSI operations in accordance with NRC regulations. The generation rate is expected to remain low. Solid radioactive waste will be shipped in accordance with NRC and U.S. Department of Transportation packaging and shipping regulations to licensed radioactive waste disposal facilities. GEH-MO would also manage its nonhazardous solid wastes and universal wastes and any hazardous waste in accordance with state and federal regulations and contract for their disposal in permitted local and regional facilities. The impacts from management of all waste types in compliance with applicable regulatory requirements would be small.

4.4 IMPACTS FROM POSTULATED ACCIDENTS

GEH-MO facility operations may pose risks to workers and public health and safety due to accidents that result in released radioactive or hazardous materials to the environment and/or increased direct radiation levels. Chapter 8 of the CSAR (GEH 2012) discusses various postulated accidents and estimates the quantity of radioactive material released and projected consequences. Calculated doses resulting from these postulated accidents would not exceed the exposure limits identified in 10 CFR 72.104 and 10 CFR 72.106.

In the Safety Evaluation Report (NRC 2004b) prepared in support of the 2004 license renewal, the NRC staff notes that the spent nuclear fuel has been cooling under water for an extended period (now more than 40 years), and the basin water is maintained in an ultra-pure state to minimize the potential for any adverse chemical attack on the fuel cladding, storage baskets, or basin liner. The MO site inventory is limited to the spent fuel currently on hand. Because the basins are essentially full and no additional spent fuel will be received during the license renewal period, the ISFSI's safety envelope will remain unchanged during the period of extended operations.

In the wake of the Fukushima Daiichi incident, NRC dispatched inspectors to each U.S. reactor and spent fuel storage site. The results of these inspections varied with different sites, with NRC inspections revealing no significant vulnerabilities for most sites. For sites with the oldest spent fuel (e.g., at the GEH-MO ISFSI), the predicted impact of an extended loss of power to the site would be minimal because of the extent of the radioactive decay during the decades of storage. NRC predicted that, "in the unlikely event that the [spent fuel wet storage basin] is completely drained of water, fuel melt would not occur given the limited fuel decay heat load." (NRC 2011)

As summarized in Section 1.1.2 of the CSAR, no credible acts of nature, man-induced events or accidents have been identified that would result in biologically significant release of radioactive material or direct radiation dose in excess of limits of 10 CFR 72.106 outside the OCA boundary.

5 MITIGATION MEASURES

As presented in Chapter 4, the only adverse impact of the proposed action is radiological dose to workers and the public. GEH adopted measures to mitigate for those potential impacts in conjunction with construction and operation of the ISFSI, as discussed below. GEH will continue to implement these measures throughout the period of extended operation.

Workers in the ISFSI wear personnel radiation monitoring devices and dose is recorded and tracked for analysis. Radiation is monitored in the facility using a combination of area radiation monitors, air sampling and monitoring, criticality monitors, and portable survey instruments (GEH 2012, Section 7.4). Radiation is continually measured at the OCA boundary surrounding the ISFSI. The Radiation Safety Officer is responsible for assessing new activities at the MO site which could adversely affect the fence line dose. If measured doses were to significantly exceed historical levels, GEH would perform analyses to determine the cause and would establish mitigation measures. The GEH-MO Radiological Protection ALARA program is an effective method for ensuring that doses to workers and the public are as low as can be achieved by reasonable, cost-effective methods.

6 ENVIRONMENTAL MEASUREMENT AND MONITORING

It is the goal of GEH to maintain radioactivity in MO effluents ALARA.

GEH conducts environmental monitoring of the ISFSI and surrounding area under the MO site-wide environmental monitoring program. MO operating instructions describe the environmental data collection, analysis and reporting requirements associated with MO effluents and direct radiation. The methodology described in the MO procedure complies with 10 CFR 20 Subpart D, "Radiation Dose Limits for Individual Members of the Public". The limiting dose to a member of the public is 25 millirems per year to the whole body, 75 millirems per year to the thyroid and 25 millirems per year to any other critical organ as prescribed in 10 CFR 20.1301, which in turn references 40 CFR 191.03.

The MO environmental monitoring program consists of the following program elements:

- Estimate of TEDE resulting from emission of gaseous and particulate radionuclides in air.
- Estimate of TEDE to the public resulting from discharge of radioactivity in surface waters exiting the site.
- Estimate of TEDE to the public resulting from radiation groundwater due to MO activities.
- Estimate of TEDE at the boundary of the OCA.

The dose assigned to the member of the public most likely to receive the highest dose is the arithmetic sum of the four TEDE estimates described above.

Thermoluminescent dosimeters (TLDs) are used to assess external radiation dose at the fence surrounding the OCA. GEH has placed TLDs at twelve locations along the fence line. The highest validated TLD result provides the quarterly external dose assessment.

The regulatory agencies with jurisdiction have prescribed no other physical, chemical, or ecological monitoring requirements, beyond those described above, to support operations of the ISFSI. The proposed action does not involve any changes to the ISFSI Technical Specifications, refurbishment of the ISFSI, or changes in ISFSI operation that would impact the effectiveness or validity of the radiation measurement program. Therefore, the current monitoring program would continue through the period of extended operation, and no additional environmental measurements or monitoring would be required.

