Environmental Report for the Exelon Generation Company, LLC Early Site Permit

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CHAPTER 1

Introduction to the Environmental Report

Exelon Generation Company (EGC), LLC, hereafter referred to as the Applicant, has developed this comprehensive Environmental Report (ER) to address environmental issues associated with its Early Site Permit (ESP). The site is colocated with an existing nuclear power plant near Clinton, Illinois. This chapter provides an introduction to the environmental impact on the site and surrounding areas, and it describes potential impacts from construction and operation of the EGC ESP Facility.

The chapter is organized into the following sections:

- The Proposed Project (Section 1.1); and
- Status of Reviews, Approvals, and Consultations (Section 1.2).

This ER was developed using the organization and format provided in the Environmental Standard Review Plan (ESRP) (NUREG-1555) (USNRC, 1999). This ER discusses the existing environment at the site and in the vicinity; summarizes environmental impacts of construction and operation and considers appropriate mitigation measures; and reviews similar alternative sites. This ER does not assess impacts based on a specific power facility design, nor does it postulate costs and benefits associated with construction or operation of any one design option. Rather this ER considers a spectrum of feasible designs.

The following categories of information regarding interfaces of the site and facilities are reviewed:

- Comparison of the functional and operational needs of the EGC ESP Facility as they relate to the site's natural and environmental resources; and
- Direct impact of the EGC ESP Facility on the site's natural and environmental resources.

1.1 The Proposed Project

This chapter provides an outline of the EGC ESP project. It is organized into the following sections:

- The Applicant and Owner (Section 1.1.1);
- Site Location (Section 1.1.2);
- Reactor Information (Section 1.1.3);
- Cooling System Information (Section 1.1.4);
- Transmission System Information (Section 1.1.5);
- The Nature of the Proposed Action and Constraints (Section 1.1.6); and
- Construction Start Date (Section 1.1.7).

1.1.1 The Applicant and Owner

Pursuant to the Atomic Energy Act of 1954 (AEA), as amended, and the Nuclear Regulatory Commission's (NRC) regulations in Title 10 of the Code of Federal Regulations (CFR), the Applicant has filed a Site Safety Analysis Report (SSAR), which accompanies this ER (10 CFR 52.17). The EGC ESP Site is located within the boundary of the Clinton Power Station (CPS) property, which is owned by AmerGen Energy Company, LLC (AmerGen). As described in Section 3.4.6 of the Administrative Information, agreements between the Applicant and AmerGen will be in place to assure that the Applicant has the necessary authority, control, and rights related to the proposed EGC ESP Site.

1.1.2 Site Location

The site is located in DeWitt County, Illinois, approximately 6-mi east of the City of Clinton and along the shore of Clinton Lake. The site is the location of the CPS, and the EGC ESP Facility will be built 700 feet (ft) south of the CPS. For purposes of this ER, the site is defined as the property within the fenceline of the CPS. The vicinity is the area within a 6-mi radius from the centerpoint of the power block footprint. The region is the area between the 6-mi radius and the 50-mi radius from the centerpoint of the power block footprint. Clinton Lake is used as a source of cooling water for the CPS, and will be used as a source of makeup water for the EGC ESP Facility. The site is already zoned as industrial. Within the vicinity of the site: 12,076 acres (ac) (16.6 percent) is classified as recreational; 59,870 ac (82.1 percent) is classified as agricultural; 512 ac (0.7 percent) is classified as industrial; and 512 ac (0.7 percent) is classified as residential. Within the region of the site: 269,258 ac (5.4 percent) is classified as recreational; 4,580,167 ac (92.5 percent) is classified as agricultural; 27,530 ac (0.6 percent) is classified as industrial; and 71,843 ac (1.5 percent) is classified as residential. For more information on site location and demographics, see Chapter 2.

1.1.3 Reactor Information

The selection of a reactor design to be used for this facility is still under consideration. The types of reactors from which the bounding parameters were determined (see SSAR, Table 1.4-1), include:

- Pebble bed modular reactor (PBMR) – 8 modules;
- Advanced boiling-water reactor (ABWR) – 1 unit;
- Advanced pressurized-water reactor (AP1000) – 2 units;
- Economic Simplified Boiling Water reactor (ESBWR) – 1 unit;
- Gas turbine-modular helium reactor (GT-MHR) – 4 modules;
- Advanced Canada Deuterium Uranium (CANDU) Reactor (ACR-700) – 2 units; and
- International Reactor Innovative and Secure (IRIS) – 3 units.

Selection of a reactor to be used at the EGC ESP Site will not be limited to those listed above. The final selected reactor may be a future design that is bounded by the surrogate plant design reflected in the Plant Parameters Envelope (PPE), as presented in SSAR Table 1.4-1.

It is estimated that the proposed reactor(s) will be capable of generating up to a core thermal power level of 6,800 megawatts thermal (MWt). For more information on the reactors assessed in the PPE, see Chapter 3.

1.1.4 Cooling System Information

Waste heat will be dissipated by a cooling tower(s), which will draw cooling water makeup from Clinton Lake. The cooling water makeup will be withdrawn from Clinton Lake through a new intake structure. The approach velocity to the intake will be limited to a maximum velocity of 0.50 feet per second (fps) at the normal lake elevation of 690 ft above mean sea level (msl). The normal raw water requirement is estimated to be 48,288 gallons per minute (gpm). A breakdown of the usage of the raw water supply can be seen in Table 3.3-2. The total discharge from the cooling tower(s) will normally be 12,000 gpm, with a maximum discharge of 49,000 gpm. For more information on the cooling system, see Section 3.4.

1.1.5 Transmission System Information

The existing transmission system is insufficient to handle the load of an additional large generation source. If EGC decides to construct generation up to the maximum load specified in the PPE, it will be necessary to increase the capacity of the existing transmission facilities as described below.

A double circuit line will connect the facility to an interconnect point at the Brokaw substation near Bloomington, Illinois, about 23-mi north of the site. A second double circuit line will connect the site to the Oreana substation, which is about 8-mi south of the site. Based on regional transmission operator (RTO) construction practices, it is anticipated that four wood pole H-Frames will be constructed to carry the lines to their destinations. The H-Frame structures will carry the double circuit lines that consist of six phases of two or three bundle conductors of 1,272 kilo circular mils (kcmil), aluminum-conductor steel-reinforced (ACSR), and two shield wires. Final conductor size will be determined by the transmission system operator based on:

- Operating voltage;
- Loads to be carried, both initially and in the future;
- Thermal capacity;
- Cost of the conductor, support structures, foundations, right-of-way, and the present value of the energy losses associated with the conductor size and expected loading; and
- Electric and magnetic field strengths, which depend on operating line voltage, conductor currents, and conductor configuration and spacing.

For more information on the transmission system, see Section 3.7.

1.1.6 The Nature of the Proposed Action and Constraints

This ER does not assess impacts based on a specific power facility design; it considers a spectrum of feasible designs. The description of the plant details and the environmental impacts provided in the ER are based on the most conservative bounding parameters.

The New Licensing Reactor Project Office (NRLPO) held a public outreach meeting on March 20, 2003, in Clinton, Illinois, to provide information on opportunities for public involvement in the ESP process for this site. Additional interaction with the public was provided by representatives from EGC, who contacted members of the surrounding community during the period of August 21, 2002 to September 1, 2002 to gather input from residents who may be affected by the construction and operation of the proposed EGC ESP project.

1.1.7 Construction Start Date

At this time, EGC has not established a date for preconstruction activities. It is estimated that site preparation activities (preconstruction) will take between six and 18 months to complete. Based on estimates provided by the reactor vendors, assuming that appropriate licenses are obtained, actual construction is expected to take between three and five years.

1.2 Status of Reviews, Approvals, and Consultations

Table 1.2-1 provides a list of the environmentally-related authorizations, permits, and certifications required by federal, state, regional, local, and affected Native American tribal agencies. It includes, but is not limited to, permits that are required before the construction and operation of the proposed EGC ESP Facility. It is organized as follows:

- The particular agency with jurisdiction over the imposed requirement;
- The authority, law, or regulation that dictates the requirement;
- The name of the required license, permit, or certification;
- The license or permit number of any existing licenses or permits;
- The expiration date on the license or permit; and
- A brief description of the requirement fulfilled or to be fulfilled by the Applicant prior to the approval of the site.

The structure of this table is based on the format provided in NUREG-1555 (USNRC, 1999). However, since the purpose of this ER is only to establish the feasibility of the proposed location, any applicable permits will not be applied for until the combined operating license (COL) phase. Therefore, the columns for existing permits and expiration dates have been left blank. For exact locations mentioned in Table 1.2-1, please refer to the site maps in Chapter 2.

CHAPTER 1

References

Chapter Introduction

U.S. Nuclear Regulatory Commission (USNRC). *Standard Review Plans for Environmental Reviews of Nuclear Power Plants*. NUREG-1555. Office of Nuclear Reactor Regulation. October 1999.

Section 1.1

10 CFR 52.17. Code of Federal Regulations. "Contents of Applications."

Section 1.2

U.S. Nuclear Regulatory Commission (USNRC). *Standard Review Plans for Environmental Reviews of Nuclear Power Plants*. NUREG-1555. Office of Nuclear Reactor Regulation. October 1999.

CHAPTER 1
Tables

TABLE 1.2-1
Federal, State, and Local Authorizations

Agency	Authority	Requirement	License/ Permit No.	Expiration Date	Authorization Granted
U.S. Nuclear Regulatory Commission (USNRC)	10 CFR 40	Source Material License	--[a]	--[a]	Possession of source material
USNRC	Atomic Energy Act of 1954 (AEA), 10 CFR 51	ER	--[a]	--[a]	Site approval for a nuclear power station separate from an application for a standard design certification or combined operating license (COL)
USNRC	10 CFR 52	COL	--[a]	--[a]	Construction and Operation Safety Review for a nuclear power station
USNRC	10 CFR 70	Special Nuclear Materials License	--[a]	--[a]	Possession of fuel
USNRC	10 CFR 30	By-product License	--[a]	--[a]	Possession of special nuclear materials
U.S. Fish and Wildlife Services (USFWS)	Threatened and Endangered Species Act	Letter of Compliance	--[a]	--[a]	Compliance with Threatened and Endangered Species Act
Federal Aviation Administration (FAA)	49 USC 1501	Construction Notice	--[a]	--[a]	Construction of structures affecting air navigation
U.S. Environ-mental Protection Agency (USEPA)	Clean Water Act (CWA)	Stormwater Pollution Prevention Plan (SWP3)	--[a]	--[a]	Discharge of stormwater associated with construction activities
US Army Corps of Engineers (USACOE)	CWA	Section 404 Permit	--[a]	--[a]	Disturbance of the crossing of a navigable stream
USACOE	Section 404 Conditional Permit	Walleye Spawning Areas Permit	--[a]	--[a]	Disturbances of walleye spawning areas
USACOE	33 CFR 209	Dredge and Fill Discharge Permit	--[a]	--[a]	Construction/modification of the discharge to Salt Creek

TABLE 1.2-1
Federal, State, and Local Authorizations

Agency	Authority	Requirement	License/ Permit No.	Expiration Date	Authorization Granted
State Historic Preservation Office (SHPO)	36 CFR 800	Cultural Resources Review	--[a]	--[a]	Confirmation that site and transmission corridor are not considered historic preservation areas
Illinois Commerce Commission	Illinois Public Utilities Act	Certification of Public Convenience and Necessity	--[a]	--[a]	Construction and operation of plant
Illinois Department of Transportation (IDOT)	Illinois Rev. Stat. 1971	Construction Permit	--[a]	--[a]	Construct lift crane
IDOT	Illinois Rev. Stat. 1971	Construction Permit	--[a]	--[a]	Construct dome lighting mast
IDOT	Illinois Commerce Act 1911	Construction Permit	--[a]	--[a]	Construction/modification of discharge structures on Salt Creek
IDOT	Illinois Commerce Act 1911	Construction Permit[b]	--[a]	--[a]	Construction of transmission lines crossing waterways
IDOT	Illinois Commerce Act 1911	Construction Permit[b]	--[a]	--[a]	Construction of transmission lines crossing state highways
Illinois Environmental Protection Agency (IEPA)	Resource Conservation and Recovery Act (RCRA)	Development (DE), Operating (OP), and Supplemental Permits	--[a]	--[a]	Storage and transportation of hazardous materials
IEPA	17 IL Adm. Code Part 120	Surface Water Withdrawal Permit	--[a]	--[a]	Withdrawal of water from a public surface water source
IEPA	CWA	IEPA Section 401 Water Quality Certification	--[a]	--[a]	Certification that activities will comply with water quality standards of the state
IEPA	General permit for discharges associated with construction activities	Notice of Intent (NOI) for Construction	--[a]	--[a]	Discharge of stormwater from site during construction
IEPA	General permit for discharges associated with construction activities	Notice of Termination (NOT) for Construction	--[a]	--[a]	Termination of coverage under the general permit for stormwater discharge associated with construction site activities
IEPA	CWA	NPDES Permit	--[a]	--[a]	Discharges to surface water

TABLE 1.2-1
Federal, State, and Local Authorizations

Agency	Authority	Requirement	License/ Permit No.	Expiration Date	Authorization Granted
IEPA	CAA	Minor Source Construction Permit	--[a]	--[a]	Construction and operation of facilities generating air emissions
IEPA	Title V	Title V Operating Permit	--[a]	--[a]	Operation of facility generating air emissions
IEPA	General Stormwater Permit	Notice of Termination (NOT) for Industrial Activities	--[a]	--[a]	Termination of coverage under the general permit for stormwater discharge associated with operations activities
IEPA	Environmental Protection Act (415 ILCS 5)	Sanitary Wastewater Hauling Permit	--[a]	--[a]	Transportation of sanitary wastewater
IEPA	Environmental Protection Act (415 ILCS 5)	Sludge Disposal Operating Permit	--[a]	--[a]	Disposal of sludge
IEPA	Environmental Protection Act (415 ILCS 5)	Non-Hazardous Domestic Waste water or Sludge Transporting Permit	--[a]	--[a]	Transportation of non-hazardous wastewater or sludge
IEPA	IL Adm. Code, Part 170	Emergency Petroleum Storage Tank Permit	--[a]	--[a]	Implementation of storage tanks containing petroleum products
IEPA	Environmental Protection Act (415 ILCS 5)	Open Burning Permit	--[a]	--[a]	Open burning of petroleum products for back-up generators
IEPA	Environmental Protection Act (415 ILCS 5)	Supplemental Waste stream Permit	--[a]	--[a]	Disposal of waste from additional waste streams
IEPA	N/A	Refrigerant Recovery/Recycling Equipment Certifications	--[a]	--[a]	Recovery and recycling of refrigerants
IEPA	Environmental Protection Act (415 ILCS 5)	Construction Permit	--[a]	--[a]	Construction of waste treating facilities
IEPA	Environmental Protection Act (415 ILCS 5)	Construction Permit	--[a]	--[a]	Construction of temporary sewage treatment unit for construction phase only

TABLE 1.2-1
Federal, State, and Local Authorizations

Agency	Authority	Requirement	License/ Permit No.	Expiration Date	Authorization Granted
IEPA	Environmental Protection Act (415 ILCS 5)	Operating Permit	--[a]	--[a]	Operation of temporary sewage treatment unit for construction phase only
IEPA	Environmental Protection Act (415 ILCS 5)	Operating Permit	--[a]	--[a]	Treatment of waste water discharge
DeWitt County Zoning Board of Appeals	Illinois Zoning Act	Approvals	--[a]	--[a]	Construction of the plant
Circuit Court of DeWitt County	Eminent Domain Act	Petition for condemnation	--[a]	--[a]	Exercise right of eminent domain

[a] Data not available. Applicable permits may not be applied for until the COL phase. Applications for permits will be made before the beginning of construction, as required. Some permits may be combined with existing CPS permits.

[b] To be obtained by the Regional Transmission Operator.

Notes: All permits will be applied for before the beginning of construction. Some permits may not be obtained since the area may be combined with some existing CPS permits.

CHAPTER 2

Environmental Description

This chapter provides a description of the environmental conditions of the area within and surrounding the EGC ESP Site. It will be used as a baseline to assess potential impacts due to construction and operation of nuclear power reactors at the EGC ESP Site. The chapter is organized into the following sections:

- Station Location (Section 2.1);
- Land (Section 2.2);
- Water (Section 2.3);
- Ecology (Section 2.4);
- Socioeconomics (Section 2.5);
- Geology (Section 2.6);
- Meteorology and Air Quality (Section 2.7); and
- Other Federal Projects (Section 2.8).

For purposes of this ER, the site is defined as the property within the fenceline of the CPS. The vicinity is the area within a 6-mi radius from the centerpoint of the power block footprint. The region is the area between the 6-mi radius and the 50-mi radius from the centerpoint of the power block footprint.

The EGC ESP Facility will be colocated with the CPS Facility. The environmental description developed for the CPS Facility is summarized in the *Clinton Power Station Updated Safety Analysis Report* (CPS USAR) (CPS, 2002) and the *Clinton Power Station Environmental Report Operating License Stage* (CPS ER [OLS]) (CPS, 1982). Based on the initial reviews, the environmental conditions described in these documents provide a valid summary of 2002 existing conditions. The environmental descriptions presented in the CPS documents were updated and supplemented, as necessary, using information from the following available sources.

- Reports, data, and databases from state agencies include the Illinois State Water Survey (ISWS), the Illinois State Geological Survey (ISGS), Illinois Department of Natural Resources (IDNR), Illinois Department of Agriculture (IDOA), Illinois Department of Transportation (IDOT), Illinois Natural Heritage Survey (INHS), and the Illinois Environmental Protection Agency (IEPA).
- Reports, data, and databases from federal agencies include the U.S. Geological Survey (USGS), U.S. Census Bureau, National Oceanic and Atmospheric Administration (NOAA), U.S. Fish and Wildlife Service (USFWS), Midwest Regional Climate Center (MRCC), U.S. Environmental Protection Agency (USEPA), U.S. Nuclear Regulatory

- STOrage and RETrieval System for Water and Biological Data (STORET) water-quality data from USEPA;
- Aerial photographs; and
- Other publicly available documents.

The existing information was used to support assumptions about meteorology, hydrology, and ecology, thus, eliminating the need for the required 1-yr period of record. Where information about the site was out of date, or needed to be supplemented, the most current information was used. Where appropriate, the applicant developed new data to supplement the existing documents.

2.1 Station Location

The EGC ESP Facility will be colocated on the site of the existing facility and adjacent to the CPS 4,895-ac man-made cooling reservoir; Clinton Lake (IDNR, 2002). The EGC ESP Facility will be located just south of the CPS Facility. The site is located in DeWitt County in east-central Illinois, approximately 6-mi east of the City of Clinton (see Figure 2.1-1) (USGS, 1990). The site is located within Sections 22, 23, 26, and 27 of Township 20 North and Range 3 East (USGS, 1990). The site is located in the political subdivision of Harp Township (IDNR, 1985). The total area of the EGC ESP Site is approximately 461 ac. Universal transverse mercator (UTM) coordinates for the EGC ESP Facility are not provided for security reasons.

The EGC ESP Site is located between the cities of Bloomington and Decatur, 22 mi to the north and 22 mi to the south, respectively. In addition, the EGC ESP Site is located between the cities of Lincoln and Champaign-Urbana, 28 mi to the west and 30 mi to the east, respectively. Figure 2.1-2 shows the site in reference to major towns and cities within a 50-mi radius. The EGC ESP Site is also approximately 51-mi northeast of Springfield, and almost equidistant (approximately 150 mi) between St. Louis and Chicago. Figure 2.1-3 shows an aerial view of the CPS, with an overlay of the EGC ESP facilities. Figure 2.1-4 shows the proposed areas for the EGC ESP structures. Figure 2.1-5 shows the location of these structures relative to CPS facilities.

2.2 Land

This section describes the land area that surrounds the EGC ESP Site, and is divided into three sections:

- Site (the area within the fenceline, see Figure 2.1-3) and vicinity (the area surrounded by a 6-mi radius from the centerpoint of the EGC ESP power block footprint);
- Transmission corridors and off-site areas; and
- Region (the area between a 6-mi radius and a 50-mi radius from the centerpoint of the EGC ESP power block footprint).

2.2.1 Site and Vicinity

Figure 2.2-1 and Figure 2.2-2 present land use based on USGS land use classification at the site and in the vicinity, respectively. Table 2.2-1 describes the percentage and actual area devoted to these major use classifications. These land uses were confirmed with a review of recent aerial photographs (USGS, 2000).

Within the site boundary, 100 percent (461 ac) has been graded or otherwise developed for the operation of the existing nuclear power plant. Except for the CPS, there are no industrial, commercial, or institutional structures on the site property (IDNR, 1998 and 1999, USGS, 2000).

The nearest resident to the site is 0.73 mi to the southwest. The nearest school is 4.8-mi west of the site, the nearest church is 3.8-mi south of the site, and the nearest campground is approximately 1-mi west of the site.

Recreational areas are the only special land uses (16.6 percent of total land use) within the vicinity, and consist of the Clinton Lake State Recreation Area and Weldon Springs State Recreation Area. Clinton Lake State Recreation Area is 9,300 ac, which includes the 4,895-ac Clinton Lake. Clinton Lake State Recreation Area offers snowmobiling, ice-fishing, ice-skating, boating, fishing, water-skiing, picnicking, camping, swimming, hiking, and hunting (IDNR, 2002). Weldon Springs State Recreation Area encompasses approximately 370 ac and contains a 28-ac lake. Weldon Springs State Recreation Area offers facilities for fishing, picnicking, boating, and hiking during the summer, and sledding, tobogganing, ice-fishing, and cross-country skiing during the winter (IDNR, 2002).

The area that comprises the vicinity is predominantly agricultural land, 82.1 percent or 59,870 ac. Industrial land use within the vicinity is less than 1 percent, and is limited to areas near Clinton and Weldon. Less than 1 percent of land within the site vicinity is residential, and consists primarily of residential areas in Clinton and Weldon (USGS, 1992). This land use was confirmed with a review of recent aerial photographs (USGS, 2000).

The topography of the vicinity is generally flat, even to the exclusion of hedgerows and forested tracts. Along the major drainage courses, however, the land is gently rolling to steeply sloped and usually forested. Elevations range from approximately 800-ft above msl in the north-central portion of the vicinity to 700-ft above msl and 696-ft above msl along Clinton Lake (USGS, 1990).

Figure 2.2-3 indicates the transportation network, comprised of highways, railroad (RR) lines, and utility rights-of-way, that cross the site and vicinity. Illinois (IL) Route 54 is approximately 1-mi north of the EGC ESP Site. IL Route 10 is approximately 3-mi south, and IL Route 48 is approximately 5-mi east of the EGC ESP Site (U.S. Census Bureau, 2000). As shown in Figure 2.2-3, access to the site is limited primarily to IL Route 54.

There is one RR line within the vicinity (see Figure 2.2-3). The Canadian National RR runs parallel to IL Route 54 and traverses the vicinity approximately 1-mi north of the CPS. (U.S. Census Bureau, 2000).

There are three private airports within the vicinity of the site. The Martin RLA Airport is located approximately 4-mi south of the site. The Thorp Airport is located approximately 5-mi northwest of the site. The Bakers Strip is located approximately 5-mi southeast of the site (Bureau of Transportation Statistics, 2000).

The waterways within the vicinity include Clinton Lake, Salt Creek, and North Fork of Salt Creek, which branches off Clinton Lake. There is one canoe access area north of the site. In addition, there is one marina with boat access south of the site, and four boat access areas, one in each cardinal direction from the site (IDNR, 2002).

There are no known significant mineral resources (e.g., sand and gravel, coal, oil, natural gas, and ores) within the vicinity (ISGS, 1999).

DeWitt County published a comprehensive plan in 1992 to guide overall development in the area. The EGC ESP Site will not conflict with the proposed zoning for the site, since the facility will be constructed within the CPS Site, which is already designated for transportation and utilities. The 1992 *DeWitt County Comprehensive Plan* states that DeWitt County should encourage new spin off development or related expansion at the CPS (University of Illinois, 1992).

2.2.2 Transmission Corridors and Off-Site Areas

The anticipated transmission corridor for the EGC ESP Facility is an existing corridor used to transmit power generated from the CPS. The transmission corridor is divided into two sections. Based on Geographic Information System (GIS) analysis, the northern section is approximately 23-mi long with a width of 250 ft (an area of 710 ac). The southern section is approximately 8-mi long with a width of 250 ft (an area of 238 ac). The northern section runs north of the EGC ESP Site, and then turns west and runs toward Bloomington, Illinois. The southern section runs southeast of the EGC ESP Site past Clinton Lake, and then turns south and runs toward the southern boundary of DeWitt County. Figure 2.2-4 depicts the anticipated transmission line corridor.

Table 2.2-2 describes the percentage and actual area devoted to the major land use classifications that were confirmed with a review of aerial photographs (USGS, 2000). The area that comprises the anticipated transmission corridor is predominantly agricultural land, 88.2 percent or 836 ac. A significant portion of the southern transmission corridor crosses Clinton Lake, which account for the fact that approximately 10.7 percent of the land use is recreation. A small portion of the land use of the transmission corridor is classified as industrial, 1.1 percent. This consists primarily of the CPS Site, RR crossings, and highway crossings.

Recreational areas are the only special land uses along the transmission corridor, and include the Clinton Lake State Recreation Area. Clinton Lake State Recreation Area is 9,300 ac, which includes the 4,895-ac Clinton Lake (IDNR, 2002).

The topography of the transmission corridor is generally flat. Along the major drainage courses, however, the land is gently rolling to steeply sloped and usually forested. Elevations range from approximately 900-ft above msl in the north-central portion of the transmission corridor to 700-ft above msl near Clinton Lake (USGS, 1990).

Figure 2.2-4 also presents the transportation network including highways and RR lines that cross the transmission corridor. The highways that traverse the transmission corridor are U.S. Highway 150, Interstate 74, U.S. Highway 136, IL Route 54, and IL Route 10 (U.S. Census Bureau, 2000).

The transmission corridor crosses three railroads (see Figure 2.2-4). The Norfolk Southern RR traverses the northern portion of the transmission corridor. The Norfolk Southern RR also has a line that runs parallel to Interstate 74 and traverses the northern central portion of the transmission corridor. The Canadian National RR runs parallel to IL Route 54, and traverses the transmission corridor approximately 1-mi north of the CPS. (U.S. Census Bureau, 2000).

There are no airports within the transmission corridor. There are three private airports and one public airport within 1.5 mi of the transmission corridor. The public airport is Bloomington-Normal Airport, located approximately 1-mi west of the northern tip of the transmission corridor. The private airports are the Martin RLA Airport, Thorp Airport, and Bakers Strip Airport discussed above in Section 2.2.1 (Bureau of Transportation Statistics, 2000).

The waterways that the transmission corridor crosses include Clinton Lake, Salt Creek, and North Fork of Salt Creek, which branches off Clinton Lake. There is one canoe access area near the northern section of the transmission corridor that crosses Salt Creek. In addition, there is one marina with boat access and separate boat access area near the southern section of the transmission corridor that crosses Clinton Lake (IDNR, 2002).

There are no known significant mineral resources (sand and gravel, coal oil, natural gas, and ores) within the transmission corridor (ISGS, 1999).

DeWitt County published a comprehensive plan in 1992. A review of the plan indicates the transmission corridor does not conflict with any proposed zoning for the county. DeWitt County has designated an area approximately 1-mi southwest of the CPS and Clinton Lake as a possible area for a new restaurant and a golf course. Bicycle and hiking trails are planned along the Canadian National RR. The county is also considering possible improvements to IL Route 10 and IL Route 54, but will conduct a study before proceeding with improvements (University of Illinois, 1992). The transmission corridor does not interfere with the county's land use plan since only existing right-of-way will be used for the transmission corridor.

McLean County published a regional comprehensive plan in August 2000. The transmission corridor will not conflict with any proposed zoning for the county. McLean County plans to make some improvements to the roads that either cross the transmission corridor or are adjacent to the transmission corridor (McLean County Regional Planning Commission, 2000). The transmission corridor does not interfere with the county's land use plan because only existing right-of-way will be used for the transmission corridor.

2.2.3 Region

Figure 2.2-5 presents land use in the region of the EGC ESP Site based on USGS land use classifications. Table 2.2-3 describes the percentage and actual acres devoted to these major use classifications.

Approximately 92.5 percent (4,580,167 ac) of the area is rural/agricultural land, 0.6 percent (27,530 ac) is industrial land, 1.5 percent (71,843 ac) is residential land, and 5.4 percent (269,258 ac) is recreational land (USGS, 1992) This land use was confirmed with a review of aerial photographs (USGS, 2000).

The region that surrounds the EGC ESP Site is primarily agricultural land with the exception of the cities of Bloomington, Champaign-Urbana, Decatur, and Springfield. Principal agricultural products in the region include corn, soybeans, and wheat (IDOA, 2001). Table 2.2-4 presents the 2000 annual yields for these principal agricultural products in the 20 Illinois counties that are located within the region of the EGC ESP Site (IDOA, 2001).

Figure 2.2-6 indicates the major transportation network of the region including major highway and RR lines. The major highways within the region include Interstate 155 in the west, Interstate 72 in the southeast, Interstate 55 in the northwest, Interstate 74 in the northeast, Interstate 39 in the north, and Interstate 57 in the east (U.S. Census Bureau, 2000).

There are only two major waterways, in addition to Clinton Lake, within the region. Lake Decatur is southeast of the City of Decatur, and Shelbyville Lake is 45-mi south of the site (U.S. Census Bureau, 2000). There are 10 public airports and 100 private airports within the region (Bureau of Transportation Statistics, 2000). Figure 2.2-7 presents the utility networks including electric lines and pipelines, within the region.

There are 10 nature preserves and seven state parks scattered throughout the region. The nature preserves include Weston Cemetery Prairie in the north; Ridgetop Hill Prairie and Mehl's Bluff in the northwest; Thaddeus Stubblefield Grove and Barton-Sommer's Woodland in the west; Carpenter Park and Calamus Lake in the southwest; Bois du Sangamon in the south; and Loda Cemetery Prairie and Tomlison Cemetery Prairie in the east. The state parks include Edward R. Madigan in the west; Sangchris Lake and Lincoln Trail Homestead in the southwest; Moraine View in the central part of the region; and Shelbyville Lake, Spitler Woods, and Eagle Creek/Wolf Creek in the south (IDNR, 2002). Figure 2.2-8 presents the locations of the parks and nature preserves in the region.

DeWitt County and McLean County are not part of any regional group that developed a regional land use plan. Therefore, a regional land use plan does not exist, and hence is not available for review. Federal, state, and Native American land use plans that include this area do not exist and, therefore, are not available for review.

2.3 Water

This section includes the site-specific and regional descriptions of the hydrology, existing water use, and water quality conditions that could affect, or be affected by, the construction or operation of the EGC ESP Facility and the transmission corridor. This description of the site-specific and regional surface and groundwater information will be used to establish the baseline hydrologic conditions to assess potential construction or operational impacts and the adequacy of the related monitoring programs. The potential construction and operational impacts to water resources are discussed in Chapter 4 and Chapter 5, respectively, and monitoring programs are presented in Chapter 6.

2.3.1 Hydrology

This section describes surface water and groundwater aquifer resources that are present in the vicinity of the site that could affect plant water supply and effluent disposal or could be affected by construction or operation of the EGC ESP Facility and the transmission corridor. The regional and site-specific data on the physical and hydrological characteristics of surface water and groundwater have been summarized to provide a basis for evaluation of impacts on water bodies and aquifers in the area.

The data and information on the hydrologic system are organized into the following sections:

- Freshwater streams;
- Lakes and impoundments; and
- Groundwater.

2.3.1.1 Freshwater Streams

The site and the adjacent Clinton Lake are near the confluence of the Salt Creek and North Fork of Salt Creek, about 56-mi east of where Salt Creek joins the Sangamon River. Clinton Lake was formed by construction of an earthen dam 1,200-ft downstream from the confluence of North Fork of Salt Creek with Salt Creek (see Figure 2.3-1). Dam construction began in 1975 and lake filling began on October 12, 1977. The lake attained the design pool level on May 17, 1978. The Salt Creek and North Fork of Salt Creek fingers extend 14-mi and 8-mi, respectively, upstream from the dam (CPS, 1982).

The general hydrologic network in the Sangamon River Basin and their relation to the site are presented in Figure 2.3-2, and are discussed below.

2.3.1.1.1 Salt Creek Basin Characteristics

Salt Creek, in central Illinois, lies within the Sangamon River Basin, which drains into the Illinois River about 10-mi upstream from Beardstown, Illinois (about 75-mi west of the site). The Sangamon River has a length of 200 mi and a drainage area of 5,400 mi^2 (CPS, 1982).

Salt Creek, the principal tributary of the Sangamon River, has its headwaters 15-mi east of Bloomington in McClean County, and flows in a southwesterly direction into DeWitt County. Thereafter, it pursues a westerly course through Logan County and into Mason and Menard counties to join the Sangamon River, 8-mi east of Oakford. The length of Salt Creek is 92 mi, and the total drainage area is 1,860 mi^2. The maximum relief in the basin between the mouth and the high point on the drainage divide, near LeRoy, is 440 ft (CPS, 1982).

Salt Creek flows through rolling country for 40 mi with a fall of 300 ft. Channel slope varies from over 10 ft/mi in the upper reaches, to less than 3 ft/mi near the Town of Rowell. At Clinton Lake, the channel slope is about 5 ft/mi. Downstream from Rowell, Salt Creek flows sluggishly through prairies to its confluence with the Sangamon River. Channel slope in the lower reach of Salt Creek is less than 2 ft/mi. The drainage area of Salt Creek to the Clinton Lake Dam is 296 mi^2 (CPS, 1982).

The cross section of the Salt Creek valley is typically u-shaped with a channel width of 20 ft to 80 ft and a channel depth of 4 ft to 12 ft. The streambed is on relatively thick sand and gravel alluvium underlain by glacial till and deep bedrock formations. Beneath the dam, the bedrock is about 300-ft below the creek bed (CPS, 1982).

The main tributaries of Salt Creek include North Fork of Salt Creek, Lake Fork, Deer Creek, Kickapoo Creek, Tenmile Creek, and Sugar Creek (CPS, 1982). The length, drainage area, maximum relief between the mouth and the high point of the drainage divide, and average annual runoff for the Salt Creek tributaries are provided in Table 2.3-1.

There are no existing reservoirs or dams upstream or downstream from Clinton Lake that could affect the availability of water to Clinton Lake (CPS, 1982).

2.3.1.1.2 Flow Characteristics

A USGS gauging station on Salt Creek is located near Rowell, 12-mi downstream from the Clinton Lake Dam. The drainage area at the gauging station is 335 mi^2. The station records from October of 1942 to November of 2002 have been evaluated to describe flow characteristics of Salt Creek.

Table 2.3-2 presents the mean monthly runoff, rainfall, and natural lake evaporation data for the Salt Creek Basin at the Rowell gauging station, following the construction of the Clinton Lake Dam (1978 to 2000). The average discharge of Salt Creek for this 21-yr period is 295 cfs, or about 12 in. of runoff per year. March has the highest average monthly runoff, amounting to 1.99 in. over the drainage area, or 578 cfs. September has the lowest runoff, amounting to 0.21 in., or 63 cfs. A maximum discharge of 7,810 cfs was recorded on April 13, 1994. The lowest mean daily flow was 3.7 cfs, observed on September 8, 1988. The postdam runoff to rainfall ratio is about 30 percent (namely 30 percent of the rainfall drains out of the basin).

The discharge data for postdam conditions (namely after 1978) at Rowell gauging station are provided in Table 2.3-3.

2.3.1.1.3 Floods

The review of postdam conditions indicates that the lake is significantly attenuating flood flows in Salt Creek. There have been no discharges over 10,000 cfs recorded at the Rowell gauging station after construction of the Clinton Lake Dam (USGS, 2002).

Flood frequency for the Rowell gauging station was analyzed based on the 22 years of records from January of 1978 to September of 2000. Figure 2.3-3 presents the peak flood frequency curve for Salt Creek at the gauging station under postdam conditions. The peak flows for various recurrence intervals at the gauging station and at the dam are also presented in Table 2.3-4. The discharges at the dam were derived using the drainage area ratio.

At the gauging station, the mean annual flood for postdam conditions is 3,600 cfs (recurrence interval of 2.3 years). The maximum postdam discharge of 7,810 cfs (April of 1994) has a recurrence interval of about 25 years (USGS, 2002).

As a result of the dam, the 10-yr recurrence interval flood flow at the Rowell gauging station has been reduced from 11,400 cfs to 6,200 cfs. The 100-yr recurrence flood flow has been reduced from 29,900 cfs to 10,400 cfs (see Table 2.3-4).

2.3.1.1.4 Droughts

Since construction of the dam in 1977, there have been significant dry periods. The most significant dry period was in 1988. The monthly runoff values at the Rowell gauging station in 1988 are provided in Table 2.3-5. The minimum postdam flow of 3.7 cfs was recorded at the Rowell gauging station on September 8, 1988 (USGS, 2002).

The Log-Pearson Type III method was used to analyze low-flow frequency for the Rowell gauging station under postdam conditions. The magnitudes and frequencies of low flows with a one-day duration at the gauging station are depicted in Figure 2.3-4. The low-flow rates for the dam derived using a drainage area ratio for the different frequencies and durations are presented in Table 2.3-6.

2.3.1.1.5 Wetlands and Floodplains

According to the USFWS, wetlands, including forested, emergent, and scrub-shrub communities, exist within 6 mi of the location of the EGC ESP Facility (USFWS, 2002). These wetlands are generally associated with small tributaries to Salt Creek and North Fork of Salt Creek.

2.3.1.2 Lakes and Impoundments

There are many small lakes and ponds, both man-made and natural, scattered around the Salt Creek Basin, particularly along the creeks. The main lake/impoundment features are related to the CPS and include Clinton Lake and the ultimate heat sink (UHS). Clinton Lake provides the cooling water for the CPS. The UHS is a submerged impoundment located within Clinton Lake that provides cooling water for the safe shutdown equipment. Clinton Lake, the existing UHS, and other area lakes are described in the following sections.

2.3.1.2.1 Clinton Lake

Clinton Lake was formed by the construction of an earthen dam across Salt Creek, 1,200-ft downstream from the confluence of North Fork of Salt Creek with Salt Creek (see Figure 2.3-1). The dam construction was completed in 1977 and the lake was filled by early 1978. The CPS is approximately 3.5-mi northeast of the dam, located between the two fingers of the lake, at an approximate grade elevation of 736 ft. The drainage area to the dam is 296 mi^2. The lake elevation area capacity curves are presented in Figure 2.3-5. In addition, the lake normal pool elevation is 690 ft, with a surface area of 4,895 ac (7.65 mi^2, 2.6 percent of the drainage area), and a storage capacity of 74,200 ac-ft at normal pool (CPS, 1982).

Clinton Lake was designed to provide cooling water to the CPS and remove the design heat load from the circulating water before the water circulates back into the plant. The CPS intakes water through the circulating water screen house located on North Fork of Salt Creek finger. The circulating water is discharged into the Salt Creek finger through a 3.4-mi long (18,040 ft) discharge flume, as depicted in Figure 2.3-1 (CPS, 1982).

2.3.1.2.1.1 Dam and Appurtenances

The dam structure has a length of 3,040 ft, with a 3:1 (horizontal to vertical) slope on both the upstream and downstream faces. The elevation at top of the dam is 711.8 ft (about 21.8 ft above the normal pool elevation), with a width of 22 ft and 10 in. at the top. The maximum height of the dam is 65 ft above the creek bed. Riprap is provided on the upstream slope of the dam for protection against wind-wave erosion and lake drawdown effects. The downstream slope is seeded and the toe of the dam is riprapped for erosion protection (CPS, 1982).

The dam includes three flow components: 1) a concrete service spillway with an ogee-shaped crest on the west abutment of the dam to pass floods; 2) an auxiliary spillway on the east abutment of the dam to pass floods greater than the 100-yr flood; and 3) a lake outlet structure near the west abutment to provide a minimum downstream release of 5 cfs (CPS, 1982). The plan of the dam and appurtenances are depicted in Figure 2.3-6.

The concrete service spillway with an ogee-shaped crest has a semicircular plan, with a crest length of 175 ft and a crest elevation of 690 ft. The height of the concrete ogee is 10 ft. Water passing over the ogee section is discharged through an 80-ft wide concrete chute into a stilling basin, where the energy of flow is dissipated. Riprap is provided downstream from the stilling basin for erosion protection. A discharge channel was excavated to convey the water to the main channel of Salt Creek (CPS, 1982).

The auxiliary spillway is open cut, with a crest length of 1,200 ft and a crest elevation of 700 ft. The dam crest or control section is 25-ft wide asphalt concrete with riprap provided on the upstream and downstream sides. A 6-ft deep rock trench is provided as a downstream cut off. This varies in distance from the crest, from 150 ft on the far end to 300 ft near the dam. This rock trench protects the spillway crest against erosion on the discharge channel. The spillway approach channel is excavated to an elevation that varies from 690 ft to 695 ft, and the discharge channel is excavated to an elevation of 695 ft. Both of the channels are vegetated (CPS, 1982).

The lake outlet works is provided to release water from the cooling lake to Salt Creek at a minimum rate of 5 cfs. The outlet works consists of a drop inlet submerged intake structure, with the crest at an elevation of 668 ft. The 36-in. diameter vertical inlet section is connected to a 36-in. prestressed, precast concrete pipe leading into the control house near the axis of the dam. The wet well control house is provided with three cast iron sluice gates, which regulate the flow of water from the lake. Two gates are 12 in. by 12 in., located at two levels. The bottom of the upper gate is at an elevation of 685.5 ft, and the bottom of the lower gate is at an elevation of 683.5 ft. The third gate is 24 in. by 36 in., with the bottom of the gate at an elevation of 650.9 ft. Water passing through the gates will flow into a 48-in. prestressed, precast concrete pipe discharging into the service spillway stilling basin. From the stilling basin, the water will flow through the discharge channel and into the main channel of Salt Creek (CPS, 1982).

The hydrologic analyses and hydraulic design for the dam and the lake are based on a probable maximum flood (PMF) condition with a standard project flood (SPF) as an antecedent flood. This design basis is in accordance with the recommendations given by the Regulatory Guide 1.59 (USNRC, 1977). The PMF is an estimated flood that may be expected from the most severe combination of critical meteorological and hydrologic conditions as can reasonably occur in the region. The SPF is estimated to be equal to 50 percent of the PMF. The maximum water level in Clinton Lake at the dam was determined by routing the antecedent SPF, occurring three days prior to the PMF, and the PMF through the lake (CPS, 1982).

At the dam, the PMF water surface elevation in the Clinton Lake is 708.8 ft. The top of the dam is at an elevation of 711.8 ft. A minimum freeboard of 3 ft from the PMF water level was provided in order to determine the elevation at the top of the dam. The freeboard provides for protection against overtopping of the dam by the PMF and wave action. The maximum wave run-up elevation at the dam, due to sustained 40-miles per hour (mph) wind acting on the PMF water level, is 711 ft (CPS, 1982).

The dam is operated passively with flow spilling over the ogee-shaped crest during moderate flows, or the auxiliary weir during high flows. Under low flow conditions, the dam discharges through the lake outlet works (CPS, 1982). The operating procedures are listed in Table 2.3-7 for lake elevation ranges.

2.3.1.2.1.2 Floods

The impoundment of Salt Creek and North Fork of Salt Creek to form Clinton Lake has permanently altered flood levels. These flood levels were altered in 1978 with completion of the Clinton Lake impounding structure. The flood water surface elevations of the lake were determined by routing the floods through the lake. The 100-yr flood level in the lake at the dam is at an elevation of 697 ft. The routed peak outflow through the service spillway is 11,610 cfs. Based on the flood frequency analysis, before the dam was built (namely before November of 1977) the 100-yr flood flow at the dam was estimated to be 26,400 cfs. The PMF level with an antecedent SPF is at an elevation of 708.8 ft at the dam and 708.9 at the plant sites (CPS, 1982).

The flooding effects on the headwater area of the cooling lake were determined by backwater computations (CPS, 1982). Figure 2.3-7 and Figure 2.3-8 depict the water surface profiles of the 100-yr flood and the PMF under natural conditions for Salt Creek and North Fork of Salt Creek, respectively.

For Salt Creek, the backwater effect of a 100-yr flood in the lake terminates at the Iron Bridge, approximately 76,000-ft or 14.5-mi upstream from the dam and 1.5-mi southwest of Farmer City. The backwater effect of the PMF in the lake terminates at the U.S. Highway 150 Bridge, approximately 86,400-ft or 16.4-mi upstream from the dam and in Farmer City. For North Fork of Salt Creek, the backwater effect of a 100-yr flood in the lake terminates at 39,000-ft or 7.5-mi upstream from the dam. The backwater effect of the PMF in the lake terminates at approximately 47,500-ft or 9.0-mi upstream from the dam (CPS, 1982).

The 100-yr flood level was a criterion used in the property acquisition for the lake area. There is no increase in flooding outside of the lake area property acquisition. The CPS is at a grade elevation of 736 ft and the EGC ESP Facility will be at elevation 735 ft. Neither location will be affected by floods in the lake. Figure 2.3-9 depicts the postdam construction normal lake level, 100-yr and PMF flood areas, and the CPS and EGC ESP sites.

Except for the dam that was built across Salt Creek to create Clinton Lake, no CPS structures have been built in the preconstruction 100-yr floodplain for the CPS. Several structures were built along the edges of the postconstruction flood prone area of the CPS. These include the intake and discharge structures, modified highway bridges, a marina, and seven boat ramps. Construction of these structures is complete, and their presence will not cause any alteration in flood levels (CPS, 1982). Construction of the EGC ESP Facility and its associated intake structure will not cause any alteration in flood levels because no facilities will be constructed in the postconstruction flood prone area.

To date, flood flows downstream of the Clinton Lake Dam have been lower than preconstruction flood flows.

2.3.1.2.1.3 Droughts

The effect of drought on lake levels has been evaluated to determine if operation of the CPS can be sustained during dry periods (CPS, 2002). A minimum safe lake level is established at elevation of 677 ft. Lake levels below this would require plant shutdown to avoid loss of the safe plant cooling capacity. Two 5-yr duration droughts were established based on historical climatic conditions. The 50-yr and 100-yr droughts were selected for the evaluation.

The drawdown analysis accounted for lake inflows generated from direct rainfall and stormwater runoff, normal evaporation, forced evaporation due to plant cooling and increased lake water temperature, ground seepage losses of 0.5 percent per month of the lake volume, minimum 5 cfs discharge at the dam to sustain the receiving stream, and dam overflow discharges. The drought analysis was completed based on the existing uprated CPS of one 1,138.5-megawatts electric (MWe) boiling-water reactor (BWR) operating at 100 percent of its rated capacity.

The results of the lake level evaluation during drought established minimum lake levels for the 50-yr and 100-yr droughts of elevation 685 ft and elevation 681.4 ft, respectively. Both minimum lake levels are well above the minimum safe lake level of elevation 677 ft. A discussion of lake levels and cooling system impacts based on both the CPS and proposed EGC ESP Facility operation is presented in Chapter 5.

2.3.1.2.1.4 Sedimentation

Sediment distribution and deposition studies were conducted for Clinton Lake to determine their effect on the lake capacity, depth, and shore area. On Salt Creek near Rowell, an average turbidity of 16 parts per million (ppm) and a discharge of 0.35 cfs/mi^2 were observed from 1950 to 1956. Water sampling at the Rowell gauging station was discontinued in 1956. Based on the average turbidity of Salt Creek, the rate of sedimentation in Clinton Lake is less than 0.1 ac-ft/mi^2 per year of drainage area. Based on the results of sedimentation surveys and studies conducted by the ISWS on 85 reservoirs in Illinois, the normal rate of lake sedimentation is 0.25 ac-ft/mi^2 per year, with a possible maximum rate of 0.40 ac-ft/mi^2 per year (CPS, 1982).

In addition, the sedimentation rates of six area man-made lakes, in existence for several years, were studied. Three of the lakes, Lake Bloomington, Lake Decatur, and Lake

Springfield are located within 50 mi of Clinton Lake. Lake Bloomington had a drainage area of 61 mi^2 and an average annual sedimentation rate of 0.5 ac-ft/mi^2 during the observed period of 26 years from 1929 to 1955. Lake Decatur had a drainage area of 906 mi^2 and an average annual sedimentation rate of 0.18 ac-ft/mi^2 during the observed period of 44 years from 1922 to 1966. Lake Springfield had a drainage area of 265 mi^2 and an average annual sedimentation rate of 0.53 ac-ft/mi^2 during the observed period of 31 years from 1934 to 1965 (CPS, 1982).

In 1972, Illinois Power Company established five surface water sampling locations at the site of Clinton Lake. The water quality data at the sampling locations are discussed in Section 2.3.3. The average turbidity observed was estimated to contribute an average rate of sedimentation of less than 0.5 ac-ft/mi^2 per year (CPS, 1982).

On the basis of the studies and turbidity observations, a sedimentation rate of 0.5 ac-ft/mi^2 per year was used in the lake sedimentation analysis (CPS, 1982). The results of the sediment studies are summarized in Table 2.3-8.

With the lake impoundment completed in 1978, the sediment deposition to date (2003, a 25-yr period) is estimated to be 3,710 ac-ft or 5.0 percent of the initial lake volume at normal pool. Extending the sedimentation relationship out to 30 years and 60 years from dam construction results in 4,450 ac-ft and 8,880 ac-ft of sediment accumulation or 6.0 percent and 12.0 percent, respectively, of the initial lake volume at normal pool. A summary of the capacities and depths in the lake before and after deposition of sediments for a period of 60 years is presented in Table 2.3-9. Recently, the IDNR has identified shore erosion as a significant source of sediment to the lake. The cause is attributed to wind and wave action from recreational boating that have prevented aquatic vegetation from becoming established along the lake shore. The expansion of programs and work to minimize shoreline erosion, establish aquatic vegetation beds, and reduce agricultural runoff and siltation were identified as priorities in the lake management plan that is an addendum to the December 16, 2002 lease agreement with IDNR (IDNR, 2002).

Sediment distribution in Clinton Lake was analyzed for a period of 50 years using the *Empirical Area - Reduction Method*. Figure 2.3-10 presents the reduction in lake surface area and capacity. Previously deposited sediments in the upper reaches of the lake are expected to move toward the lower reaches during severe floods due to the steep gradients of the streambed. The average bed gradient of Salt Creek is 1 in 2,100 (2.5 ft/mi). However, the upper reaches of Salt Creek, between Iron Bridge and the bridge on U.S. Highway 150, have a very steep gradient of 1 in 670 (7.9 ft/mi). The average bed gradient of North Fork of Salt Creek is 1 in 1,140 (4.6 ft/mi) (CPS, 1982).

The effect of flood levels after 50 years of sedimentation in the lake was also analyzed. Backwater computations indicate that there has been no appreciable rise of lake level in the upper reaches of the reservoir due to sediment deposition (CPS, 1982).

2.3.1.2.1.5 Lake Temperature

Table 2.3-10 provides a representative sample of the natural surface temperatures expected from the cooling lake in the absence of a power plant. These values were computed using the LAKET computer program developed by Sargent & Lundy.

Many different meteorological factors, such as wet and dry bulb air temperatures, wind direction and velocity, cloud cover, and solar radiation can affect natural surface lake temperatures. The years 1954, 1964, and 1966 were selected on the basis of computer trials because these years had combinations of meteorological factors that would produce the highest natural surface lake temperatures (CPS, 1982).

Table 2.3-11 includes the measured average monthly temperatures in June, July, and August at a point approximately 100-ft downstream of the Clinton Lake Dam for a period from 1994 to 2000. These values are representative of a mix of lake temperatures from the various points of discharge from the dam. The measured data (62°F minimum in June to 86°F maximum in August) are similar to the computed range without the power plant (67°F minimum in June and 83°F maximum in July). The maximum measured water temperatures near the dam are at the high end of the range of temperatures measured 12-mi downstream at the Rowell gauging station (see Figure 2.3-11).

2.3.1.2.2 The Ultimate Heat Sink

The CPS maintains a secure storage impoundment of cooling water that is available in the unlikely event of failure of the main dam and loss of the cooling lake. This submerged impoundment is referred to as the UHS. The UHS is provided within Clinton Lake to supply cooling water for the safe shutdown equipment. The UHS was formed by constructing a secondary submerged dam across North Fork of Salt Creek with an approach channel leading into the circulating water screen house. The UHS was designed to accommodate safe plant shutdown cooling for two 992-MWe BWR units in accordance with the Regulatory Guide 1.27 (USNRC, 1976). The design water surface elevation of the UHS is 675 ft, which is lower than the Clinton Lake 100-yr drought elevation of 681.4 ft. The surface area of the UHS at an elevation of 675 ft is 158 ac with a volume of 1,067 ac-ft (CPS, 1982). The area capacity curve of the UHS is presented in Figure 2.3-12. The volume of the UHS is evaluated annually. The most recent 2001 volume estimate set the volume at 1,022 ac-ft. The minimum UHS volume estimated during CPS design to accommodate the cooling to bring the two units to a cold shutdown is 849 ac-ft.

2.3.1.2.3 Other Area Lakes

There are many small lakes and ponds, both man-made and natural, scattered around the Salt Creek Basin, particularly along the creeks. The largest lake is the Weldon Springs Lake located in Weldon Springs State Recreation Area, about 2.5-mi southwest of the Clinton Lake Dam. It has an area of 28 ac and is used for recreational purposes. Most of the other lakes and ponds are for farm and recreational uses and are too small to affect the hydrologic regime of the Salt Creek Basin (CPS, 1982).

2.3.1.3 Groundwater

2.3.1.3.1 General Hydrogeologic Conditions

Unconsolidated deposits of Quaternary-age glacial drift and stream alluvium overlie thick sequences of Paleozoic sedimentary rock throughout most of Illinois. Bedrock aquifers within 50 mi of the EGC ESP Site are presented in Figure 2.3-13. The description and characteristics of the geologic and hydrogeologic systems in the vicinity of the site are summarized in Table 2.3-12.

The aquifer systems within 50 mi of the site are found in the following geologic environments, in descending order (CPS, 2002):

- Alluvial deposits along streams;
- Glacial drift including layers and lenses of sand and gravel within and between the various tills;
- Glacial outwash (Kansan Stage) in buried bedrock valleys;
- Bedrock of Pennsylvanian-age, consisting of shale, siltstone, limestone, sandstone, underclay, and coal;
- Bedrock of Silurian-age, Devonian-age, and Mississippian-age, predominantly dolomites and limestones; and
- Bedrock of Cambrian-Ordovician-age, consisting of a sequence of limestone, dolomites, and sandstones.

According to the USEPA, none of the aquifers occurring within a 50-mi radius of the site have been designated as “sole source” aquifers (USEPA, 2002).

Groundwater supplies are obtained chiefly from the glacial outwash in the buried bedrock valleys and shallower unconsolidated deposits. In addition, they are obtained, to a minor extent, from the upper 100 ft of the Pennsylvanian rock sequence beneath the glacial drift. In DeWitt County, the lower bedrock aquifers are not typically used for water supply because adequate supplies for municipal, agricultural, and domestic requirements are more easily obtained from the shallower bedrock or the overlying unconsolidated materials. Poor water quality in the deeper aquifers is also typical in this region (CPS, 2002).

The various aquifer systems are described in the following sections.

2.3.1.3.1.1 Alluvial Aquifers

Alluvial deposits, consisting of varying amounts of clay, silt, sand, and gravel, occur in the valleys of many streams in the regional area. The alluvium may be used for groundwater supply in those areas, where thick, permeable sand and gravel deposits are present. Such deposits commonly occur along larger streams having established floodplains, such as Salt Creek and North Fork of Salt Creek. Alluvial aquifers are not used extensively in the regional area because the floodplain areas have undergone only minor development.

The public water supply for Heyworth, in McLean County, is obtained from alluvial deposits along Kickapoo Creek. Pumping tests indicate the aquifer at this location is capable of supplying over 200 gpm per well (CPS, 2002).

2.3.1.3.1.2 Glacial Drift Aquifers

With the exception of the surficial alluvium in present stream valleys, the regional area is underlain by a thick sequence of silts of eolian and lacustrine origin, tills, and outwash. This sequence of Wisconsinan-aged, Illinoian-aged, and Kansan-aged deposits are collectively referred to as glacial drift. The total thickness of these deposits varies from less than 50 ft to approximately 400 ft, and averages 200 ft. The silts are often clayey and may contain fine sand. The tills are composed of heterogeneous mixtures of clay, silts, sand, and gravel, but consist predominantly of clayey silts or silty clays. Lenses, and thin discontinuous layers of silt, sand, or gravel are common between and within the tills. Outwash deposits consist of sand and gravel with varying amounts of silt or clay (CPS, 2002).

Availability of groundwater from the unconsolidated material is governed by the occurrence of permeable sand and gravel deposits within the glacial drift and recharge sources. Sand and gravel deposits may occur above or below the individual tills, as lenses within the tills, or as relatively continuous deposits in bedrock valleys.

The Wisconsinan formations are generally composed of fine grained sediments with only shallow and very localized deposits of sand and gravel. Thus, they are poor sources of groundwater. The water table in the upper (Wisconsinan) glacial deposits generally occurs within a few feet of the ground surface. Groundwater levels are deepest over topographically high areas and shallowest in topographically low or flat areas. Groundwater levels have been measured regionally by the ISWS in a statewide network of observation wells. The water table in wells, finished in Wisconsinan deposits, varies from 2-ft to 19-ft below the ground surface. Seasonal fluctuations in individual observation wells range from 1.5 ft to 12 ft and averages approximately 5 ft. Water levels are highest during spring when conditions are most favorable for recharge from precipitation. The water table falls from the spring peak during late spring, summer, and early fall when discharge by evapotranspiration and groundwater runoff exceeds recharge from precipitation. Regional groundwater movement on the Wisconsinan till plain is generally west and southwest toward the Illinois River, under a hydraulic gradient of approximately 2 ft/mi to 3 ft/mi. The water table is locally deflected and steepened toward stream courses that cross the till plain, and are tributaries to the Illinois River (CPS, 2002).

Widespread lenses of sand and gravel intercalated in the Illinoian drift are capable of supplying small to moderate amounts of groundwater. Sand and gravel deposits in the Kansan-aged drift occur primarily as outwash deposits in buried bedrock valleys. The axes of the bedrock valleys in central Illinois are depicted in Figure 2.3-14. Specifically important to this area are the Mahomet and Mackinaw bedrock valleys, which are filled with sand and gravel (USGS, 1995). Deposits filling the valley include the widespread Mahomet Sand Member, and are as much as 200-ft thick (Kempton et. al, 1991). With hydraulic conductivities as high as 570 ft/day, a horizontal hydraulic gradient of 0.0002 ft/ft, and an assumed porosity of 0.25, average linear groundwater velocities in this material are estimated at 0.45 ft/day. Aquifers associated with the Mahomet Bedrock Valley and the ancient Mississippi Bedrock Valley are the only highly productive, nonalluvial sand and gravel aquifers in southern Illinois. Forty municipalities and water districts obtained groundwater from these aquifers as of 1991. The largest groundwater withdrawals from the valley aquifer occur in the Champaign-Urbana area, averaging 17 million gallons per day (mgd) (Kempton et. al., 1991).

Groundwater in the Illinoian and Kansan deposits occurs under artesian conditions, whereas, in the Wisconsinan deposits, water table conditions generally prevail (see Figure 2.3-15). Wells in the outwash near the margins of the bedrock valleys may produce as much as 500 gpm. Wells located in the center of the valleys might yield substantially higher quantities of groundwater on a sustained basis given proper well construction and management. Most wells in this area do not produce from this deep outwash because adequate supplies for domestic, agricultural, and most municipal purposes may be developed from the shallow alluvium along stream courses or from small permeable lenses in the upper glacial drift materials (CPS, 2002).

Groundwater in the glacial drift is derived from precipitation, underflow through bedrock and bedrock valleys, and induced infiltration from streambeds. Recharge to the sand and gravel deposits occurs primarily by vertical leakage of infiltrating precipitation, the rate of which is controlled by the vertical permeability of the relatively impermeable tills; the thickness of the tills (confining beds); and the head differential between the source of recharge and the receiving aquifer. Vertical permeability for till with some sand and gravel averages 0.02 gallons per day per square feet (gpd/ft^2). The recharge rates for sand and gravel aquifers overlain by thick glacial drift consisting largely of till is estimated to be 115,000 gpd/mi^2. The recharge rate for the Kansan glacial deposits is estimated to be 107,000 gpd/mi^2 (CPS, 1982).

Groundwater in the glacial drift aquifers is discharged to streams that intersect the aquifers (base flow), to the underlying glacial drift, to the Pennsylvanian bedrock, and to pumping wells. Groundwater base flow for the upper portion of the Salt Creek drainage basin, calculated from hydrologic data collected at the Rowell gauging station, averages 0.36 cfs/mi^2 for years that have near normal precipitation. Groundwater base flow averages 0.13 cfs/mi^2 for years that have below normal precipitation and 0.58 cfs/mi^2 for years that have above normal precipitation. In alluvial deposits, bank storage accounts for much of the variability in observed values of groundwater runoff between years of below normal and above normal precipitation (CPS, 2002).

2.3.1.3.1.3 Bedrock Aquifers

Bedrock aquifers within the 50-mi radius of the site are presented in Figure 2.3-13. Most of the glacial drift in the study area is underlain by Pennsylvanian bedrock that consists largely of shale and siltstone interbedded with limestone, sandstone, underclay, and coal. Small amounts of groundwater may be obtained from wells penetrating beds of sandstone, creviced limestone, and fractured shale and coal. Recharge to the Pennsylvanian bedrock occurs by vertical leakage from the overlying glacial drift. Groundwater in the bedrock is under artesian conditions, and is discharged to lower bedrock formations or to the glacial drift in those areas where the potentiometric surface of the Pennsylvanian aquifers is higher than that of the drift aquifers. Most wells in the Pennsylvanian bedrock extend less than 100-ft below the bedrock surface because the formations become tighter and mineralization of the groundwater increases with depth. Bedrock is used as a source of domestic water supply in the regional area only where conditions are unfavorable for the development of drift aquifers. The USGS reports that yield of wells in the Pennsylvanian aquifers range from less than 1 to about 100 gpm, with an average well yield of about 10 gpm (USGS, 1995). Fresh groundwater withdrawals from these aquifers during 1985 accounted for less than 4 percent of the total withdrawals in Illinois.

Bedrock aquifers of the Mississippian-age or Silurian-Devonian-age occur beneath the unconsolidated deposits in the northeast portion of the study area (see Figure 2.3-13). Mississippian rocks that are aquifers are generally comprised of thick-bedded limestone and sandstone. However, these aquifers are typically used for water supply when they are less than 200-ft below land surface and when more water can be obtained from them than from the overlying surficial aquifer system. Water is typically under confined conditions where the water yielding zones lie beneath clay or shale beds. Recharge to the Mississippian aquifers occurs primarily by water that percolates downward through the unconsolidated materials and the Pennsylvanian bedrock. Reported well yields range from 1 gpm to 100 gpm, with an average of about 10 gpm. Fresh groundwater withdrawals from the Mississippian aquifers during 1985 were less than 3 percent of the total groundwater withdrawn in Illinois (USGS, 1995).

Dolomites and limestone of Silurian-Devonian-age also constitute some of the aquifers in the northeast portion of the study area (see Figure 2.3-13). The aquifer portion of the rock lies beneath the upper Devonian shale, Mississippian rocks, or Quaternary deposits. This aquifer generally contains freshwater to about 500-ft below the ground surface. The base of freshwater coincides approximately with the base of the aquifer. Underlying Ordovician shale impedes the downward movement of freshwater. Groundwater is generally under confined conditions and moves through fractures, bedding planes, and solution cavities. Probable well yields in the study area, where this aquifer is used, range from less than 250 gpm to 500 gpm. In 1985, withdrawals from the Silurian-Devonian aquifer accounted for about 15 percent of the total groundwater withdrawn in Illinois (USGS, 1995).

2.3.1.3.2 Site Hydrogeologic Conditions

The hydrogeologic systems in the site area consist of alluvial deposits along Salt Creek and North Fork of Salt Creek, glacial drift, glacial outwash in the buried Mahomet Bedrock Valley, and Pennsylvanian-age bedrock. General occurrence and characteristics of yield, recharge, and discharge of these systems are discussed in the previous section. The data presented in this section are mainly based upon site investigations conducted for the CPS and are summarized in the CPS USAR (CPS, 2002). In July and August of 2002, a limited geological investigation was conducted within the proposed area of the plant to confirm the underlying subsurface conditions are consistent with those presented in the CPS USAR.

Alluvial deposits (Henry Formation) encountered in the vicinity of the UHS for the CPS consist of fine grained floodplain deposits overlying coarse grained outwash. Illinoian till (Glasford Formation) underlies the alluvial deposits. The floodplain deposits are commonly silt with some fine sand and clay, whereas the outwash deposits are sand and gravel with varying amounts of silt or clay. The total thickness of the alluvial deposits varies from 6 ft to 48 ft in the UHS borings, with an average of 18.5 ft. Floodplain deposits range to a maximum thickness of 23 ft, and average about 9 ft. Outwash deposits range to a maximum of 41-ft thick and average about 9-ft thick. The thickest outwash deposits are located over an apparent terrace on the north side of the valley. Outwash deposits were observed to be continuous in the foundation excavation for the UHS dam. The base of the outwash that was observed in the borings ranges in elevation from 650.5 ft to 678.3 ft, with the most frequently reported base elevations in the interval between 657 ft and 667 ft. Permeability tests were not performed in the UHS borings. Based upon the results of particle size analyses for samples from the borings, the permeability of the outwash deposits is approximately 2.8 ft/day to 28 ft/day. There were no known domestic or farm supply wells in the alluvial deposits in the CPS UHS area (CPS, 2002).

The CPS excavation exposed the sequence of glacial drift consisting of the Wisconsinan-age Richland Loess, Wedron Formation, Robein Silt, and the Illinoian-age Glasford Formation. Based on the CPS borings, the elevation of the top of the Illinoian deposits averaged 698 ft. Fifteen deep borings in the CPS and UHS areas encountered lacustrine deposits and Kansan-age till beneath the Illinoian drift at an average elevation of 572 ft. The total thickness of the glacial drift in the CPS area varies from 230 ft to 250 ft and averages about 237 ft (CPS, 2002). The lithologies of these stratigraphic units are summarized in Table 2.3-12.

Several discontinuous sand lenses, ranging in thickness from several inches to 22 ft, were encountered by the CPS Site borings between an elevation of 650 ft and 730 ft. The CPS excavation that extended to an elevation of about 680 ft penetrated some of these lenses. The majority of the sand deposits encountered are discontinuous pockets or lenses. The one exception is a nearly continuous layer of fine sand near the top of the Wedron Formation. Sand is reported at the same position in most of the borings around the site except those within the triangular area formed by the UHS baffle dike abutment, the screen house, and the southwest corner of the excavation. In general, the base of the sand layer slopes from an elevation of 723 ft at the western limit of the excavation to an elevation of 716 ft on the slope above the cooling lake. In borings between the excavation and the cooling lake, the thickness of the sand layer varies from 2.0 ft to 16.5 ft. The remainder of the sand deposits encountered occurred as discontinuous seams and localized pockets within the tills of the Wedron and Glasford Formations (CPS, 2002).

Four additional soil borings were advanced in July and August of 2002, within the footprint for EGC ESP Facility. These borings confirm that the general stratigraphic sequence depicted in Figure 2.3-15 continues south of the CPS. Two of these borings extend into the Pennsylvanian bedrock. In these borings, unconsolidated deposits encountered include the Richland Loess, the Wedron Formation (Wisconsinan glacial till and outwash), the Robien Silt (Interglacial Zone), the Glasford Formation (Illinoian glacial till and outwash), lacustrine deposits, the Banner Formation (pre-Illinoian glacial till and outwash), and pre-Illinoian alluvial deposits. The continuous fine sand deposit noted in previous site borings near the top of the Wedron Formation apparently continues south of the CPS, tapering out to the southeast. The top of the Glasford Formation drops toward the south, to an average elevation of 678 ft in the four additional borings. Lacustrine deposits were encountered below the Glasford Formation at elevations (566 ft and 574 ft), consistent with previous site borings. Pre-Illinoian alluvial deposits, consisting of interbedded silts, clays, sands, and gravels, were encountered above the top of the bedrock.

The additional borings indicate that the bedrock surface dips to the south of the CPS and from west to east. The top of bedrock was encountered at elevations of 446 ft and 448 ft in these borings, approximately 35-ft lower than at previous site borings to the north and west. This bedrock valley is filled with pre-Illinoian alluvial deposits. The upper 20 ft to 30 ft of bedrock was cored, and consists of interbedded shale, limestone, and siltstone.

2.3.1.3.2.1 Potentiometric Levels, Flow, and Interactions

Configuration of the water table in the immediate vicinity of the site was established by measuring water levels in piezometers installed in selected borings during the CPS Site investigations conducted in 1972 and 1973. Additional piezometers were installed in 1976 around the lake during construction (Observation Well [OW]-1 through OW-8) and downstream from the dam in 1977 and 1979 (OW-9 through OW-24). Some of the piezometers that were destroyed by construction activities are no longer functional (CPS, 2002). A summary of the installation dates, tested intervals, and status of the piezometers is presented in Table 2.3-13.

Based on the data presented in the CPS USAR, the groundwater table in the upper glacial deposits (Wisconsinan) generally occurs a few feet below the ground surface (CPS, 2002). The highest groundwater level in the CPS Site has been measured at an elevation of 729.7 ft. The water table in the vicinity of the CPS occurs as a ridge like mound in the Wisconsinan till between Salt Creek and North Fork of Salt Creek (see Figure 2.3-16). The position of the groundwater ridge marks a recharge area from which groundwater flows to the southeast toward Salt Creek and to the northwest, across the site, toward North Fork of Salt Creek. The magnitude of the hydraulic gradient at the site is approximately 0.09 ft/ft, or 450 ft/mi. This value is based upon a maximum head loss of 55 ft over a minimum distance of 640 ft from the site to the edge of the floodplain of North Fork of Salt Creek (CPS, 1982).

Prior to impoundment of the cooling lake, North Fork of Salt Creek served as the local base level for groundwater flow from the facility to the floodplain. Impoundment of the cooling lake has raised the base level to an elevation of 690 ft, causing the groundwater and surface water interface to shift to the southeast toward the facility (CPS, 1982).

Groundwater exists under water table conditions in the Wisconsinan till and under confinement in the underlying Illinoian and Kansan tills. Piezometer levels measured for the CPS Site investigation ranged from 675 ft to 717 ft, with an average of 713 ft in the Illinoian till. In addition, the piezometer levels measured approximately at an elevation of 680 ft in the Kansan till over a three-year period of observation in the late 1970s. The potentiometric level in the Kansan outwash deposits of the buried Mahomet Bedrock Valley, as measured in the CPS test well, was at an elevation of approximately 600 ft. The head relationships between the Wisconsinan, Illinoian, and Kansan aquifers indicate that the glacial drift aquifers are recharged by vertical seepage from the overlying drift under a net downward hydraulic gradient (CPS, 2002).

Three additional piezometers were installed southwest of the CPS in July of 2002. Two of these piezometers were completed in the upper Wisconsinan glacial deposits (Wedron Formation), and the third was completed in the upper Illinoian glacial deposits (Glasford Formation). In these additional piezometers, water table elevations in the Wedron Formation were between 725 ft and 730 ft, and the piezometric head elevation in the Glasford Formation was approximately 710 ft. These measurements are generally consistent with groundwater elevations observed in previous site investigations.

A correlation between daily precipitation volumes and groundwater elevations in site piezometers is not evident from a qualitative review of the figures in the CPS USAR. "Typical" seasonal variations (higher groundwater levels in the spring, lower groundwater levels in the fall and summer) are also not apparent. These conditions are consistent with the fine grained nature of much of the glacial drift that inhibits groundwater flow, and therefore, recharge velocity.

Some groundwater in the upper glacial drift deposits are discharged into streams from springs present within the general vicinity of the CPS and Clinton Lake. A survey was conducted by use of aerial photo interpretations, field reconnaissance, and personal interviews with local farmers in order to locate springs in the vicinity of the site. The springs found during this survey are presented in Figure 2.3-17. None of these springs are being used as a potable water supply (CPS, 2002).

2.3.1.3.2.2 *Hydraulic Characteristics*

Falling-head and constant-head type permeability tests were performed in the laboratory on representative soil samples of the Salt Creek Alluvium (Henry Formation), the interglacial zone (weathered material at the top of Illinoian deposits and the bottom of the Wisconsinan till deposits), and the Illinoian glacial till (Glasford Formation). The tests resulted in measurements of the vertical permeability of each soil formation. The results of these tests are presented in Table 2.3-14. Only one sample of the Salt Creek Alluvium was tested, the results of which indicate a vertical permeability of 5.1E-05 ft/day for the fine grained floodplain deposits. The underlying outwash was not tested. Vertical permeability of sand samples from the interglacial zone (weathered portion of the Glasford Formation) averages 6 ft/day, ranging from 0.5 ft/day to 13 ft/day. In the Illinoian deposits (unaltered Glasford Formation), the vertical permeability ranges from 1.1E-05 ft/day to 6.5E-04 ft/day, and averages 1.1E-04 ft/day. Also presented in Table 2.3-14 is an estimate of the porosity for each sample. The porosity was calculated using laboratory data that included degree of saturation, wet density, moisture content, and an assumed specific gravity (CPS, 2002).

During the CPS Site investigations, falling-head type field permeability tests were also performed on samples collected from the Clinton Lake Dam site and the CPS Site. The tests were performed in piezometers to estimate average horizontal permeability within the zone of percolation in the borehole, and the results are provided in Table 2.3-15. Average horizontal permeability values range from 3.4E-03 ft/day to 0.01 ft/day in the Wisconsinan till and 0.02 ft/day to 0.04 ft/day in the Illinoian till (CPS, 2002).

Using a hydraulic conductivity of 0.01 ft/day from field hydraulic conductivity testing of the Wisconsinan till, a water table gradient of 0.086, and an assumed porosity of 0.25 (based on one value provided for the Wisconsinan till in the CPS USAR report; CPS, 2002), the estimated average linear groundwater velocity for the upper portion of the Wisconsinan till is 2.5E-03 ft/day. Additional laboratory data for Wisconsinan glacial till and Mahomet Bedrock Valley Outwash are provided in Table 2.3-16 and Table 2.3-17, respectively.

2.3.2 Water Use

2.3.2.1 Freshwater Streams

There are no communities, either upstream or downstream of the Clinton Lake Dam, that draw water from Salt Creek for public water supply. Within 25 mi of the site, Bloomington (approximately 35,000 population) draws water from the Mackinaw River Watershed upstream of the confluence with Salt Creek. Decatur (approximately 95,000 population) draws water from the Sangamon River Watershed. There is a population of 308,000 in the counties that lie within a 50-mi radius of the site that use surface water from a public water supply other than Salt Creek (see Table 2.3-18). Public water supplies draw about 75 mgd from surface waters. There are no private surface water withdrawals for domestic water supply or for agricultural purposes. There are 10 million gallons of private surface water withdrawn for commercial purposes, and 30 million gallons withdrawn for industrial purposes (USGS, 1995a).

2.3.2.2 Lakes and Impoundments

The primary purpose of the 4,895-ac Clinton Lake is to provide the water required for the operation of the CPS. The water use and effluent characteristics of the EGC ESP Facility are discussed in Chapter 3. In addition, Clinton Lake also supplies a wide variety of quality recreation opportunities. Clinton Lake is classified as both a general use (namely protected water) and a public food processing water supply source. The lake is considered protected general use water because of the primary human contact (swimming and water-skiing) which occurs on the lake during the summer months. The public and food processing water supply classification is applicable because potable water for the CPS is drawn from the lake (CPS, 2001).

Clinton Lake, which is managed by the IDNR, was opened to the public on August 22, 1979 for recreational use. The lake had a yearly attendance rate of 972,616 in 2000 and 877,245 in 2001. Peak attendance typically occurs between June and August, with an average daily attendance of 5,137 people per day and a peak attendance of 10,000. The recreational facility is used year-round and offers snowmobiling, ice-fishing, ice-skating, boating, fishing, water-skiing, picnicking, camping, swimming, hiking, and hunting (IDNR, 2002a).

Weldon Springs State Recreation Area, located about 5.5-mi southwest of the site, had 415,449 visitors in the year 2000, and 377,743 visitors in the year 2001. Peak attendance typically occurs between May and August. The daily average attendance is 1,636 people per day with a peak attendance of 10,000 people. The 443-ac park offers facilities for fishing, picnicking, boating, hiking, sledding, tobogganing, ice-fishing, and cross-country skiing (IDNR, 2002a).

2.3.2.3 Groundwater Use

2.3.2.3.1 On-Site Use

Groundwater with high naturally-occurring methane was collected from a test well during the site planning for the CPS. Therefore, the CPS water requirements have been met by surface water sources (namely Clinton Lake) rather than from groundwater. The original test well was located approximately 1-mi south of the site (CPS, 1982). Based on the presence of the naturally-occurring methane in the groundwater and the availability of water from Clinton Lake, groundwater will not be used for operations of the EGC ESP Facility. As such, groundwater use and/or quality regulations do not apply (CPS, 1982). In addition, there are no sole source aquifers in the State of Illinois (USEPA, 2002).

2.3.2.3.2 Present and Future Groundwater Use

Public water supplies in the regional area are derived mainly from groundwater sources. Water supply and water wells within a 50-mi radius of the site and within a 15-mi radius of the site that are in the ISGS GIS database are presented in Figure 2.3-18 and Figure 2.3-19, respectively. In addition, information on the water supply and water wells within a 15-mi radius of the site is provided in Appendix A.

The CPS USAR reported that within 15 mi of the site, approximately 65 percent of the total public groundwater supplies are pumped from the Mahomet Bedrock Valley aquifer. Except for the alluvial wells at Heyworth, the remaining public water supplies are pumped from wells in the Wisconsinan, Illinoian, and Kansan glacial deposits. Bedrock wells are not used in any of the public water supply systems within 15 mi of the site (CPS, 2002).

The CPS USAR identifies a small test well located about 1-mi south of the CPS Site, 120-ft southeast of the CPS test well, that will be used as a water supply well for the Village of DeWitt (see Figure 2.3-17). The well is about 340-ft deep, and produces water from the sand

and gravel deposits of the buried Mahomet Bedrock Valley at a depth of 300 to 340 ft (CPS, 2002).

The database, maintained by the ISGS, identifies approximately 179 water wells and 18 water test holes within 5 mi of the site. The available data indicate that the depths of the water wells and water test holes range from 36-ft to 413-ft below ground surface. Four wells with depths greater than 400 ft, 12 water wells, and two additional water test holes are owned by Illinois Power Company and occur within a 5-mi radius of the site (ISGS, 2002).

Most of the domestic wells are less than 150-ft deep and produce from sand lenses in the upper glacial tills rather than from the deeper Mahomet Bedrock Valley aquifer. Production exceeded 10 gpm in only a few cases. With the exception of wells used by tenant farmers or for monitoring, wells on the site property were abandoned and sealed in accordance with applicable state requirements during facility construction (CPS, 2002).

The area within 15 mi of the site includes most of DeWitt County and portions of Macon, McLean, and Piatt counties (see Figure 2.3-19). Available groundwater supplies for DeWitt County exceed 39 mgd (CPS, 2002). In 1995, public groundwater withdrawals totaled 1.48 mgd in DeWitt County, see Table 2.3-18 (USGS, 1995a). The USGS reported in 1995 that the rural groundwater use in the county was approximately 0.4 mgd. This indicates that the present water demands are less than 2 mgd, or approximately 5 percent of the total available supplies. Thus, groundwater is capable of meeting any foreseeable increase in water demand in DeWitt County. Similar conclusions may be drawn for the rest of the regional area since the hydrogeologic and population characteristics of the other counties are similar to those for DeWitt County.

Reversals in the regional hydraulic gradient and regional declines in the potentiometric surface have resulted from intensive pumping in the heavily urbanized Champaign-Urbana district, 32 mi to the east, where groundwater is pumped from the Mahomet Bedrock Valley aquifer. Although no positive evidence of these effects was identified in the CPS USAR for DeWitt County, declines may eventually occur in the eastern portion of the county if pumping continues to increase in the Champaign-Urbana district (CPS, 2002). These declines will probably not be significant at the site and no changes in the local pattern of groundwater movement are expected to occur.

In DeWitt County, reversals in the hydraulic gradient may also be expected to occur in response to pumping from the City of Clinton municipal well field. Lower potentiometric levels within the cone of influence induce higher recharge rates to the Mahomet Bedrock Valley aquifer. In turn, this may cause potentiometric levels in the overlying aquifers to decline slightly within the cone of influence. However, the cone of influence associated with the City of Clinton municipal well field is much smaller than the cone developed around Champaign-Urbana because pumping at the City of Clinton totals less than one-tenth of that at Champaign-Urbana. The cone of influence at the City of Clinton is likely limited to an area within a few miles of the well field and will have little, if any effect on groundwater levels at the site. In addition, the main facility borings indicated the buried Mahomet Bedrock Valley is not present beneath the site (CPS, 2002).

2.3.3 Water Quality

This section describes the water quality conditions in the surface water and groundwater that may potentially affect, or be affected by the construction or operation of the EGC ESP Facility. The potential construction or operational impacts on water quality are discussed in Chapters 4 and 5, respectively.

2.3.3.1 Freshwater Streams

The water quality of Salt Creek was monitored by the ISWS at the Rowell gauging station, 12-mi downstream of the Clinton Lake Dam, from 1950 to 1956. Water quality sampling for Salt Creek at Rowell was resumed with measurements beginning in 1964 through 1997. Water quality information is also available, beginning in 1972 (prior to construction of the dam), at five other sampling locations established by Illinois Power Company on Salt Creek and North Fork of Salt Creek in the vicinity of the then proposed Clinton Lake. The sampling procedure and the water quality analyses are discussed in the CPS ER, Chapter 2, Section 6.1.1 (CPS, 1982). Detailed summer maximum, minimum, and average temperatures were also measured between 1994 and 2000 at a point on Salt Creek 100-ft downstream of the Clinton Lake Dam (CPS, 1994, 1995, 1996, 1997, 1998, 2000, and 2001a).

Stream water quality data was evaluated for two time periods:

- Postdam and preoperational period (1978 through 1986 after filling of the lake and before the operation of the CPS); and
- Postdam and operational period (1987 to present).

The postdam and preoperational period consists of a nine-year period of time following the construction of the dam and before the operation of the CPS.

Temperature, suspended solids, and phosphorus were evaluated for the three time periods. Figure 2.3-11 shows the temperature plot measured at the Rowell gauging station. Generally there is little change from one period to the next. The dominant summer high temperature during the three periods is generally in the 85 degrees Fahrenheit (°F) range. The dominant low winter temperature is 32°F. Even the transition between preoperation and postoperation of the power plant shows similar temperature values.

Water temperature was also monitored at a point 100-ft downstream of the dam (National Pollutant Discharge Elimination System [NPDES] Permit Order 92-142) during CPS operation. These data were compared to water temperature measured at Rowell gauging station during the same time period. A comparison of stream temperatures measured 100-ft downstream of the dam and at Rowell gauging station for June, July, and August of 1994, 1995, and 1996 are presented in Figure 2.3-20, Figure 2.3-21, and Figure 2.3-22.

Values for suspended solids measured as turbidity at the Rowell gauging station are presented on Figure 2.3-23. Postdam high turbidity values generally range from 30 to 120 Nephelometric Turbidity Units. The transition between before operation of CPS and postoperation at CPS indicates unremarkable changes in turbidity.

Values for phosphorus at the Rowell gauging station are presented on Figure 2.3-24. Recorded postdam values indicate relatively low phosphorus levels generally less than

0.6 milligrams per liter (mg/L). Elevated phosphorus values in the 1.0 mg/L range were recorded periodically for the two-year period following the start of CPS operation but levels returned to preplant operation values for the last ten years of monitoring (USGS, 2002).

The Illinois Water Quality Report 2002 (305b report) does not list any impairments for Salt Creek and gives it an Aquatic Life Use assessment of good for the upstream reaches and fair for the most downstream reach. The 2002 303d list identifies the most downstream reach of Salt Creek as water quality limited. This reach is located about 50-mi downstream, measured directly, or 75 river miles downstream of the Clinton Lake Dam. No impairments are shown on the original listing, but Errata No. 21 includes a swimming use impairment and identifies the cause of the impairment as pathogens (code 1700) (IEPA, 2002). This impairment is likely to be a result of downstream population centers in the vicinity of the impairment rather than Clinton Lake or activity around the lake.

2.3.3.2 Lakes and Impoundments

Water quality data have been gathered from Clinton Lake for the nine years between the completion of the dam prior to power plant operations (1978 through 1986), and five years since the CPS began operation (1987 through 1991). Illinois Power Company monitored 28 water quality parameters during the program. The sample locations were selected to monitor upstream of and near the cooling water discharge, along the path between the discharge and the cooling water intake, and near the CPS intake screen house (CPS, 1992). The CPS sampling locations are presented on Figure 2.3-25. Selected water quality data collected during this monitoring program from 1987 to 1991 for Monitoring Site 4 (near plant intake) and Site 2 (near plant discharge) are presented in Table 2.3-19.

As part of the ambient lake program, IEPA collects temperature and chemical data at three sites in Clinton Lake. The "Core Lakes," including Clinton Lake, are sampled every 3 years. During the monitoring event the lake is sampled five times: once during the spring runoff (April or May), three times during the summer (June, July, and August), and once during the fall (September or October). The analytical data can be accessed from the STORET water quality database maintained by the USEPA (IEPA, 2002a). The sample locations are also presented in Figure 2.3-25. A summary of water quality data from 1991 through 2000 from the STORET database for selected parameters is also presented in Table 2.3-19.