7 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

7.1 UNAVOIDABLE ADVERSE IMPACTS

As presented in Chapter 4, the only adverse impacts of the proposed action are radiological dose to workers and radiological dose to the public. Although GEH employs inspections, maintenance, monitoring, and ALARA principles (Section 5) to mitigate these impacts, some impact is unavoidable. However, as indicated in Section 4.2, NRC concluded that the impact of the ISFSI to both workers and members of the public is within regulatory limits (radiation protection standards of 10 CFR 20.1201 and 10 CFR 20.1301) (NRC 2004a, Section 4.2.1). The stored spent fuel at the GE-Morris facility will further decay; therefore, small amounts of radioactive material will be released via the gaseous effluents over the period of extended operation. These contaminants represent a small portion of the radioactivity that exists in the environment naturally and, as such, have no adverse impact on the environment.

7.2 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The continued operation of the GEH-MO ISFSI for the license renewal term would result in no additional irreversible and irretrievable resource commitments beyond those materials committed during the initial licensing of the ISFSI that cannot be recovered or recycled or that are consumed or reduced to unrecoverable forms. As noted in the previous license renewal application for the ISFSI and NRC's corresponding EA, those resources committed to this facility, whether irreversibly or for the life of the facility, represent small portions of the total amount of such resources available for use in any particular category.

7.3 SHORT-TERM USES, MAINTENANCE, AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The current balance between short-term use and long-term productivity of the environment would be unchanged by the renewal of the specific license for the GEH-MO ISFSI. The ISFSI is a temporary storage facility. Once the spent nuclear fuel is moved to a permanent repository, the MO buildings, structures, and fencing could be removed and the land used for another purpose. Extended operation of the ISFSI would postpone restoration of the site and its potential availability for uses other than fuel storage for up to an additional 20 years.

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Appendix A

State-listed Threatened and Endangered Species in Grundy and Will Counties

Table A-1. State-listed Threatened and Endangered Species in Grundy and Will Counties.

Common Name	Scientific Name	State Status	County
Mammals			
Franklin's Ground Squirrel	<i>Poliocitellus franklinii</i>	LT	W
Gray/timber Wolf	<i>Canis lupus</i>	LT	G
Northern Long-eared Myotis	<i>Myotis septentrionalis</i>	LT	G, W
Birds			
American Bittern	<i>Botaurus lentiginosus</i>	LE	G
Barn Owl	<i>Tyto alba</i>	LT	W
Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>	LE	W
Chuck-will's-widow	<i>Caprimulgus carolinensis</i>	LT	G
Common Gallinule	<i>Gallinula galeata</i>	LE	G
King Rail	<i>Rallus elegans</i>	LE	G, W
Least Bittern	<i>Ixobrychus exilis</i>	LT	G, W
Loggerhead Shrike	<i>Lanius ludovicianus</i>	LE	G, W
Northern Harrier	<i>Circus cyaneus</i>	LE	G, W
Osprey	<i>Pandion haliaetus</i>	LE	W
Short-eared Owl	<i>Asio flammeus</i>	LE	G
Upland Sandpiper	<i>Bartramia longicauda</i>	LE	G, W
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	LE	W
Reptiles			
Blanding's Turtle	<i>Emydoidea blandingii</i>	LE	G, W
Eastern Massasauga	<i>Sistrurus catenatus</i>	LE	W
Kirtland's Snake	<i>Clonophis kirtlandi</i>	LT	W
Ornate Box Turtle	<i>Terrapene ornata</i>	LT	G, W
Spotted Turtle	<i>Clemmys guttata</i>	LE	W
Amphibians			
Four-toed Salamander	<i>Hemidactylium scutatum</i>	LT	W
Mudpuppy	<i>Necturus maculosus</i>	LT	W
Fish			
American Eel	<i>Anguilla rostrata</i>	LT	G
Banded Killifish	<i>Fundulus diaphanus</i>	LT	G, W
Bigeye Shiner	<i>Notropis boops</i>	LE	G, W