Lake temperature appears to be the most significant water quality change that has resulted from the current facility operation. Lake temperatures from the plant intake to the discharge appear to be about 5°F warmer on average. More recent average water temperatures for the combined IEPA monitoring sites are slightly lower than the discharge monitoring data. This is a good trend, but no solid conclusions can be drawn because of the limited number of recent data values and the data do not cover the same summer time period.

Dissolved oxygen levels are reduced by approximately 1 mg/L between the intake and the discharge locations, which is consistent with the noted temperature increase. More recent average dissolved oxygen levels from combined sites appear to be slightly higher than the previous discharge values. Again, this is a good trend, but variations in the number of samples and the seasonal distribution of the samples make solid conclusions difficult to draw.

Turbidity is increased slightly at the discharge monitoring site over values measured at the intake. The more recent composite turbidity values showed reduced average turbidity. Other constituents reviewed did not appear to show significant change. They include hardness, TDS, magnesium, chloride, orthophosphate, and sulfate.

The designated uses for Clinton Lake, based on the Illinois Water Quality Report 2002 and the 2002 303d List, includes Full Aquatic Life (F20), Full Fish Consumption (F21), Partial Support General Use (P1), Partial Support Swimming (P42), and Partial Support Secondary Contact (P44). No assessment was made for Drinking Water Supply (X50). The IEPA has identified two causes of impaired use and has established a medium priority for further study. The causes of impaired use include a Confidence Level 3 (high) Excess Algal Growth (H2210), and a Confidence Level 2 (moderate) Metals (M500). The sources of impairment listed include Industrial Point Sources (100), Agriculture (1000) Crop Related Sources (1050) Non-irrigated Crop Production (1100), Hydrologic/Habitat Modification (7000) Flow Regulation Modification (7400), and Marinas and Recreational Boating (7900) (IEPA, 2002). The impaired status and medium priority indicates that further study is required to confirm and resolve the impairments.

Excessive algal growth is generally associated with elevated nutrient levels and clear water that allows deep sunlight penetration. Major sources of nutrients to Clinton Lake are expected to be agriculture, crop-related sources, and non-irrigated crop production. Other sources may also contribute to the availability of nutrients in the water column such as recreational boating that may increase sediment resuspension and shoreline erosion. Power plant operation is not considered a significant source of nutrients to Clinton Lake.

Chlorophyll-a is the accepted water quality parameter for establishing excessive algal growth. Review of recent Chlorophyll-a monitoring data collected by IEPA from 1981 to 2000 indicate average concentrations of 33 µg/L. A minimum value of 2 µg/L was measured on August 19, 1981, and a maximum value of 103 µg/L was measured on June 12, 1997. The second highest value measured over this period was 69 µg/L measured on June 12, 2000. The samples were collected during the months of April through October (USEPA, 2002a).

IEPA uses specific ranges for slight, moderate, and high magnitude of impairment levels. The following ranges have been adopted for Chlorophyll-a (IEPA, 2002):

- Slight >20 to <92 µg/L;
- Moderate >92 to <426 µg/L; and
- High >426 µg/L.

Recent recorded Chlorophyll-a values generally fall in the no impairment to slight impairment range.

The moderate impairment due to metals may be attributed to a number of sources including geological or natural sources in soil, agriculture, and industrial sources. Control measures are limited for natural sources except to promote erosion control practices on adjacent land uses in order to prevent mobilization and delivery of naturally occurring metals in sediment to the lake and tributary rivers and streams. Agricultural land is the dominant land use in the lake watershed. Therefore, erosion and sediment control from agricultural land is potentially the single most effective control measure for metals that are naturally occurring or used in agricultural applications. Industrial sources, such as the CPS, are also a potential source of metals. Control practices include stormwater management and sediment and erosion control, and corrosion control measures for the cooling system and selection of pipe materials and other exposed metals that have a reduced potential for leaching metals. The CPS operates in compliance with a NPDES stormwater discharge permit.

2.3.3.3 Groundwater

The following description of the groundwater quality conditions for the various aquifers beneath the site are based on data collected for the CPS and from regional sources. Investigations for the CPS Facility included collection of groundwater samples from the alluvial and the glacial drift aquifers. In 1974, a groundwater sample was also collected from the test well in the Mahomet Bedrock aquifer (CPS, 2002). Water quality of the deeper bedrock aquifers that were not encountered by the investigations for the CPS Facility are summarized from studies conducted by the ISWS, IDNR, or the USGS. A summary of water quality conditions for the different aquifer units is presented in the following sections.

2.3.3.3.1 Alluvial Aquifer

The alluvial deposits consisting of thick, permeable sand, and gravel deposits, commonly occur along larger streams having established floodplains, such as Salt Creek and North Fork of Salt Creek. Water quality data for the alluvial aquifers in the regional area are limited since these aquifers are not used extensively because the floodplain areas have undergone only minor development. One municipality that uses the alluvial deposits along Kickapoo Creek as a source of public water is Heyworth in McLean County (CPS, 2002).

The following concentrations were reported in the CPS USAR for selected chemical constituents in groundwater from the alluvial aquifer at Heyworth for a sample collected in 1972: hardness (as $CaC0_3$), 284 ppm; alkalinity (as $CaC0_3$), 240 ppm; chloride, 16 ppm; total iron, 0.4 ppm; and total dissolved minerals, 329 ppm (CPS, 2002).

2.3.3.3.2 Glacial Drift Aquifers

Chemical analyses of site groundwater samples from selected borings in the glacial deposits during the site investigation for the CPS are provided in Table 2.3-20.

Regional groundwater quality in the Illinoian and Kansan aquifers is summarized in Table 2.3-21. As indicated in the table, the quality of groundwater does not differ substantially between aquifers. Water from wells pumping from the Wisconsinan aquifers generally has a lower mineral content than water from wells in the deeper formations. However, the quality of groundwater obtained from Wisconsinan aquifers is more variable, which is due in part to local contamination of shallow wells from nearby pollution sources, such as septic tanks and feedlots. The high chloride content reported for some wells in the Illinoian and Kansan aquifers suggests that some highly mineralized water is being discharged from the Pennsylvanian bedrock to the overlying glacial deposits in some areas. In addition to the CPS test well, methane gas is present in seven public water supply systems within 15 mi of the site. Methane is also reported from numerous private wells in the regional area (CPS, 2002).

General groundwater chemistry of the Glasford sand and gravel aquifers, within the Illinoian deposits of southwest McLean and southeast Tazewell counties, have been summarized by the ISWS (IDNR et al., 1995) and are provided in Table 2.3-22.

2.3.3.3.3 Kansan Outwash in Buried Mahomet Bedrock Valley Aquifer

The Mahomet Bedrock Valley aquifer is one of the most highly productive, nonalluvial sand and gravel aquifers in southern Illinois (Kempton et. al., 1991). In 1974, a test well drilled to total depth of 358 ft was installed about 1 mi from the site in order to establish the groundwater quality of the buried Mahomet Bedrock Valley aquifer. Analytical data for that test well are summarized in Table 2.3-23. The analytical results for the groundwater from the test well were relatively consistent with regional levels measured in the Illinoian and Kansan aquifers (see Table 2.3-21). Burnable gas was detected in the groundwater during pumping of the test well. Results of two gas analyses indicated that methane comprised more than 80 percent of the total gas sample. This volume of gas is similar to that reported for other gas producing water wells in DeWitt County (CPS, 1982).

Regional water quality data from DeWitt County, collected as part of the Mahomet Aquifer Study being conducted by the ISWS, and for the Sankoty-Mahomet Sand aquifer of southwest McLean and southeast Tazewell counties (IDNR et al., 1995) are presented in Table 2.3-24 and Table 2.3-25, respectively. The groundwater quality of the Mahomet Aquifer in DeWitt County falls in the middle of the range observed regionally for this aquifer (see Table 2.3-21 and Table 2.3-25). The total dissolved solid, hardness, and calcium concentrations in the water samples from the Mahomet Bedrock Valley aquifer in DeWitt County are not indicative of the highly mineralized water that have been observed at depth in some areas (see Table 2.3-25).

2.3.3.3.4 Pennsylvanian Bedrock Aquifer

Pronounced increases in the concentrations of dissolved solids due to increased sodium and chloride occur with depth in these deposits. However, the water can be somewhat softened by ion exchange between the water and minerals in the shales and clays. Water yielding sandstone and limestone are thin and interlayered with low permeability deposits of shale and coal. Water from the freshwater parts of the Pennsylvanian aquifers is moderately hard and of a sodium bicarbonate type with a median dissolved solids concentration greater than 500 mg/L (USGS, 1995).

2.3.3.3.5 Mississippian Bedrock Aquifer

The USGS summarized chemical analyses of water from this aquifer with the exception of Greene County, Indiana, on the eastern side of the Illinois Basin. The water is moderately hard and is a sodium calcium bicarbonate type. The TDS concentrations typically increase as the depth of the well increases. Mississippian-aged rocks in this part of Illinois typically contain water with dissolved solids concentrations of greater than 1,000 mg/L (USGS, 1995).

2.3.3.3.6 Silurian-Devonian Bedrock Aquifer

The USGS indicates that concentrations of dissolved solids and iron exceed secondary maximum contaminant levels established by the USEPA in more than 50 percent of the studied samples. The water is also hard, and sulfate concentrations exceed 250 mg/L in many samples (USGS, 1995).

2.4 Ecology

This section describes the ecological resources existing at the site and within the vicinity surrounding the EGC ESP Site. This description of ecological resources focuses on the terrestrial and aquatic environments that could affect or be affected by the construction or operation of the EGC ESP Facility, in addition to transmission corridors and off-site facilities.

The information presented in this section has been summarized from the following sources:

- CPS ER (CPS, 1973), various sections;
- CPS ER (operating license stage [OLS]) (CPS, 1982), various sections;
- USFWS and IDNR GIS databases;
- USGS reports and databases;
- Aerial photographs; and
- Additional investigations and monitoring reports prepared for the CPS.

2.4.1 Terrestrial Ecology

The following sections of this document describe the terrestrial environment and biota of the site, vicinity, and off-site areas likely to be affected by construction, maintenance, or operation of the facility and transmission corridor. This portion of the document has been divided into three sections describing the existing land use, wildlife resources, and important species and habitats found within the site and vicinity. Resources were initially identified from the CPS ER (CPS, 1973) and the CPS ER (OLS) (CPS, 1982), and were then updated based on review of state databases and current available aerial and site photographs.

2.4.1.1 Existing Land Use

According to historic studies, evaluations that have been performed in conjunction with activities associated with the CPS, and other available resources, a variety of vegetation communities in various stages of ecological succession can be found within the vicinity and along the proposed transmission corridor. The following section describes the major land use types and ecological habitats present within the EGC ESP Facility vicinity and along the proposed transmission corridor.

2.4.1.1.1 Active Agricultural Land

Agriculture is the predominant land use for areas within 6 mi of the site (USGS, 1992). Active agricultural practices within the vicinity include hay, row crops, and small grains.

2.4.1.1.2 Upland Pasture

Many of the plant species observed to be growing within pasturelands in the vicinity include exotic (non-native) species.

Open lands within the vicinity that are not used for active agricultural purposes are commonly used as pastureland for the grazing of livestock. According to baseline and subsequent monitoring year studies performed for the CPS and other available sources, plants commonly found in upland pasture and open field habitats in the vicinity include common ragweed, Kentucky bluegrass, red sorrel, Japanese brome, timothy, and common yarrow. During baseline and subsequent monitoring year surveys, shrub species observed in upland pasture and open field communities include multiflora rose, blackberry, and hawthorn (CPS, 1973 and CPS, 1982). Observations made during various field efforts in 2002 confirmed the continued predominance of open field habitats at and adjacent to the site.

2.4.1.1.3 Upland Forest

According to baseline and subsequent monitoring year studies in support of the CPS ER and CPS ER (OLS), typical species found in the understory and herbaceous layers of upland forest communities included multiflora rose, may-apple, trillium, goldenrod species, aster species, and Jack-in-the-pulpit (CPS, 1973 and CPS, 1982). These species continue to be commonly observed herbaceous species throughout the region.

During baseline and subsequent monitoring events, upland forest communities located within the vicinity were observed to be predominantly vegetated with several species of oak and elm, black cherry, shagbark hickory, black walnut, hackberry, honeylocust, and red mulberry (CPS, 1973 and CPS, 1982). These species continue to be commonly observed upland forest communities throughout the region.

2.4.1.1.4 Wetland and Floodplain Forest

Wetland and floodplain forest areas are present along Salt Creek and North Fork of Salt Creek. Additionally, some floodplain forest areas can be found along Clinton Lake, north of the EGC ESP Facility (USFWS, 2002), and in areas along the proposed transmission corridor.

Tree species commonly found within wetland and floodplain forests in the vicinity include hackberry, elms, black walnut, silver maple, and box elder. Vegetation commonly found in the understory of these forest areas include wood nettle, avens, and beggarticks (CPS, 1973). Observations made during field studies supporting the CPS ER (OLS) presented data confirming the predominance of these species in forested wetlands in the vicinity (CPS, 1982).

An increasing problem in Illinois is the spread of invasive perennial weeds, including purple loosestrife and cut-leafed teasel. Purple loosestrife is increasingly more common in wet areas, while cut-leafed teasel has been documented as occurring near the existing facility.

According to the INHS, purple loosestrife has gradually come to dominate many of the remaining high quality wetlands in the northern half of Illinois (INHS, 2002). The IDNR is researching several methods to control purple loosestrife in Illinois (INHS, 2002).

Additionally, the IDOT has solicited the INHS to conduct research on the management and natural history of cut-leafed teasel to develop a management strategy. The INHS studies seed dispersal, the influence of mowing on patch size, and the transition time between life stages of selected teasel plants growing below the spillway at Clinton Lake (INHS, 2002).

2.4.1.2 Wildlife Resources

The following discussion presents the wildlife resources existing within the vicinity and along the proposed transmission corridors. The data are based on the results of the wildlife studies performed in support of the original CPS (both baseline surveys and subsequent monitoring surveys), as well as recent information gathered from the IDNR and other available sources.

Wildlife resources found within the vicinity and along the proposed transmission corridors are consistent with those species commonly found in the central Illinois region. Extensive wildlife surveys, including trapping and general observational events, were performed to characterize species composition in the vicinity of the CPS. The results of those surveys are presented below.

Eighteen species of mammals were identified in the vicinity during baseline surveys performed in support of the CPS ER, and include deer mouse, white-footed mouse, meadow vole, various species of shrews (including shorttail and least shrews, white-tailed deer, eastern cottontail, beaver, muskrat, striped skunk, mink, and thirteen-lined ground squirrel) (CPS, 1973). Additional surveys performed as part of the monitoring plan supporting the CPS confirmed that wildlife species present in the vicinity generally are consistent with species present during baseline studies (CPS, 1982).

Based on baseline trapping results, it was concluded that deer mice are the most widespread and abundant species, accounting for over half of the mammals captured during sampling events (CPS, 1973). Deer mice were found in the different habitats that were sampled, but were most common in shrub dominated communities and floodplain communities. In general, diversity and abundance of each species varied among the habitat types sampled. Relative abundance was highest in habitats dominated by herbaceous vegetation. Diversity was highest in forested communities (CPS, 1973). Results of sampling efforts performed in support of the CPS ER (OLS) confirmed that mice, including deer mice, were still the most widespread and abundant species of the mammals captured during sampling efforts (CPS, 1982).

Habitats located in the vicinity and along the proposed transmission corridors are suitable for a variety of migrating songbirds, shorebirds, waterfowl, and raptors. Ninety-six species of birds were identified during the spring and fall survey conducted within the vicinity. Birds that were observed include red-winged blackbird, common grackle, northern cardinal, redheaded woodpecker, various species of sparrows, juncos, black-capped chickadee, blue jay, mourning dove, yellow-shafted flicker, downy woodpecker, common crow, and starling (CPS, 1973). Of the bird species observed, 36 were characterized as summer residents, 29 were characterized as migratory, 28 were characterized as permanent residents, and 3 were characterized as winter residents (CPS, 1973). In addition, there have been documented observations of a variety of rare bird species in the vicinity, including gyrfalcon and prairie falcon near Clinton Lake (De Vore, 2000).

Clinton Lake, and other waterbodies located within the vicinity provides a suitable habitat for a variety of waterfowl species. Waterfowl observed, or documented to occur within the vicinity, include the blue-winged teal, mallard, American widgeon, wood duck, lesser scaup, and Canada goose. In addition, migratory shorebirds were also observed during baseline and subsequent monitoring year surveys. Common species identified include a variety of sandpipers and heron (CPS, 1973 and CPS, 1982). According to Birding Illinois, key bird species observed at Clinton Lake include migratory loons and grebes, regularly occurring migratory waterfowl, migratory shorebirds, and migratory and wintering gulls (De Vore, 2000).

According to baseline and subsequent monitoring year surveys, and confirmed by various other sources including the IDNR, game birds commonly observed within the vicinity include ring-necked pheasant and common bobwhite.

Reptiles and amphibians that commonly occur within the vicinity include various species of frogs, salamanders, snakes, and turtles, most of which are commonly found throughout the region.

The most common species of concern as disease vectors or pests in the region include ticks and mosquitoes. Recent studies show that the tiger mosquito has become a major problem in every county in Illinois (INHS, 2002). In addition, rats and other small rodents can transmit diseases and are general nuisances to residential and agricultural areas in the vicinity.

2.4.1.3 Important Species

According to the USNRC, "important" species are defined as state- or federally-listed (or proposed for listing) threatened or endangered species; commercially or recreationally valuable species; species that are essential to the maintenance and survival of species that are rare and commercially or recreationally valuable; species that are critical to the structure and function of the local terrestrial ecosystem; and/or species that may serve as biological indicators to monitor the effects of the facilities on the terrestrial environment (USNRC, 1999).

Important species and habitats are shown in Table 2.4-1.

2.4.1.3.1 Federally-listed Threatened and Endangered Species

Based on preliminary database reviews, no federally-listed threatened or endangered species have been documented within the immediate vicinity (IDNR, 2002a) (see Figure 2.4-1). Federal wildlife agencies will be formally contacted at a date closer to the facility construction to confirm the absence of federal listed threatened and endangered species, since confirmation letters are valid for only one year after issuance.

2.4.1.3.2 State-listed Threatened and Endangered Species

Based on preliminary database reviews, no state-listed threatened or endangered species have been documented within the immediate vicinity (IDNR, 2002a). However, there have been documented sightings of rare bird species in the vicinity. According to local Audubon Societies and other sources for birding in Illinois, snowy egret, Henslow's sparrow, northern harrier, peregrine falcon, black-crowned night heron, short-eared owl, yellow-headed blackbird, sandhill crane, pied-billed grebe, bald eagle, brown creeper, and red-shouldered hawk are state-listed threatened or endangered bird species that have been observed in the vicinity (De Vore, 2000 and Illinois Audubon Society, 2003).

Additionally, the CPS ER and CPS ER (OLS) identified the river otter as a species that was present during field surveys (CPS, 1973 and CPS, 1982). The river otter is listed as a threatened species in the State of Illinois (IDNR, 2002h).

State wildlife agencies will be formally contacted at a date closer to the facility construction to confirm the absence of state-listed threatened and endangered species, since confirmation letters are valid for only two years after issuance.

2.4.1.3.3 Species of Commercial or Recreational Value

Species that are commercially or recreationally valuable and can be found within the vicinity are:

- White-tailed Deer - Hunting for white-tailed deer in DeWitt County has been ongoing since its implementation in 1970. In the first few years of existence, the number of permits that were issued each year to deer hunters within the county was limited to 200, with actual numbers of deer harvested ranging from 27 to 30, in 1971 and 1970 respectively (CPS, 1973). Total numbers of deer harvested in DeWitt County in the year 2000 were 309, and increased to 326 in the year 2001 (IDNR, 2002b).
- Waterfowl - Waterfowl species commonly hunted in DeWitt County and at the Clinton Lake State Recreation Area include mallard, scaup, wood duck, redhead, black duck, pintail, teal, coot, and Canada goose (IDNR, 2002c).

  Hunting season for most waterfowl is in the fall, generally from mid-October through mid-December, with certain exceptions. In central Illinois there are two goose hunting seasons: the last week in October and from mid-November through January.
- Other Species with Recreational Value - In addition to deer and wild turkey, mammals including eastern cottontail, raccoon, opossum, fox, skunk, coyote, and squirrel are hunted recreationally in DeWitt County (IDNR, 2002b).

2.4.1.3.4 Biological Indicators

The USEPA describes biological indicators as groups or types of biological resources that can be used to assess environmental conditions (USEPA, 2003). Within these groups, certain species can be chosen to characterize current status or to track or predict significant change. Many species could be considered as biological indicators including federally-listed and state-listed threatened and endangered species, and other rare species occurring within the terrestrial environments near the EGC ESP Facility.

Avian species that could be considered as biological indicators for the ecosystems within the vicinity include bald eagle and osprey. These are two species that are commonly observed in and near Clinton Lake, and because of their location at the top of the food chain, they become an irreplaceable indicator for measuring the health of an ecosystem.

River otter is another terrestrial species historically observed in the vicinity that could be used as a biological indicator for the surrounding ecosystems. River otters are typically recognized as an indicator species for both water quality and riparian vegetation. Their success indicates clean water, viable fish populations, and lush riparian areas.

2.4.1.4 Important Habitats

According to the USNRC, "important" habitats include any wildlife sanctuaries, refuges, or preserves; habitats identified by state or federal agencies as unique, rare, or of priority for protection; wetlands and floodplains; and land areas identified as critical habitat for species listed as threatened or endangered by the USFWS (USNRC, 1999).

2.4.1.4.1 Clinton Lake State Recreation Area

The CPS is located on Clinton Lake, which is part of the Clinton Lake State Recreation Area. This entire recreational area is approximately 9,300 ac, and provides opportunities for an array of recreational activities including fishing, picnicking, hiking, camping, swimming, boating, hunting, and wildlife viewing activities.

According to the IDNR, major habitat types of the Clinton Lake State Recreation Area include forest (38 percent of the area), grassland (32 percent), shrubs (21 percent), cropland (6 percent), and wetlands (3 percent) (IDNR, 2003). The parklands are owned by AmerGen, who also operates the CPS. The state has operated the park through a long-term lease with AmerGen since 1978 (IDNR, 2002d).

According to Birding Illinois, there are several habitats within the Clinton Lake State Recreation Area that are significant for birding including wet meadows, pine forest, and a marsh associated with a nearby beaver dam (De Vore, 2000). These areas provide habitats significant to a variety of birds including rare and threatened and endangered species.

2.4.1.4.2 Weldon Springs State Recreation Area

Weldon Springs State Recreation Area is a 370-ac park located southeast of the City of Clinton. This recreation area offers a variety of recreational opportunities including fishing, boating, picnicking, camping, hiking, and wildlife viewing activities (IDNR, 2002e).

Woodlands in the Weldon Springs State Recreation Area are vegetated predominantly with a variety of oak, hickory, maple, ash, in addition to walnut, sweetgum, sycamore and locust (City of Clinton, 2003).

Wetlands observed in the Weldon Springs State Recreation Area include lake, pond, and stream habitats, in addition to marsh, forested wetland and riparian areas (City of Clinton, 2003).

Weldon Springs State Recreation Area is located approximately 6 mi from the EGC ESP Facility.

2.4.1.4.3 Environmentally Sensitive Areas (Illinois Natural Area Inventory Sites)

Illinois designates certain environmentally sensitive areas as Illinois Natural Areas. These areas are protected to varying degrees, under the jurisdiction of the Illinois Nature Preserves Commission. There are two environmentally sensitive areas located near the site, specifically along Salt Creek and Tenmile Creek (see Figure 2.4-2). They are approximately 3 mi and 5 mi, respectively, from the location of the EGC ESP Facility (IDNR, 2002).

Salt Creek, located southeast of the location of the EGC ESP Facility, is classified as a highly valued aquatic resource.

Tenmile Creek, located approximately 5-mi west of the location of the EGC ESP Facility, is classified by the IEPA as a unique aquatic resource (see Table 2.4-2). This portion of the watercourse is also listed as an important resource, "medium gradient creek," by the IDNR.

2.4.1.4.4 Wetlands and Floodplains

According to National Wetland Inventory databases, there are four minor areas (less than 1 ac) within the site boundary, that have been identified as wetlands (USFWS, 2002). These areas generally are comprised of open water resources consistent with constructed sediment basins.

In addition, wetland resources including forested, emergent, and scrub-shrub communities, exist within 6 mi of the location of the EGC ESP Facility and along the proposed transmission corridors (USFWS, 2002). These wetlands generally are associated with small tributaries to Salt Creek and North Fork of Salt Creek.

2.4.2 Aquatic Ecology

The following sections describe the aquatic environment and biota of the site, vicinity, and off-site areas likely to be affected by construction, maintenance, or operation of the facility and transmission corridors. This section has been divided into three parts describing the existing water quality and use, fisheries resources, and important species and habitats found within the site and vicinity.

2.4.2.1 Water Quality and Use

This section presents a general description of the water quality and use of watercourses within the vicinity of the EGC ESP Site. Section 2.3.2 and Section 2.3.3 present detailed descriptions of water use and quality. This includes the identification of consumptive water uses that could affect the water supply of the facility: the identification of recreational, navigational, and other nonconsumptive uses; and additional information regarding the quality of watercourses and supplies in the vicinity.

According to the IEPA's *Biological Assessment of Illinois Stream Quality (through 1993)*, water quality within the vicinity of the EGC ESP Site is generally good, with most of the existing watercourses designated as moderate, highly valued, or unique aquatic resources (IEPA, 2002). Below are descriptions of the quality of area waterbodies. Figure 2.4-3 presents the biological stream characterizations for watercourses within the vicinity.

- Tenmile Creek, located approximately 5-mi west of the location of the EGC ESP Facility, is classified by the IEPA as a unique aquatic resource (see Table 2.4-2). This portion of the watercourse is also listed as an important resource, "medium gradient creek," by the IDNR.
- Coon Creek, located approximately 3 mi from the location of the EGC ESP Facility, is classified by the IEPA as a highly valued aquatic resource (see Table 2.4-2).
- North Fork of Salt Creek, located north of the location of the EGC ESP Facility, is classified as a moderate aquatic resource (see Table 2.4-2).
- Salt Creek, located southeast of the location of the EGC ESP Facility, is classified as a highly valued aquatic resource.
- Friends Creek and Wolf Run, tributaries to the Sangamon River, are both classified as highly valued aquatic resources.
- Watercourses within the vicinity of the EGC ESP Site are used for a variety of purposes (depending on the size and nature of the waterbody). Many streams in the vicinity are

utilized for fishing, boating, canoeing, and kayaking. Other recreational activities include hiking and wildlife viewing.

- Clinton Lake, a 4,895-ac lake constructed as a source for cooling water for the CPS, is located immediately adjacent to the EGC ESP Facility. Clinton Lake is a significant resource for a variety of recreational activities including fishing, boating, swimming, and wildlife viewing. The water quality of Clinton Lake is presently classified as an impaired waterbody by the IEPA. Important ecological habitats located in the vicinity of Clinton Lake include wetlands and riparian forest lands.
- The Weldon Springs Lake, a 28-ac spring fed lake is located in Weldon Springs State Recreation Area and is primarily used for recreational activities including boating, fishing, camping, hiking, and wildlife viewing. Other important ecological habitats observed at Weldon Springs State Recreation Area include wetlands and natural springs.

2.4.2.2 Fisheries Resources

As previously mentioned, the EGC ESP Site is located on Clinton Lake, a 4,895-ac waterbody created as a cooling source for the CPS. Since its creation, Clinton Lake has become a tremendous resource for a variety of stocked and naturally occurring populations of fish species.

The Clinton Lake fish community is dominated by gizzard shad, common carp, bluegill, white crappie, largemouth bass, quillback, and bigmouth buffalo. Channel catfish are also a major part of the Clinton Lake fishery. In addition, the IDNR has implemented a fishery stocking program that has introduced striped bass (including hybrid populations) and walleye (IDNR, 2002f and 2002g). These species are discussed further in Section 2.4.2.3.

Fisheries in watercourses of the vicinity are consistent with fisheries commonly found in the central Illinois region. During extensive baseline and subsequent monitoring year surveys performed in Salt Creek and the North Fork of Salt Creek, species collected include several species of shiner (common, bigmouth, red, sand, and redfin), bluntnose minnow, creek chub, white sucker, black bullhead, channel catfish, bluegill, largemouth bass, and crappie (CPS, 1973 and CPS, 1982). Information obtained from various IDNR sources and recent studies in support of the CPS confirm that species present within waterbodies in the vicinity generally remain consistent to species observed during the baseline and subsequent monitoring year surveys.

2.4.2.3 Important Species

According to the USNRC, “important” species are defined as state- or federally-listed (or proposed for listing) threatened or endangered species; commercially or recreationally valuable species; species that are essential to the maintenance and survival of species that are rare and commercially or recreationally valuable; species that are critical to the structure and function of the local terrestrial ecosystem; and/or species that may serve as biological indicators to monitor the effects of the facilities on the terrestrial environment (USNRC, 1999). Important species and habitats are presented in Table 2.4-3.

2.4.2.3.1 Federally-listed Threatened and Endangered Species

Based on preliminary database reviews, no federally-listed threatened or endangered species are known to occur within the vicinity (IDNR, 2002a). Applicable federal agencies, including the National Marine Fisheries Service and the USFWS will be formally contacted in order to confirm the presence or absence of any federally-listed (or proposed for listing) threatened or endangered fish or other aquatic species.

2.4.2.3.2 State-listed Threatened and Endangered Species

According to information provided by the IDNR, only one aquatic state threatened or endangered species has been identified within 10 mi of the EGC ESP Site. Documented occurrences of the spike (*Elliptio dilatata*), a freshwater mussel, have been made approximately 10 mi from the EGC ESP Site (IDNR, 2002a). This is approximately 4 mi beyond the limits of the vicinity. The spike, also known as the lady finger mussel, is designated as "threatened" in the State of Illinois (IDNR, 2002a). A suitable habitat for the spike includes small to large streams. In addition, they are occasionally found in lakes with muddy or gravelly substrates (IDNR, 2002i).

There are no documented occurrences of the spike in Clinton Lake, or any other watercourses within the site or vicinity.

2.4.2.3.3 Species of Commercial or Recreational Value

As previously mentioned, "important" species include those aquatic species that present value in a commercial or recreational manner. There are no commercial fisheries within the site or vicinity. Species that are of recreational value that can be found within the vicinity are described below.

- **Channel Catfish** - The self sustaining population of channel catfish found in Clinton Lake has been a major part of the fishery of Clinton Lake (IDNR, 2002j). Clinton Lake has been described as one of the best places in the state for catching channel catfish, a common sport fish that can be found in many locations in the lake (IDNR, 2002j). As previously mentioned, channel catfish are also present in watercourses located within the vicinity, specifically in Salt Creek and the North Fork of Salt Creek.

  Channel catfish prefer fairly deep waters with sand, gravel, or rocky substrates, and are not usually found in areas comprised of dense aquatic vegetation. In streams, channel catfish are usually found in moderate to swift current and thrive in water temperatures above 70^{o}F.

  Channel catfish are highly migratory and ascend small streams to spawn. They are commonly referred to as cavity spawners, and will only spawn in secluded areas.

  Adult channel catfish typically come into shallow water at night to feed, but return to deep holes or shelters during daylight. They feed by sight and by taste, using the barbels. Channel catfish feed primarily on aquatic insects when young and have a more varied diet (including insects, fish, and aquatic plants) when older.

- **Striped Bass** - According to the IDNR, Clinton Lake was one of the first lakes in Illinois to receive hybrid striped bass, which was first stocked in 1978 (IDNR, 2002k). Striped bass thrived in Clinton Lake until the early 1990's. However, consecutive years of flash floods significantly reduced the hybrid bass numbers. In past years, stock additions have increased overall populations to where they had been during the peak years of the fishery's existence (IDNR, 2002k).

Striped bass and hybrid striped bass are commonly stocked into large lakes and reservoirs for recreational purposes. They are generally most active during dawn and dusk hours, when there is lower amounts of light.

Striped bass typically inhabit deeper areas during winter months, then migrate to shallow and upstream areas to spawn.

Striped bass and hybrid striped bass eat insects and other crustaceans when young, and primarily eat fish when older.

- **Largemouth Bass** - The largemouth bass population of Clinton Lake exists as a recreationally important species, but has struggled over the past several years. According to the IDNR, the INHS is conducting extensive research to determine the causes of poor reproduction in the lake (IDNR, 2002g). As previously discussed, largemouth bass are also present in watercourses located within the vicinity, specifically Salt Creek and North Fork of Salt Creek.

  Largemouth bass can be found in a variety of types of waterbodies, from small farm ponds to large lakes, and are highly valued by fishermen for their fighting abilities.

  Spawning typically occurs after one year, when water temperatures have settled between 65ºF and 75ºF. Largemouth bass tend to spawn close to the shore, in waters 1 to 4 ft in depth.

  Largemouth bass feed on fish and a variety of other aquatic life including insects and crayfish.

  Reproduction and recruitment of largemouth bass (and white crappie) are a major concern in Clinton Lake due to the continued reproductive difficulties that have been observed in these species. A variety of regulations have been implemented to assist in the management and protection of these species.

- **Walleye** - According to the IDNR, between 1987 and 1992, the walleye population in Clinton Lake was one of the best in the state (IDNR, 2002f). Recurring floods in the early 1990's hurt existing populations, but stocking events over the past few years have greatly improved the walleye fishery (IDNR, 2002f).

  The walleye is known for low-light vision and sensitivity to bright light, which plays a large role in its behavior. They usually feed in shallow water at dawn and dusk, and during daylight hours tend to migrate towards deeper waters or areas somewhat sheltered from the light.

  Walleye typically spawn over rocks, rubble, or gravelly substrate in rivers or shallow water (1 to 6 ft deep). Male walleye move into spawning areas in early spring when the water temperature may be only a few degrees above freezing.

2.4.2.4 Biological Indicators

As previously discussed, biological indicators are defined as groups or types of biological resources that can be used to assess environmental condition (USEPA, 2003). Within these groups, certain species can be chosen to characterize current status or to track or predict significant change. Consistent with the indicators discussed in terrestrial ecosystems, many species could be considered as biological indicators for aquatic ecosystems including federally-listed and state-listed threatened and endangered species, and other rare or otherwise sensitive species occurring within the aquatic environments near the EGC ESP Facility.

Aquatic insects and macroinvertebrates are often used to monitor the quality of aquatic habitats. Indicators of healthy aquatic ecosystems include species richness, relative abundance, community structure, and dominance (IDNR, 2000). Specific aquatic insects and macroinvertebrates that are sensitive to changes in their environments include stoneflies, mayflies, dobsonflies, and certain freshwater mussel species. Species moderately tolerant of changes to their environment include damselflies, dragonflies, crayfish, blackflies, and craneflies. Aquatic species typically more tolerant of polluted or otherwise contaminated environments include midgeflies, worms, leeches, and certain species of snails (USEPA, 2003).

2.4.2.5 Important Habitats

According to the USNRC, "important" habitats include any wildlife sanctuaries, refuges, or preserve habitats identified by state or federal agencies as unique, rare, or of priority for protection; wetlands and floodplains; and land areas identified as critical habitat for species listed as threatened or endangered by the USFWS (USNRC, 1999). Important habitat in and around the EGC ESP Facility include:

- Clinton Lake State Recreation Area;
- Weldon Springs State Recreation Area;
- Environmentally sensitive areas; and
- Floodplains and wetlands.

Additional information on these areas is provided in the sections below.

2.4.2.5.1 Clinton Lake State Recreation Area

The EGC ESP Site is located on Clinton Lake, which is part of the Clinton Lake State Recreation Area. This recreation area is approximately 9,300 ac, of which, approximately 5,000 ac are open water areas (IDNR, 2003).

The parklands are owned by AmerGen, which operates and maintains the existing power station. The state has operated the park through a long-term lease with AmerGen since 1978 (IDNR, 2002d).

Important aquatic habitats present at the Clinton Lake State Recreation Area include deep lake, marsh, and riverine habitats. These areas provide habitat for a variety of wildlife species including several species of state-listed threatened and endangered birds and other wildlife.

2.4.2.5.2 Weldon Springs State Recreation Area

Weldon Springs State Recreation Area is a 370-ac park, which includes a 29-ac spring fed lake, located southeast of the City of Clinton (IDNR, 2002e).

Weldon Springs State Recreation Area is located approximately 6 mi from the location of the EGC ESP Facility.

Important aquatic habitats present at Weldon Springs State Recreation Area include lake habitat, natural spring habitats, and riverine habitats. These environments provide significant habitat for a variety of wildlife species.

2.4.2.5.3 Environmentally Sensitive Areas

Illinois designates certain environmentally sensitive areas as Illinois Natural Areas. These areas are protected to varying degrees, under the jurisdiction of the Illinois Nature Preserves Commission. There are two environmentally sensitive areas located within 6 mi of the site, specifically along Salt Creek and Tenmile Creek, approximately 3 mi and 5 mi respectively, from the location of the EGC ESP Facility (see Figure 2.4-2) (IDNR, 2002).

These waterbodies were described previously in Section 2.4.2.1.

2.4.2.5.4 Other Important Habitats

According to data provided by the IDNR, portions of Tenmile Creek, west of the City of Clinton, have been designated as the critical habitat, “medium gradient creek” (IDNR, 2002a). This portion of Tenmile Creek, classified by the IEPA as a unique aquatic resource, is located approximately 10 mi from the location of the EGC ESP Facility, approximately 4 mi beyond the limits of the vicinity (IDNR, 2002a).

2.4.2.5.5 Wetlands and Floodplains

According to National Wetland Inventory databases, there are four minor areas (less than 1 ac) within the site boundary that have been identified as wetlands (USFWS, 2002). These areas are generally comprised of open water resources comparable to constructed sediment basins. In addition, wetland resources including forested, emergent, and scrub-shrub communities, exist within 6 mi of the location of the EGC ESP Facility and along the proposed transmission corridors (USFWS, 2002). These wetlands are generally associated with small tributaries to Salt Creek and North Fork of Salt Creek.

2.5 Socioeconomics

The socioeconomic characteristics of the site, vicinity, and region are discussed in this section. Socioeconomic characteristics include:

- Population information;
- Community characteristics;
- Historical property information; and
- Environmental justice.

2.5.1 Demography

This section discusses population within the vicinity and region, projected populations for the vicinity and region, transient and migratory population, and demographic characteristics, which include sex, race, age, and income. Data on population was gathered using U.S. Census Bureau 2000 data (U.S. Census Bureau, 2001). Projected population was determined based upon projection data provided by Illinois State University (ISU) (ISU, 2002).

2.5.1.1 Population Within 16 km (10 mi)

The 2000 total residential population within 16 km (10 mi) of the site is 12,358 (U.S. Census Bureau, 2001). Figure 2.5-1 depicts the population groupings (i.e., towns and cities) within 16 km (10 mi) of the site. Figure 2.5-1 also includes a 0- to 16-km (0- to 10-mi) sector chart, which is used as a key for the population distribution tables described below.

Table 2.5-1 presents the population and transient population within the sectors depicted in Figure 2.5-1. The table indicates that the majority of the population lives in the west sector, 10 km to 16 km (6.2 mi to 10 mi) from the site. The west sector includes the City of Clinton, which has a population of over 7,000. Most of the area within a 16-km (10-mi) radius of the site is rural, with an average population density of 39 people per mi^2. Comparatively, suburban communities around Springfield have a population density of 500 to 2,500 people per mi^2 in previous sections (U.S. Census Bureau, 2001). A GIS system, in conjunction with the U.S. Census Bureau data from 2000, was used to determine the population by sector. Data were grouped by each census block, which is the smallest unit area of U.S. Census Bureau data collected. There are approximately 290 census blocks within a 16-km (10-mi) radius of the site. It was assumed that the population was evenly distributed within a census block. For example, if a sector made up 50 percent of a census block, it was assumed that the sector had 50 percent of the population in that census block.

In order to determine the total transient population, the following categories of transient population were estimated:

- Seasonal Population – This population was based on the number of temporary houses used for recreation or other seasonal work provided by the 2000 Census (U.S. Census Bureau, 2001).

- Transient Business Population – For commercial and manufacturing business within the 16-km (10-mi) radius, it was assumed, based on reasonable judgement, that business workers lived outside the 16-km (10-mi) radius. Therefore, to be conservative, employees of businesses within the 16-km (10-mi) radius were considered transients. Approximately 130 small business were estimated to have three or less employees, for a total of 390 (Clinton Chamber of Commerce [CCC], 2002). Larger business were surveyed during August and September 2002 and were verified by the DeWitt County Emergency Services and Disaster Agency Coordinator.

- Hotel/Motel Population – Within the 16-km (10-mi) radius, information was collected on the number of rooms for each hotel or motel. To be conservative and based on reasonable judgement, it were assumed that one person occupied each room on any given day.

- Recreation Areas – Data was obtained from the IDNR on the number of visitors to state parks including Clinton Lake State Recreation Area (IDNR, 2002). These visitors were considered transients. Data was also obtained for smaller recreational facilities in the region by survey during August and September 2002 and verified by the DeWitt County Emergency Services and Disaster Agency Coordinator.

- Special Population (Schools, Hospitals, Nursing Homes, and Correctional Facilities) – To be conservative, special population within the 16-km (10-mi) radius, was assumed to be transient. Population estimates were collected by surveys conducted during August and September 2002 and verified by the DeWitt County Emergency Services and Disaster Agency Coordinator.

- Festivals – Data was obtained from the CCC on the attendees at the annual Apple and Pork Festival that is held in Clinton. In 2002, 22,000 people, in addition to residents of Clinton, attended this festival. These people were not included, however, in the summary of transients within the 16-km (10-mi) radius, since this event occurs only one weekend each year, the last full weekend of September, see Table 2.5-1.

- Migrant Workers – Based on average statewide statistics on the percentage of migrant farmers supplied by the Illinois Agricultural Statistics Service (IASS), it was estimated that the number of migrant farm workers in the area is 13.6 percent of the agricultural labor force. Data on the amount of agricultural labor was obtained by the county from the Bureau of Economic Analysis (USDOC, 2002). The migrant workers were considered transients.

Table 2.5-2 presents population projections for the facility starting with 2010, and for 10-yr increments up to 60 years from the latest decennial census (i.e., 2060). The ISU provided population projections for 2010 and 2020 for each county (ISU, 2002). Based on this data, the expected population change rates (percent change) between 2000 and 2010 and between 2010 and 2020 was estimated for each county. It was assumed that the expected population change rate for the four 10-yr increments between 2020 and 2060 would be similar to the estimated population change rate between 2010 and 2020. These population rates were then applied using U.S. Census Bureau data from 2000 to each census block within a county. Population forecasts for each sector were calculated by assuming an even distribution of population throughout the census block. Transient population was forecast using the same growth percentages.

2.5.1.2 Population Between 16 km and 80 km (10 mi and 50 mi)

The total residential population within 80 km (50 mi) of the site is 752,008 (U.S. Census Bureau, 2001). More than 70 percent of this population live outside of a 40-km (25-mi) radius from the site (U.S. Census Bureau, 2001). Figure 2.5-2 indicates the location of communities and cities within 80 km (50 mi) of the site, as well as a 16- to 80-km (0- to 50-mi) sector chart, which is used as a key for the population distribution tables described below.

Table 2.5-3 presents the population within the sectors depicted in Figure 2.5-2. The most heavily populated sector within 16 km and 80 km (10 mi and 50 mi) of the site is the east sector. The high population in this sector is due primarily to the cities of Champaign and Urbana with an approximate 2000 population of 67,518 and 36,395, respectively. The northeast sector has the lowest population. The average population density within 80 km (50 mi) of the site is 97 people per mi^2. The area between 40 and 60 km (25 and 37 mi) of the site is the most densely populated, with a population of 267,376 and an average population density of 110 per mi^2 (U.S. Census Bureau, 2001). A GIS system, in conjunction with U.S. Census Bureau data, as described in Section 2.5.1.1, was used to determine the population by sector.

In order to determine the total transient population, the following categories of transient population were estimated:

- Seasonal Population – The same methodology was used that is described in Section 2.5.1.1.

- Transient Business Population – For commercial and manufacturing business within the 80-km (50-mi) radius, it was assumed, because of the large area and based on reasonable judgment, that there is no net change in population. In other words, on any given business day, the number of workers commuting into the 80-km (50-mi) radius is the same as the number of workers commuting out of the 80-km (50-mi) radius.

- Hotel/Motel Population – Information was collected on the location and number of hotels or motels within the 16-km to 80-km (10-mi to 50-mi radius). It was then assumed, based on data collected for the 0-16 km radius and surveys of selected hotels and motels within the 80-km radius that, on average, 25 rooms were available in each motel and 75 rooms were available in each hotel. Based on reasonable judgment, it was assumed that one person occupied each room.

- Special Population (Schools, Hospitals, Nursing Homes, and Correctional Facilities) – For special population within the 80-km (50-mi) radius, it was assumed, because of the large area and based on reasonable judgment, that there is no net change in population. In other words, students and staff of schools within the region, likely live with in the region. University students living in dormitories or apartments are counted in residential totals, based on U.S. Census Bureau procedure. Staff and residences temporarily in hospitals and nursing homes also likely live within the region. Residence of correctional facilities or long-term residences of nursing homes, hospitals, and other institutions are counted in residential totals, based on the U.S. Census Bureau procedure.

- Recreation Areas – Data was obtained from the IDNR on the number of visitors to state parks, which was then used to estimate transient population (IDNR, 2002). Visitors to local nature preserves and county or local parks were not included in estimates of transient population because it was assumed that these visitors would likely originate from the area encompassed by a 80-km (50-mi) radius.
- Migrant Workers – The same methodology was used that is described in Section 2.5.1.1.

Table 2.5-4 presents population projections for the region starting with 2010, and for 10-yr increments up to 60 years from the latest decennial census (i.e., 2060). The methodology used to forecast the population in the 16- to 80-km (10- to 50-mi) radius is the same that was used for the 0- to 16-km (0- to 10-mi) radius, see Section 2.5.1.1.

2.5.1.3 Demographic Characteristics of the Population Within 80 km (50 mi)

Demographic characteristics were prepared for the low population zone (the area within a 2.5-mi radius centered on the EGC ESP Facility footprint), the emergency planning zone (EPZ) (the area within approximately a 10-mi radius of the EGC ESP Site), and the region (the area within a 50-mi radius of the EGC ESP Site).

2.5.1.3.1 Age and Sex Distribution of Population

A summary of age and sex distribution by low population zone, EPZ, and region is shown in Table 2.5-5. In general, the population within the region of the site has the same or a greater percentage of adults than the national average (U.S. Census Bureau, 2001). In addition, the male and female population within a 50-mi radius of the site is about equal (U.S. Census Bureau, 2001).

2.5.1.3.2 Racial and Ethnic Distribution

A summary of racial and ethnic distribution by low population zone, EPZ, and region is shown in Table 2.5-6. Minority populations include people who identified themselves in the U.S. Census as African-American, Asian, Hawaiian, Hispanic, Native American, other, or having two or more races.

Within the low population zone, the minority population is 4.3 percent. Within the EPZ, the minority population is 3.6 percent. Within the region, the minority population is 13 percent (U.S. Census Bureau, 2001 and 2001a). The national average for minority population is 37 percent. Therefore, minority population in the region is well below the national average.

2.5.1.3.3 Income Distribution

Within the low population zone, 3.4 percent of the population had a 1999 income below the poverty level. Within the EPZ, 8 percent of the population had a 1999 income below the poverty level. Within the region, 10 percent of the population had a 1999 income below the poverty level (U.S. Census Bureau, 2001 and 2001a). The national average of population below the poverty level is 11.3 percent (U.S. Census Bureau, 2001b). Other income distributions for the exclusion area, low population zone, EPZ, and region is provided in Table 2.5-7.

2.5.2 Community Characteristics

2.5.2.1 Economic Characteristics

The principal economic centers in the region include the cities of Bloomington-Normal, Champaign-Urbana, Decatur, and Springfield. The smaller communities of East Peoria, Lincoln, Monticello, Morton, Pekin, Pontiac, Rantoul, Taylorville, and Washington, also serve important, but smaller roles in the region of the EGC ESP Site (see Figure 2.1-2). The types of industry in the region include manufacturing, government, retail trade, transportation and public utilities, and other services. These communities also support agribusiness throughout the region. Additionally, universities in the region are also a significant employer. Table 2.5-8 presents the level of employment for the region in these industry categories for the years 1990 and 2000. The table also shows that in the year 2000, the construction industry had 38,485 jobs, an increase from 1990 (USDOC, 2002). In addition, Table 2.5-9 shows the major employers in the region. It is estimated that the EGC ESP Facility will require up to 3,150 construction workers and up to 580 workers to operate the facility.

Regional employment trends, by county, are shown in Table 2.5-10. Employment trends indicate a stable economy with slight shifts in individual employment categories. All but three of the counties within the region (DeWitt, Ford, and Vermilion) had an increase in employment from 1990 to 2000. Unemployment in the region is relatively low, and has remained stable from 1990 to 2000 (USDOL, 2002).

2.5.2.2 Political Structure

Figure 2.5-3 presents the political jurisdictions in the region including cities, townships, and counties. The taxing districts that will be directly affected by facility construction and operation are as follows:

- DeWitt County;
- Harp Township;
- Clinton Community School District No. 15;
- Richland Community College District No. 537;
- Multi-Township Assessment District No. 3;
- Vespasian Warner Public Library District; and
- Mahomet Valley Water Authority.

Table 2.5-11 indicates the taxing rate and distribution between the taxing bodies for the year 2000.

DeWitt County is the local planning authority for the site. The EGC ESP Site will not conflict with the proposed zoning for the site since the EGC ESP Site will be constructed adjacent to the CPS. The CPS is already designated for transportation and utilities (University of Illinois, 1992). The EGC ESP Site is located in a rural area; therefore, no regional planning organizations include the EGC ESP Site or vicinity in their planning area.

2.5.2.3 Social Structure

There are four major cities in the region of the site including Bloomington-Normal, Champaign-Urbana, Decatur, and Springfield, each with a population of over 80,000. These cities are the regional centers for employment, services, entertainment, education, and cultural activities. The remainder of the area is largely rural, with smaller communities that vary in size from 100 to 25,000 residents (U.S. Census Bureau, 2001). These communities provide services for daily needs. The major cities in the region serve as a magnet for population growth, with rural areas and small communities experiencing stable or declining populations. This is likely due to the trend of younger workers moving away from smaller towns to the cities for employment opportunities.

Most of the population enjoys a rural quality of life, unencumbered travel, and easy access to outdoor activities. The population is fairly homogeneous, largely white, and not dominated by a particular ethnic group (U.S. Census Bureau, 2001a).

However, an Amish community is located around the towns of Arthur and Arcola, which are 37-mi and 44-mi southeast of the site, respectively. Although cultural and religious variations exist, there are several general characteristics that describe the Amish community. For instance, the Amish stress separatism, a simple life, importance of family, harmony with soil and nature, mutual assistance and neighborliness, and a disciplined church and religious community. The Amish are characterized as hard working, agrarian, ethnically homogeneous, and religious. Their simplicity of dress and their use of horses for transportation and farm work are the most noticeable outward expressions of the importance that the Amish place on humility, family and community, and separation from the world. No impacts from the EGC ESP Facility are expected because of the relatively long distance between these communities and the EGC ESP Site.

2.5.2.4 Housing Information

In this region, residential areas are primarily found in the communities with rural residences (farmsteads) and scattered throughout the area. Rental property is available primarily in larger communities in the region (Bloomington-Normal, Champaign-Urbana, Decatur, and Springfield). In the vicinity, residential areas are, for the most part, older single-family residences and mobile homes. Newer communities are located primarily in the four major cities (U.S. Census Bureau, 2001 and references listed in Table 2.5-13).

Table 2.5-12 presents the total housing units in the region, by area, as well as a breakdown of owner versus renter occupied units. In 2000, approximately 68.79 percent of the housing units within a 50-mi radius were owner occupied, and 31.21 percent were renter occupied (U.S. Census Bureau, 2001).

Within the last four years (1998–2001), there has been an average of 43 residence permits issued by DeWitt County. As of August 8, 2002, DeWitt County has issued 22 resident permits for the year 2002. These permits are issued for new single family housing and apartment buildings to be built within DeWitt County (DeWitt County, 2002).

Several local and regional newspapers were consulted to achieve a snapshot of the availability of rental units or houses for sale (Clinton Daily Journal, 2002; Herald & Review, 2002; State Journal Register, 2002; DeWitt County, 2002; Pantagraph, 2002). In general, rental units and houses are readily available. Table 2.5-13 presents the results of these consultations.

2.5.2.5 Educational System

The public school system in the region is organized into 110 primary, secondary, or unit school districts. Figure 2.5-4 presents the location of the schools located in these school districts. Appendix B of this report lists the schools located in the region and their distance from the EGC ESP Site. A survey of class size of schools in the region was performed, and 70 percent of schools have a class size at or below the national average. This indicates there is sufficient capacity for a small increase in population. There are three community colleges and eight 4-yr colleges and universities in the region. The 4-yr colleges and universities are listed below (NCES, 2002):

- Eureka College – 525 students;
- Illinois Central College – 13,930 students;
- ISU – 20,504 students;
- Illinois Wesleyan – 2,028 students;
- Millikin University – 2,079 students;
- Parkland College – 9,280 students;
- Southern Illinois University – 4,334 students; and
- University of Illinois Urbana-Champaign – 36,936 students.

2.5.2.6 Recreation

There are several parks, forest preserves, golf courses, and other recreation areas in the region. These recreation areas generally serve the local community only. The state parks and larger recreation areas that serve the region include:

- Clinton Lake State Recreation Area;
- Weldon Springs State Recreation Area;
- Allerton Park;
- Eagle Creek Recreation Area/Wolf Creek State Park;
- Edward R. Madigan State Fish and Wildlife Park;
- Lincoln Trail Homestead;
- Moraine View State Recreation Area;
- Sangchris Lake State Recreation Area;
- Shelbyville State Fish and Wildlife Area; and
- Spitler Woods State Natural Area.

Clinton Lake State Recreation Area comprises 9,300 ac of land and is managed by the IDNR. This recreation area is used year-round and offers snowmobiling, ice-fishing, ice-skating, boating, fishing, water-skiing, picnicking, camping, swimming, hiking, and hunting (IDNR, 2002). Clinton Lake State Recreation Area is less than 1 mi from the site.

Weldon Springs State Recreation Area is also managed by the IDNR, and is located 5.5-mi southwest of the site. This 370-ac park offers fishing, picnicking, boating, and hiking during the summer, and sledding, tobogganing, ice-fishing, and cross-country skiing during the winter (IDNR, 2002).

Allerton Park is a 1,517-ac park located approximately 20-mi southeast of the site. The park offers formal gardens, outdoor sculpture parks, and nature trails. The park also contains a Georgian manor house formerly owned by Robert Allerton, who donated the land and house to the University of Illinois (University of Illinois, 2003).

Eagle Creek Recreation Area/Wolf Creek State Park encompasses 11,100 ac of water with 250 mi of shoreline, which is managed by the IDNR. This recreation area offers camping, hiking, horseback riding, snowmobiling, fishing, water-skiing, pontoon boating, and windsurfing (IDNR, 2002). This area is 45-mi south of the site.

Edward R. Madigan State Fish and Wildlife Park is located west of the site, and compromises 723 ac of land. Activities include picnicking, fishing, canoeing, hiking, and hunting. This park is the home of the largest sycamore tree in Illinois, and is located 29-mi west of the site (IDNR, 2002).

Lincoln Trail Homestead is the site of Abraham Lincoln’s first home, and is located 29-mi south-southwest of the site. The site compromises 162 ac of land. A memorial commemorating the beginning of Lincoln’s life is present on the property. Activities available include camping, fishing, hiking, and picnicking (IDNR, 2002).

Moraine View State Recreation Area encompasses 1,687 ac of land with a 158-ac lake. This area offers many different activities including boating, camping, fishing, hiking, horseback riding, hunting, picnicking, swimming, snowmobiling, and other winter sports (IDNR, 2002). Moraine View State Recreation Area is located 16-mi north-northeast of the site.

Sangchris Lake State Recreation Area is located east of Springfield, Illinois, and is 48-mi southwest of the site. There is a total of 3,022 ac of land with 120 mi of shoreline available for boating, camping, fishing, hiking, hunting, and picnicking. There is also a dog training area for seasonal use. The park is closed in the winter (IDNR, 2002).

Shelbyville State Fish and Wildlife Area is 37-mi south of the site and contains over 6,000 ac of mixed habitat land with a 39,000-ac lake, Lake Shelbyville. This area offers some of the best hunting, river fishing, and nature study opportunities in the state. However, no camping, picnicking, or day use facilities are available due to hunting activities (IDNR, 2002).

Spitler Woods State Natural Area is southeast of Decatur, Illinois, and is located 27-mi south of the site. This park offers 202 ac of land for camping, picnicking, and hiking. It also includes a large nature preserve (IDNR, 2002).

Figure 2.2-8 presents the location of the parks and recreation areas within the region.

2.5.2.7 Public Services and Facilities

Public services and facilities consist of schools, public utilities, police and fire departments, hospitals, and churches. They are typically located within municipal boundaries and near population centers. Schools are described in Section 2.5.2.5. The remaining services are described below.

Public utilities include facilities for distributing energy, such as electricity and natural gas, as well as water supplies and wastewater treatment plants (WWTP). In the vicinity of the site, drinking water in DeWitt County is primarily obtained from groundwater extracted from wells, with only a small number of residents that have private well systems. The Clinton Sanitary District Sewage Treatment Plant serves the wastewater needs of the City of Clinton. In the region, rural communities generally have private well water and septic systems. Larger communities in the region obtain water from public groundwater extraction wells, and are served by public sewer systems. Figure 2.5-5 shows the locations of public water supply sources, and also water and wastewater treatment plants in the region. A survey was performed for water and water facilities in the region, and the facilities have excess capacity to accommodate a potential increase in population in the region.

Within the vicinity, there is one fire department and three police departments that serve the City of Clinton. In the region, there are 89 fire departments and 76 police departments. Outside of the four regional centers (Bloomington-Normal, Champaign-Urbana, Decatur, and Springfield), communities typically share fire fighting services. Figure 2.5-6 presents the locations of fire protection and law enforcement locations within the region.

In the vicinity, there are two nursing homes and one hospital serving the City of Clinton. In the region, there are 52 hospitals and 84 nursing homes. Figure 2.5-7 presents the locations of hospitals and nursing homes within the region.

The projected capacity of public services is adequate and is expected to expand modestly to meet the demands of a slight population growth in the region.

2.5.2.8 Transportation Facilities

The EGC ESP Site is located close to major road and RR transportation systems that support the CPS. IL Route 54 serves the entrance to the existing facility site. This two-lane roadway is a rural highway with sufficient capacity to serve future traffic-related to the construction and operation of the EGC ESP Site. Additionally, IL Route 10 is an east-west highway (2-lane), located south of the EGC ESP Site. Both IL Route 54 and IL Route 10 have continuity through the area and connect to an interstate highway to the east and the west. Although traffic is typical of low volume rural highways, weekend recreational use does result in traffic volume increases. U.S. Highway 51, a major north-south route, is located about 5-mi west of the site. This 4-lane divided highway is relatively low volume, with sufficient capacity to accommodate future traffic. U.S. Highway 51 connects to Interstate 74 about 20-mi north of the site and connects to Interstate 72 about 20-mi south of the site. IL Route 54 also connects to Interstate 74 about 12-mi east of the site. Figure 2.2-3 and Figure 2.2-6 show the vicinity and regional transportation network. Public transit systems, such as bus or rail, are not available within the vicinity of the site.

The EGC ESP Site falls within IDOT's District 5. According to the *FY 2002-2006 Proposed Highway Improvement Program*, approximately 438 million dollars is budgeted for road improvements in the district between the years of 2002 and 2006. In DeWitt County, the following projects are planned (IDOT, 2001):

- Resurfacing of 3.5 mi of U.S. Highway 51 Bypass in Clinton;
- Resurfacing of 7.1 mi of U.S. Highway 51, south of the McLean County Line to Forsyth;
- Resurfacing of 9.9 mi of U.S. Highway 150 from the McLean County Line to Mansfield;
- Resurfacing of 8.4 mi of IL Route 10 from Logan County Line to U.S. Highway 51, west of Clinton;
- Bridge replacement on IL Route 10, over a creek, 2-mi east of the Logan County Line;
- Culvert replacement, land acquisition, and utility adjustment at IL Route 48/IL Route 10;
- Resurfacing of 13.5 mi of IL Route 10 from IL Route 48 to Interstate 72;
- Resurfacing of 9.9 mi of IL Route 54 from Logan County Line to U.S. Highway 51;
- Installation of signals at IL Route 54 and Illini Drive in Clinton; and
- Resurfacing of 9.9 mi and bridge replacement on IL Route 54 from IL Route 48 to the McLean County Line.

2.5.2.9 Distinctive Communities

As stated in Section 2.5.2.3, and presented in Section 2.5.4, the population in the region is fairly homogeneous, largely white, and not dominated by a particular ethnic group. The one exception is an Amish community located around the towns of Arthur and Arcola.

Other distinct communities within the region include the State Capitol of Illinois in Springfield, and the college town of Champaign-Urbana. Springfield is approximately 50-mi southwest of the site. Special landmarks in Springfield include The State Capitol Building, The Old State Capitol, several historic homes, and a national cemetery that was once a site for training civil war soldiers. There are many tourist attractions associated with Abraham Lincoln including his childhood home, his old law office, a pew from his church, and his tomb. The Illinois State Fair is also held every summer at the State Fairgrounds in Springfield.

The University of Illinois is located in Champaign-Urbana, which is approximately 30-mi east of the site. As stated in Section 2.5.2.5, the University of Illinois is a large university with numerous staff and students. There are many theaters, museums, and other cultural attractions typically associated with a larger university.

2.5.2.10 Agriculture

According to the *Illinois Agricultural Statistics Annual Summary 2001*, Illinois is rich with agricultural resources and is recognized as a world supplier of food. Illinois is a strong agricultural resource because of its fertile soil and favorable climate. In 2000, Illinois ranked second among all states in the production of corn and soybeans. Other agricultural resources in Illinois that are not as prominent include wheat, sorghum, hay, livestock, and dairy production (IDOA, 2001).

When comparing all Illinois counties, La Salle County is ranked first among all Illinois counties with 1,581 farms, while DeWitt County, with 463 farms, ranked 77 out of 102 (IDOA, 2001).

DeWitt County is not a large producer of either corn or soybean crops. In fact, DeWitt County ranks 43 out of 102 Illinois counties in corn crop production and 46 out of 102 Illinois counties in soybean crop production. Illinois counties that lead in the production of corn include McLean (51,057,000 bushels), Iroquois (45,472,000 bushels), and La Salle (42,803,200 bushels). DeWitt County produced only 15,904,000 bushels of corn in 2000. Illinois counties that lead in the production of soybeans include McLean (14,602,900 bushels), Livingston (12,874,400 bushels), and Iroquois (12,641,200 bushels). Comparably, DeWitt County produced only 4,601,300 bushels of soybeans. Ultimately, DeWitt County is not a major contributor to the production of any agricultural resource (IDOA, 2001).

Table 2.5-14 provides agricultural statistics for the counties within a 50-mi radius of the project area.

The total market value of DeWitt County agricultural products sold in the year 2000 was $53,745,000. Crop sales accounted for 95 percent of DeWitt County agricultural cash receipts in 2000; livestock made up the remaining 5 percent (IDOA, 2001). Table 2.5-15 represents a breakdown of the cash receipts for the counties within a 50-mi radius of the site.

2.5.3 Historic Properties

The vicinity of the site lies entirely within DeWitt County. DeWitt County, located in east central Illinois, is one of the smaller counties in Illinois. The first pioneers entered the county as part of the general westward expansion, and the area was slowly settled and farmed. DeWitt County retains many of the rural characteristics that were part of its early history (CPS, 1973).

Comprehensive cultural resource and historic property investigation was performed prior to construction of the CPS, approximately 30 years ago. Any issues that were raised at this time were resolved through removal of these historic and cultural resources.

A database and literature review was performed in September 2002, to assess the potential for cultural resources within the EGC ESP Site power block footprint and as a buffer to the area within a 2-mi radius of the CPS. A database and literature review of the area between 2-mi and 10-mi from the EGC ESP Site power block footprint was not performed because no impacts to archaeological or cultural resources are expected in this area. No historic standing structures have been identified within the EGC ESP Facility power block footprint, cooling tower footprint, or in the immediate vicinity of the CPS. Within the EGC ESP Facility power block and cooling tower footprint, there are no records of historic standing structures, archaeological sites within the historic period, or dateable archaeological sites within the prehistoric period.

Archaeological site files at the Illinois Historic Preservation Agency indicate that a total of 95 archaeological sites and isolated "find" spots have been identified within a 2-mi radius of the CPS. Ten archaeological sites contained features or artifacts dating from the historic period; 92 sites contained features and/or artifacts that represented prehistoric activity or occupation. Of the 92 sites with prehistoric remains, 22 sites were dateable and suggest that prehistoric occupation of the area began in the Early Archaic period (ca. 10,000 Before Present [BP]) through the Late Woodland/Mississippian period (ca. 1,000-500 BP). Within the EGC ESP Site footprint, there are two small and undateable prehistoric sites. These two sites are small prehistoric occupations of unknown cultural affiliation that were identified during the archaeological surveys for the CPS in the early 1970s. There is no evidence in the state site files that any further study was conducted at these sites after their initial identification. It is likely that these sites were identified either through controlled surface reconnaissance or shovel testing. The ten archaeological sites with historic material are dated from the late nineteenth or early twentieth centuries. Four sites can be linked to historically identifiable map locations including a schoolhouse and three dwellings. Within a 2-mi radius of the CPS, there are three records of standing structures. They include Harp Township Hall and the Centenary Methodist Episcopal Church Barn, which are located in Birkbeck (northwest of the EGC ESP Site). An 1850 Valley Mill property was also identified, but it is no longer standing.

The location of the EGC ESP Facility power block footprint appears to have been heavily disturbed by previous development of the CPS; therefore, archaeological testing appears not to be warranted. The cooling tower footprint of the EGC ESP Facility also may have been disturbed by pervious development of the CPS, although it is unclear whether this area was surveyed prior to development of the CPS. The aerial photo illustrates disturbances related to roads and some stripping, possibly resulting from laydown activities. Therefore, archaeological testing of this area does not appear to be warranted. If additional area within the EGC ESP Site will be required, further evaluation will be performed to determine if additional archaeological review is required.

2.5.4 Environmental Justice

Environmental justice refers to a federal executive order in which federal actions should not result in disproportionately high and adverse impacts to low income or minority populations. Executive Order 12898 directs federal agencies to consider environmental justice by identifying and mitigating disproportionately high and adverse human health and environmental effects. This includes the interrelated social and economic effects of their programs, policies, and activities on low income and minority populations. This review considers “minority” or “low income” communities within a 50-mi radius in and around DeWitt County. In addition, the review demonstrates that the construction and operation of the proposed facility does not adversely affect the distinctive character of these communities or disproportionately affect low income or minority populations.

This section, along with Section 4.4.3 and Section 5.8.3, details the studies that are used to define these populations of interest. Furthermore, the environmental justice review has two goals:

- Define racial, ethnic, and special characteristics of groups that may be affected by any adverse environmental impact from the facility; and
- Define the income characteristics of the populations that may be affected by any adverse environmental impact from the facility.

The scope of the review includes an analysis of impacts on low income and minority populations, the location and significance of any environmental impact during operations on populations that are particularly sensitive, and any additional information pertaining to mitigation.

U.S. Census Bureau data from 2000 was used to accurately identify low income or minority populations in the region, information on racial, ethnic, and income population characteristics. Based on environmental justice guidelines, each census block within the region (community of comparison) was examined for racial composition and median household income in comparison to the potential impact area as a whole.

2.5.4.1 Racial, Ethnic, and Special Groups

According to the U.S. Census Bureau data from 2000, 97.1 percent of DeWitt County is white, 0.5 percent is African American, 0.2 percent is American Indian, 1.3 percent is of Hispanic origin, and 0.9 percent is classified as other races. Figure 2.5-8 identifies the minority populations in the region (U.S. Census Bureau, 2001a).

As stated in Section 2.5.2.3, the only special group within the region is an Amish community located around the towns of Arthur and Arcola, which are 37-mi and 44-mi southeast of the site, respectively. The U.S. Census Bureau does not track and consider the Amish separately. The Amish tend to be fairly homogeneous, largely white, and not dominated by a particular ethnic group. According to the Town of Arthur's website, the Amish population is about 3,500 (Town of Arthur, 2002). According to the Town of Arcola's website, the Amish population is about 4,200 (Town of Arcola, 2002).

2.5.4.2 Income Characteristics

A block census evaluation of household income was performed to identify low income populations, as defined by the Department of Health and Human Services.[1] Within the vicinity, 8 percent of the population had a 1999 income below the poverty level. Within the region, 10 percent of the population had a 1999 income below the poverty level. In DeWitt County, 8 percent of the population is considered low income. For perspective, the national average of low income population is 11.3 percent (U.S. Census Bureau, 2001b). Figure 2.5-9 shows the population below the poverty level within each census block (U.S. Census Bureau, 2001 and 2001b).

[1] The Department of Health and Human Services defines "low income" as those residents living below the defined poverty guideline; the U.S. Census Bureau defines families whose income falls below the poverty threshold as "poor." (See www.census.gov for more information.) For a family of four, the poverty threshold for the year 2001 is $17,960.

2.6 Geology

In accordance with NUREG-1555, an environmental review of geology is not required in the Environmental Report (USNRC, 1999). However, in order to assess the suitability of a site for a facility of the general size and type proposed, a summary of the geological features for the site and vicinity have been included in the SSAR. In addition, the SSAR presents detailed analyses and evaluations of geological, seismological, and geotechnical data that have become available for the site and region since the preparation of the Final Safety Analysis Report (FSAR) and CPS USAR. The new information includes updated estimates of peak horizontal and vertical ground accelerations and response spectra associated with the Safe Shutdown Earthquake (SSE). These seismic motions have been determined by conducting a probabilistic seismic hazards analysis (PSHA).

Based on the geological, seismological, and geotechnical conditions present within the project area, there are no long-term adverse geological, seismological, or geotechnical impacts anticipated from the future construction or operation of a new facility. For example:

- There are no known geological hazards, such as karstification or surface faulting that could affect the EGC ESP Facility.
- The long-term impacts from seismic loading are expected to be similar to those that would occur if the facility were not constructed. The potential effects of seismic loads, such as liquefaction and soil structure interaction, will be considered during design.
- While any new structure will load the soil, the magnitudes of the load will not result in consolidation of aquifers located below the site. The site has been overridden by past glaciations, and the loads associated with these glaciations exceed the imposed load of any new facilities.
- Small amounts of settlement could result at the ground surface near the constructed facility. This settlement could affect surface water drainage. These effects, if they were to occur, will take place during construction, and can be easily mitigated by regrading the site.
- There are no slopes in proximity to the proposed facility location that could be affected by the imposed structural loads or whose instability could affect the facility.
- Imported backfill material will be required to fill excavations next to the constructed EGC ESP Facility. Any negative effects either to the underlying soil or to the structure from the imported backfill material will be mitigated during design.
- New cooling water detention ponds could be required, based on the final reactor selection. Although these ponds would have the potential to serve as a source of groundwater infiltration, the cooling water ponds will be lined to preclude such occurrences.

A number of short-term geological impacts could occur during construction, but again, these are not expected to have any long-term adverse impacts. The geological impacts could include excavations, vibrations, and dewatering during the construction of the EGC ESP Facility.

- Excavated material will be disposed either on site or off site. Normal methods will be used to mitigate the potential for erosion of material at the disposal site, such as reseeding and drainage control. Excavated slopes or soil surfaces exposed during construction will be protected from erosion.
- Construction equipment could cause vibrations that are felt by the operating facility and nearby residences. These vibrations will not be large enough to cause any adverse impacts.
- Discussion of the potential for impacts from construction dewatering is presented in Section 4.2.

2.7 Meteorology and Air Quality

This section provides a description of the general climate of the EGC ESP Site, as well as the regional meteorological conditions used as a basis for design and operating conditions. In addition, this section documents the range of meteorological and conditions that will exist during the construction and operation of the proposed facility. The information contained in this section is also used to establish the range of conditions that are considered in the design of the facility. A climatological summary of normal and extreme values of several meteorological parameters is presented for the "first order" National Weather Service (NWS) Stations in Peoria, Illinois and Springfield, Illinois. Further information regarding regional climatology was derived from pertinent documents, which are referenced in the text.

2.7.1 General Climate

2.7.1.1 General Description

The EGC ESP Site is located near the geographical center of Illinois, approximately 55-mi southeast of the NWS Station in Peoria, and 49-mi east-northeast of the NWS Station in Springfield. Both of these stations are considered to be "first order" weather observing stations because they are fully instrumented and record a complete range of meteorological parameters. Additionally, the observations are recorded continuously, either by automated instruments or by human observer for the 24-hr period, midnight to midnight.

General climatological data for the region surrounding the site area were obtained from several sources of information that contain statistical summaries of historical meteorological data for the region. The climatic data from the Peoria and Springfield observation stations are considered to be representative of the climate at the site. This is due to the relatively close proximity of these two stations to the site, as well as similarities of terrain and vegetation features in the area. With the exception of a few low hills in the extreme southern and northwest portions of the state, the terrain throughout Illinois is considered to be flat to gently rolling, with vegetation consisting predominantly of croplands, interspersed with only modest amounts of deciduous forestation. The references that were used to characterize the climatology of the region include Climates of the States, Third Edition (Gale Research Company, 1985), Weather of U.S. Cities, Fourth Edition (Gale Research Company, 1992), and The Weather Almanac, Sixth Edition (Gale Research Company, 1992a).

The climate of central Illinois is typically continental, with cold winters, warm summers, and frequent short period fluctuations in temperature, humidity, cloudiness, and wind direction. The great variability in the central Illinois climate is due to its location in a confluence zone, particularly during the cooler months, between different air masses. The air masses that affect central Illinois typically include maritime tropical air, which originates in the Gulf of Mexico; continental tropical air, which originates in Mexico and the southern Rockies; Pacific air which originates in Mexico and in the eastern North Pacific Ocean; and continental polar and continental arctic air, which originates in Canada. As these air masses migrate from their source regions, they may undergo substantial modification in their characteristics. Monthly streamline analyses of resultant surface winds suggest that air reaching central Illinois most frequently originates over the Gulf of Mexico from April through August, over the southeastern U.S. from September through November, and over both the Pacific Ocean and the Gulf of Mexico from December through March (Bryson, 1966).

The major factors controlling the frequency and variation of weather types in central Illinois are distinctly different during two separate periods of the year. During the fall, winter, and spring months, the frequency and variation of weather types is determined by the movement of synoptic-scale storm systems, which commonly follow paths along a major confluence zone between air masses, and is usually oriented from southwest to northeast through the region. The confluence zone normally shifts in latitude during this period, ranging in position from the central states to the U.S.-Canadian border. The average frequency of the passage of storm systems along this zone is about once every five to eight days. The storm systems are most frequent during the winter and spring months, causing a maximum of cloudiness during these seasons. Winter is characterized by alternating periods of steady precipitation (rain, freezing rain, sleet, or snow) and periods of clear, crisp, and cold weather. Springtime precipitation is primarily showery in nature. The frequent passage of storm systems, presence of high winds aloft, and frequent occurrence of unstable conditions caused by the close proximity of warm, moist air masses to cold, dry air masses result in a relatively high frequency of thunderstorms during this period. These thunderstorms, on occasion, are the source of hail, damaging winds, and tornadoes. Although synoptic-scale storm systems also occur during the fall months, their frequency of occurrence is less than in winter or spring. Periods of pleasant, dry weather characterize the fall season, but ends rather abruptly with the returning storminess that usually begins in November.

In contrast, weather during the summer months is characterized by weaker storm systems, which tend to pass to the north of Illinois. A major confluence zone is not present in the region, and the region's weather is characterized by much sunshine interspersed with thunderstorm situations. Showers and thunderstorms are usually of the air mass type, although occasional outbreaks of cold air bring precipitation and weather typical of that associated with the fronts and storm systems of the spring months.

When southeast and easterly winds are present in central Illinois, they usually bring mild and wet weather. Southerly winds are warm and showery, westerly winds are dry with moderate temperatures, and winds from the northwest and north are cool and dry.

Table 2.7-1 presents a summary of historical climatological observations from the Peoria and Springfield meteorological observing stations.

2.7.1.2 Winds

In both Peoria and Springfield, the prevailing wind is southerly. The frequency of winds from other directions is relatively well distributed. The monthly average wind speed is lowest during late summer at both stations, with the prevailing direction from the south in Peoria and the south-southwest in Springfield. The monthly average wind speed is highest during late winter and early spring at both stations, with the prevailing directions from the west-northwest and the south in Peoria, and the northwest and south in Springfield. Annual average wind speeds are 10.1 mph in Peoria and 11.2 mph in Springfield. Peak gusts during the period of 1941–1990 were 69 mph in Peoria (April of 1989) and 69 mph in

Springfield (August of 1987). The fastest mile of wind was 75 mph in Peoria (July of 1953) and 75 mph in Springfield (June of 1957) (Gale Research Company, 1992a).

2.7.1.3 Temperature

The annual average temperature is 51.1°F in Peoria and 53.2°F in Springfield. Monthly average temperatures in the site region range from the mid-twenties in January to the mid-seventies in July. Extreme temperatures recorded in the region range from a maximum of 105°F (Peoria) and 112°F (Springfield) to a minimum of -25°F (Peoria) and -22°F (Springfield). Maximum temperatures in the EGC ESP Site region equal or exceed 90°F, with an average of 20 to 31 times per year. Minimum temperatures in this region are less than or equal to 32°F with an average of 117 to 129 times per year (Gale Research Company, 1992a).

2.7.1.4 Atmospheric Moisture

Relative humidity varies with wind direction, being lower with west or northwest winds and higher with east or south winds. The early morning relative humidity is highest during the late summer, with an average of 89 percent in both Peoria and Springfield. The relative humidity is highest throughout the day during December, ranging from 83 percent in early morning to 71 percent at noon in Peoria and 82 percent in early morning to 71 percent at noon in Springfield.

2.7.1.5 Precipitation

Annual precipitation in the site area averages about 35 in. per year. For the 40-yr period (1961-1990), the minimum annual precipitation was 22.16 in. at Peoria (1988), and 25.31 in. at Springfield (1988). For the same period, the maximum annual precipitation was 55.35 in. for Peoria (1990), and 52.67 in. for Springfield (1990). On average in the region, about 55 percent of the annual precipitation occurs from April through August each year. However, no month in this region averages less than 4 percent of the annual total. Monthly precipitation totals have ranged from 13.09 in. at Peoria (September of 1961) to a trace amount in Springfield (September of 1979). The maximum 24-hr precipitation, at either station, was 6.12 in, recorded in Springfield in December of 1982. Snowfall commonly occurs from November through March, with an annual average of 25.1 in. at Peoria, and 23.9 in. at Springfield. The monthly maximum snowfall was 24.7 in. at Peoria (January of 1979) and 22.7 in. at Springfield (December of 1973). The 24-hr maximum snowfall was 12.2 in. at Peoria (January of 1979) and 10.9 in. at Springfield (December of 1973) (Gale Research Company, 1992a).

2.7.2 Regional Air Quality

There are eleven counties within the State of Illinois that are classified as nonattainment areas. Nonattainment areas are specifically designated areas (typically an entire county) where air pollution levels exceed the National Ambient Air Quality Standards (NAAQS). In Illinois, the two pollutants that exceed the NAAQS are ozone and particulate matter (PM) less than 10 microns in diameter (PM-10). The eleven counties and the pollutants of concern within each county are presented in Table 2.7-2 (USEPA, 2002). None of these counties are in the region of the EGC ESP Site, nor are any of these areas within 100 mi of the site.

Therefore, air emissions from the proposed facility are not expected to impact any nonattainment areas in Illinois.

The EGC ESP Site is located in DeWitt County, Illinois. Based on USEPA's designation, DeWitt County is designated as being in attainment of NAAQS. To determine whether a county is in attainment of the NAAQS, the IEPA operates a network of ambient air quality monitoring stations. This network has been designed to measure ambient air quality levels in the various Illinois Air Quality Control Regions (AQCR). For example, DeWitt County is located in AQCR No. 66 - East Central Illinois Interstate. Three air monitoring stations are located within AQCR No. 66.

In general, outdoor air quality in Illinois is considered to be good most of the time. The year 2000 was the first year since ozone has been monitored that there were no exceedances of the 1-hr health standard anywhere in the state. However, both the Chicago and East St. Louis metropolitan regions do not meet the federal air quality standard for ozone (smog), which is associated with both human respiratory problems and ecosystem damage. Recently, the Supreme Court upheld USEPA's fine particulate (PM-2.5) air quality standard, which is based on a 3-yr annual average of monitoring results at a given location. PM-2.5 compliance will be determined on the basis of data collected during the period from 2000 through 2002. Based on preliminary results from the year 2000, the Chicago and East St. Louis metropolitan areas will not likely meet the PM-2.5 annual standard. In addition, further reductions of emissions in the affected counties may be needed in the future (IEPA, 2001).

Based on the Illinois Air Quality Index (AQI), which now includes the proposed new 8-hr ozone and PM-2.5 standards, there were 25 days when air quality was considered unhealthy for sensitive groups in one or more portions of Illinois during 2000, with 18 days due to PM-2.5 and 9 days due to ozone. Two of those days reflected high levels of both fine particulates and ozone measured for the 8-hr standard (IEPA, 2001).

2.7.3 Severe Weather

2.7.3.1 Thunderstorms, Hail, and Lightning

Thunderstorms occurred on an average of 48 days per year in Peoria (1955-1990) and Springfield (1959-1990) (Gale Research Company, 1992a). Approximately 41 percent of the annual precipitation in the region is estimated to fall during thunderstorms (Changnon, 1957). Thunderstorms occur most frequently during the months of June and July, each with eight days per month in Peoria, and nine days per month in Springfield. Peoria and Springfield average five or more thunderstorm days per month throughout the season from April through September. Both stations average two or less thunderstorm days per month from November through February (Gale Research Company, 1992a). A thunderstorm day is normally recorded only if thunder is heard and the observation is independent of whether or not rain and/or lightning are observed concurrent with the thunder (American Meteorological Society [AMS], 1970).

A severe thunderstorm is defined by the National Severe Storms Forecast Center (NSSFC) of the NWS as a thunderstorm that possesses one or more of the following characteristics (USDOC, 1969):

- Winds of 50 knots or more;
- Hail of 0.75 in. or more in diameter; or
- Cumulonimbus cloud favorable to tornado formation.

The above referenced report by the NSSFC provides values for the total number of hail reports of 0.75 in. or greater, winds of 50 knots or greater, and the number of tornadoes for the period 1955-1967 by 1° squares (latitude by longitude). The report shows that during this 13-yr period, the 1° square containing the site had 15 hailstorms producing hail 0.75-in. diameter or greater, 26 occurrences of winds of 50 knots or greater, and 42 tornadoes.

At least one day of hail is observed per year over approximately 90 percent of Illinois, with the average number of hail days at a point varying from one to four (Huff and Changnon, 1959). Considerable year to year variation in the number of hail days is seen to occur; annual extremes vary from no hail in certain years to as many as 14 hail days in other years. About 80 percent of the hail days occur from March through August, with spring (March through May) being the primary period of occurrence. In the region, Peoria and Springfield average approximately 22 hail days per 10-yr period, with about 55 percent of hail days occurring in the spring (Huff and Changnon, 1959). The maximum number of hail days in a year for Peoria and Springfield is seven (1927, 1950, 1954) and eight (1975), respectively (Changnon, 1995). Total hailstorm life averages about 7 minutes, with maximum storm life generally not over 20 minutes for Illinois (Changnon, 1957).

The frequency of lightning flashes per thunderstorm day over a specific area can be estimated by using Equation 2.7-1, taking into account the distance of the location from the equator (Marshall, 1971):

Equation 2.7-1: $N = (0.1 + 0.35 \sin \varnothing)\ (0.40 \pm 0.20)$

N = Number of flashes to each per thunderstorm day per km^2
$\varnothing$ = Geographical latitude

For the EGC ESP Site, which is located at approximately 40° north latitude, the frequency of lightning flashes (N) ranges from 0.065 to 0.195 flashes per thunderstorm day per km^2. The value 0.195 is used as the most conservative estimate of lightning frequency in the calculations that follow.

Taking the annual average number of thunderstorm days in the site region as 48, the mean frequency of lightning flashes per km^2 per year is 9.4, as calculated below:

$$\frac{0.195 \text{ flashes}}{\text{thunderstorm day} \bullet km^2} \times \frac{48 \text{ thunderstorm days}}{\text{yr}} = \frac{9.4 \text{ flashes}}{km^2 \bullet \text{yr}}$$

The area of the CPS Site is approximately 14,000 ac. Hence, the expected frequency of lightning flashes at the site per year is 533, as calculated below:

$$\frac{9.4\ \text{flashes}}{\text{km}^2 \bullet \text{yr}} \quad \text{x} \quad 56.7\ \text{km}^2 \quad = \quad \frac{533\ \text{flashes}}{\text{yr}}$$

The exclusion area for the EGC ESP Facility has a radius of 3,362 ft. Hence, the expected frequency of lightning flashes in the exclusion area per year is 31, as calculated below:

$$\frac{9.4\ \text{flashes}}{\text{km}^2 \bullet \text{yr}} \quad \text{x} \quad 3.3\ \text{km}^2 \quad = \quad \frac{31\ \text{flashes}}{\text{yr}}$$

2.7.3.2 Tornadoes and Severe Winds

Illinois ranks eighth in the U.S. for average annual number of tornadoes, based on the period of record 1953-1989 (Gale Research Company, 1992a). During the period 1950 to 2002, the average number of tornadoes per year that have occurred in Illinois is 30 (NOAA, 2002). For this same period of record, Illinois tornado statistics, based on storm intensity, are summarized in Table 2.7-3 (NOAA, 2002a). It is important to note that the wind speeds associated with the storm intensities (i.e., the Fujita Tornado Scale) listed in Table 2.7-3 are estimates and have never been verified by actual measurement. The scale is based on estimated winds associated with the amount of damage observed after the storm event. For DeWitt and the immediately adjacent surrounding counties, the number of tornadoes reported for the same period are summarized in Table 2.7-4.