Common Name	Scientific Name	State Status	County
Blacknose Shiner	<i>Notropis heterolepis</i>	LE	G, W
Gravel Chub	<i>Erimystax x-punctatus</i>	LT	W
Greater Redhorse	<i>Moxostoma valenciennesi</i>	LE	G
Iowa Darter	<i>Etheostoma exile</i>	LT	W
Ironcolor Shiner	<i>Notropis chalybaeus</i>	LT	G, W
Pallid Shiner	<i>Hybopsis amnis</i>	LE	G, W
River Redhorse	<i>Moxostoma carinatum</i>	LT	G, W
Starhead Topminnow	<i>Fundulus dispar</i>	LT	W
Weed Shiner	<i>Notropis texanus</i>	LE	W
Western Sand Darter	<i>Ammocrypta clarum</i>	LE	W
Mussels			
Black Sandshell	<i>Ligumia recta</i>	LT	G, W
Purple Wartyback	<i>Cyclonaias tuberculata</i>	LT	G, W
Salamander Mussel	<i>Simpsonaias ambigua</i>	LE	W
Scaleshell Mussel	<i>Leptodea leptodon</i>	LE	G
Sheepnose	<i>Plethobasus cyphus</i>	LE	W
Slippershell	<i>Alasmodonta viridis</i>	LT	G, W
Spike	<i>Elliptio dilatata</i>	LT	G, W
Insects			
Eryngium Stem Borer	<i>Papaipema eryngii</i>	LT	G
Hine's Emerald Dragonfly	<i>Somatochlora hineana</i>	LE	W
Redveined Prairie Leafhopper	<i>Aflexia rubranura</i>	LT	G, W
Regal Fritillary	<i>Speyeria idalia</i>	LT	G
Plants			
American Burnet	<i>Sanguisorba canadensis</i>	LE	W
American Slough Grass	<i>Beckmannia syzigachne</i>	LE	W
Beaked Spike Rush	<i>Eleocharis rostellata</i>	LT	W
Blue Sage	<i>Salvia azurea</i>	LT	W
Bristly Blackberry	<i>Rubus schneideri</i>	LT	W
Buffalo Clover	<i>Trifolium reflexum</i>	LT	W
Bulrush	<i>Scirpus hattorianus</i>	LE	W

Common Name	Scientific Name	State Status	County
Canada Violet	<i>Viola canadensis</i>	LE	W
Carolina Whipgrass	<i>Scleria pauciflora</i>	LE	W
Common Bog Arrow Grass	<i>Triglochin maritima</i>	LT	W
Corn Salad	<i>Valerianella chenopodifolia</i>	LE	W
Corn Salad	<i>Valerianella umbilicata</i>	LE	W
Decurrent False Aster	<i>Boltonia decurrens</i>	LT	W
Eastern Prairie Fringed Orchid	<i>Platanthera leucophaea</i>	LE	G, W
Eryngium Stem Borer	<i>Papaipema eryngii</i>	LT	G, W
False Mallow	<i>Malvastrum hispidum</i>	LE	G, W
Flat-leaved Bladderwort	<i>Utricularia intermedia</i>	LT	W
Forked Aster	<i>Aster furcatus</i>	LT	G, W
Golden Corydalis	<i>Corydalis aurea</i>	LE	W
Grass Pink Orchid	<i>Calopogon tuberosus</i>	LE	G, W
Grass-leaved Pondweed	<i>Potamogeton gramineus</i>	LT	W
Hairy Umbrella-wort	<i>Mirabilis hirsuta</i>	LE	W
Heart-leaved Plantain	<i>Plantago cordata</i>	LE	W
Hedge Hyssop	<i>Gratiola quartermaniae</i>	LE	W
Jack Pine	<i>Pinus banksiana</i>	LE	G, W
Lakeside Daisy	<i>Tetraneuris herbacea</i>	LE	W
Large Cranberry	<i>Vaccinium macrocarpon</i>	LE	W
Leafy Prairie Clover	<i>Dalea foliosa</i>	LE	W
Little Green Sedge	<i>Carex viridula</i>	LT	W
Marsh Speedwell	<i>Veronica scutellata</i>	LT	W
Mead's Milkweed	<i>Asclepias meadii</i>	LE	W
Narrow-leaved Sundew	<i>Drosera intermedia</i>	LT	G, W
Northern Cranesbill	<i>Geranium bicknellii</i>	LE	W
Northern Panic Grass	<i>Dichanthelium boreale</i>	LE	W
Oklahoma grass pink orchid	<i>Calopogon oklahomensis</i>	LE	G, W
Primrose Violet	<i>Viola primulifolia</i>	LE	W
Queen-of-the-prairie	<i>Filipendula rubra</i>	LT	G, W
Quillwort	<i>Isoetes butleri</i>	LE	W

Appendix A

Common Name	Scientific Name	State Status	County
Red Pine	<i>Pinus resinosa</i>	LE	G
Richardson's Rush	<i>Juncus alpinoarticulatus</i>	LT	W
Royal Catchfly	<i>Silene regia</i>	LE	W
Running Pine	<i>Lycopodium clavatum</i>	LE	W
Shore St. John's Wort	<i>Hypericum adpressum</i>	LE	W
Slender Bog Arrow Grass	<i>Triglochin palustris</i>	LT	W
Slender Sandwort	<i>Minuartia patula</i>	LT	G, W
Spotted Coral-root Orchid	<i>Corallorhiza maculata</i>	LE	W
Tubercled Orchid	<i>Platanthera flava</i>	LT	W
Wood Orchid	<i>Platanthera clavellata</i>	LE	W
Yellow-lipped Ladies' Tresses	<i>Spiranthes lucida</i>	LE	W

LE = Endangered
LT = Threatened
G = Grundy County
W = Will County
Source: IDNR 2018c