Approximately 65 percent of Illinois tornadoes have occurred during the months of March through June, with the highest statewide probability of a tornado occurrence in April. Tornadoes can occur at any hour of the day, but are most common during the afternoon and evening hours. About 50 percent of Illinois tornadoes travel from the southwest to northeast. Slightly over 80 percent exhibit directions of movement toward the northeast through east. Fewer than 2 percent move from a direction with an easterly component (Wilson and Changnon, 1971).

Figure 2.7-1 illustrates the total number of tornadoes recorded during the period (1916-1969) for each county in Illinois. This figure was obtained from the CPS USAR (CPS, 2002). It illustrates that 36 tornadoes originated during the 54-yr period in the five-county area surrounding and including the EGC ESP Site (e.g., DeWitt, McLean, Logan, Macon, and Piatt counties). Three of these tornadoes were recorded in DeWitt County during the 54-yr period. For the period of 1950–2002, 11 tornadoes were recorded in DeWitt County and 188 tornadoes recorded in the 5-county area. In spite of the fact that there was a significant increase in the number of recorded tornadoes in the area from 1950–2002 period, when compared to the 1916–1969 period, there is no reason to believe that the existence of such a large increase actually occurred. Based on a statistical analysis of tornado occurrences in the U.S. over a 70-yr period, Fujita (1987) concluded that the indicated increase in tornado occurrences was a result of increased reporting efficiency and confirmation skill, and that F0 and F1 class tornadoes were typically overlooked during the early data-collection years. Additionally, research conducted by Grazulis (1993) concluded that the increase in urbanization over the past 50 yrs has effectively resulted in an increase in the number of reported tornadoes, if for no other reason than there are more targets destroyed or damaged by a tornado in an urban area than in a rural area. As a result, there is a higher frequency of reported incidents in urban areas than in rural areas.

The likelihood of a given point being struck by a tornado can be calculated by using a method developed by H.C.S. Thom (Thom, 1963). Thom presents a map of the continental U.S. showing the mean annual frequency of occurrence of tornadoes for each 1° square (latitude by longitude) for the period of 1953-1962. For the 1° square (3,634 mi^2 in area) containing the EGC ESP Site, Thom computed an annual average of 1.9 tornadoes. Assuming 2.82 mi^2 is the average tornado path area, the mean probability of a tornado occurring at any point within the 1° square containing the site area in any given year, is calculated to be 0.0015. This converts to a mean recurrence interval of 670 yrs. Using the same annual frequency, but an average area of tornado coverage of 3.5 mi^2 (Wilson and Changnon, 1971), the mean probability of a tornado occurrence is 0.0018. More recent data containing tornado frequencies, for the period of 1955-1967, indicate an annual tornado frequency of 3.2 for the 1° square containing the site (USDOC, 1969). This frequency, in conjunction with Wilson and Changnon's average path area of 3.5 mi^2, results in an estimated mean tornado probability of 0.0031, with a corresponding mean return period of 325 yrs.

The annual tornado probability (for a tornado of any intensity) in the area is best expressed as being in the range of 0.0015 to 0.0031, with a mean tornado return period of 325 to 670 yrs. Based on the observed occurrences of worst case tornadoes in Illinois (i.e., F4 and F5 on the Fujita Scale), an estimate of worst-case tornadic events at the EGC ESP Site can be made. The distribution of tornadoes in Illinois by intensity, as shown in Table 2.7-3 during the period of 1950–2002, indicates that there were 43 occurrences of F4 and F5 tornadoes out of a total of 1,716 tornadoes (i.e., 2.51 percent). Applying this percentage to the range of annual tornado probabilities for the site area, the probability of occurrence of a worst tornado is therefore 0.000038 to 0.000078.

2.7.3.3 Heavy Snow and Severe Glaze Storms

Severe winter storms, which usually produce snowfall in excess of 6 in. and are often accompanied by damaging glaze, are responsible for more damage in Illinois than any other form of severe weather including hail, tornadoes, or lightning (Changnon, 1969). These storms occur on an average of five times per year in the state. The estimated probability of one or more severe winter storms occurring in a given year is virtually 100 percent, while the estimated probability of three or more severe winter storms occurring in Illinois in a year is 87 percent. A typical storm has a median point duration of 14.2 hrs. Point durations have ranged from 2 hrs to 48 hrs during the 61-yr period of record from 1900 to 1960, which is used in the severe winter storm statistical analyses (Changnon, 1969). Data on the average areal extent of severe winter storms in Illinois show that they deposit at least 4 in. of snow over 15,050 mi^2. Central Illinois (including the EGC ESP Site) had 107 occurrences of a 6-in. snow or glaze damage area during the years from 1900-1960. About 42 of those storms deposited more than 6 in. of snowfall in DeWitt County (Changnon, 1969).

The 2-day and 7-day maximum snowfall values (in.) for selected recurrence intervals in the EGC ESP Site area as follows (Changnon, 1969):

	2-yr	5-yr	10-yr	20-yr	30-yr	50-yr
2-day:	7.0	8.6	10.2	12.1	13.4	15.2
7-day:	7.6	10.1	12.8	16.3	18.7	22.0

In the Springfield area, the maximum recorded 24-hr snowfall is 15.0 in, and the maximum monthly snowfall is 24.4 in., both of which occurred in February of 1900. On average, heavy snows of 4 in. to 6 in. have occurred one to two times per year (Changnon, 1969).

Sleet or freezing rain occurs during the colder months of the year when rain falls through a shallow layer of cold air, with a temperature below 32°F from an overlying warm layer of a temperature above 32°F. The rain becomes supercooled as it descends through the cold air. If it cools enough to freeze in the air, it descends to the ground as sleet; otherwise, it freezes upon contact with the ground or other objects, causing glaze.

In Illinois, severe glaze storms occur on an average of about three times every 2 yrs. Statewide statistics indicate that during the 61-yr period from 1900-1960, there were 92 recorded glaze storms defined either by the occurrence of glaze damage or by the occurrence of glaze over at least 10 percent of Illinois. These 92 glaze storms represent 30 percent of the total winter storms in the period. The greatest number of glaze storms in 1 yr is six (1951); in 2 yrs is nine (1950-1951); in 3 yrs is ten (1950-1952); and in 5 yrs is fifteen (1948-1952). In an analysis of these 92 glaze storms, Changnon determined that in 66 storms, the heaviest glaze disappeared within 2 days; in 11 storms it disappeared after 3 to 5 days; in eight storms it disappeared after 6 to 8 days; in four storms it disappeared after 9 to 11 days; and in three storms it disappeared after 12 to 15 days. Fifteen days was the maximum persistence of glaze (1969). Within the central third of Illinois, 11 localized areas received damaging glaze in an average 10-yr period. The EGC ESP Site area averages slightly over 5 days of glaze per year (Changnon, 1969).

Ice measurements recorded in some of the most severe Illinois glaze storms are shown in Table 2.7-5. The list reveals that severe glaze storms that deposit ice of moderate to large radial thickness may occur in any part of Illinois. An average of one storm every 3 yrs will produce glaze ice 0.75 in. or thicker on wires (Changnon, 1969).

Strong winds during and after a glaze storm greatly increase the amount of damage to trees and power lines. In studying wind effects on glaze-loaded wires, the Association of American Railroads concluded that maximum wind gusts were not as significant (harmful) a measure of wind damage as were speeds sustained over 5-minute periods (Association of American Railroads, 1955). Moderate wind speeds (10-24 mph) occurring after glaze storms are most prevalent. Wind speeds of 25 mph or higher are not unusual; however, there has been 5-minute winds in excess of 40 mph with a glaze thickness of 0.25 in. or more (Changnon, 1969). Table 2.7-6 presents specific glaze thickness data for the five fastest 5-minute speeds and the speeds with the five greatest measured glazed thicknesses for 148 glaze storms throughout the country during the period from 1926-1937. Although these data were collected from various locations throughout the U.S., they are considered applicable design values for locations in Illinois.

The 100-yr return period snowpack, as obtained from the ANSI building code requirements (American National Standards Institute [ANSI], 1972), is 22 pounds per square foot (psf), which corresponds to approximately 22 in. of snowpack.

The weight of the accumulation of winter precipitation from a single storm is 13 psf. This is based on the assumption that the worst case storm event would be consistent with the maximum monthly snowfall observed in the Springfield/Peoria area over the past 100 yrs. The maximum recorded monthly snowfall in the area is 24.7 in. (Peoria, January of 1979) and 24.4 in. (Springfield, February of 1900). This translates to the equivalent of about 2.5 in. of precipitable water, and is assumed to be representative of a worst case storm event during the winter months. Thus, a conservative estimate of the accumulated weight of snow and ice that could have occurred (based on actual observations) after a worst case winter storm event is conservatively calculated to be 35 psf (i.e., 22 psf + 13 psf).

2.7.3.4 Hurricanes

The site area has never been affected by tropical cyclones or hurricanes.

2.7.3.5 Inversions and High Air Pollution Potential

Weather records from many U.S. weather stations have been analyzed by Hosler (1961) and Holzworth (1972) with the objective of characterizing atmospheric dispersion potential (Hosler, 1961 and Holzworth, 1972). The seasonal frequencies of inversions based below 500 ft for the general area of the EGC ESP Site are shown in Table 2.7-7.

Since central Illinois has a primarily continental climate, inversion frequencies are expected to be closely related to the diurnal cycle. The less frequent occurrence of storms in summer and early fall is expected to produce a larger frequency of nights with short duration inversion conditions.

Holzworth's data give estimates of the average depth of vigorous vertical mixing, which gives an indication of the vertical depth of atmosphere available for mixing and dispersion of effluents. For the EGC ESP Site region, the seasonal values of the mean daily mixing depths are provided by Holzworth and presented in Table 2.7-8. In general, when daytime (maximum) mixing depths are shallow (i.e., low inversion heights), pollution potential is considered to be greatest.

Holzworth has also presented statistics on the frequency of episodes of high air pollution potential, defined as a combination of low mixing depth and light winds. Holzworth's data indicate that during the 5-yr period of 1960-1964, the region, including the EGC ESP Site, did not experience any episodes of 2 days or longer with mixing depths less than 500 meters (m) and winds less than 2 meters per second (mps). There were two episodes with winds remaining less than 4 mps. For mixing heights less than 1,000 m and winds less than 4 mps, there were approximately nine episodes in the 5-yr period that lasted 2 days or more. However, there were no episodes lasting 5 days or more. Holzworth's data indicates that central Illinois is in a relatively favorable dispersion regime in that a relatively low frequency of extended periods of high air pollution potential is expected (Holzworth, 1972).

2.7.4 Local Meteorology

Local meteorological conditions are characterized by data obtained from an on-site meteorological monitoring system that was installed and began operation at the CPS Site on April 13, 1972. The location of the on-site monitoring system is approximately 3,200-ft south-southeast of the CPS containment structure and approximately 1,800-ft south-southeast of the center of the EGC ESP Site power block footprint. Based on its proximity to the EGC ESP Site, the meteorological parameters that are monitored by the CPS monitoring station are representative of the EGC ESP Site and are, therefore, appropriate for use in characterizing local meteorological conditions in this report. Local meteorological monitoring results and summaries of the parameters monitored by the on-site system are contained in this section. A more detailed description of the physical characteristics of the on-site meteorological monitoring system is described is Section 2.7.5 and Section 6.4. There is also information in Section 2 of the CPS USAR (CPS, 2002), Section 6 of the CPS ER (CPS, 1973) and Section 6 of the CPS ER (OLS) (CPS, 1982). Data from the CPS meteorological monitoring system, as described and documented in these reports, have previously been used in the preparation of the CPS USAR and the CPS ER for the 5-yr period that spans April 13, 1972 through April 30, 1977. These data were also previously used in the assessment of the radiological impacts associated with routine station operation (i.e., routine radiological releases), as well as the impacts of potential accidental releases that could occur during station operation.

During the 5-yr period of record that was reported in the CPS ER (OLS) and the CPS USAR, the meteorological system monitored the following parameters, also summarized in Table 6.1-5 of the CPS ER (CPS, 1973):

Tower Level	**Parameters Measured**
Ground:	Precipitation
10 m:	Wind speed and direction Ambient air temperature Dew point
60 m:	Wind speed and direction Ambient air temperature (for computing delta temperature with 10-m temperature) Delta temperature Dew point

Data available from the CPS on-site meteorological monitoring system were obtained from the same tower system and at the same levels above ground.

Since the CPS began operation in 1987, annual reports have been prepared and submitted to the USNRC. It contains annual summaries, such as joint frequency distributions of wind speed, direction, and atmospheric stability of the meteorological data collected by the CPS on-site meteorological monitoring system. The most recent example of such a report is the *2001 Annual Radioactive Effluent Release Report for the CPS* (Campbell, 2002).

For the purposes of this ER, two different periods of records have been utilized and referenced as follows:

April 13, 1972 to April 30, 1977:	The data from this period of record were representative of the EGC ESP Site prior to construction of the CPS (including the filling of Clinton Lake) and were used in the original CPS ER (OLS) and the CPS USAR for the CPS. Analyses of these data included joint frequency distributions of wind speed, direction, and atmospheric stability, as well as short- and long-term analyses of accidental and routine radiological releases from the CPS.
January 1, 2000 to August 31, 2002:	The data from this period of record were used to characterize site-specific meteorological conditions. They were also used to assess the impacts of long-term routine radiological releases from the EGC ESP Facility using operational software utilized by the CPS personnel.

2.7.4.1 Normal and Extreme Values of Meteorological Parameters

2.7.4.1.1 Wind Summaries

Detailed wind records are available from the CPS meteorological monitoring system for two periods of record, namely 1972–1977 and 2000–2002. Monthly and long-term average wind roses were constructed from wind speed and direction measurements made at the 10-m (33-ft) level of the on-site meteorological tower. The location of the tower is shown in Figure 2.7-2. A composite wind rose for the period of 1972–1977 is presented in Figure 2.7-3, and the composite monthly average wind roses for the same period are shown in Figure 2.7-4 through Figure 2.7-15. A composite wind rose for the period of 2000–2002 is presented in Figure 2.7-16. Seasonal variations are evident from the monthly data for the 1972–1977 period of record. Winds from the south-southeast through west-northwest sectors tend to dominate in most months. Winter months show generally higher wind speeds, fewer calms, and more west-northwest winds than do the summer months. A visual comparison of the composite wind roses for the two periods of record illustrates that the wind speed and direction characteristics of the site area did not change substantially before (1972–1977) and after (2000–2002) the construction of the CPS Facility. The two data periods are similar in their overall characteristics in that they exhibit a predominance of winds from the northwest through the southwest and south-southeast sectors. The most notable differences include a slight increase in occurrence of winds from the northeast sector in the 2000–2002 data period (7 percent versus a less than 5 percent occurrence in the 1972–1977 data). There is also an apparent increase in some direction sectors (of less than approximately 1 percent per sector) in the frequency of occurrence of wind speeds greater than 8 mps in the 2000–2002 period. However, Table 2.7-9 illustrates that for sectors combined there is a general shift towards lower wind speeds in the more recent data. These types of differences are consistent with what can be expected when comparing wind roses and statistical data summaries for periods in the midwestern U.S. Furthermore, such variations will be somewhat more noticeable in the shorter 32-month period of 2000–2002, as a result of year to year variations that may otherwise be averaged out over a longer 5-yr period.

For the 1972–1977 period of record, there were two occurrences of persistence of wind direction for 33 hrs (the longest persistence observed). These occurred in two sectors, the south-southwest and the northeast.

2.7.4.1.2 Temperatures

Temperatures at the CPS meteorological monitoring site are measured at the 10- and 60-m level of the tower. For the 1972–1977 period of record, the average daily temperature was 50.9°F. The absolute maximum temperature was 95.4°F, and the absolute minimum temperature was -19.8°F. The 1972–1977 period of record and composite monthly summaries of the on-site temperature data are presented in Tables 2.7-10 through Table 2.7-12. These data are believed to be representative of the site area, and have been previously shown to be consistent with regional observations from Peoria and Springfield.

2.7.4.1.3 Atmospheric Moisture

2.7.4.1.3.1 Relative Humidity

The relative humidity for a given moisture content of the air is inversely proportional to the temperature cycle. Maximum relative humidity usually occurs during the early morning hours, and minimum relative humidity is typically observed in the mid-afternoon. For the annual cycle, the lowest humidities occur in mid-spring; the winter months experience the highest humidities. Table 2.7-13 presents a summary of relative humidity at the 10-m level for the CPS during the period from 1972–1977. These data are believed to be representative of the site area, and have been previously shown to be consistent with regional observations from Peoria and Springfield.

2.7.4.1.3.2 Wet Bulb

The wet bulb temperature is not as strong a function of the ambient temperature as the relative humidity. Wet bulb temperature is used for evaporative cooling system modeling studies. The wet bulb temperature is defined to be the temperature in which an air parcel may be cooled by evaporating water into it at a constant pressure until it is saturated. The latent heat utilized in the process is supplied by the air parcel. Summaries of 10-m wet bulb temperatures are presented in Table 2.7-14 for the period from 1972–1977. These values were calculated from the dew point and ambient temperatures, assuming a constant standard sea level pressure of 1,013.25 millibars. These data are believed to be representative of the site area, and have been previously shown to be consistent with regional observations from Peoria and Springfield.

2.7.4.1.3.3 Dew Point Temperature

Dew point temperature is a measure of absolute humidity in the air. It is the temperature in which the air must be cooled to cause condensation to occur, assuming pressure and water vapor content remain constant. Summaries of composite monthly and period of record 10-m dew point measurements are presented in Tables 2.7-15 through Table 2.7-17 for the period from 1972–1977. These data are believed to be representative of the site area, and have been previously shown to be consistent with regional observations from Peoria and Springfield.

2.7.4.1.4 Precipitation

The average yearly precipitation for the 1972–1977 period of record for the EGC ESP Site is 25.47 in. Period of record and composite monthly precipitation data appear in Table 2.7-18. The months of March and June are the wettest, and December, January, and February are the driest. These data are believed to be representative of the site area, and have been previously shown to be consistent with regional observations from Peoria and Springfield.

2.7.4.1.5 Fog

Fog is an aggregate of minute water droplets suspended in the atmosphere near the surface of the earth. According to international definition, fog reduces visibility to less than 0.62 mi According to U.S. observing practice, ground fog is a fog that hides less than 60 percent of the sky, and does not extend to the base of any clouds that may lie above it. Ice fog is fog composed of suspended particles of ice. It usually occurs in high latitudes in calm, clear weather at temperatures below -20°F, and increases in frequency as temperature decreases (AMS, 1970).

Since local data are not available to assess the fog statistics at the EGC ESP Site, data are presented for nearby Springfield and Peoria. Fog is a very local phenomenon; thus, this data will be considered as only regional estimates. The average number of days during which heavy fog (visibility less than 0.25 mi) was observed is presented in Table 2.7-19 for the 23-yr period of 1949–1971. The yearly average number of fog days for this reporting period was 18.5 days in Springfield and 20 days in Peoria, with the highest occurrence of fog in the winter months for both locations.

Table 2.7-20 and Table 2.7-21 also summarize the frequency of occurrence, number of hours, and persistence of fog for Peoria and Springfield, respectively. These summaries were obtained from the CPS USAR (CPS, 2002), and were originally prepared by processing the digital data tapes for these NWS observation stations. Fog extracted from these tapes included any of the fogs coded as either "fog," "ground fog," or "ice fog," which occurred in column 132, "obstruction to vision," on the Airways Surface Observations tapes.

The percentage of the total fog observations reported for Peoria and Springfield is presented in Table 2.7-20 and Table 2.7-21. The table also provides information on the hour and the percentage of observations for that hour of the maximum and minimum fog occurrence.

Peoria was observed to have a higher frequency of fog in all months. The long-term annual average percent of hourly observations with any intensity of fog for Peoria and Springfield were 11.3 percent and 9.1 percent, respectively. The occurrence of prolonged periods of fog was also greater for Peoria. Although information on fog is generally a very local phenomenon, the expected occurrences at the EGC ESP Site will be within the range represented by these two stations.

A less detailed summary of fog occurrence in Peoria and Springfield available for a 40-yr reporting period spanning over 1951–1990 (Gale Research Company, 1992a), indicates that the average occurrence of fog is 21 times per year in Peoria and 17 times per year in Springfield.

The observations of fog in Peoria and Springfield, at approximately 20 to 21 days of occurrence per year, can be considered to be a "baseline" occurrence. This is because they do not account for any occurrences of fog associated with the presence of Clinton Lake or the once through cooling system used by the CPS. During winter months, cold air passing over the relatively warmer water surface of Clinton Lake can become saturated with respect to water vapor. When sufficient evaporated water vapor condenses into droplets, steam fog occurs. The characteristics of such steam fog will vary with the water temperature, the distance traveled over the water, the low level ambient air temperature, relative humidity, vertical and horizontal stability, and the transporting wind speed.

In addition to the regional observations of fog obtained from the Springfield and Peoria airports, the impacts of fog associated with the presence of Clinton Lake and the once through cooling were previously addressed and documented in Section 2.3.2.2.2 of the CPS USAR (CPS, 2002). An analytical model was used to account for the processes of evaporation, condensation, and diffusion downwind. A description of the model that was used was provided in Attachment A2.3 (Analytical Fog Model) of the CPS USAR. The modeling analysis focused on a number of areas surrounding the CPS including roadways and areas of population. The steam fog prediction model was used to calculate the occurrence of restricted visibility caused by steam fog in the specified areas of interest. This process was repeated for each month to account for the monthly difference in water temperature. The results were documented in several hundred maps showing the concentration of water vapor and water droplets for Clinton Lake and adjacent areas. The maps produced by the computer fog model illustrated the horizontal extent of visible water vapor plumes that were predicted to occur with a given wind direction for a specified combination of air temperature and relative humidity. The analyses of these maps as described in the CPS USAR concluded that the maximum extent of reduced visibility beyond Clinton Lake from the lake steam fog would generally be confined to the area that is south of Clinton Lake and east of the Town of Lane. However, steam fog was predicted to occasionally drift over IL Route 54, where it passes near the northern edge of Clinton Lake. The steam fog analysis also concluded that there was no significant probability of lake steam fog extending to the towns of DeWitt or Lane. In addition, the remaining sections of roads around Clinton Lake were not affected significantly by the predicted lake steam fog. In general, the steam fog analysis presented in the CPS USAR concluded that the maximum horizontal extent of steam fog from Clinton Lake would be 1 mi or less. The extent of extremely dense steam fog would be limited to the area immediately adjacent to Clinton Lake, and, in particular, the shallow water discharge flume and the point of discharge to the lake.

2.7.4.1.6 Atmospheric Stability

For estimates of average dispersion over extended periods, the joint probability of occurrence of wind speed, wind direction, and atmospheric stability must be known. These probabilities, or frequencies, have been generated from on-site data using the vertical temperature gradient and the variability of the horizontal wind to estimate atmospheric stability in accordance with Regulatory Guide 1.23. Joint frequency distributions of wind speed, wind direction, and atmospheric stability measured at the site are provided in Table 2.7-22 through Table 2.7-29 for the 1972–1977 period of record. Joint frequency distributions for the 2000–2002 period of record are provided in Table 2.7-30 through Table 2.7-37.

Table 2.7-38 summarizes the percent frequencies of occurrence for each stability class (determined on the basis of vertical temperature gradient) recorded at the EGC ESP Site. The upper part of the table summarizes the 1972–1977 period of record, and the lower part summarizes the 2000–2002 period of record.

For the 1972–1977 period of record, the combination of E stability and calm winds (less than 0.3 mps) occurred 0.06 percent of the time; F and calm conditions occurred 0.06 percent of the time; and G and calm conditions occurred 0.12 percent of the time. For the 2000–2002 period of record, only 9 hrs of calm winds occurred out of 21,430 hrs of valid observations and 1,937 hrs of missing data (see Table 2.7-30 through Table 2.7-37).

2.7.4.1.7 Topographical Description of the Surrounding Area

Figure 2.7-17 is a topographic map of the area within 5 mi of the site. Figure 2.7-18 shows topographic cross sections in the 16 primary compass directions radiating from the site. The crosshatched sections represent the areas associated with Clinton Lake. The EGC ESP Facility will be located at an elevation of approximately 735-ft above msl. Within the 5-mi radius, no land elevation is above 760 ft or below 640 ft. Most of this modest relief is due to the shallow valleys surrounding North Fork of Salt Creek and Salt Creek. These valleys form the boundaries of the CPS cooling lake (Clinton Lake). The surface of Clinton Lake is approximately 690-ft above msl. Thus, a large portion of the topographical relief in the immediate area is filled by Clinton Lake.

The terrain in central Illinois is relatively flat and differences in elevation will have no influence on the general climate within 50 mi of the project site. However, the low hills and shallow river valleys that do exist could exert a small effect upon nocturnal wind drainage patterns and fog frequency under certain atmospheric conditions.

In the immediate vicinity of the site, the 4,895-ac Clinton Lake represents a discontinuity in the ground surface over which diffusing gases can travel. Clinton Lake presents a smoother surface than does the land over which the air parcels will travel and, for both east and west winds, there will be up to a maximum of approximately 6,000 ft (1.1 mi) of upwind-downwind fetch that could potentially have an effect on diffusion downwind of the site. Under certain atmospheric conditions, this could reduce the surface- or mechanically-induced turbulence, and thus, the resulting diffusion of any pollutants released from the station. At the same time, however, reduced frictional effects would allow for an increase in wind speed. Thus, to some effect, it will mitigate the effects of decreased diffusion due to turbulence. In view of the relatively short distances across Clinton Lake for releases from the facility under most wind directions, no adjustments in the diffusion calculations are proposed to account for the reduction in surface roughness caused by Clinton Lake.

Since Clinton Lake is used as a heat sink for the CPS reactor, a more potentially significant impact of Clinton Lake is the warm surface that it can present to the atmosphere that, at times, can be much warmer than the surrounding ground and air. Under these conditions, this increase in surface temperature could cause the layer of air in contact with Clinton Lake to achieve a neutral or unstable lapse rate in the vertical, especially when thermally stable conditions prevail over the land. In addition, a release from a ground level source would undergo some additional vertical diffusion over Clinton Lake than would be computed (using a stable delta temperature based stability category) from the meteorological tower. However, due to the relatively small dimensions of Clinton Lake and its orientation with respect to the facility, no adjustments are proposed to the diffusion calculations. Additional dispersion effects attributable to elevated lake temperatures were not accounted for. This should add to the conservative nature of the routine and accidental release diffusion estimates that are described in detail later in this section.

The natural topography of the area surrounding the site is considered to be rural in nature and is not expected to affect the diffusion estimates.

2.7.4.2 Local Meteorological Conditions for Design and Operating Bases

Design and operating bases, such as tornado parameters, ice glaze thickness, and winter probable maximum precipitation are statistics by which definition and necessity are based upon long-term regional records. While data collected at the on-site meteorological monitoring system can be considered representative of long-term site meteorology, long-term regional data are most appropriate for use as conservative estimates of climatological extremes. Therefore, the design and operating basis conditions were based upon regional meteorological data, as described in Section 2.7.1.

2.7.5 On-Site Meteorological Measurements Program

Detailed information on the meteorological measurements program, including system design, location, instrumentation, and data reduction protocols, have previously been described in Section 2 of the CPS USAR (CPS, 2002), Section 6 of the CPS ER (CPS, 1973) and Section 6 of the CPS ER (OLS) (CPS, 1982). Since the proposed EGC ESP Site location is adjacent to the CPS Facility, the location of the CPS meteorological monitoring tower and system is considered to be ideally situated for the on-site meteorological measurements required for this ESP evaluation. A summary description of the system, including the chronology of the instrumentation in use at the CPS and the EGC ESP sites, is provided below.

2.7.5.1 Instrumentation

The CPS meteorological monitoring tower is located approximately 3,200-ft south-southeast of the CPS containment structure, and approximately 1,800-ft south-southeast of the center of the EGC ESP Site. The tower is located in an open area with no trees. Tall obstructions or topographical features in the immediate vicinity of the tower could cause a bias in the measured values of the parameters. Soybeans and similar crops have historically been raised in the fields surrounding the plot that contains the tower. The ground immediately under the tower is covered with short natural grasses and weeds. Heating and ventilation are thermostatically controlled in the instrument shed to provide a controlled environment for the signal translating equipment. The location of the tower with respect to the CPS and the EGC ESP Facility is shown in Figure 2.7-2. The tower has been at this location since its original installation.

It is noted that some of the original monitoring equipment (i.e., sensors, data recorders, electronic data loggers, remote interrogation equipment) have undergone routine replacement, repair, and upgrade since the original installation of the system. Additionally, certain changes in the method of data reduction have been made since the original installation date, with a transition from a manual to an electronic based system with strip chart backup. However, the basic monitoring system hardware that is in use at the CPS is very similar to what was originally installed in 1972. The meteorological monitoring system has been demonstrated throughout this period to be compliant with Regulatory Guide 1.23 (USNRC, 1972).

Data from the two periods of record used in this report (see Section 2.7.4) were found to compare relatively favorably, although some differences exist that are believed to be attributable to increased instrument accuracy, lower monitoring thresholds, and improved (electronic) methods of data reduction and interpretation. These two data sets were used and evaluated separately, rather than in combination because of these improvements over time. The original data and analyses, as presented in the CPS USAR and construction and licensing phase ERs, were supplemented with the additional analyses based on the more recent 2000–2002 data period.

The CPS meteorological monitoring system is slated for a substantial upgrade to improve the overall system reliability, data capture efficiency, data accuracy, and data retention recordkeeping. The new system is being designed to be fully compliant with Regulatory Guide 1.23. In addition, it will include the replacement of the electronics at the 10-m and 60-m levels of the existing tower including wind speed sensors, wind direction sensors, temperature sensors, and dew point sensors. The existing rain gauge will be retained, but rewired to new electronics. System electronics being replaced or added will include new multiplexer (MUX) components, instrument cabinets, digital recorder, data logger, and instrument cabling. The new monitoring sensors will be generally more accurate, and in some cases with lower monitoring thresholds than the sensors that will be replaced. When the upgrade becomes operational, a new data processing software system will also be implemented, replacing the previous MIDAS™ system. The new system, which will be supplied and installed by the CPS meteorological consultants (Murray and Trettel, Inc.), is the Yokagowa developed Darwin DW/WA DP300-13 Enhanced Data Logging Software (Release Revision 2). Murray and Trettel have advised the CPS staff that the meteorological data obtained and processed by the MIDAS™ system can be made compatible with the data produced by the new Darwin software system.

Meteorological monitoring instruments are also located on a nearby microwave tower to act as a backup to the existing meteorological monitoring instruments on the primary meteorological tower. The microwave tower is 250-ft high with instrumentation installed at the 10-m (33-ft) level. Backup instrumentation on this tower consists of wind speed and direction sensors only. The location of the tower is depicted in Figure 2.7-2.

The CPS USAR also included the submittal of a complete record of 12 consecutive months of hour by hour on-site meteorological data for the 1-yr period from 12:00 A.M., January 15, 1973 to 11:59 P.M., January 14, 1974. Also included with this submittal were two attachments (see Section 2.3.3 of the CPS USAR; CPS, 2002):

- Attachment A – listing of the dates and hours of missing data in the period.
- Attachment B – listing of recommended substitute values for the missing data. The bases for the substitutions were extrapolations and interpolation using data before and after the missing period. There were no lengthy periods of missing data that required more involved methods. There are no recommended values for precipitation given.

2.7.5.1.1 Wind System

The wind speed and direction at the 10-m and 60-m levels of the primary meteorological tower system are measured by a combined cup and vane sensor. A more detailed discussion of the monitoring instrumentation used to record wind speeds at the site since 1972 is provided in Section 6.4.

2.7.5.1.2 Temperature and Delta Temperature System

Temperature is sensed by an aspirated dual temperature sensor at the 60-m level, and an aspirated dual temperature sensor at the 10-m level. One-half of the dual sensor at each elevation is used for ambient temperature. The other half of each sensor is used to provide a differential temperature (delta temperature) between the 10-m and 60-m elevation. A more detailed discussion of the monitoring instrumentation used to record temperature and delta temperature at the site since 1972 is provided in Section 6.4.

2.7.5.1.3 Dew Point System

Lower level (10 m) dew point is measured with an aspirated dew point sensor. A more detailed discussion of the monitoring instrumentation used to record dew point at the site since 1972 is provided in Section 6.4.

2.7.5.1.4 Precipitation System

Precipitation is measured by a tipping bucket rain gauge. A more detailed discussion of the monitoring instrumentation used to record precipitation at the site since 1972 is provided in Section 6.4.

2.7.5.2 Maintenance and Calibration

Emergency maintenance may be performed by the system vendor, with routine maintenance performed by the CPS technicians. Data recovery is normally greater than 90 percent for the parameters.

Semiannual calibrations are periodically performed by trained technicians. Ice baths are used to check ambient temperature sensors. The lithium chloride dew point unit is checked against calibrated material and test equipment.

The wind direction and wind speed sensors are checked for normal operation, according to vendor specifications.

A more detailed discussion of the meteorological monitoring system maintenance and calibration procedures used at the site since 1972 is provided in Section 6.4.

2.7.5.3 Data Reduction

A discussion of the data reduction procedures used on the data obtained from the meteorological monitoring system since 1972 is provided in Section 6.4.

2.7.5.4 Control Room Monitoring

Meteorological data are recorded in the CPS main control room. Additionally, 10-minute averages are available on the radiation monitoring system cathode-ray tube (CRT) terminal in the technical support center (TSC).

The main control room wind recorders are dual 5-in. zone, continuous strip, and 3-in. per hour chart recorders. They continuously record wind direction and speed at the 10-m and 60-m level. A multi-point recorder records 10-m and 60-m temperature, delta temperature, precipitation, and 10-m dew point.

2.7.6 Short-Term Diffusion Estimates

2.7.6.1 Objective

Conservative estimates of the local atmospheric dilution factors (Chi/Q) for the EGC ESP Facility are available from two sources of information:

- Chi/Q analyses (including 5 and 50 percent probability levels that are described and presented in the CPS USAR for the CPS (CPS, 2002); and
- Chi/Q estimates using the PAVAN Computer code (described in Section 2.7.6.3) and the on-site meteorological data from the period of 2000–2002.

Sections 2.7.6.2 and Section 2.7.6.3 provide additional information on the results of the short-term Chi/Q estimates for the EGC ESP Facility.

2.7.6.2 Chi/Q Estimates From the CPS USAR

The short-term Chi/Q analyses presented in the CPS USAR were prepared for the CPS exclusion area boundary (EAB). This was defined to be 975 m from the release point in sectors, as well as the low population zone (LPZ) that was defined to be 4,018 m from the release point in all directions. Calculations were made for sliding time period windows of 1, 8, 16, 72, and 624 hrs using on-site meteorological data obtained from the CPS meteorological monitoring system during the April 4, 1972 through April 30, 1977 meteorological monitoring period. Calculations of the short-term ground level atmospheric dilution factors for the CPS were performed using Gaussian plume diffusion models for a continuously emitting ground level source, in accordance with guidance provided in Regulatory Guide 1.145 (USNRC, 1983). Hourly centerline χ/Q values were computed from concurrent hourly mean values of wind speed, wind direction and variability, and Pasquill stability class of the on-site meteorological data. The wind speed at the 10-m level was used in the diffusion estimates for the ground level release. The Pasquill stability class was determined from the measured vertical temperature difference (delta temperature) and the variation of horizontal wind direction, according to Regulatory Guide 1.23 (USNRC, 1972). Calms were assigned a wind speed value equal to the starting speed of the wind vane (0.7 mph). Cumulative frequency distributions were prepared to determine the Chi/Q values that exceeded no more than 5 percent and 50 percent of the time.

The short-term diffusion estimates that were made for the CPS are also representative of short-term releases from the EGC ESP Facility, based on the following assumptions:

- The EAB for the EGC ESP Facility is defined to be 1,025 m, which compares with the EAB that was defined for the CPS of 975 m. Since the EAB in the CPS USAR analysis for the CPS is smaller than the EAB for the proposed unit by 50 m, the results will be slightly more conservative (higher) than if the larger EAB were used in the analysis. Since the accidental release modeling was performed as a ground level release, the predicted concentrations decrease with increasing distance from the source.
- The LPZ distance of 4,018 m is the same as the LPZ used in the CPS USAR analysis.
- The meteorological data and characteristics used in the original analysis are still representative of the site conditions.

Gaussian plume diffusion models for ground level concentration were used to describe the downwind spread of effluents (Campbell, 2002). A continuous ground level release of effluents at a constant emission rate was assumed in the diffusion estimates. Total reflection of the plume at ground level was assumed in the diffusion estimates (i.e., no deposition or reaction at the surface). Hourly Chi/Q values were calculated by using the following equations:

Equation 2.7-2: $Chi/Q = 1/(u_{10}\ \pi\ \Sigma_y\ \sigma_z)$

Equation 2.7-3: $Chi/Q = 1/[u_{10}\ (\pi\sigma_y\sigma_z + A/2)]$

Equation 2.7-4: $Chi/Q = 1/[u_{10}\ (3\ \pi\ \sigma_{y3}\ \sigma_z)]$

Chi/Q = Relative centerline concentration (sec/m^3) at ground level

$\pi = 3.14159$

u_{10} = Wind speed (mps) at 10-m above the ground

Σ_y = Lateral plume spread (m), a function of atmospheric stability, wind speed, and downwind distance from the point of release. For distances to 800 m, $\Sigma_y = M\sigma_y$; M being a function of atmospheric stability and wind speed. For distances greater than 800 m, $\Sigma_y = (M\text{-}1)\ \sigma_{y\ 800m} + \sigma_y$

σ_y = Lateral plume spread as a function of atmospheric stability and distance

σ_z = Vertical plume spread as a function of atmospheric stability and distance

A = Smallest vertical plane, cross-sectional area of the building from which the effluent is released (A=2,069 m^2)

For neutral to stable conditions with wind speeds less than 6 mps, Equation 2.7-3 and Equation 2.7-4 were calculated and compared, and the higher Chi/Q was selected. This higher value was compared to the Chi/Q resulting from Equation 2.7-2 and the lower was selected. This was done in accordance with Regulatory Guide 1.145 (USNRC, 1983). For other stability and/or wind speed conditions, Chi/Q was selected as the higher value from Equation 2.7-3 and Equation 2.7-4.

From these hourly Chi/Q values, cumulative frequency distributions were prepared from the mean values of sliding time windows of 1, 2, 8, 16, 72, and 624 hrs. These intervals correspond to time periods of 0-1 hr, 0-2 hrs, 0-8 hrs, 8-24 hrs, 1-4 days, and 4-30 days. For each time period used, the mean centerline χ/Q value in each sector was computed. The results of these analyses are presented in Table 2.7-39 through Table 2.7-50.

2.7.6.3 Chi/Q Estimates using the PAVAN Computer Code and On-Site Data

The PAVAN computer code (USNRC, 1982) was used to calculate short-term accident Chi/Q values attributable to potential accidental releases from the proposed EGC ESP Facility. It was determined in accordance with Regulatory Guide 1.145 for the 0.5 percent maximum sector Chi/Q and the 5 percent direction independent value. In addition, 50 percent direction independent values were determined. The model ran for two cases using 2 yrs and 8 months of on-site meteorological data from the period of 2000–2002, a description is provided above. The following two cases were evaluated:

- Case 1: CPS Site distances used in CPS USAR (EAB = 975 m, LPZ = 4,018 m)
- Case 2: EGC ESP Site distance (EAB =1,025 m, LPZ = 4,018 m)

In addition, Case 2 was evaluated with and without building wake effects.

These two cases were modeled to facilitate an evaluation and comparison of the Chi/Q calculations with those presented in the CPS USAR, as well as to examine the relative significance of building wake effects on the calculations.

Input to the PAVAN model consisted of the following:

- Meteorological Data: Joint frequency distribution of wind speed, wind direction, atmospheric stability, 16 standard azimuthal sectors, period of record January 1, 2000 to August 31, 2002 (see Table 2.7-30 through Table 2.7-37)
- Wind Sensor Height: 10 m
- Delta Temperature Heights: 10 m – 60 m
- Number of Wind Speed Categories: 6
- Minimum Building Cross Section: 2,069 m^2 (equivalent to the CPS containment structure)
- Containment Height: 76.1 m
- Release Height: 10 m (ground level default height)

The release points and receptor locations in this analysis are defined as the EGC ESP Site EAB (1,025 m) and LPZ (4,018 m).

Short-term Chi/Q analyses were performed using the PAVAN model. The results of the PAVAN modeling analysis are summarized in Table 2.7-51 and Table 2.7-52. Table 2.7-51 summarizes, in a matrix format, the results of the modeling analysis for the two cases discussed above. Maximum sector Chi/Qs from the PAVAN modeling analysis are compared with the maximum sector Chi/Qs in the CPS USAR. It is noted that the PAVAN results for the EGC ESP Site distances reflect the limiting values based on the 0.5 percent maximum sector Chi/Q. The values from the CPS USAR reflect the 5 percent maximum sector. A review of the results summarized in the table leads to the following conclusions:

- A comparison of the CPS USAR and the PAVAN Chi/Qs for the CPS 975-m EAB distance indicates that the results are similar, with the PAVAN model results being only moderately greater for averaging periods. Differences are attributed to the different models used, as well as differences in the meteorology used in each analysis (i.e., 1972–1977 for the CPS USAR analysis and 2000–2002 for the PAVAN analysis).
- A comparison of the CPS USAR and the PAVAN Chi/Qs for the 4,018-m LPZ distance indicates that the results are similar, with the PAVAN model results being only moderately greater for averaging periods. Differences are attributed to the different models used, as well as differences in the meteorology used in each analysis (i.e., 1972–1977 for the CPS USAR analysis and 2000–2002 for the PAVAN analysis).
- A comparison of Case 2 results in both with and without building wake effects, and illustrates that building wake effects have very little influence on Chi/Qs, particularly for very short averaging periods. This conclusion is the same for both the EAB distance of 1,025 m and the LPZ distance of 4,018 m. Since the results obtained without building

wakes tend to be slightly higher at both distances (i.e., for averaging periods greater than 2 hrs), these values are used for further ESP evaluations or analyses.

2.7.6.4 Chi/Q Estimates for Short-Term Diffusion Calculations

Although the results of the Chi/Q analyses discussed above have been demonstrated to compare favorably with one another, the results of the analysis using the PAVAN model and the meteorological data for the period 2000–2002 are moderately higher for some scenarios. Since this is a more conservative estimate of the Chi/Qs, they will be used for the short-term diffusion estimates.

2.7.7 Long-Term (Routine) Diffusion Estimates

2.7.7.1 Objective

Estimates of long-term atmospheric dilution factors (Chi/Q) and relative deposition (D/Q) were made using a straight line Gaussian model, consistent with Regulatory Guides 1.111 and 1.109. The objective was to calculate Chi/Q and D/Q values at the following locations in the 16 primary directions including:

- Nearest property boundary;
- Exclusion area boundary;
- Low population zone;
- Nearest milk cow;
- Nearest milk goat;
- Nearest garden;
- Nearest meat animal;
- Nearest residence; and
- Distances of 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 6.0, 8.0, 10.0, 15.0 20.0, 25.0, 30.0, 35.0, 40.0, 45.0, and 47.5 mi from the EGC ESP Facility.

Section 2.7.7.2 provides additional information on the results of the long-term Chi/Q estimates for the EGC ESP Facility.

2.7.7.2 Calculations

The calculations were made using the MIDAS© suite of software programs that is licensed and installed at the CPS (CPS, 2002). Program XDCALC from the MIDAS™ software package calculates hourly centerline values of Chi/Q and D/Q, and accumulates those values over any specified time period less than 32,760 hrs.

The calculations of Chi/Q and D/Q were made by program XDCALC using hourly on-site meteorological data. Hourly meteorological data was obtained using the 15-minute observation period that ended on each hour. The program was used to estimate centerline Chi/Qs and D/Qs for a ground level release, with an assumed height of release of 10 m. The 10-m release height is consistent with the height at which wind speed and direction are measured on the CPS meteorological tower, as well as with USNRC guidance for the modeling of ground level releases. Assumptions used in the analysis are summarized below:

- Meteorological Data Source: CPS on-site meteorological tower
- Period of Record: January 1, 2000 to August 31, 2002
- Wind Reference Level: 10 m
- Stability Calculation: Delta temperature (10-m and 60-m tower levels)
- Release Type: Ground level
- Release Height: 10 m
- Building Wake Effects: Included

The results of the long-term diffusion modeling analysis are contained in Table 2.7-53 to represent undepleted Chi/Q calculations from the EGC ESP Facility. Table 2.7-54 represents Chi/Q calculations that account for deposition effects. Table 2.7-55 contains estimates that include radioactive decay with an overall half-life of 2.26 days for short-lived noble gases. Table 2.7-56 contains estimates that include an 8-day half-life for iodines released to the atmosphere.

2.8 Other Federal Projects

The purpose of this section is to identify any federal activities that are related to the project, review cumulative impacts due to the projects, and the possible need for another federal agency to participate in the preparation of the environmental impact statement as a cooperating agency. Actions related only to the granting of licenses, permits, or approvals by other federal agencies are not considered in this review, in accordance with NUREG-1555 (USNRC, 1999). A review of possible federal agency actions in the vicinity shows that no other federal projects are associated with this ESP application. Future federal actions related to this project include permits and licenses that may be required at the time of the COL application. Other federal projects may be required at the COL stage, such as transmission-related studies by FERC. However, these activities do not relate to the ESP, and have not been started. Thus, the cumulative impacts from any of these future activities cannot be postulated.

In summary, no other federal activities or projects are associated with the permitting of the EGC ESP Site, as listed below.

- There are no federal actions planned associated with acquisition and/or use of the EGC ESP Site.
- There are no federal projects planned that will be required to provide facility cooling water.
- There are no federal projects planned that must be completed as a condition of facility construction or operation.
- There are no federal projects that are contingent on facility construction and operation.

CHAPTER 2

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CHAPTER 2

Tables

TABLE 2.2-1
Land Use in the Site and Vicinity

USGS Land Use Classification	Percent of Site Area	Area within Site (ac)	Percent of Vicinity Area	Area within Vicinity (ac)
Recreation	0%	0	16.6%	12,076
Agricultural	0%	0	82.1%	59,870
Industrial	100%	461	0.7%	512
Residential	0%	0	0.7%	512

Source: USGS, 1992

Note: Entire area within site boundary is zoned industrial. Actual land cover within the site boundary varies.

TABLE 2.2-2
Land Use Within the Transmission Corridors

USGS Land Use Classification	Percent of Region Area	Area within Region (ac)
Recreation	10.7%	101
Agricultural	88.2%	836
Industrial	1.1%	10
Residential	0%	0

Source: USGS, 1992

TABLE 2.2-3
Land Use in the Region

USGS Land Use Classification	Percent of Region Area	Area within Region (ac)
Recreation	5.4%	269,258
Agricultural	92.5%	4,580,167
Industrial	0.6%	27,530
Residential	1.5%	71,843

Source: USGS, 1992

TABLE 2.2-4
2000 Yields for Principal Agricultural Products for Counties in the Region

County	Production (bushels)		
	Corn	Soybeans	Wheat
DeWitt	15,904,000	4,601,300	97,500
McLean	51,057,000	14,602,900	0[a]
Logan	29,340,000	7,646,900	132,800
Macon	26,023,600	7,242,200	109,800
Piatt	21,248,000	5,990,000	---[b]
Champaign	40,034,500	12,492,600	238,400[b]
Douglas	18,259,200	5,659,200	160,000[c]
Moultrie	15,016,400	4,075,200	---[c]
Shelby	29,291,100	7,787,900	1,228,800
Christian	34,621,200	8,756,300	276,000
Sangamon	35,635,200	9,350,400	67,200
Menard	13,711,600	3,263,700	158,400
Mason	16,747,600	4,307,600	382,800
Tazewell	24,057,000	6,038,400	207,900
Woodford	21,488,000	6,182,400	175,200
Livingston	42,277,200	12,874,400	361,900
Ford	19,570,400	5,665,800	150,000
Coles	20,202,200	5,595,000	110,400
Iroquois	45,472,000	12,641,200	364,500
Vermilion	29,947,200	9,801,000	285,000

Source: IDOA, 2001

[a] Counties with less than 1,000 ac harvested for grain not published.
[b] Piatt County combined with Champaign County.
[c] Douglas County combined with Moultrie County.

TABLE 2.3-1
Drainage Characteristics of Salt Creek and its Tributaries

Creek	Length (mi)	Drainage Area (mi^2)	Maximum Relief (ft)	Average Annual Runoff (in)
North Fork	26	128	270	9.73
Lake Fork	40	280	210	8.88
Deer Creek	25	81	240	10.30
Kickapoo Creek	55	330	380	8.91
Sugar Creek	55	480	380	8.63
Tenmile Creek	19	41	250	10.10
Salt Creek	92	1860	440	9.17

Source: CPS, 1982 and Knapp, 1999

[a] Data not available

TABLE 2.3-2
Mean Monthly Runoff, Rainfall, and Natural Lake Evaporation Data for Salt Creek Basin (Postdam)

Month	Mean Runoff (in)	Mean Rainfall (in)	Percent of Rainfall as Runoff	Mean Lake Evaporation (in)
January	0.80	1.91	41.7%	---[a]
February	1.01	1.99	50.4%	---[a]
March	1.99	3.13	63.6%	1.17
April	1.76	4.31	40.8%	3.34
May	1.86	4.50	41.3%	5.19
June	1.21	3.82	31.6%	6.41
July	0.84	4.43	18.9%	6.24
August	0.50	3.78	13.2%	5.26
September	0.21	2.51	8.4%	4.14
October	0.35	3.36	10.5%	2.47
November	0.57	3.63	15.8%	0.52
December	0.87	2.80	31.2%	---[a]
Total	**11.97**	**40.17**	**29.8%[b]**	**34.74**

Source: USGS, 2002; MRCC, 2002 and 2002a

[a] Data not available

[b] Percentage taken as an average rather than a total

TABLE 2.3-3
Discharge Data for Salt Creek at Rowell

Discharge	Postdam Magnitude (1978-1999) (cfs)
Mean Annual	295
Highest Mean Monthly	578 (March)
Lowest Mean Monthly (September)	63
Maximum Mean Daily Peak	6960
Minimum Mean Daily Low	3.7

Source: USGS, 2002

TABLE 2.3-4
Calculated Peak Flood Magnitudes and Frequencies at Rowell Gauging Station and at Dam Site

Recurrence Interval (year)	Postdam Flood Magnitude (cfs)	
	Rowell Gauge	Clinton Lake Dam
2.33	3,600	3,200
10	6,200	5,500
25	7,900	7,000
50	9,100	8,000
100	10,400	9,200

Source: USGS, 2002

TABLE 2.3-5
Monthly Runoff on Salt Creek at Rowell Gauging Station for the Years 1952 through 1957 and 1988 Droughts

Month	Runoff per Year (in)						
	1952 [a]	1953 [a]	1954 [a]	1955 [a]	1956 [a]	1957 [a]	1988 [b]
January	--- [c]	0.11	0.13	0.18	0.05	0.20	0.96
February	--- [c]	0.20	0.08	0.53	0.49	0.39	0.83
March	--- [c]	1.60	0.14	0.57	0.28	0.20	0.72
April	--- [c]	1.57	0.43	0.54	0.19	--- [c]	1.00
May	--- [c]	0.43	0.12	0.43	2.33	--- [c]	0.16
June	--- [c]	0.52	0.35	0.89	0.67	--- [c]	0.05
July	--- [c]	0.90	0.03	0.19	0.18	--- [c]	0.03
August	0.09	0.12	0.07	0.03	0.33	--- [c]	0.02
September	0.04	0.03	0.006	0.03	0.03	--- [c]	0.02
October	0.03	0.02	0.05	0.20	0.01	--- [c]	0.03
November	0.05	0.03	0.02	0.10	0.03	--- [c]	0.03
December	0.06	0.04	0.03	0.08	0.04	--- [c]	0.05
Annual Total	--- [c]	**5.57**	**1.46**	**3.77**	**4.63**	--- [c]	**3.90**

[a] CPS, 1982
[b] USGS, 2002
[c] Data not available

TABLE 2.3-6
Postdam Low Flow Rates for Various Frequencies for Salt Creek at Clinton Lake Dam

Recurrence Interval (year)	Low Flow Rate with One-Day Duration (cfs)
2	8.1
5	6.1
10	5.2
20	3.9
50	2.9
100	2.4

Source: USGS, 2002

TABLE 2.3-7
Standard Dam Operating Procedures

Lake Elevation	Gate (12 in x 12 in @ 686 ft)	Gate (12 in x 12 in @ 684 ft)	Gate (24 in x36 in @ 650.88 ft)
> 687	Open	Closed	Closed
685 – 687	Open	Open	Closed
≤ 685 (Drought condition)	Open	Open	Open with Management Approval

Source: IDOT, 1984

Notes: Operational activities will be performed by CPS Personnel. Gates will be opened and/or closed by use of a manual crank. Operator activities are based on lake level elevation; therefore, as a result of “periodic surveillance” when the lake level approaches 687 ft the Nuclear Station Engineering Department will notify CPS staff of the need to initiate operator involvement.

TABLE 2.3-8
Summary of Lake Sediment Studies

Location	Duration	Volume of Sediment
Salt Creek near Rowell	1950-1956	0.10 ac-ft/yr/mi^2
85 reservoirs in Illinois	---[a]	0.40 ac-ft/yr/mi^2
Lake Bloomington (61 mi^2)	1929-1955	0.50 ac-ft/yr/mi^2
Lake Decatur (906 mi^2)	1922-1966	0.18 ac-ft/yr/mi^2
Lake Springfield (265 mi^2)	1934-1965	0.53 ac-ft/yr/mi^2
Five surface water sampling locations on Salt Creek	1972	<0.50 ac-ft/yr/mi^2

Source: CPS, 1982

[a] Data not available

TABLE 2.3-9
Summary of Capacities and Depths at Clinton Lake Before and After Deposition of Sediment

Interval (years)		10 yrs (1988)	20 yrs (1998)	25 yrs (2003)	30 yrs (2008)	40 yrs (2018)	50 yrs (2028)	55 yrs (2033)	60 yrs (2038)
Salt Creek	Original Capacity (ac-ft)	59,360	59,360	59,360	59,360	59,360	59,360	59,360	59,360
	Sediment Volume (ac-ft)	840	1,680	2,100	2,520	3,360	4,200	4,620	5,040
	Available Capacity (ac-ft)	58,520	57,680	57,260	56,840	56,000	55,160	54,740	54,320
North Fork Creek	Original Capacity (ac-ft)	14,840	14,840	14,840	14,840	14,840	14,840	14,840	14,840
	Sediment Volume (ac-ft)	640	1,290	1,610	1,930	2,570	3,410	3,730	3,840
	Available Capacity (ac-ft)	14,200	13,500	13,210	12,910	12,270	11,430	11,110	11,000
Clinton Lake	Original Capacity (ac-ft)	74,200	74,200	74,200	74,200	74,200	74,200	74,200	74,200
	Sediment Volume (ac-ft)	1,480	2,970	3,710	4,450	5,930	7,610	8,350	8,880
	Available Capacity (ac-ft)	72,720	71,230	70,490	69,750	68,270	66,590	65,850	65,320
Reduction in Depth at the Dam (ft)		7.2	7.8	---[a]	8.2	9.0	9.4	---[a]	---[a]

Source: CPS, 1982

[a] Data not available

Note: 25-, 55-, and 60-yr intervals were extrapolated from Table 2.4-11 of CPS, 1982.

TABLE 2.3-10
Simulated Clinton Lake Temperatures

	Simulated Lake Temperature (°F)					
	1966		1964		1954	
Month	**Day 1**	**Day 15**	**Day 1**	**Day 15**	**Day 1**	**Day 15**
January	35.1	32.0	32.0	32.0	32.0	32.0
February	32.0	32.0	32.0	32.0	32.0	35.6
March	32.0	37.1	34.3	40.0	40.0	38.7
April	43.7	46.4	40.3	49.3	43.4	54.8
May	55.1	57.3	57.0	67.0	63.3	61.0
June	69.5	70.5	69.7	74.8	67.0	76.6
July	81.3	82.2	82.8	78.3	81.8	81.2
August	78.9	76.5	81.3	73.6	80.1	77.9
September	77.6	71.4	74.6	71.5	79.4	72.0
October	61.6	58.0	63.9	57.2	70.0	62.2
November	48.9	43.8	52.	53.9	48.0	46.6
December	38.6	33.5	37.2	32.0	38.7	33.3

Source: CPS, 1982

Notes: Temperatures are simulated estimates for the lake surface in the absence of a power plant and represent 3:00 p.m. values. Values for years 1966 and 1964 are based on Peoria, Illinois, Weather Station and year 1954 is based on Springfield, Illinois, Weather Station.

TABLE 2.3-11
Measured Temperatures 100 ft Below the Clinton Lake Dam (1994-2000)

	Temperature (°F)					
Year	**June**		**July**		**August**	
	Day 1	**Day 15**	**Day 1**	**Day 15**	**Day 1**	**Day 15**
1994	72.7	76.4	79.9	79.6	79.6	76.2
1995	69.8	73.8	78.2	85.5	81.3	86.3
1996	68.4	78	83.8	78	78.9	80.1
1997	62	68.4	78.5	79	78.5	76.3
1998	71.8	71.4	79	81.6	80.1	---[a]
1999	69.9	77.8	78.6	80.2	83.5	78.9
2000	70.4	73.5	78.1	83.8	80.7	80.1

Source: USGS, 2002

[a] Data not available

TABLE 2.3-12
Stratigraphic Units and Their Hydrogeologic Characteristics

Geologic System	Stratigraphic Unit	Description	Hydrogeologic System	Hydrogeologic Characteristics
Quaternary	Henry Formation	Clayey silt overlying stratified silt, sand, or gravel	Alluvium	Groundwater occurs in permeable sand and gravel deposits underlying the fine-grained floodplain deposits. Yields are generally suitable for domestic or farm use. Sufficient quantities for municipal use may be available in those areas along the larger streams where thick sand and gravel deposits are present.
	Richland Loess	Clayey silt, trace fine sand	Wisconsinan deposits	Groundwater may be obtained from sand and gravel lenses in the Wisconsinan tills. Groundwater occurs under water table conditions in the Wisconsinan deposits.
	Wedron Formation	Clayey sandy silt till with interbedded discontinuous lenses of stratified silt, sand, or gravel		
	Robien Silt	Silt, some organics, trace clay, and fine sand	Interglacial Zone	
	Glasford Formation	Sandy silt till, with interbedded discontinuous lenses of stratified silt, sand, or sandy silt; upper 10 ft is highly weathered (altered)	Illinoian deposits	Groundwater may be obtained from sand and gravel lenses in the Illinoian tills. Groundwater occurs under artesian conditions in the Illinoian deposits. Yields from wells that intercept good water-yielding sand and gravel deposits are suitable for domestic and farm purposes. Higher yields for small industrial or municipal supply are locally available. Where sand and gravel deposits are thin or absent, small amounts of groundwater may be obtained using large-diameter wells.
	Banner Formation	Complex sequence of stratified silt, sandy clay till, and sand and gravel outwash	Kansan deposits	Groundwater may be obtained from Kansan outwash deposits (Banner Formation) in the buried Mahomet Bedrock Valley. Groundwater occurs under artesian conditions in the Kansan deposits. Kansan sand and gravel deposits in the buried Mahomet Bedrock Valley comprise the major aquifer in the area. Yields of up to 2,000 gpm may be obtained from a suitably constructed well located in the main channel of the valley
Pennsylvanian	Bond Formation	Shale with thin beds of limestone, sandstone, siltstone underclay, and coal	Pennsylvanian bedrock	Groundwater occurs in thin sandstone and fractured limestone beds under artesian conditions. Small quantities of groundwater, suitable only for domestic or farm supply, may be obtained from the upper 50 to 100 ft of the Pennsylvanian formations.
	Modesto Formation			
	Carbondale Formation			
	Spoon Formation			
	Abbott Formation			
Mississippian, Silurian, Devonian	Various Formations	Sandstone, limestone, and dolomite units	Mississippian, Silurian, Devonian bedrock	The best groundwater yields are from wells that intersect bedding planes, fractures, and solution channels.

Source: CPS, 2002; USGS, 1995

Note: Excavations for the CPS did not extend below the Glasford Formation. CPS borings did not fully penetrate rocks of the Carbondale Formation. The ESP borings did not fully penetrate the Modesto Formation.

TABLE 2.3-13
Historical and Recent Piezometer Data

Investigation [a, b]	Piezometer Number	Date of Installation	Surface Elevation (ft, msl)	Tested Interval [c]		Stratigraphic Units Open to Piezometer
				Depth (ft)	Elevation (ft, msl)	
CPS	D-23B [d]	7-14-72	655.8	11.5–16.0	639.8–644.3	Alluvium
CPS	D-30B [d]	7-26-72	669.9	3.5–12.0	657.9–666.4	Alluvium
CPS	D-3B [d]	7-13-72	660.0	10.5–20.5	639.5–649.5	Alluvium
CPS	D-8B [d]	7-19-72	655.7	1.5–16.0	639.7–654.2	Alluvium
CPS	P-1B [d]	6-26-72	675.9	10.0?–?	?–665.9?	Alluvium
CPS	OW-18	7-16-79	656.5	7.0–15.0	641.5–649.5	Alluvium and Fill
CPS	D-19B [d]	7-13-72	658.9	23.0–30.0	628.9–635.9	Alluvium and Illinoian
CPS	OW-12	8-2-77	659.2	17.0–25.0	634.2–642.2	Alluvium and Illinoian
CPS	OW-19	7-16-79	654.5	6.0–18.5	636.0–648.5	Alluvium and Illinoian
ESP	B-2[b]	8-2002	737.2	8-28	729.2-709.2	Wisconsinan
ESP	B-3[b]	8-2002	734.1	16-26	718.1-708.1	Wisconsinan
CPS	D-50	4-30-73	718.0	2.0–37.0	681.0–716.0	Wisconsinan
CPS	E-1B [d]	7-13-72	733	30–40	693–703	Wisconsinan
CPS	OW-22B	10-9-79	665.9	5.5–20.0	645.9–660.4	Wisconsinan
CPS	OW-3d	5-10-76	735.9	10–40	695.9–725.9	Wisconsinan
CPS	OW-3s	5-10-76	735.9	5–10	725.9–730.9	Wisconsinan
CPS	OW-4d	5-7-76	721.0	10–23.5	697.5–711.0	Wisconsinan
CPS	OW-4s	5-7-76	720.9	2.5–6.5	714.1–718.1	Wisconsinan
CPS	OW-5d	5-7-76	712.6	10–18.2	694.4–702.6	Wisconsinan
CPS	OW-5s	5-7-76	712.8	4–8	704.8–708.8	Wisconsinan
CPS	OW-6d	5-10-76	743.2	10–52	691.2–733.2	Wisconsinan
CPS	OW-6s	5-10-76	743.3	2.5–7.5	735.8–740.8	Wisconsinan
CPS	OW-7d	5-13-76	718.6	10–25	693.6–708.6	Wisconsinan
CPS	OW-7s	5-13-76	718.6	2–6	712.6–716.6	Wisconsinan
CPS	P-37 [d]	8-27-73	739.1	16.0–40.0	699.1–723.1	Wisconsinan
CPS	P-40 [d]	10-19-73	742.1	10.0–38.0	704.1–732.1	Wisconsinan
CPS	D-46	4-24-73	710.3	2.0–27.0	683.3–708.3	Wisconsinan and Illinoian

TABLE 2.3-13
Historical and Recent Piezometer Data

Investigation [a, b]	Piezometer Number	Date of Installation	Surface Elevation (ft, msl)	Tested Interval [c]		Stratigraphic Units Open to Piezometer
				Depth (ft)	Elevation (ft, msl)	
CPS	D-47 [d]	4-24-73	714.8	2.0–38.0	676.8–712.8	Wisconsinan and Illinoian
CPS	D-48	4-24-73	715.3	2.0–39.0	676.3–713.3	Wisconsinan and Illinoian
CPS	OW-2 [d]	5-12-76	--[e]	5–20	--[e]	Wisconsinan and Illinoian
CPS	OW-8	5-12-76	719.2	18–42	677.2–701.2	Wisconsinan and Illinoian
CPS	E-6B	7-25-72	736	0–151	585–736	Wisconsinan, Illinoian, and Kansan
CPS	E-7 [d]	7-20-72	712	0–151	560.5–712	Wisconsinan, Illinoian, and Kansan
ESP	B-1[b]	8-2002	738.6	80-90	658.6-648.6	Illinoian
CPS	D-19A [d]	7-13-72	658.9	33.0–38.0	620.9–625.9	Illinoian
CPS	D-23A [d]	7-14-72	655.8	25.0–31.5	624.3–630.8	Illinoian
CPS	D-30C [d]	7-27-72	669.9	45.0–50.0	619.9–624.9	Illinoian
CPS	D-3A [d]	7-13-72	660.0	30.0–40.0	620.0–630.0	Illinoian
CPS	E-2B [d]	7-12-72	746	60–68	678–686	Illinoian
CPS	E-3B	7-12-72	730	68–75	655–662	Illinoian
CPS	E-4B	7-6-72	740	80–96	644–654	Illinoian
CPS	E-5B	7-19-72	750	70–76	674–680	Illinoian
CPS	OW-1	5-12-76	716.7	60–70	646.7–656.7	Illinoian
CPS	OW-10	8-2-77	656.0	27.0–35.0	621.0–629.0	Illinoian
CPS	OW-11	8-2-77	654.5	19.0–27.0	627.5–635.5	Illinoian
CPS	OW-13	8-2-77	662.1	32.0–40.0	622.1–630.1	Illinoian
CPS	OW-14	8-2-77	657.1	23.0–31.0	626.1–634.1	Illinoian
CPS	OW-15	8-3-77	664.5	47.0–55.0	609.5–617.5	Illinoian
CPS	OW-16	8-3-77	657.9	22.0–30.0	627.9–635.9	Illinoian
CPS	OW-17	8-3-77	659.5	32.0–40.0	619.5–627.5	Illinoian
CPS	OW-22A	10-9-79	665.9	23.0–44.5	621.4–642.9	Illinoian
CPS	OW-9	8-1-77	654.3	16.5–24.5	629.8–637.8	Illinoian
CPS	P-1A [d]	6-26-72	675.9	66.0?–79.5	596.4–609.9?	Illinoian

TABLE 2.3-13
Historical and Recent Piezometer Data

Investigation [a, b]	Piezometer Number	Date of Installation	Surface Elevation (ft, msl)	Tested Interval [c]		Stratigraphic Units Open to Piezometer
				Depth (ft)	Elevation (ft, msl)	
CPS	P-22B [d]	6-28-72	734.0	55.0–64.0	670.0–679.0	Illinoian
CPS	P-27 [d]	6-6-72	742.9	57.5	85.4	Illinoian
CPS	P-31 [d]	9-11-73	736.8	50.0–159.0	577.8–686.8	Illinoian
CPS	P-39 [d]	8-28-73	740.8	62.0–150.0	590.8–678.8	Illinoian
CPS	P-7B [d]	7-5-72	737.5	70.0–78.0	659.5–667.5	Illinoian
CPS	OW-20	7-17-79	658.4	10.0–34.4	624.0–648.4	Illinoian and Fill
CPS	OW-21	10-8-79	670.0	5.0–55.0	615.0–665.0	Illinoian and Fill
CPS	OW-23	10-10-79	654.5	5.0–34.5	620.0–649.5	Illinoian and Fill
CPS	OW-24	10-11-79	654.9	5.0–34.0	620.9–649.9	Illinoian and Fill
CPS	P-17 [d]	7-10-72	738.3	149.9–240.0	498.3–589.3	Illinoian and Kansan
CPS	P-20 [d]	6-28-72	738.3	170.0–305.5	432.8–568.3	Illinoian, Kansan, and Bedrock
CPS	D-31 [d]	6-16-72	667.7	158.0–356.5	311.2–509.7	Illinoian, Mahomet Sand, and Bedrock
CPS	P-36 [d]	11-6-73	738.2	178.0–223.0	515.2–560.2	Kansan
CPS	E-3A	7-5-72	730	214–238	492–516	Kansan and Mahomet Sand
CPS	D-11 [d]	6-21-72	653.8	140.0–343.5	310.3–513.8	Kansan, Mahomet Sand, and Bedrock

[a] CPS data as reported in CPS, 2002.
[b] ESP data as reported for wells installed in 2002.
[c] "Tested Interval" refers to portion of piezometer backfilled with pea gravel and open to stratigraphic unit.
[d] Piezometer has been destroyed by construction activities.
[e] Data not available.

Note: "?" indicates that the exact depth was not been recorded.

TABLE 2.3-14
Laboratory Permeability Test Data

Boring Number	Elevation (ft-in)	Soil Type [a]	Geologic Unit	Type of Test	Field Moisture Content	Field Dry Density (lb/ft^3)	Average Coefficient of Permeability at 20°C (cmps) [b]	Estimated Porosity
Dam Site Borings								
D-3	626.2	ML	Illinoian Glacial Till	Falling head	7.5%	144	3.9E-09	16.8%
D-10	627.0	ML	Illinoian Glacial Till	Falling head	7.2%	131	1.0E-08	16.3%
D-13	676.4	SP	Interglacial Zone	Constant head	24.8%	94	1.8E-04	40.0%
D-13	661.4	SP, SW	Interglacial Zone	Constant head	6.4%	105	4.7E-03	14.8%
D-13	632.0	ML	Illinoian Glacial Till	Falling head	7.3%	142	3.8E-09	16.4%
D-24	631.0	ML	Salt Creek Alluvium	Falling head	7.4%	123	1.8E-08	16.5%
D-34	664.8	SP, GP	Interglacial Zone	Constant head	6.2%	112	2.3E-03	14.3%
D-34	649.8	SP, GP	Interglacial Zone	Constant head	17.5%	118	2.0E-04	32.0%
D-34	629.8	ML	Illinoian Glacial Till	Falling head	7.8%	138	6.5E-09	17.4%
D-37	663.7	SP, SW	Interglacial Zone	Constant head	12.2%	116	3.0E-03	24.7%
D-37	643.7	ML, CL	Illinoian Glacial Till	Falling head	11.7%	134	1.3E-08	24.0%
Station Site Borings								
P-14	654.8	ML	Illinoian Glacial Till	Falling head	9.5%	129	2.5E-08	
P-14	579.8	ML	Illinoian Glacial Till	Falling head	8.1%	139	9.5E-09	
P-18	683.7	ML, SM	Illinoian Glacial Till	Falling head	10.3%	131	2.3E-07	

Source: CPS, 2002

[a] Soil Types:

GP = Poorly-graded gravels, gravel-sand mixtures, little or no fines
SW = Well-graded sands, gravelly sands, little or no fines
SP = Poorly graded sands, gravelly sands, little or no fines
SM = Silty sands, silt-sand mixtures
ML = Inorganic silts with very fine sands, rock flour, silty or clayey fine sands or clayey silts, with slight plasticity
CL = Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays

[b] The unit cmps stands for centimeter per second.

TABLE 2.3-15
Field Permeability Tests

Boring Number	Ground Surface Elevation (ft)	Zone of Percolation Elevation (ft)	Geologic Unit	Average Coefficient of Permeability (cmps) [b]	Estimated Porosity
D-19	658.9	625.0–620.9	Illinoian Till	1.4E-05	26.7%
D-23	655.8	630.8–624.3	Illinoian Till	6.1E-06	24.5%
E-1B	733.0	703.0–693.0	Wisconsinan Till	1.5E-06	---[a]
P-37	741.5	726.1–701.1	Wisconsinan Till	2.6E-06	25.7%

Source: CPS, 2002

[a] Data not available
[b] The unit cmps stands for centimeter per second.

TABLE 2.3-16
Laboratory Permeability for Site Soils

Boring Number	Elevation (ft msl)	Soil Type	Geologic Unit	Test Type	Remolded Sample		Average Coefficient of Permeability at 20°C (cmps) [a]
					Moisture Content	Dry Density (lb/ft^3)	
S-10	702.6–697.6	Clay	Wisconsinan Glacial Till	Falling head	13.6%	126	3.2E-09
S-10	702.6–697.6	Clay	Wisconsinan Glacial Till	Falling head	12.4%	125	2.0E-08
S-14	727.2–720.2	Clay	Wisconsinan Glacial Till	Falling head	16.8%	109	1.6E-08
S-14	727.2–720.2	Clay	Wisconsinan Glacial Till	Falling head	11.0%	125	1.0E-08

Source: CPS, 2002

[a] The unit cmps stands for centimeter per second.

TABLE 2.3-17
Relative Density Data for Site Soils

Boring Number	Elevation (ft)	Soil Type	Geologic Unit	Minimum Dry Density (lb/ft^3)	Maximum Dry Density (lb/ft^3) (wet method)
D-11	473.8	Sand and gravel	Mahomet Bedrock Valley Outwash	92	113
D-11	424.8	Sand and gravel	Mahomet Bedrock Valley Outwash	91	118

Source: CPS, 2002

TABLE 2.3-18
Water Withdrawals by County

		Population/Usage (thousands)				Public Supply Withdrawals (MGD)			Domestic Supply Withdrawals (MGD)		
County	Number of Producing Wells	Pop. Served by Public Supply Groundwater	Pop. Served by Public Supply Surface Water	Total Pop. Served by Public Supply	Pop. Served by Domestic Supply	Ground-water	Surface Water	Total	Ground-water	Surface Water	Total
Champaign	3,755	166.88	0	166.88	2.22	22.59	0	22.59	0.2	0	0.2
Christian	1,523	13.96	5.08	19.04	15.88	2.13	0.77	2.9	1.43	0	1.43
DeWitt	997	12.38	0	12.38	4.44	1.48	0	1.48	0.4	0	0.4
Douglas	1,114	13.06	0	13.06	6.74	1.26	0	1.26	0.61	0	0.61
Ford	876	9.23	0	9.23	4.9	1.73	0	1.73	0.44	0	0.44
Livingston	1,535	11.02	17.43	28.45	11.95	1.88	2.97	4.85	1.08	0	1.08
Logan	1,360	25.97	0	25.97	5.3	3.2	0	3.2	0.48	0	0.48
Macon	1,575	4.96	95.34	100.3	16.11	1.96	37.74	39.7	1.45	0	1.45
Mason	1,636	8.96	0	8.96	7.73	1.16	0	1.16	0.7	0	0.7
McLean	2,241	42.38	36.79	79.17	60.1	5.64	4.9	10.54	5.41	0	5.41
Menard	780	8.73	0	8.73	3.55	0.76	0	0.76	0.32	0	0.32
Moultrie	714	9.75	0	9.75	4.42	1.16	0	1.16	0.4	0	0.4
Piatt	958	6.58	0	6.58	9.58	1.35	0	1.35	0.86	0	0.86
Sangamon	2,284	13.67	129.45	143.12	41.61	2.27	21.52	23.79	3.74	0	3.74
Shelby	2,003	7.09	6.9	13.99	8.57	1.21	1.18	2.39	0.77	0	0.77
Tazewell	3,051	112.64	0.82	113.46	14.14	14.66	0.11	14.77	1.27	0	1.27
Woodford	1,890	5.28	16.22	21.5	13.08	2.13	6.54	8.67	1.18	0	1.18

Source: USGS, 1995a

TABLE 2.3-18 (CONTINUED)
Water Withdrawals by County

County	Number of Producing Wells	Commercial Withdrawals (MGD)			Industrial Withdrawals (MGD)			Irrigation Withdrawals (MGD)			Total Agricultural Withdrawals[a] (MGD)
		Ground-water	Surface Water	Total	Ground-water	Surface Water	Total	Ground-water	Surface Water	Total	
Champaign	3,755	0.1	0.03	0.13	2.27	0	2.27	5.32	0	5.32	5.57
Christian	1,523	0.01	0	0.01	0	0	0	0.16	0	0.16	0.43
DeWitt	997	0.04	0	0.04	0	0	0	0.38	0	0.38	0.68
Douglas	1,114	0.03	0	0.03	0	3.32	3.32	0.02	0	0.02	0.28
Ford	876	0.09	0	0.09	0.1	0	0.1	0.62	0	0.62	0.88
Livingston	1,535	0	0.21	0.21	0.08	0	0.08	0.29	0	0.29	0.96
Logan	1,360	0	0	0	0	0	0	0.64	0	0.64	1.09
Macon	1,575	0.01	0	0.01	0.6	4.36	4.96	0.26	0	0.26	0.43
Mason	1,636	4.35	9.17	13.52	0	0	0	35.57	0	35.57	42.4
McLean	2,241	0.12	0	0.12	0	0	0	0.26	0	0.26	0.89
Menard	780	0	0	0	0	0	0	0.52	0	0.52	0.85
Moultrie	714	0	0.8	0.8	0	0	0	0.02	0	0.02	0.2
Piatt	958	0.02	0	0.02	0.79	0	0.79	0.15	0	0.15	0.27
Sangamon	2,284	0	0	0	0	0	0	0.49	0	0.49	1.03
Shelby	2,003	0.29	0	0.29	0	0	0	0.25	0	0.25	0.92
Tazewell	3,051	0.02	0	0.02	12.99	22.84	35.83	11.61	0	11.61	12.24
Woodford	1,890	0.01	0	0.01	0.01	0	0.01	0.26	0	0.26	0.88

Source: USGS, 1995a
[a] Total Agricultural Withdrawals is the total of irrigation withdrawals and livestock withdrawals.

TABLE 2.3-19
Water Quality at Clinton Lake Monitoring Sites

	1987 to 1991[a]		1991 to 2000[b]
Constituent	**Site 4 Intake**	**Site 2 Discharge**	**IEPA Sites (combined)**
Temperature (°C)			
Average	19.3	24.6	23.4
Max	29.0	36.2	32.7
Min	6.2	8.2	14.9
Dissolved Oxygen (mg/l)			
Average	9.3	8.1	8.6
Max	16.2	12.6	14.5
Min	5.0	4.8	5.4
Turbidity	(NTU)	(NTU)	(FTU)
Average	8.0	11.0	8.2
Max	11.0	28.0	28.5
Min	4.0	4.7	3.3
Hardness (mg/l)			
Average	233	233	--[c]
Max	284	291	--[c]
Min	186	186	--[c]
Total Dissolved Solids (mg/l)			
Average	276	277	--[c]
Max	340	370	--[c]
Min	210	220	--[c]
Magnesium (mg/l)			
Average	32	32	--[c]
Max	37	40	--[c]
Min	27	26	--[c]
Chloride (mg/l)			
Average	27.2	27.2	--[c]
Max	37.2	35.2	--[c]
Min	20.6	21.2	--[c]
Orthophosphate			
Average Annual	0.01	0.02	--[c]
Max	0.06	0.08	--[c]
Min	0.00	0.00	--[c]
Sulfate (mg/l)			
Average	39	39	--[c]
Max	54	55	--[c]
Min	29	30	--[c]
Chlorophyll-a[d] (μg/l)			
Average	--[c]	--[c]	33.5
Max	--[c]	--[c]	103.2
Min	--[c]	--[c]	2.1

[a] CPS, 1992
[b] USEPA, 2002a
[c] Data not available.
[d] Chlorophyll-a concentration determined using the Spectrophotometric method. Data range for Chlorophyll-a is 1981 to 2000.

TABLE 2.3-20
Chemical Analyses of Glacial Drift Groundwater Samples from Selected Site Piezometers

	Piezometer Number							
	E-7	**E-6**	**D-3A**	**E-5B**	**P-22**	**P-14**	**D-31**	**E-3A**
Depth To Water (ft)	5	12	10	19	30	60	60	10
Tested Aquifer	Wisconsinan and Illinoian	Wisconsinan, Illinoian, and Kansan	Illinoian	Illinoian	Illinoian	Illinoian and Kansan	Illinoian, Kansan, and Bedrock	Kansan
pH	6.70	6.62	6.77	7.01	7.19	6.90	9.98	7.25
Ca^{++}	17	62	40	43	46	39	35	36
Mg^{++}	28	82	49	38	42	45	2	41
Na^{+}	16	24	60	100	34	11	18	46
K^{+}	3	1	9	8	4	1	4	5
Cl^{-}	12	12	37	35	14	15	40	15
SO_4^{--}	55	325	180	30	70	30	60	65
CO_3	0	0	0	0	0	0	36	0
HCO_3^{-}	55	278	122	262	214	149	0	195
Fe	--[a]	--[a]	--[a]	0.32	--[a]	0.10	--[a]	--[a]
SiO_2	5	26	19	28	18	19	30	23

Source: CPS, 2002

[a] Concentration was below the detection limit of about 0.1 ppm.

Notes: All concentrations except pH are reported in milligrams per liter (mg/L). Locations of the piezometers are shown in Figure 2.3-16.

TABLE 2.3-21
Quality of Groundwater in Illinoian versus Kansan Aquifers

	Illinoian Aquifer		Kansan Aquifer	
Parameter	**Range (mg/L)**	**Mean (mg/L)**	**Range (mg/L)**	**Mean (mg/L)**
Iron	0.6–3.2	1.8	0.2–3.0	1.2
Chloride	Trace–37	4	Trace–66	11
Sulfate	0–9	2.3	0–5	0.9
Alkalinity (as $CaCO_3$)	278–475	363	284–454	363
Hardness (as $CaCO_3$)	170–595	299	150–438	293
Total Dissolved Minerals	310–478	379	295–636	414

Source: CPS, 1982

TABLE 2.3-22
Summary of the General Groundwater Chemistry of the Glasford (Illinoian) Sand and Gravel Aquifers

Constituent	Number of Samples	Minimum	Maximum	Mean	Median	Standard Deviation
Calcium	29	35.0	202	98.0	92.0	36.6
Magnesium	30	25.0	224	53.8	42.1	36.7
Sodium	30	0.0	254	47	32	51
Potassium	13	1.0	2.2	1.7	1.6	0.4
Chloride	86	1.0	452	29	5	63
Sulfate	33	0.0	250	57	24	70
Arsenic	12	0.0	0.020	0.005	0.004	6.59
Iron	86	0.0	28.5	3.0	2.50	4.19
Lead	12	0.0	0.030	0.008	0.006	8.30
Manganese	35	0.0	0.800	0.056	0.028	136.61
pH	20	6.4	8.0	7.2	7.2	0.45
Alkalinity	86	154	652	396	396	95
Ammonia	9	0.13	5.0	1.91	1.30	1.79
Hardness	86	216	1056	423	360	165
TDS	86	263	1556	535	476	227

Source: IDNR et al., 1995

Notes: Constituent concentrations are in mg/L; hardness and alkalinity are measured as $CaCO_3$. Results of 0.0 indicate that concentration was below method detection limit (MDL).

TABLE 2.3-23
Partial Water Quality Analysis for CPS Test Well in the Mahomet Bedrock Valley Aquifer

Parameter [a]	A&H Engineering Corp [b]	Illinois State Water Survey [c]
PH	7.4	Not reported
Hardness	279 (EDTA)	264 (as $CaCO_3$)
Alkalinity	472 (total)	480 (as $CaCO_3$)
Chloride	140	160
Fluoride	Not reported	0.7
Sulfate	< 1	Not reported
Nitrate	0.13 (as N)	0.9
Silica (as SiO_2)	19	Not reported
Iron (total)	4.5	1.6
Manganese	0.15 (total)	0.08
Total Dissolved Solids	641	784

Source: CPS, 1982

[a] All parameters except pH are reported in milligrams per liter.
[b] Water samples were collected on September 26 and 27, 1974, during test pumping of well.
[c] Water sample was collected from test well on September 11, 1974.

Notes: A gas flow measurement was made during test well pumping on September 26, 1979, by the Illinois State Water Survey. Results of two gas analyses indicated that methane comprised more than 80 percent of the total gas sample.

TABLE 2.3-24
Water Quality Results for Mahomet Aquifer Study in DeWitt County

Parameter (mg/L)	Owner				
	AmerGen [a]	Green Acres Campground [b]	City of Decatur [c]	City of Decatur [d]	City of Decatur [e]
pH	7.29	7.43	7.28	7.21	7.30
Hardness	237	277	269	307	348
Alkalinity	443	423	431	433	401
Chloride	128	71	76	54	53
Fluoride	0.64	0.86	0.80	0.68	0.48
Sulfate	2.72	0.57	0.40	0.46	14.2
Nitrate	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Iron (total)	2.18	1.90	1.52	2.00	0.56
Magnesium	25.3	34.6	33.2	36.1	36.0
Total Dissolved Solids	670	560	582	553	513
Manganese	0.025	0.019	0.023	0.027	0.045
Calcium	53.1	53.9	53.1	63.4	80.3
Sodium	168	125	129	97	76
Barium	0.59	0.86	1.42	1.40	1.49
Boron	0.245	0.767	0.688	0.508	0.488
Chromium	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Copper	0.004	< 0.003	< 0.003	< 0.003	< 0.003
Nickel	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Zinc	0.085	< 0.002	< 0.002	< 0.002	< 0.002

[a] ISWS, 2000. Date Collected: 8/1/00, Well Depth (ft): 340
[b] ISWS, 2000a. Date Collected: 6/27/00, Well Depth (ft): 335
[c] ISWS, 2000b. Date Collected: 6/28/00, Well Depth (ft): 318
[d] ISWS, 2000c. Date Collected: 6/28/00, Well Depth (ft): 296
[e] ISWS, 2000d. Date Collected: 6/28/00, Well Depth (ft): 296

Note: < = Below detection limit (i.e., < 1.0 = less than 1.0 mg/L)

TABLE 2.3-25
Summary of the General Groundwater Chemistry of the Sankoty-Mahomet Sand Aquifer

Constituent	Number of Samples	Minimum	Maximum	Mean	Median	Standard Deviation
Calcium	39	15.9	193	76.3	72.0	24.74
Magnesium	38	25.5	67.8	35.3	33.8	8.39
Sodium	36	0.0	160	55	27	50.23
Potassium	25	1.2	3.3	2.0	2.1	0.65
Chloride	61	1.0	100	25.2	8.8	27.93
Sulfate	34	0.0	122	16.1	2.5	26.85
Arsenic	25	0.0	0.051	0.016	0.014	12.80
Iron	62	0.07	12.5	2.95	2.35	2.35
Lead	19	0.0	0.040	0.008	0.006	10.55
Manganese	44	0.0	0.235	0.053	0.040	57.9
pH	31	6.8	8.1	7.3	7.4	0.3
Alkalinity	64	300	644	416	426	78.3
Ammonia	20	0.0	9.2	3.3	2.2	2.96
Hardness	58	197	761	333	322	77.64
TDS	62	312	789	469	465	112

Source: IDNR et al., 1995

Notes: Constituent concentrations except for pH are in mg/L; hardness and alkalinity are measured as $CaCO_3$. Results of 0.0 indicate that concentration was below method detection limit.

TABLE 2.4-1
Important Terrestrial Species and Habitats

Important Species	Important Habitats
White-tailed deer	Clinton Lake State Recreation Area
Various species of waterfowl (including mallard, scaup, wood duck, redhead, black duck, pintail, teal, coot, Canada goose)	Weldon Springs State Recreation Area
Small game mammals (including cottontail rabbit, raccoon, possum, fox, skunk, coyote, squirrel)	Salt Creek (Illinois Natural Area Inventory Site)
	Tenmile Creek (Illinois Natural Area Inventory Site)
	Wetlands within Site Vicinity

Source: IDNR, 2002, 2002b, 2002c, 2002d, 2002e

TABLE 2.4-2
Biological Stream Characterization Summary

Category	Stream Class	Biotic Resource Quality	Description
Unique Aquatic Resource	A	Excellent	Comparable to the best situations without human disturbance.
Highly Valued Aquatic Resource	B	Good	Good fishery for important gamefish species. Species richness may be somewhat below expectations for stream size or geographic region.
Moderate Aquatic Resource	C	Fair	Fishery consists primarily of catfish, sunfish, and carp. Species diversity and number of intolerant fish reduced. Trophic structure skewed with increased frequency of omnivores, green sunfish or tolerant species.
Limited Aquatic Resource	D	Poor	Fishery predominantly for carp; fish community dominated by omnivores and tolerant forms. Species richness may be notably lower than expected for geographic area, stream size, or available habitat.
Restricted Aquatic Resource	E	Very Poor	Few fish of any species present; no sport fishery exists. Species richness very limited.

Source: IEPA, 2002

TABLE 2.4-3
Important Aquatic Species and Habitats within the Site and Vicinity

Important Species
Channel catfish
Striped bass
Largemouth bass
Walleye
Important Habitats
Clinton Lake State Recreation Area
Weldon Springs State Recreation Area
Salt Creek (Illinois Natural Area Inventory Site)
Tenmile Creek (Illinois Natural Area Inventory Site)
Wetlands within Site Vicinity

Sources: IDNR, 2002, 2002d, 2002e, 2002f, 2002g, 2002j, 2002k, 2002l

TABLE 2.5-1
2000 Resident and Transient Population Within 16 km (10 mi)

km mi	0-2 0-1.2	2-4 1.2-2.5	4-6 2.5-3.7	6-8 3.7-5	8-10 5-6.2	10-16 6.2-10	Total for Sector
North-Residential	0	10	16	30	25	51	**132**
North-Transient	0	0	0	3	1	3	**7**
North North East-Residential	0	9	12	49	33	88	**191**
North North East-Transient	0	0	0	7	1	3	**11**
North East-Residential	1	5	4	11	8	85	**114**
North East-Transient	1,115	0	0	0	1	3	**1,119**
East North East-Residential	1	3	194	16	27	164	**405**
East North East-Transient	0	0	264	0	1	3	**268**
East-Residential	0	3	10	42	11	43	**109**
East-Transient	0	0	864	0	1	2	**867**
East South East-Residential	0	0	12	5	39	58	**114**
East South East-Transient	0	0	0	0	1	2	**3**
South East-Residential	0	1	15	11	440	35	**502**
South East-Transient	0	1,848	0	0	162	2	**2,012**
South South East-Residential	0	8	8	11	15	69	**111**
South South East-Transient	0	0	0	0	1	9	**10**
South-Residential	0	2	19	10	13	73	**117**
South-Transient	630	0	3	0	1	3	**637**
South South West-Residential	0	0	92	21	12	60	**185**
South South West-Transient	0	0	0	0	1	3	**4**
South West-Residential	0	0	24	46	68	161	**299**
South West-Transient	0	437	0	1	677	403	**1,518**
West South West-Residential	0	8	29	22	198	2,147	**2,404**
West South West-Transient	0	821	0	0	4	537	**1,362**
West-Residential	0	55	37	23	1,245	5,207	**6,567**
West-Transient	0	3	0	1	11	3,749	**3,764**
West North West-Residential	1	16	8	10	23	743	**801**
West North West-Transient	0	0	0	1	1	19	**21**
North West-Residential	5	11	11	12	11	150	**200**
North West-Transient	0	0	0	0	1	153	**154**
North North West-Residential	0	11	14	9	13	60	**107**
North North West-Transient	73	0	0	0	1	3	**77**
Residential Total	**8**	**142**	**505**	**328**	**2,181**	**9,194**	**12,358**
Cumulative Total (Residential plus Transient)	**1,826**	**3,251**	**1,636**	**341**	**3,047**	**14,091**	**24,192**

Source: Residential Population is from U.S. Census Bureau, 2001. Transient Population is from U.S. Census Bureau, 2001; IDNR, 2002; USDOC, 2002

TABLE 2.5-2
Resident and Transient Population Projections Within 16 km (10 mi)

km mi	0-2 0-1.2	2-4 1.2-2.5	4-6 2.5-3.7	6-8 3.7-5	8-10 5-6.2	10-16 6.2-10	Total for Sector
North-Residential							
2010 population	0	9	15	29	24	52	**129**
2020 population	0	9	15	28	24	53	**129**
2030 population	0	9	15	27	23	55	**129**
2040 population	0	9	14	27	22	57	**129**
2050 population	0	8	14	26	22	59	**129**
2060 population	0	8	14	25	21	60	**128**
North-Transient							
2010 population	0	0	0	3	1	3	**7**
2020 population	0	0	0	3	1	3	**7**
2030 population	0	0	0	3	1	3	**7**
2040 population	0	0	0	3	1	3	**7**
2050 population	0	0	0	3	1	3	**7**
2060 population	0	0	0	3	1	4	**7**
North North East-Residential							
2010 population	0	9	11	47	31	86	**184**
2020 population	0	9	11	46	30	86	**182**
2030 population	0	8	11	44	30	86	**179**
2040 population	0	8	10	43	29	85	**175**
2050 population	0	8	10	42	28	85	**173**
2060 population	0	8	10	41	27	85	**171**
North North East-Transient							
2010 population	0	0	0	7	1	3	**11**
2020 population	0	0	0	7	1	3	**10**
2030 population	0	0	0	6	1	3	**10**
2040 population	0	0	0	6	1	3	**10**
2050 population	0	0	0	6	1	3	**10**
2060 population	0	0	0	6	1	3	**10**
North East-Residential							
2010 population	1	5	4	10	8	81	**109**
2020 population	1	5	4	10	8	79	**107**
2030 population	1	4	4	10	8	77	**104**
2040 population	1	4	4	10	7	76	**102**
2050 population	1	4	4	9	7	74	**99**
2060 population	1	4	4	9	7	72	**97**
North East-Transient							
2010 population	1,115	0	0	0	1	3	**1,119**
2020 population	1,115	0	0	0	1	3	**1,119**
2030 population	1,115	0	0	0	1	3	**1,119**
2040 population	1,115	0	0	0	1	3	**1,119**
2050 population	1,115	0	0	0	1	3	**1,118**
2060 population	1,115	0	0	0	1	3	**1,118**
East North East-Residential							
2010 population	1	3	184	16	26	155	**385**
2020 population	1	3	180	15	25	152	**376**
2030 population	1	3	175	15	25	148	**367**
2040 population	1	3	171	15	24	145	**359**
2050 population	1	3	167	14	24	141	**350**
2060 population	1	3	163	14	23	137	**341**

TABLE 2.5-2
Resident and Transient Population Projections Within 16 km (10 mi)

km mi	0-2 0-1.2	2-4 1.2-2.5	4-6 2.5-3.7	6-8 3.7-5	8-10 5-6.2	10-16 6.2-10	Total for Sector
East North East-Transient							
2010 population	0	0	250	0	1	3	**254**
2020 population	0	0	245	0	1	3	**249**
2030 population	0	0	238	0	1	3	**242**
2040 population	0	0	233	0	1	3	**236**
2050 population	0	0	227	0	1	3	**231**
2060 population	0	0	222	0	1	3	**225**
East-Residential							
2010 population	0	3	10	40	10	41	**104**
2020 population	0	3	9	39	10	41	**102**
2030 population	0	2	9	38	10	41	**100**
2040 population	0	2	9	37	9	41	**98**
2050 population	0	2	9	36	9	41	**97**
2060 population	0	2	8	35	9	40	**94**
East-Transient							
2010 population	0	0	864	0	1	2	**867**
2020 population	0	0	778	0	1	2	**780**
2030 population	0	0	778	0	1	2	**780**
2040 population	0	0	778	0	1	2	**780**
2050 population	0	0	778	0	1	2	**780**
2060 population	0	0	691	0	1	2	**694**
East South East-Residential							
2010 population	0	0	11	5	37	57	**110**
2020 population	0	0	11	5	37	57	**110**
2030 population	0	0	11	5	36	57	**109**
2040 population	0	0	10	5	35	57	**107**
2050 population	0	0	10	5	34	58	**107**
2060 population	0	0	10	5	33	58	**106**
East South East-Transient							
2010 population	0	0	0	0	1	2	**3**
2020 population	0	0	0	0	1	2	**3**
2030 population	0	0	0	0	1	2	**3**
2040 population	0	0	0	0	1	2	**3**
2050 population	0	0	0	0	1	2	**3**
2060 population	0	0	0	0	1	2	**3**
South East-Residential							
2010 population	0	1	14	10	418	35	**478**
2020 population	0	1	14	10	408	35	**468**
2030 population	0	1	13	10	398	36	**458**
2040 population	0	1	13	10	389	36	**449**
2050 population	0	1	13	9	379	37	**439**
2060 population	0	1	12	9	369	37	**428**
South East-Transient							
2010 population	0	1,848	0	0	154	2	**2,004**
2020 population	0	1,848	0	0	150	2	**2,000**
2030 population	0	1,848	0	0	147	2	**1,997**
2040 population	0	1,848	0	0	143	2	**1,993**
2050 population	0	1,848	0	0	140	2	**1,990**
2060 population	0	1,848	0	0	136	2	**1,986**

TABLE 2.5-2
Resident and Transient Population Projections Within 16 km (10 mi)

km mi	0-2 0-1.2	2-4 1.2-2.5	4-6 2.5-3.7	6-8 3.7-5	8-10 5-6.2	10-16 6.2-10	Total for Sector
South South East-Residential							
2010 population	0	8	7	10	14	69	**108**
2020 population	0	8	7	10	14	68	**107**
2030 population	0	7	7	10	13	68	**105**
2040 population	0	7	7	9	13	68	**104**
2050 population	0	7	7	9	13	67	**103**
2060 population	0	7	7	9	12	67	**102**
South South East-Transient							
2010 population	0	0	0	0	1	9	**10**
2020 population	0	0	0	0	1	9	**10**
2030 population	0	0	0	0	1	9	**10**
2040 population	0	0	0	0	1	9	**10**
2050 population	0	0	0	0	1	9	**10**
2060 population	0	0	0	0	1	9	**10**
South-Residential							
2010 population	0	1	18	10	12	73	**114**
2020 population	0	1	18	9	12	73	**113**
2030 population	0	1	17	9	12	73	**112**
2040 population	0	1	17	9	11	73	**111**
2050 population	0	1	17	9	11	72	**110**
2060 population	0	1	16	9	11	72	**109**
South-Transient							
2010 population	630	0	3	0	1	3	**637**
2020 population	630	0	3	0	1	3	**637**
2030 population	630	0	3	0	1	3	**637**
2040 population	630	0	3	0	1	3	**637**
2050 population	630	0	3	0	1	3	**636**
2060 population	630	0	3	0	1	3	**636**
South South West-Residential							
2010 population	0	0	87	20	12	59	**178**
2020 population	0	0	85	20	12	58	**175**
2030 population	0	0	83	19	11	57	**170**
2040 population	0	0	81	19	11	57	**168**
2050 population	0	0	79	18	11	56	**164**
2060 population	0	0	77	18	10	56	**161**
South South West-Transient							
2010 population	0	0	0	0	1	3	**4**
2020 population	0	0	0	0	1	3	**4**
2030 population	0	0	0	0	1	3	**4**
2040 population	0	0	0	0	1	3	**4**
2050 population	0	0	0	0	1	3	**4**
2060 population	0	0	0	0	1	3	**4**
South West-Residential							
2010 population	0	0	22	44	65	154	**285**
2020 population	0	0	22	43	63	150	**278**
2030 population	0	0	21	42	62	147	**272**
2040 population	0	0	21	41	60	143	**265**
2050 population	0	0	20	40	59	139	**258**
2060 population	0	0	20	39	57	136	**252**

TABLE 2.5-2
Resident and Transient Population Projections Within 16 km (10 mi)

km mi	0-2 0-1.2	2-4 1.2-2.5	4-6 2.5-3.7	6-8 3.7-5	8-10 5-6.2	10-16 6.2-10	Total for Sector
South West-Transient							
2010 population	0	437	0	1	647	385	**1,471**
2020 population	0	437	0	1	627	375	**1,441**
2030 population	0	437	0	1	617	368	**1,423**
2040 population	0	437	0	1	597	358	**1,393**
2050 population	0	437	0	1	587	348	**1,373**
2060 population	0	437	0	1	567	340	**1,346**
West South West-Residential							
2010 population	0	8	27	21	188	2,041	**2,285**
2020 population	0	7	27	20	184	1,993	**2,231**
2030 population	0	7	26	20	180	1,945	**2,178**
2040 population	0	7	26	19	175	1,898	**2,125**
2050 population	0	7	25	19	171	1,850	**2,072**
2060 population	0	7	24	18	166	1,802	**2,017**
West South West-Transient							
2010 population	0	821	0	0	4	510	**1,335**
2020 population	0	718	0	0	4	498	**1,221**
2030 population	0	718	0	0	4	486	**1,208**
2040 population	0	718	0	0	4	475	**1,197**
2050 population	0	718	0	0	3	463	**1,185**
2060 population	0	718	0	0	3	451	**1,172**
West-Residential							
2010 population	0	52	36	22	1,183	4,950	**6,243**
2020 population	0	51	35	21	1,155	4,834	**6,096**
2030 population	0	50	34	21	1,128	4,719	**5,952**
2040 population	0	48	33	20	1,100	4,603	**5,804**
2050 population	0	47	32	20	1,073	4,487	**5,659**
2060 population	0	46	31	19	1,045	4,372	**5,513**
West-Transient							
2010 population	0	3	0	1	10	3,564	**3,578**
2020 population	0	3	0	1	10	3,480	**3,494**
2030 population	0	3	0	1	10	3,398	**3,411**
2040 population	0	3	0	1	10	3,314	**3,327**
2050 population	0	3	0	1	9	3,231	**3,244**
2060 population	0	3	0	1	9	3,148	**3,160**
West North West-Residential							
2010 population	1	15	8	10	22	706	**762**
2020 population	1	15	8	9	22	689	**744**
2030 population	1	14	7	9	21	673	**725**
2040 population	1	14	7	9	21	656	**708**
2050 population	1	14	7	9	20	640	**691**
2060 population	1	13	7	9	20	624	**674**
West North West-Transient							
2010 population	0	0	0	1	1	18	**20**
2020 population	0	0	0	1	1	18	**19**
2030 population	0	0	0	1	1	17	**19**
2040 population	0	0	0	1	1	17	**19**
2050 population	0	0	0	1	1	16	**18**
2060 population	0	0	0	1	1	16	**18**

TABLE 2.5-2
Resident and Transient Population Projections Within 16 km (10 mi)

km mi	0-2 0-1.2	2-4 1.2-2.5	4-6 2.5-3.7	6-8 3.7-5	8-10 5-6.2	10-16 6.2-10	Total for Sector
North West-Residential							
2010 population	4	10	11	12	11	142	**190**
2020 population	4	10	10	11	10	139	**184**
2030 population	4	10	10	11	10	136	**181**
2040 population	4	10	10	11	10	132	**177**
2050 population	4	9	10	11	10	129	**173**
2060 population	4	9	9	10	9	126	**167**
North West-Transient							
2010 population	0	0	0	0	1	145	**146**
2020 population	0	0	0	0	1	142	**143**
2030 population	0	0	0	0	1	139	**140**
2040 population	0	0	0	0	1	135	**136**
2050 population	0	0	0	0	1	132	**132**
2060 population	0	0	0	0	1	129	**129**
North North West-Residential							
2010 population	0	10	13	9	12	59	**103**
2020 population	0	10	13	9	12	60	**104**
2030 population	0	10	12	8	12	61	**103**
2040 population	0	9	12	8	11	62	**102**
2050 population	0	9	12	8	11	63	**103**
2060 population	0	9	11	8	11	63	**102**
North North West-Transient							
2010 population	73	0	0	0	1	3	**77**
2020 population	73	0	0	0	1	3	**77**
2030 population	73	0	0	0	1	3	**77**
2040 population	73	0	0	0	1	3	**77**
2050 population	73	0	0	0	1	3	**77**
2060 population	73	0	0	0	1	3	**77**
2010 population							
Residential Total	7	134	478	315	2,073	8,760	**11,767**
Cumulative Total (Residential plus Transient)	1,825	3,243	1,595	328	2,900	13,423	**23,309**
2020 population							
Residential Total	7	132	469	305	2,026	8,567	**11,506**
Cumulative Total (Residential plus Transient)	1,825	3,138	1,494	317	2,829	13,123	**22,719**
2030 population							
Residential Total	7	126	455	298	1,979	8,379	**11,244**
Cumulative Total (Residential plus Transient)	1,825	3,132	1,473	310	2,767	12,834	**22,330**
2040 population							
Residential Total	7	123	445	292	1,927	8,189	**10,983**
Cumulative Total (Residential plus Transient)	1,825	3,129	1,458	304	2,691	12,537	**21,929**
2050 population							
Residential Total	7	120	436	284	1,882	7,998	**10,727**
Cumulative Total (Residential plus Transient)	1,825	3,126	1,444	295	2,632	12,242	**21,544**

TABLE 2.5-2
Resident and Transient Population Projections Within 16 km (10 mi)

km mi	0-2 0-1.2	2-4 1.2-2.5	4-6 2.5-3.7	6-8 3.7-5	8-10 5-6.2	10-16 6.2-10	Total for Sector
2060 population							
Residential Total	7	118	423	277	1,830	7,807	**10,462**
Cumulative Total (Residential plus Transient)	1,825	3,124	1,339	288	2,556	11,947	**21,057**

Source: ISU, 2002

Notes: 2010 and 2020 projections are based on a methodology determined by the Illinois State University. They are based on 1990 populations and fertility, mortality, and migration rates from the early 1990s. They have not been adjusted for the 2000 Census population. Population projections from the 2000 Census are being prepared by the State of Illinois and are expected to be released in 2004 to 2006. A ratio of the population in 2010 and 2020 was used to determine the projected population for 2030, 2040, 2050, and 2060. Transient population was assumed to follow the same population trends as residential population.

TABLE 2.5-3
2000 Resident and Transient Population Between 16 km and 80 km (10 mi and 50 mi)

km mi	16-40 10-25	40-60 25-37	60-80 37-50	Total for Sector
North-Residential	10,558	5,161	6,645	22,364
North-Transient	39	329	81	449
North North East-Residential	4,874	2,426	12,357	19,657
North North East-Transient	4,063	40	124	4,227
North East-Residential	1,852	4,552	3,665	10,069
North East-Transient	21	52	78	151
East North East-Residential	3,987	7,622	18,845	30,454
East North East-Transient	133	230	421	784
East -Residential	9,734	114,051	8,157	131,942
East -Transient	63	1,934	60	2,057
East South East-Residential	3,266	22,665	8,686	34,617
East South East-Transient	37	235	82	354
South East-Residential	7,436	3,381	11,508	22,325
South East-Transient	58	63	262	383
South South East-Residential	2,526	5,910	9,581	18,017
South South East-Transient	33	51	132	216
South-Residential	14,620	12,296	3,125	30,041
South-Transient	196	1,958	34,287	36,441
South South West-Residential	69,848	15,636	19,275	104,759
South South West-Transient	1,094	1,056	104	2,254
South West-Residential	4,058	3,324	11,585	18,967
South West-Transient	40	45	11,418	44,503
West South West-Residential	1,585	3,483	58,674	63,742
West South West-Transient	34	43	241	318
West -Residential	1,381	20,729	5,931	28,041
West -Transient	26	1,196	71	1,293
West North West-Residential	3,770	3,724	12,702	20,196
West North West-Transient	67	54	101	222
North West-Residential	3,010	6,786	56,991	66,787
North West-Transient	27	294	412	733
North North West-Residential	79,919	35,630	14,481	130,030
North North West-Transient	1,423	1,097	155	2,675
Residential Total	**222,424**	**267,376**	**262,208**	**752,008**
Cumulative Total (Residential plus Transient)	**229,778**	**276,053**	**310,237**	**816,068**

Source: CH2M HILL, 2002. Residential Population is from U.S. Census Bureau, 2001. Transient Population is from U.S. Census Bureau, 2001; IDNR, 2002; USDOC, 2002

TABLE 2.5-4

Resident and Transient Population Projections Between 16 km and 80 km (10 mi and 50 mi)

km mi	16-40 10-25	40-60 25-37	60-80 37-50	Total for Sector
North-Residential				
2010 population	10,972	5,363	6,809	**23,144**
2020 population	11,599	5,670	7,085	**24,354**
2030 population	12,227	5,977	7,361	**25,565**
2040 population	12,854	6,283	7,637	**26,774**
2050 population	13,481	6,590	7,913	**27,984**
2060 population	14,109	6,897	8,189	**29,195**
North-Transient				
2010 population	41	342	83	**465**
2020 population	43	361	86	**491**
2030 population	45	381	90	**516**
2040 population	47	401	93	**541**
2050 population	50	420	96	**566**
2060 population	52	440	100	**592**
North North East-Residential				
2010 population	5,065	2,518	12,207	**19,790**
2020 population	5,354	2,659	12,185	**20,198**
2030 population	5,644	2,800	12,163	**20,607**
2040 population	5,934	2,941	12,141	**21,016**
2050 population	6,223	3,082	12,119	**21,424**
2060 population	6,513	3,223	12,097	**21,833**
North North East-Transient				
2010 population	4,222	42	122	**4,386**
2020 population	4,463	44	122	**4,629**
2030 population	4,705	46	122	**4,873**
2040 population	4,947	48	122	**5,117**
2050 population	5,188	51	122	**5,360**
2060 population	5,429	53	121	**5,604**
North East-Residential				
2010 population	1,920	4,509	3,613	**10,042**
2020 population	2,026	4,446	3,572	**10,044**
2030 population	2,132	4,383	3,530	**10,045**
2040 population	2,237	4,320	3,489	**10,046**
2050 population	2,343	4,258	3,448	**10,049**
2060 population	2,449	4,195	3,406	**10,050**
North East-Transient				
2010 population	22	52	77	**150**
2020 population	23	51	76	**150**
2030 population	24	50	75	**149**
2040 population	25	49	74	**149**
2050 population	27	49	73	**149**
2060 population	28	48	72	**148**
East North East-Residential				
2010 population	3,981	8,208	19,670	**31,859**
2020 population	4,026	8,656	20,297	**32,979**
2030 population	4,070	9,104	20,925	**34,099**
2040 population	4,115	9,552	21,552	**35,219**
2050 population	4,159	10,000	22,179	**36,338**
2060 population	4,204	10,448	22,807	**37,459**

TABLE 2.5-4

Resident and Transient Population Projections Between 16 km and 80 km (10 mi and 50 mi)

km mi	16-40 10-25	40-60 25-37	60-80 37-50	Total for Sector
East North East-Transient				
2010 population	133	248	439	**820**
2020 population	134	261	453	**849**
2030 population	136	275	467	**878**
2040 population	137	288	481	**907**
2050 population	139	302	495	**936**
2060 population	140	315	510	**965**
East -Residential				
2010 population	10,430	123,506	8,818	**142,754**
2020 population	11,014	130,812	9,325	**151,151**
2030 population	11,598	138,118	9,833	**159,549**
2040 population	12,182	145,423	10,341	**167,946**
2050 population	12,766	152,729	10,849	**176,344**
2060 population	13,350	160,035	11,356	**184,741**
East -Transient				
2010 population	68	2,094	65	**2,227**
2020 population	71	2,218	69	**2,358**
2030 population	75	2,342	72	**2,490**
2040 population	79	2,466	76	**2,621**
2050 population	83	2,590	80	**2,752**
2060 population	86	2,714	84	**2,884**
East South East-Residential				
2010 population	3,348	24,544	9,119	**37,011**
2020 population	3,489	25,996	9,488	**38,973**
2030 population	3,631	27,447	9,858	**40,936**
2040 population	3,773	28,899	10,228	**42,900**
2050 population	3,914	30,351	10,597	**44,862**
2060 population	4,056	31,803	10,967	**46,826**
East South East-Transient				
2010 population	38	254	86	**378**
2020 population	40	270	90	**399**
2030 population	41	285	93	**419**
2040 population	43	300	97	**439**
2050 population	44	315	100	**459**
2060 population	46	330	104	**479**
South East-Residential				
2010 population	7,538	3,424	11,427	**22,389**
2020 population	7,830	3,505	11,515	**22,850**
2030 population	8,123	3,587	11,603	**23,313**
2040 population	8,415	3,668	11,691	**23,774**
2050 population	8,707	3,750	11,779	**24,236**
2060 population	9,000	3,831	11,868	**24,699**
South East-Transient				
2010 population	59	64	260	**383**
2020 population	61	65	262	**389**
2030 population	63	67	264	**394**
2040 population	66	68	266	**400**
2050 population	68	70	268	**406**
2060 population	70	71	270	**412**

TABLE 2.5-4

Resident and Transient Population Projections Between 16 km and 80 km (10 mi and 50 mi)

km mi	16-40 10-25	40-60 25-37	60-80 37-50	Total for Sector
South South East-Residential				
2010 population	2,563	5,901	9,614	**18,078**
2020 population	2,655	6,006	9,830	**18,491**
2030 population	2,748	6,111	10,046	**18,905**
2040 population	2,840	6,215	10,262	**19,317**
2050 population	2,932	6,320	10,478	**19,730**
2060 population	3,024	6,425	10,694	**20,143**
South South East-Transient				
2010 population	33	51	132	**217**
2020 population	35	52	135	**222**
2030 population	36	53	138	**227**
2040 population	37	54	141	**232**
2050 population	38	55	144	**237**
2060 population	40	55	147	**242**
South-Residential				
2010 population	14,988	12,540	3,174	**30,702**
2020 population	15,068	12,636	3,359	**31,063**
2030 population	15,147	12,733	3,543	**31,423**
2040 population	15,226	12,829	3,728	**31,783**
2050 population	15,305	12,926	3,912	**32,143**
2060 population	15,385	13,022	4,097	**32,504**
South-Transient				
2010 population	201	1,997	34,825	**37,022**
2020 population	202	2,012	36,854	**39,069**
2030 population	203	2,028	38,873	**41,104**
2040 population	204	2,043	40,903	**43,150**
2050 population	205	2,058	42,922	**45,485**
2060 population	206	2,074	44,952	**47,231**
South South West-Residential				
2010 population	71,610	16,027	19,193	**106,830**
2020 population	71,988	16,114	19,463	**107,565**
2030 population	72,366	16,202	19,733	**108,301**
2040 population	72,744	16,290	20,003	**109,037**
2050 population	73,122	16,378	20,273	**109,773**
2060 population	73,500	16,466	20,542	**110,508**
South South West-Transient				
2010 population	1,122	1,082	104	**2,308**
2020 population	1,128	1,088	105	**2,321**
2030 population	1,133	1,094	106	**2,334**
2040 population	1,139	1,100	108	**2,347**
2050 population	1,145	1,106	109	**2,361**
2060 population	1,151	1,112	111	**2,374**
South West-Residential				
2010 population	4,180	3,453	12,191	**19,824**
2020 population	4,207	3,508	12,467	**20,182**
2030 population	4,233	3,563	12,744	**20,540**
2040 population	4,260	3,618	13,021	**20,899**
2050 population	4,286	3,673	13,298	**21,257**
2060 population	4,313	3,729	13,575	**21,617**

TABLE 2.5-4

Resident and Transient Population Projections Between 16 km and 80 km (10 mi and 50 mi)

km mi	16-40 10-25	40-60 25-37	60-80 37-50	Total for Sector
South West-Transient				
2010 population	41	47	12,015	**12,103**
2020 population	41	47	12,287	**12,376**
2030 population	42	48	12,560	**12,650**
2040 population	42	49	12,833	**12,924**
2050 population	42	50	13,106	**13,198**
2060 population	43	50	13,379	**13,472**
West South West-Residential				
2010 population	1,595	3,727	63,458	**68,780**
2020 population	1,589	3,787	65,682	**71,058**
2030 population	1,583	3,847	67,906	**73,336**
2040 population	1,577	3,907	70,130	**75,614**
2050 population	1,571	3,967	72,354	**77,892**
2060 population	1,565	4,028	74,578	**80,171**
West South West-Transient				
2010 population	34	46	261	**341**
2020 population	34	47	270	**351**
2030 population	34	47	279	**360**
2040 population	34	48	288	**370**
2050 population	34	49	297	**380**
2060 population	34	50	306	**390**
West-Residential				
2010 population	1,413	22,179	6,300	**29,892**
2020 population	1,415	22,525	6,631	**30,571**
2030 population	1,417	22,871	6,963	**31,251**
2040 population	1,419	23,218	7,294	**31,931**
2050 population	1,421	23,564	7,626	**32,611**
2060 population	1,423	23,910	7,957	**33,290**
West-Transient				
2010 population	27	1,280	75	**1,382**
2020 population	27	1,300	79	**1,406**
2030 population	27	1,320	83	**1,430**
2040 population	27	1,340	87	**1,454**
2050 population	27	1,360	91	**1,478**
2060 population	27	1,380	95	**1,502**
West North West-Residential				
2010 population	3,912	3,880	12,941	**20,733**
2020 population	3,991	3,945	13,134	**21,070**
2030 population	4,070	4,010	13,327	**21,407**
2040 population	4,149	4,074	13,519	**21,742**
2050 population	4,228	4,139	13,712	**22,079**
2060 population	4,307	4,204	13,904	**22,415**
West North West-Transient				
2010 population	70	56	103	**229**
2020 population	71	57	104	**233**
2030 population	72	58	106	**236**
2040 population	74	59	107	**240**
2050 population	75	60	109	**244**
2060 population	77	61	111	**248**

TABLE 2.5-4

Resident and Transient Population Projections Between 16 km and 80 km (10 mi and 50 mi)

km mi	16-40 10-25	40-60 25-37	60-80 37-50	Total for Sector
North West-Residential				
2010 population	3,116	6,994	58,417	**68,527**
2020 population	3,284	7,237	59,515	**70,036**
2030 population	3,451	7,480	60,613	**71,544**
2040 population	3,619	7,723	61,712	**73,054**
2050 population	3,787	7,966	62,810	**74,563**
2060 population	3,955	8,209	63,908	**76,072**
North West-Transient				
2010 population	28	303	422	**753**
2020 population	29	314	430	**773**
2030 population	31	324	438	**793**
2040 population	32	335	446	**813**
2050 population	34	345	454	**833**
2060 population	35	356	462	**853**
North North West-Residential				
2010 population	83,049	37,128	16,035	**136,212**
2020 population	87,798	39,354	17,933	**145,085**
2030 population	92,547	41,579	19,830	**153,956**
2040 population	97,296	43,804	21,728	**162,828**
2050 population	102,044	46,030	23,625	**171,699**
2060 population	106,793	48,255	25,523	**180,571**
North North West-Transient				
2010 population	1,479	1,143	172	**2,793**
2020 population	1,563	1,212	192	**2,967**
2030 population	1,648	1,280	212	**3,140**
2040 population	1,732	1,349	233	**3,314**
2050 population	1,817	1,417	253	**3,487**
2060 population	1,902	1,486	273	**3,660**
2010 population				
Residential Total	229,680	283,901	272,986	**786,567**
Cumulative Total (Residential plus Transient)	237,296	293,001	322,228	**852,525**
2020 population				
Residential Total	237,333	296,856	281,481	**815,670**
Cumulative Total (Residential plus Transient)	245,298	306,255	333,097	**884,650**
2030 population				
Residential Total	244,987	309,812	289,978	**844,777**
Cumulative Total (Residential plus Transient)	253,302	319,510	343,959	**916,771**
2040 population				
Residential Total	252,640	322,764	298,476	**873,880**
Cumulative Total (Residential plus Transient)	261,306	332,760	354,833	**948,899**
2050 population				
Residential Total	260,289	335,723	306,972	**902,984**
Cumulative Total (Residential plus Transient)	269,304	346,018	365,693	**981,016**

TABLE 2.5-4

Resident and Transient Population Projections Between 16 km and 80 km (10 mi and 50 mi)

km mi	16-40 10-25	40-60 25-37	60-80 37-50	Total for Sector
2060 population				
Residential Total	267,946	348,680	315,468	**932,094**
Cumulative Total (Residential plus Transient)	277,311	359,274	376,565	**1,013,150**

Source: ISU, 2002

Notes: 2010 and 2020 projections are based on a methodology determined by the Illinois State University. They are based on 1990 populations and fertility, mortality, and migration rates from the early 1990s. They have not been adjusted for the 2000 Census population. Population projections from the 2000 Census are being prepared by the State of Illinois and are expected to be released 2004 to 2006. A ratio of the population in 2010 and 2020 was used to determine the projected population for 2030, 2040, 2050, and 2060. Transient population was assumed to follow the same population trends as residential population.

TABLE 2.5-5

Age and Sex Distribution Within the Region

	Low Population Zone (2.5-mi radius)	Emergency Planning Zone (10-mi radius)	Region (50-mi radius)
Male	55.89%	48.79%	48.99%
Female	44.11%	51.21%	51.01%
Under 5 yrs	4.48%	6.59%	6.21%
5-9 yrs	4.17%	7.03%	6.66%
10-17 yrs	15.16%	11.43%	10.91%
18-21 yrs	4.77%	4.60%	9.22%
22-29 yrs	2.12%	9.49%	11.40%
30-39 yrs	13.19%	14.47%	13.76%
40-49 yrs	23.84%	15.26%	14.69%
50-59 yrs	6.60%	11.23%	10.53%
60-69 yrs	14.02%	8.64%	7.12%
70-79 yrs	9.91%	7.07%	5.84%
80-84 yrs	0.83%	2.43%	1.90%
85 yrs and Over	0.91%	1.76%	1.76%

Source: U.S. Census Bureau, 2001

TABLE 2.5-6
Racial and Ethnic Distribution Within the Region

	African-American	Asian	Hawaiian	Hispanic	Native American	Caucasian	Other	Two or More Races
Low Population Zone 2.5-mi radius	0%	0.35%	0%	0%	0.67%	95.74%	0.64%	2.61%
Emergency Planning Zone 10-mi radius	0.59%	0.35%	0.02%	1.52%	0.22%	96.40%	0.15%	0.74%
Region 50-mi radius	7.75%	2.15%	0.02%	1.84%	0.17%	86.86%	0.10%	1.10%

Source: U.S. Census Bureau, 2001a

TABLE 2.5-7
Income Distribution Within the Region – Percent of Households

	Low Population Zone (2.5-mi radius)	Emergency Planning Zone (10-mi radius)	Region (50-mi radius)
Less Than $10,000	2.59%	7.88%	8.29%
$10,000 to $14,999	4.03%	7.86%	6.75%
$15,000 to $19,999	6.34%	6.88%	6.19%
$20,000 to $24,999	5.48%	6.48%	7.11%
$25,000 to $29,999	3.75%	6.56%	7.31%
$30,000 to $34,999	4.32%	6.77%	7.03%
$35,000 to $39,999	4.03%	7.10%	6.13%
$40,000 to $44,999	5.48%	5.12%	6.25%
$45,000 to $49,999	6.92%	4.87%	6.31%
$50,000 to $59,999	14.12%	10.84%	10.60%
$60,000 to $74,999	13.54%	11.75%	10.86%
$75,000 to $99,999	16.14%	8.69%	9.09%
$100,000 to $124,999	6.34%	4.65%	3.79%
$125,000 to $149,999	2.59%	1.91%	1.73%
$150,000 to $199,999	3.75%	1.76%	1.53%
$200,000 or More	0.58%	0.88%	1.03%

Source: U.S. Census Bureau, 2001 and 2001b

Note: Percent of population below the poverty level is not shown in this table, since poverty level is a function of both income and household size.

TABLE 2.5-8
Employment by Industry

Industry	1990		2000	
	Number of Jobs	**Percent of Total**	**Number of Jobs**	**Percent of Total**
Agricultural Services, Forestry, Fishing	6,946	1.1%	6,357	0.9%
Construction	29,136	4.6%	38,485	5.2%
Farming	25,636	4.0%	22,879	3.1%
Finance, Insurance, and Real Estate	46,291	7.2%	64,975	8.8%
Government and Government Enterprises	121,872	19.1%	125,485	17.0%
Manufacturing	87,735	13.7%	90,601	12.3%
Mining	1,735	0.3%	640	0.1%
Retail Trade	108,781	17.0%	127,409	17.3%
Services	157,102	24.6%	198,829	27.0%
Transportation and Public Utilities	28,639	4.5%	34,198	4.7%
Wholesale Trade	25,024	3.9%	26,733	3.6%
Total	**638,897**		**736,591**	

Source: USDOC, 2002

TABLE 2.5-9

Employer	City	Employees
Agricultural		
A.E. Staley Manufacturing Co	Decatur	720
Archer Daniels Midland	Decatur	3,300
Grain Systems Inc.	Taylorville	850
Distribution		
Hobbico	Champaign	700
Supervalu	Urbana	625
Education		
Bloomington School District 87	Bloomington	708
Champaign School District	Champaign	1,305
Decatur Public Schools	Decatur	1,325
Illinois Central College	East Peoria	1,400
Illinois State University	Normal	3,400
Illinois Wesleyan University	Bloomington	550
Millikin University	Decatur	590
Normal School Unit 5	Normal	1,343
Parkland College	Champaign	1,200
SIU School of Medicine	Springfield	1,200
Springfield School District 186	Springfield	2,112
University of Illinois	Urbana	20,571
Urbana School District	Urbana	887
Government		
City of Decatur	Decatur	583
City of Springfield	Springfield	1,707
Federal Bureau of Prisons	Pekin	3,130
Illinois National Guard	Springfield	2,700
McLean County Government	Bloomington	942
Pontiac Correctional Center	Pontiac	800
State of Illinois	Springfield	21,600
Health Care		
BroMenn	Normal	1,860
Carle Clinic	Urbana	2,918

TABLE 2.5-9

Employer	City	Employees
Carle Foundation	Urbana	2,100
Christie Clinic Association	Champaign	800
Decatur Memorial Hospital	Decatur	2,200
Memorial Health Systems	Springfield	3,500
OSF/St. Joseph Medical Center	Bloomington	1,000
Pekin Memorial Hospital	Pekin	680
Provena Covenant	Urbana	1,200
Springfield Clinic	Springfield	1,100
St. John's Hospital	Springfield	3,588
St. Mary's Hospital	Decatur	1,200
Manufacturing		
Bell Sports/Bell Racing	Rantoul	561
Bridgestone/Firestone	Normal	575
Caradco	Rantoul	510
Caterpillar, Inc.	Decatur	2,000
Caterpillar	Morton	1,800
Caterpillar, Inc.	Pontiac	1,170
Caterpillar Tractor – Earth	East Peoria	4,000
Eagle Wings Ind.	Rantoul	513
Eaton Cutler Hammer	Lincoln	625
Interlake, Inc.	Pontiac	530
Kraft Foods	Champaign	1,300
Mitsubishi Motor Manufacturing of America	Normal	3,200
Morton Metalcraft – Sheet	Morton	950
Nestle USA	Bloomington	625
Plastipak Packaging Inc.	Champaign	600
Solo Cup	Urbana	700
Textron Auto Co, Rantoul Products	Rantoul	1,211
Verizon	Bloomington	750
Retail		
Meijer	Champaign	584
Walmart	East Peoria	500

TABLE 2.5-9

Employer	City	Employees
Services		
Anderson Financial Network	Bloomington	1,118
Boyd Gaming	East Peoria	1,100
Country Companies Insurance	Bloomington	2,118
Horace Mann Insurance Company	Springfield	1,310
Lincoln Developmental Center	Lincoln	683
Pekin Insurance	Pekin	650
R.R. Donnelley and Sons, Inc.	Pontiac	710
Roman Catholic Diocese	Springfield	1,600
State Farm Insurance	Bloomington-Normal	15,889
Transportation		
G & D Transportation – Trucking	Morton	755
Norfolk Southern Corp.	Decatur	600
Star Transport	Morton	1,150
Utilities		
Illinois Power Company	Decatur	1,250

Source: IDDCA, 2002

Notes: Last updated 6/2001 for Bloomington, 3/2002 for Champaign, 3/2002 for Decatur, 10/2001 for East Peoria, 9/2001 for Lincoln, 3/2001 for Morton, 6/2001 for Normal, 8/2001 for Pekin, 5/2001 for Pontiac, 8/2001 for Rantoul, 6/2002 for Springfield, 2/2001 for Taylorville, 3/2002 for Urbana, and 12/2001 for Washington.

TABLE 2.5-10
Regional Employment Trends

County	Workers Employed 1990	Workers Employed 2000	Percent Change in Workers Employed 1990-2000	Unemployment Rate 1990	Unemployment Rate 2000
DeWitt	7,632	7,318	-4.3%	6.10%	7.40%
Champaign	88,002	96,832	9.1%	3.30%	2.40%
Christian	16,651	18,000	7.5%	5.60%	5.40%
Coles	23,854	26,723	10.7%	6.00%	4.10%
Douglas	9,253	12,567	26.4%	4.70%	3.40%
Ford	6,575	6,469	-1.6%	4.70%	3.60%
Iroquois	13,973	15,259	8.4%	5.30%	4.50%
Livingston	18,008	19,872	9.4%	3.50%	3.40%
Logan	12,891	13,546	4.8%	5.90%	3.60%
McLean	69,106	90,126	23.3%	3.70%	2.50%
Macon	54,038	57,334	5.7%	7.10%	5.10%
Mason	6,863	8,055	14.8%	7.80%	6.10%
Menard	5,598	6,093	8.1%	4.50%	3.60%
Moultrie	6,210	8,071	23.1%	6.40%	4.00%
Piatt	7,789	8,115	4.0%	5.20%	3.40%
Sangamon	96,063	97,929	1.9%	3.90%	3.60%
Shelby	9,662	10,885	11.2%	7.10%	5.10%
Tazewell	59,582	68,531	13.1%	5.40%	3.70%
Vermilion	37,107	36,400	-1.9%	9.70%	6.60%
Woodford	15,818	18,817	15.9%	3.40%	2.80%
Total	**564,675**	**626,942**	**9.9%**		

Source: USDOL, 2002

TABLE 2.5-11

Taxing Body	Taxing Rate
DeWitt County	0.5809%
Clinton Community School District 15	2.2141%
Harp Township	6.0278%[a]
-- Richland Community College District 537	---[a]
-- Multi-Township Assessment District 3	---[a]
-- Vespasian Warner Public Library District	---[a]
-- Mahomet Valley Water Authority	---[a]

[a] Harp Township, Richland Community College District 537, Multi-Township Assessment District 3, Vespasian Warner Public Library District, and Mahomet Valley Water Authority have a combined tax rate of 6.0278%.

Note: Last updated 10/2000 for Clinton. Clinton Nuclear Generating Station Settlement Agreement, January 31, 2001.

TABLE 2.5-12
Housing Characteristics

County	Total Housing Units	Number Vacant	Number Owner-Occupied	Number Renter-Occupied
Champaign	75,280	4,683	39,329	31,268
Christian	14,992	1,071	10,610	3,311
Coles	22,768	1,725	13,028	8,015
DeWitt	7,282	512	5,076	1,694
Douglas	8,005	431	5,827	1,747
Ford	6,060	421	4,297	1,342
Iroquois	13,362	1,142	9,335	2,885
Livingston	15,297	923	10,655	3,719
Logan	11,872	759	7,925	3,188
McLean	59,972	3,226	37,710	19,036
Macon	50,241	3,680	33,345	13,216
Mason	7,033	644	4,905	1,484
Menard	5,285	412	3,847	1,026
Moultrie	5,743	338	4,241	1,164
Piatt	6,798	323	5,191	1,284
Sangamon	85,459	6,737	55,082	23,640
Shelby	10,060	1,004	7,337	1,719
Tazewell	52,973	2,646	38,293	12,034
Vermilion	36,349	2,943	23,953	9,453
Woodford	13,487	690	10,591	2,206

Source: U.S. Census Bureau, 2001

TABLE 2.5-13
Available Housing Within the Region

Area	Rental Property	Sale Property	Source
Clinton	3	2	Clinton Daily Journal, August 8, 2002
Decatur	58	55	Herald & Review, August 12, 2002
Springfield	68	16	State Journal Register, August 12, 2002
DeWitt County	0	56	DeWitt County, August 8, 2002
Central Illinois	23	33	Pantagraph, August 12, 2002

TABLE 2.5-14
Agricultural Lands

County	Total Land Area of County (ac)	Total Land in Farms (ac)	Percent of Total Land Area	Number of Farms	Average Farm Size (ac)
DeWitt	259,194	204,896	79%	463	443
Champaign	638,047	567,697	89%	1,371	414
Christian	458,131	389,958	85%	820	476
Coles	326,257	256,974	79%	681	377
Douglas	266,983	249,551	93%	630	396
Ford	315,000	314,806	99%	550	572
Iroquois	715,022	667,134	93%	1,393	479
Livingston	668,865	613,645	92%	1,380	445
Logan	396,265	380,921	96%	739	515
McLean	759,116	696,575	92%	1,475	472
Macon	374,537	332,875	89%	665	501
Mason	360,904	291,579	81%	486	600
Menard	202,002	170,231	84%	352	484
Moultrie	220,398	172,657	78%	464	372
Piatt	281,744	253,317	90%	448	565
Sangamon	561,666	466,956	83%	993	470
Shelby	491,433	418,688	85%	1,250	335
Tazewell	421,188	328,289	78%	909	361
Vermillion	577,006	484,846	84%	984	493
Woodford	347,335	299,763	86%	923	325

Source: IDOA, 2001

TABLE 2.5-15
2000 Agricultural Cash Receipts

County	Corn	Soybeans	Wheat	All other crops	Cattle and Calves	Hogs and Pigs	Total Receipts
DeWitt	$28,577	$22,410	$68	$780	$911	$999	$53,745
Champaign	$76,714	$62,648	$450	$5,280	$2,352	$4,696	$152,140
Christian	$52,319	$37,690	$870	$2,354	$1,290	$6,495	$101,018
Coles	$29,435	$23,824	$337	$1,125	$1,821	$1,998	$58,540
Douglas	$30,777	$25,515	$75	$2,255	$2,277	$1,199	$62,098
Ford	$37,853	$33,197	$217	$714	$1,062	$5,795	$78,838
Iroquois	$80,200	$66,394	$710	$10,414	$10,168	$4,896	$172,782
Livingston	$67,651	$63,248	$374	$1,910	$3,642	$28,577	$165,402
Logan	$50,159	$37,563	$313	$1,882	$1,594	$21,083	$112,594
McLean	$92,599	$74,742	$281	$2,312	$5,995	$13,689	$189,618
Macon	$43,937	$33,219	$145	$1,021	$1,290	$2,998	$82,610
Mason	$30,359	$20,184	$1,269	$29,325	$2,201	$5,496	$88,834
Menard	$18,432	$14,619	$486	$1,083	$2,504	$7,094	$44,218
Moultrie	$21,379	$16,675	$174	$1,385	$1,062	$999	$41,674
Piatt	$33,567	$28,274	$103	$605	$835	$3,697	$67,081
Sangamon	$59,679	$46,999	$401	$2,014	$3,035	$10,092	$122,220
Shelby	$36,122	$29,946	$2,702	$1,508	$7,133	$11,191	$88,602
Tazewell	$38,207	$30,650	$479	$16,703	$3,035	$11,591	$100,665
Vermilion	$55,102	$50,106	$601	$2,047	$2,884	$2,998	$113,738
Woodford	$35,264	$30,586	$240	$1,839	$2,656	$16,889	$87,474

Source: IDOA, 2001

Notes: Total and selected commodities in thousands of dollars.

TABLE 2.7-1
Climatological Data from Peoria and Springfield, Illinois

Parameter	Station	
	Peoria	**Springfield**
Location		
Distance (mi)	55	49
Direction from CPS	Northwest	West-Southwest
Temperature		
Annual (°F)	51.1	53.2
Maximum (°F)	105 (July 1988)	112 (July 1954)
Minimum (°F)	-25 (January 1977)	-22 (February 1963)
Degree days (heating)	6,226	5,654
Degree days (cooling)	948	1,165
Relative Humidity (%)		
Annual average at 6 A.M.	83	82
Annual average at Noon	61	61
Wind		
Annual average speed (mph)	10.1	11.2
Prevailing direction	South	South Southwest
Fastest mile:		
Speed (mph)	75 (July 1953)	75 (June 1957)
Direction	Northwest	Southwest
Peak Gust		
Speed (mph)	69 (April 1989)	69 (August 1987)
Direction	North	West
Precipitation (in.)		
Annual average	34.89	33.78
Monthly maximum	13.09 (September 1961)	10.76 (July 1981)
Monthly minimum	0.03 (September 1979)	Trace amount (September 1979)
24-hr maximum	5.06 (April 1950)	6.12 (December 1982)
Maximum Annual	55.35 (1990)	52.67 (1990)
Snowfall (in.)		
Annual average	25.1	23.9
Monthly maximum	24.7 (January 1979)	22.7 (December 1973)
Maximum 24-hr	12.2 (January 1979)	10.9 (December 1973)

TABLE 2.7-1
Climatological Data from Peoria and Springfield, Illinois

Parameter	Station	
	Peoria	**Springfield**
Mean Annual (number of days)		
Precipitation > 0.01 in.	113	113
Snow, sleet, hail > 1.0 in.	8	8
Heavy fog (visibility 0.25 mi or less)	21	17
Maximum temperature > 90°F	20	31
Minimum temperature < 32°F	129	117

Source: Gale Research Company, 1985, 1992, 1992a

Notes: These statistics are based on periods of record ranging from 22 to 50 years in length. The ranges span the years 1941 to 1990.

TABLE 2.7-2
Nonattainment Areas in Illinois

Illinois Nonattainment Counties	Nonattainment Pollutant(s)
Cook	Ozone, PM-10
DuPage, Grundy, Kane, Kendall, Lake, Madison, McHenry, Monroe, St. Claire, and Will	Ozone

Source: USEPA, 2002

TABLE 2.7-3
Summary of Illinois Tornado Occurrences

Tornado Intensity (Fujita Tornado Scale)	Number of Reported Occurrences January 1, 1950 – April 30, 2002
≥ F0	1,16
> F1	1,16
≥ F2	509
≥ F3	164
≥ F4	43
F5	3

Source: NOAA, 2002a

Notes:
F0: 40-72 mph
F1: 73 – 112 mph
F2: 113 – 157 mph
F3: 158 – 206 mph
F4: 207 – 260 mph
F5: 261 – 318 mph

TABLE 2.7-4
Reported Tornado Occurrences in DeWitt and Surrounding Counties

County	No. of Reported Tornadoes (1950 – 2002)
DeWitt	11
Piatt	19
Macon	41
Logan	33
McLean	84

Source: NOAA, 2002a

TABLE 2.7-5
Measures of Ice Glazing in Various Severe Winter Storms for the State of Illinois

Storm Date	Radial Thickness of Ice on Wire (in)	Ratio of Ice Weight to Weight of 0.25-in Twig	Weight of Ice (oz) on 1 ft of Standard (No. 12) Wire	City	State Section
2 – 4 February 1883	---[a]	---[a]	11	Springfield	WSW
20 March 1912	0.5	---[a]	---[a]	Decatur	C
21 February 1913	2.0	---[a]	---[a]	La Salle	NE
12 March 1923	1.6	---[a]	12	Marengo	NE
17 – 19 December 1924	1.2	15:1	8	Springfield	WSW
22 – 23 January 1927	1.1	---[a]	2	Cairo	SE
31 March 1929	0.5	---[a]	---[a]	Moline	NW
7 – 8 January 1930	1.2	---[a]	---[a]	Carlinville	WSW
1 – 2 March 1932	0.5	---[a]	---[a]	Galena	NW
7 – 8 January 1937	1.5	---[a]	---[a]	Quincy	W
31 Dec 1947 – 1 January 1948	1.0	---[a]	72	Chicago	NE
10 January 1949	0.8	---[a]	---[a]	Macomb	W
8 December 1956	---[a]	---[a]	---[a]	Alton	WSW
20 – 22 January 1959	0.7	12:1	---[a]	Urbana	E
26 – 27 January 1967	1.7	17:1	40	Urbana	E

Source: Changnon, 1969

[a] Data not available

Notes: C=Central, E=East, N=North, S=South, W=West

TABLE 2.7-6
Wind-Glaze Thickness Relations for Five Periods of Greatest Speed and Greatest Thickness

	Five Periods When Five Fastest 5-minute Speeds Were Registered		Five Periods When Five Greatest Ice Thicknesses Were Measured	
Rank	Speed (mph)	Ice Thickness (in)	Ice Thickness (in)	Speed (mph)
1	50	0.19	2.87	30
2	46	0.79	1.71	18
3	45	0.26	1.50	21
4	40	0.30	1.10	28
5	35	0.78	1.00	18

Source: Changnon, 1969

Notes: From data collected throughout the United States during period 1926-1937.

TABLE 2.7-7
Seasonal Frequencies of Inversions Below 500 ft in Central Illinois

	Inversions Below 500 ft	
Season	**Percent of Total Hours**	**Percent of 24-hr Periods with at Least 1 hr of Inversion**
Winter	29%	53%
Spring	29%	67%
Summer	33%	81%
Fall	39%	82%

Source: Hosler,1961

TABLE 2.7-8
Seasonal Values of Mean Daily Mixing Depth in Central Illinois

	Mean Daily Mixing Depths (m)	
Season	**Morning**	**Afternoon**
Winter	400	690
Spring	490	1,500
Summer	330	1,600
Fall	390	1,200

Source: Holzworth,1972

TABLE 2.7-9
Frequency of Occurrence of Wind Speed in the Site Area

Wind Speed (mps)	Percent of Occurrence	
	1972 – 1977	**2000 – 2002**
< 0.3 (calm)	0.3	0.03
0.3 to 1.4	7.7	13.83
1.5 to 3.0	28.2	40.40
3.1 to 5.0	30.7	31.41
5.1 to 8.0	23.7	12.21
> 8.0	9.4	2.16

Sources: CPS, 2002; ER Table 2.7-44

TABLE 2.7-10

Summary of 10 m Ambient Temperature Measurements at Clinton Power Station Facility (1972-1977)

	Average Daily	Average Daily Maximum	Average Daily Minimum	Absolute Maximum	Absolute Minimum
January	-5.1	-1.3	-8.9	15.5	-28.8
February	-1.3	1.9	-4.4	15.8	-23.6
March	5.9	10.5	1.6	25.5	-15.1
April	11.4	16.7	6.1	29.3	-6.5
May	16.4	21.2	11.2	32.1	0.0
June	21.2	26.1	16.0	33.0	5.0
July	23.6	28.4	18.5	35.2	8.1
August	22.1	26.8	17.4	23.2	9.1
September	17.7	22.8	12.7	33.3	0.8
October	11.9	17.1	6.9	30.0	-4.8
November	4.5	8.4	0.8	23.0	-15.8
December	-2.3	1.3	-5.9	17.8	-23.8
Period of Record	10.5	15.0	6.0	35.2	-28.8

Source: CPS, 2002

Notes: Temperatures in ^{o}C.

TABLE 2.7-11
Hourly Temperature Distribution at Clinton Power Station Facility (1972-1977)

	> 32.2°C		< 0.0°C		< -12.2°C		< -17.8°C	
	Hours	**Percent**	**Hours**	**Percent**	**Hours**	**Percent**	**Hours**	**Percent**
January	0	0.0%	2,628	72.5%	730	20.1%	225	6.2%
February	0	0.0%	2,019	60.5%	203	6.1%	48	1.4%
March	0	0.0%	808	21.9%	19	0.5%	0	0.0%
April	0	0.0%	188	4.7%	0	0.0%	0	0.0%
May	0	0.0%	1	0.0%	0	0.0%	0	0.0%
June	8	0.2%	0	0.0%	0	0.0%	0	0.0%
July	67	1.9%	0	0.0%	0	0.0%	0	0.0%
August	0	0.0%	0	0.0%	0	0.0%	0	0.0%
September	3	0.1%	0	0.0%	0	0.0%	0	0.0%
October	0	0.0%	82	2.3%	0	0.0%	0	0.0%
November	0	0.0%	948	26.4%	28	0.8%	0	0.0%
December	0	0.0%	2,414	65.9%	302	8.2%	56	1.5%
Period of Record	78	0.2%	9,088	21.0%	1,282	3.0%	329	0.8%

Source: CPS, 2002

TABLE 2.7-12
Daily Temperature Distribution at Clinton Power Station Facility (1972-1977)

	> 32.2°C		< 0.0°C		< -12.2°C		< -17.8°C	
	Days	**Percent**	**Days**	**Percent**	**Days**	**Percent**	**Days**	**Percent**
January	0	0.0%	132	86.3%	55	35.9%	24	15.7%
February	0	0.0%	116	82.3%	21	14.9%	6	4.3%
March	0	0.0%	65	41.9%	2	1.3%	0	0.0%
April	0	0.0%	27	16.2%	0	0.0%	0	0.0%
May	0	0.0%	1	0.6%	0	0.0%	0	0.0%
June	3	2.0%	0	0.0%	0	0.0%	0	0.0%
July	15	10.0%	0	0.0%	0	0.0%	0	0.0%
August	0	0.0%	0	0.0%	0	0.0%	0	0.0%
September	1	0.7%	0	0.0%	0	0.0%	0	0.0%
October	0	0.0%	15	9.9%	0	0.0%	0	0.0%
November	0	0.0%	73	48.7%	3	2.0%	0	0.0%
December	0	0.0%	129	83.8%	29	18.8%	8	5.2%
Period of Record	19	1.0%	558	30.5%	110	6.0%	38	2.1%

Source: CPS, 2002

TABLE 2.7-13
Summary of Relative Humidity Measurements at Clinton Power Station Facility (1972-1977)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Period of Record
Average	85.94	82.04	77.29	68.01	64.44	68.24	70.00	74.04	72.15	67.15	77.58	85.71	68.28
Average Daily Max.	92.10	89.77	87.75	83.96	80.77	83.26	85.13	86.04	85.33	80.75	86.61	90.47	79.01
Average Daily Min.	71.04	65.71	56.91	46.43	43.89	47.52	49.03	53.84	49.40	45.57	60.44	71.64	50.63
Absolute Max.	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Absolute Min.	38.34	14.11	22.26	16.80	15.78	19.22	27.20	23.93	15.91	14.86	23.13	21.40	14.11
Average by Hour of Day													
00	83.15	80.78	74.30	69.75	68.25	70.72	69.96	76.71	73.91	67.56	76.45	82.07	68.35
03	84.00	81.27	75.53	74.31	73.88	75.17	75.54	80.02	78.10	71.51	78.10	82.49	71.15
06	84.88	82.23	79.17	77.55	75.88	76.23	77.75	82.62	80.27	74.87	79.87	83.10	73.04
09	84.31	79.85	71.60	66.35	61.19	64.77	66.22	73.67	73.38	68.40	77.39	82.10	66.35
12	78.10	75.28	63.31	54.95	52.41	53.97	55.67	61.81	59.77	56.74	67.48	77.51	57.85
15	74.32	71.11	59.83	53.07	49.43	50.32	50.25	56.39	51.12	49.93	63.62	74.12	53.79
18	78.53	75.99	64.18	54.48	52.14	52.18	54.35	61.51	56.89	53.79	69.04	79.07	57.52
21	81.66	78.76	63.76	63.76	61.91	61.11	65.27	70.98	67.38	62.08	74.42	81.32	64.26

Source: CPS, 2002

Notes: Period of Record: 4/14/72-4/30/77

TABLE 2.7-14
Summary of Wet Bulb Temperature Measurements at Clinton Power Station Facility (1972-1977)

	Average Daily	Average Daily Maximum	Average Daily Minimum	Absolute Maximum	Absolute Minimum	57% Wet Bulb Value
January	-4.13	0.27	-7.98	16.67	-28.35	--[a]
February	0.43	4.31	-3.16	17.76	-20.42	--[a]
March	8.67	13.36	3.6	27.7	-13.7	--[a]
April	13.74	19.21	7.16	32.13	-6.05	--[a]
May	18.84	23.52	12.27	33	2.25	--[a]
June	23.19	27.32	16.69	34.17	5.52	--[a]
July	25.49	29.28	19.1	35.59	9.64	--[a]
August	23.64	27.61	17.67	32.41	9.64	--[a]
September	19.95	24.79	13.75	33.15	1	--[a]
October	14.1	19.38	7.95	33.13	-4.16	--[a]
November	6.23	10.42	1.8	24.67	14.95	--[a]
December	-1.22	2.65	-5	18.67	-23.32	--[a]
Period of Record	11.34	15.41	6.33	35.59	-28.35	28.17

Source: CPS, 2002

Notes: Temperatures in °C. Period of Record: 4/14/72-4/30/77

--[a] = Data not available

TABLE 2.7-15
Summary of 10-m Dew Point Measurements at Clinton Power Station Facility (1972-1977)

	Average Daily	Average Daily Maximum	Average Daily Minimum	Absolute Maximum	Absolute Minimum
January	-7.8	-4.4	-11.1	14.1	-29.5
February	-4.0	-0.7	-7.5	13.6	-24.1
March	1.8	5.4	-1.2	17.7	-17.8
April	4.2	7.4	1.3	19.0	-10.0
May	8.1	11.0	5.2	22.7	-9.0
June	13.5	16.4	10.6	25.6	-0.3
July	16.5	19.3	14.0	25.	3.5
August	15.9	18.1	13.6	24.5	2.5
September	11.4	14.0	8.5	23.3	-7.1
October	4.2	7.1	1.4	9.1	-11.3
November	-0.1	2.8	-2.7	16.3	-17.5
December	-5.2	-2.1	-8.3	13.1	-25.7
Period of Record	4.7	7.8	1.9	25.6	-29.5

Source: CPS, 2002

Notes: Temperatures in °C. Period of Record: 4/14/72-4/30/77

TABLE 2.7-16
Hourly Dew Point Temperature Persistence at Clinton Power Station Facility (1972-1977)-Percent of Hours with Dew Point

	> 18.3°C	> 12.8°C	> 7.2°C	> 0.0°C
January	0.0	0.1	2.0	16.5
February	0.0	0.2	3.5	27.9
March	0.0	5.9	21.7	58.9
April	0.1	9.9	32.8	73.7
May	3.0	22.1	59.1	89.5
June	19.3	54.1	89.0	99.9
July	38.1	79.3	98.1	100.0
August	37.7	73.9	94.3	100.0
September	20.3	41.1	73.0	96.2
October	0.4	13.5	34.1	72.5
November	0.0	4.6	15.0	47.3
December	0.0	0.1	2.5	17.9
Period of Record	9.5	24.9	43.3	66.3

Source: CPS, 2002

Notes: Period of Record: 4/14/72-4/30/77

TABLE 2.7-17
Summary of Dew Point Variability at Clinton Power Station Facility (1972-1977)-Percent of Hours with Dew Point Spread

	0.0 to 0.7°C	0.8 to 2.2°C	2.3 to 4.4°C	≥ 4.5°C
January	15.8%	33.0%	37.3%	14.0%
February	20.1%	20.7%	26.8%	32.3%
March	6.6%	18.0%	29.0%	46.5%
April	3.4%	14.2%	21.1%	61.2%
May	1.4%	9.0%	22.7%	66.9%
June	3.0%	11.1%	20.5%	65.4%
July	2.6%	8.3%	22.0%	67.1%
August	3.0%	16.3%	25.9%	54.8%
September	5.0%	16.8%	23.5%	54.7%
October	4.5%	14.9%	16.2%	64.4%
November	7.6%	20.8%	31.1%	40.6%
December	12.7%	26.7%	31.8%	18.8%
Period of Record	7.0%	18.4%	25.8%	48.8%

Source: CPS, 2002

Notes: Period of Record: 4/14/72-4/30/77

TABLE 2.7-18
Summary of Precipitation Measurements at Clinton Power Station Facility (1972-1977)

				Percent Hours With Precipitation		Percent Days With Precipitation		Max. Consecutive Hours		Max. Consecutive Days	
	Average Monthly and Annual	Maximum 1 hr	Maximum 1 day	0.01 or More	1.00 or More	0.01 or More	1.00 or More	With Precip.	Without Precip.	With Precip.	Without Precip.
January	1.40	0.50	2.53	3.4%	0.0%	21.3%	0.6%	14	356	5	14
February	1.15	0.26	0.97	3.3%	0.0%	19.9%	0.0%	9	470	3	19
March	3.44	0.69	1.29	5.9%	0.0%	23.3%	1.9%	10	408	3	16
April	1.67	0.69	1.63	3.4%	0.0%	25.1%	0.6%	14	455	5	18
May	1.80	0.52	0.62	3.6%	0.0%	26.0%	0.0%	6	293	5	12
June	4.16	1.15	2.72	4.7%	0.0%	31.3%	3.3%	14	545	5	22
July	2.27	0.43	1.74	3.1%	0.0%	25.2%	0.6%	7	365	4	14
August	2.52	0.80	1.34	2.9%	0.0%	21.9%	0.6%	8	476	3	21
September	2.44	0.81	1.26	3.8%	0.0%	28.0%	2.0%	11	372	8	15
October	1.53	0.45	0.94	3.7%	0.0%	20.6%	0.0%	12	332	3	13
November	1.83	0.40	1.06	4.4%	0.0%	22.0%	0.7%	11	620	5	25
December	1.33	0.34	0.93	3.7%	0.0%	21.9%	0.0%	8	406	8	16
Period of Record	25.47	1.15	2.72	3.8%	0.0%	24.6%	0.9%	14	807	8	33

Source: CPS, 2002

Notes: Precipitation is measured in inches. Period of Record: 4/14/72-4/30/77

TABLE 2.7-19
Average Number of Days of Fog Occurrence at Peoria and Springfield, Illinois

	Average Number of Days of Fog (Observed)	
	Springfield, IL	**Peoria, IL**
January	2	3
February	3	3
March	2	2
April	1	1
May	1	1
June	1/2	1
July	1	1
August	1	1
September	1	1
October	1	1
November	2	2
December	3	3
Year	18.5	20
Period of Record	1951-1961; 1963-1970	1949-1951; 1957-1971

Source: CPS, 2002

Notes: Originally obtained from NOAA, Local Climatological Data Summaries for Peoria and Springfield, Illinois.

TABLE 2.7-20
Monthly Frequency of Fog Occurrence, Hours of Maximum and Minimum, and Fog Persistence for Peoria, Illinois (1949-1951; 1957-1971)

Month	Percent Total Frequency of Occurrences	Daily Maximum		Daily Minimum		Number of Times In 15 yrs Fog Persisted For At Least:		
		Hour	Percent	Hour	Percent	12 hrs	24 hrs	Max.
January	17.8	8 AM	25.1%	6 PM	14.0%	38	15	95
February	17.1	8 AM	26.8%	3 PM	11.6%	32	8	42
March	14.9	6 AM	24.1%	3 PM	9.5%	33	8	74
April	8.2	6 AM	18.0%	2 PM	4.1%	10	4	36
May	7.4	6 AM	17.2%	5 PM	2.5%	11	2	34
June	5.7	5 AM	17.4%	6 PM	0.9%	3	1	42
July	7.3	5 AM	27.6%	5 PM	0.7%	7	0	15
August	8.6	6 AM	35.7%	4 PM	0.4%	5	0	19
September	9.1	6 AM	27.3%	2 PM	1.9%	10	1	33
October	10.3	7 AM	23.3%	3 PM	5.4%	15	3	34
November	13.8	8 AM	23.0%	1 PM	8.5%	25	7	43
December	15.5	9 AM	21.5%	4 PM	10.0%	38	9	48

Source: CPS, 2002

TABLE 2.7-21
Monthly Frequency of Fog Occurrence, Hours of Maximum and Minimum, and Fog Persistence for Springfield, Illinois (1951-1961; 1963-1970)

Month	Percent Total Frequency of Occurrences	Daily Maximum		Daily Minimum		Number of Times In 15 yrs Fog Persisted for at Least:		
		Hour	Percent	Hour	Percent	12 hrs	24 hrs	Max.
January	17.2%	7 AM	25.1%	3 PM	13.4%	49	17	90
February	15.0%	7 AM	23.9%	3 PM	10.8%	39	15	53
March	12.7%	6 AM	21.4%	3 PM	8.7%	36	8	36
April	6.4%	6 AM	16.1%	4 PM	2.3%	16	2	26
May	5.5%	5 AM	14.6%	4 PM	1.5%	8	1	27
June	3.7%	6 AM	12.4%	5 PM	0.8%	1	1	29
July	5.0%	5 AM	22.3%	3 PM	0.2%	6	0	19
August	6.1%	6 AM	27.0%	4 PM	0.2%	2	0	13
September	5.5%	6 AM	23.9%	4 PM	0.3%	3	0	22
October	6.7%	6 AM	15.8%	4 PM	4.0%	14	3	47
November	9.4%	7 AM	17.4%	2 PM	4.9%	25	5	51
December	15.4%	8 AM	20.8%	2 PM	12.2%	37	17	75

Source: CPS, 2002

TABLE 2.7-22

Joint Frequency Distribution of Wind Speed, Wind Direction, and Atmospheric Stability at Clinton Power Station Facility

Wind Level: 10 m (33 ft)

Stability Category: A (Delta Temperature Less Than -1.8°C per 100 m)

Period of Record: 4/14/72-4/30/77

	Direction (3)																
Speed (mps)	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**SSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**	**N**	**Total**
0.3- 1.4	1	4	3	2	2	7	9	5	5	6	2	3	4	3	4	5	65
(1)	0.06	0.23	0.17	0.11	0.11	0.40	0.51	0.28	0.28	0.34	0.11	0.17	0.23	0.17	0.23	0.28	3.68
(2)	0.00	0.01	0.01	0.00	0.00	0.02	0.02	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.05	0.16
1.5- 3.0	23	24	12	14	8	19	34	41	31	37	13	24	30	27	18	24	379
(1)	1.30	1.36	0.68	0.79	0.45	1.08	1.93	2.32	1.76	2.10	0.74	1.36	1.70	1.53	1.02	1.36	21.46
(2)	0.06	0.06	0.03	0.03	0.02	0.05	0.08	0.10	0.08	0.09	0.03	0.06	0.07	0.07	0.04	0.06	0.93
3.1- 5.0	39	43	26	19	8	17	38	61	40	65	32	44	37	57	24	29	579
(1)	2.21	2.43	1.47	1.08	0.45	0.96	2.15	3.45	2.27	3.68	1.81	2.49	2.10	3.23	1.36	1.64	32.79
(2)	0.10	0.11	0.06	0.05	0.02	0.04	0.09	0.15	0.10	0.16	0.08	0.11	0.09	0.14	0.06	0.07	1.42
5.1- 8.0	28	59	27	8	4	10	22	46	38	52	46	71	65	48	49	26	594
(1)	1.59	3.34	1.25	0.45	0.23	0.57	1.25	2.60	2.15	2.94	2.60	4.02	3.68	2.72	2.77	1.47	33.64
(2)	0.07	0.15	0.05	0.02	0.01	0.02	0.05	0.11	0.09	0.13	0.11	0.17	0.16	0.12	0.12	0.06	1.46
8.1-10.4	4	2	2	0	0	0	1	9	6	11	13	19	8	5	13	6	104
(1)	0.23	0.11	0.11	0.00	0.00	0.00	0.06	0.51	0.34	0.62	1.02	1.08	0.45	0.28	0.74	0.34	5.89
(2)	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.03	0.04	0.05	0.02	0.01	0.03	0.01	0.26
OVER 10.4	0	12	1	1	2	0	1	0	2	2	3	7	2	4	2	5	44
(1)	0.00	0.68	0.06	0.06	0.11	0.00	0.06	0.00	0.11	0.11	0.17	0.40	0.11	0.23	0.11	0.28	2.49
(2)	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.01	0.00	0.01	0.11
All Speeds (4)	95	144	66	44	24	53	105	162	122	173	114	168	146	144	110	95	1,765
(1)	5.38	8.15	3.74	2.49	1.36	3.00	5.95	9.17	6.91	9.80	6.46	9.51	8.27	8.15	6.23	5.38	99.94
(2)	0.23	0.35	0.16	0.11	0.06	0.13	0.26	0.40	0.30	0.43	0.28	0.41	0.36	0.35	0.27	0.23	4.34

Source: CPS, 2002

Notes: (1) Percent of all good observations for this page; (2) Percent of all good observations for the period; (3) E=East, N=North, S=South, W=West; (4) 1,766 hours on this page with 1 hours (0.1 percent) at less than 0.3 mps (0.0 percent of all hours).

TABLE 2.7-23

Joint Frequency Distribution of Wind Speed, Wind Direction, and Atmospheric Stability at Clinton Power Station Facility

Wind Level: 10 m (33 ft)

Stability Category: B (Delta Temperature Range = -1.8 to -1.7°C per 100 m)

Period of Record: 4/14/72-4/30/77

	Direction (3)																
Speed (mps)	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**SSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**	**N**	**Total**
0.3- 1.4	0	4	5	1	0	1	1	2	1	6	2	5	4	2	2	0	36
(1)	0.00	0.27	0.34	0.07	0.00	0.07	0.07	0.14	0.07	0.41	0.14	0.34	0.27	0.14	0.14	0.00	2.47
(2)	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.09
1.5- 3.0	12	24	8	13	10	10	14	22	13	36	22	15	18	15	13	15	260
(1)	0.82	1.65	0.55	0.89	0.69	0.69	0.96	1.51	0.69	2.47	1.51	1.03	1.24	1.03	0.89	1.03	17.86
(2)	0.03	0.06	0.02	0.03	0.02	0.02	0.03	0.05	0.03	0.09	0.05	0.04	0.04	0.04	0.03	0.04	0.64
3.1- 5.0	35	32	18	14	17	24	29	41	45	61	40	46	40	43	28	27	541
(1)	2.40	2.20	1.24	0.96	1.17	1.72	1.99	2.82	3.09	4.19	2.75	3.16	2.75	2.95	1.92	1.85	37.16
(2)	0.09	0.08	0.04	0.03	0.04	0.06	0.07	0.10	0.11	0.15	0-.10	0.11	0.10	0.11	0.07	0.07	1.33
5.1- 8.0	20	34	16	20	6	16	31	27	35	46	42	40	47	47	22	26	475
(1)	1.37	2.34	1.10	1.37	0.41	1.10	2.13	1.85	2.40	3.16	2.88	2.76	3.23	3.23	1.51	1.79	32.62
(2)	0.05	0.08	0.04	0.05	0.01	0.04	0.08	0.07	0.09	0.11	0.10	0.10	0.12	0.12	0.05	0.06	1.17
8.1-10.4	3	0	0	1	0	0	2	7	5	5	9	24	16	4	3	3	82
(1)	0.21	0.00	0.00	0.07	0.00	0.00	0.14	0.48	0.34	0.34	0.62	1.65	1.10	0.27	0.21	0.21	5.63
(2)	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.01	0.02	0.06	0.04	0.01	0.01	0.01	0.20
Over 10.4	2	1	0	2	6	2	1	6	3	4	5	8	15	1	0	5	61
(1)	0.14	0.07	0.00	0.14	0.41	0.14	0.07	0.41	0.21	0.27	0.34	0.55	1.03	0.07	0.00	0.34	4.19
(2)	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.04	0.00	0.00	0.01	0.15
All Speeds (4)	72	95	47	51	39	54	78	105	102	158	120	138	140	112	68	76	1,455
(1)	4.95	6.52	3.23	3.50	2.68	3.71	5.36	7.21	7.01	10.85	8.24	9.48	9.62	7.69	4.67	5.22	99.93
(2)	0.18	0.23	0.12	0.13	0.10	0.13	0.19	0.26	0.25	0.39	0.30	0.34	0.34	0.28	0.17	0.19	3.58

Source: CPS, 2002

Notes: (1) Percent of all good observations for this page, (2) Percent of all good observations for the period; (3) E=East, N=North, S=South, W=West; (4) 1,456 hrs on this page, with 1 hr (0.1 percent) at less than 0.3 mps (0.0 percent of all hours).

TABLE 2.7-24

Joint Frequency Distribution Clinton Power Station Facility

Wind Level: 10 m (33 ft)

Stability Category: C (Delta Temperature Range = -1.6 to -1.5 °C per 100 m)

Period of Record: 4/14/72-4/30/77

	Direction (3)																
Speed (mps)	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**SSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**	**N**	**Total**
0.3-1.4	0	5	4	1	1	3	7	7	7	4	5	5	6	4	3	2	64
(1)	0.00	0.23	0.18	0.05	0.05	0.14	0.32	0.32	0.32	0.18	0.23	0.23	0.27	0.18	0.14	0.09	2.92
(2)	0.00	0.01	0.01	0.00	0.00	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.16
1.5- 3.0	27	31	31	18	12	25	29	36	29	32	22	28	35	18	28	22	423
(1)	1.23	1.42	1.42	0.82	0.55	1.14	1.32	1.64	1.32	1.46	1.01	1.28	1.60	0.82	1.28	1.01	19.32
(2)	0.07	0.08	0.08	0.04	0.03	0.06	0.07	0.09	0.07	0.08	0.05	0.07	0.09	0.04	0.07	0.05	1.04
3.1- 5.0	42	46	40	31	31	24	51	55	47	83	67	38	62	50	52	27	746
I (1)	1.92	2.10	1.83	1.42	1.42	1.10	2.33	2.51	2.15	3.79	3.06	1.74	2.83	2.28	2.38	1.23	34.08
(2)	0.10	0.11	0.10	0.08	0.08	0.06	0.13	0.14	0.12	0.20	0.16	0.09	0.15	0.12	0.13	0.07	1.83
5.1- 8.0	35	34	19	20	20	31	40	33	43	88	62	61	72	55	33	29	675
(1)	1.60	1.55	0.87	0.91	0.91	1.42	1.83	1.51	1.96	4.02	2.83	2.79	3.29	2.51	1.51	1.32	30.84
(2)	0.09	0.08	0.05	0.05	0.05	0.08	0.10	0.08	0.11	0.22	0.15	0.15	0.18	0.14	0.08	0.07	1.66
8.1-10.4	8	3	0	1	0	2	2	9	14	12	17	36	20	13	5	7	149
(1)	0.37	0.14	0.00	0.05	0.00	0.09	0.09	0.41	0.64	0.55	0.78	1.64	0.91	0.59	0.23	0.32	6.81
(2)	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.03	0.04	0.09	0.05	0.03	0.01	0.02	0.37
Over 10.4	1	3	1	8	7	9	10	3	12	9	19	23	12	4	4	5	130
(1)	0.05	0.14	0.05	0.37	0.32	0.41	0.46	0.14	0.55	0.41	0.87	1.05	0.55	0.18	0.18	0.23	5.94
(2)	0.00	0.01	0.00	0.02	0.02	0.02	0.02	0.01	0.03	0.02	0.05	0.06	0.03	0.01	0.01	0.01	0.32
All Speeds (4)	113	122	95	79	71	94	139	143	152	228	192	191	207	144	125	92	2,187
(1)	5.16	5.57	4.34	3.61	3.24	4.29	6.35	6.53	6.94	10.42	8.77	8.73	9.46	6.58	5.71	4.20	99.91
(2)	0.28	0.30	0.23	0.19	0.17	0.23	0.34	0.35	0.37	0.56	0.47	0.47	0.51	0.35	0.31	0.23	5.38

Source: CPS, 2002

Notes: (1) Percent of all good observations for this page; (2) Percent of all good observations for the period; (3) E=East, N=North, S=South, W=West; (4) 2,189 hrs on this page with 2 hrs (0.1 percent) at less than 0.3 mps (0.0 percent of all hours).

TABLE 2.7-25

Joint Frequency Distribution of Wind Speed, Wind Direction, and Atmospheric Stability at Clinton Power Station Facility

Wind Level: 10 m (33 ft)

Stability Category: D (Delta Temperature Range = -1.4 to -0.5°C per 100 m)

Period of Record: 4/14/72-4/30/77

	Direction (3)																
Speed (mps)	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**SSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**	**N**	**Total**
0.3-1.4	30	34	31	37	40	25	46	50	46	52	37	36	46	26	35	31	602
(1)	0.18	0.21	0.19	0.23	0.25	0.15	0.28	0.31	0.28	0.32	0.23	0.22	0.28	0.16	0.21	0.19	3.69
(2)	0.07	0.08	0.08	0.09	0.10	0.06	0.11	0.12	0.11	0.13	0.09	0.09	0.11	0.06	0.09	0.08	1.48
1.5- 3.0	126	178	204	197	147	173	250	249	218	229	160	162	190	166	155	135	2,939
(1)	0.77	1.09	1.25	1.21	0.90	1.06	1.53	1.53	1.34	1.40	0.98	0.99	1.16	1.02	0.95	0.83	18.01
(2)	0.31	0.44	0.50	0.48	0.36	0.43	0.61	0.61	0.54	0.56	0.39	0.40	0.47	0.41	0.38	0.33	7.23
3.1- 5.0	269	289	291	286	248	231	302	416	466	396	314	360	450	406	316	294	5,334
(1)	1.65	1.77	1.78	1.75	1.52	1.42	1.85	2.55	2.86	2.43	1.92	2.21	2.76	2.49	1.94	1.80	32.69 4
(2)	0.66	0.71	0.72	0.70	0.61	0.57	0.74	1.02	1.15	0.97	0.77	0.89	1.11	1.00	0.78	0.72	13.11
5.1- 8.0	240	263	138	134	170	193	228	439	515	428	323	535	679	457	319	269	5,330
(1)	1.47	1.61	0.85	0.82	1.04	1.18	1.40	2.69	3.16	2.62	1.98	3.28	4.16	2.80	1.96	1.65	32.67
(2)	0.59	0.65	0.34	0.33	0.42	0.47	0.56	1.08	1.27	1.05	0.79	1.32	1.67	1.12	0.78	0.66	13.10
8.1-10.4	65	63	11	16	16	23	40	152	139	119	137	200	204	102	86	73	1,446
(1)	0.40	0.39	0.07	0.10	0.10	0.14	0.25	0.93	0.85	0.73	0.84	1.23	1.25	0.63	0.53	0.85	8.86
(2)	0.16	0.15	0.03	0.04	0.04	0.06	0.10	0.37	0.34	0.29	0.34	0.42	0.50	0.25	0.21	0.18	3.55
Over 10.4	25	19	13	21	18	22	17	39	58	52	95	132	80	24	24	23	662
(1)	0.15	0.12	0.08	0.13	0.11	0.13	0.10	0.24	0.36	0.32	0.58	0.81	0.49	0.15	0.15	0.14	4.06
(2)	0.06	0.05	0.03	0.05	0.04	0.05	0.04	0.10	0.14	0.13	0.23	0.32	0.20	0.06	0.06	0.06	1.63
All Speeds (4)	755	846	688	691	639	667	883	1,345	1,442	1,276	1,066	1,425	1,649	1,181	935	825	16,313
(1)	4.63	5.18	4.22	4.23	3.92	4.09	5.41	8.24	8.84	7.82	6.53	8.73	10.11	7.24	5.73	5.06	99.98
(2)	1.86	2.08	1.69	1.70	1.57	1.64	26.17	3.31	3.55	3.14	2.62	3.50	4.05	2.90	2.30	2.03	40.10

Source: CPS, 2002

Notes: (1) Percent of all good observations for this page; (2) Percent of all good observations for the period; (3) E=East, N=North, S=South, W=West; (4) 16,317 hrs on this page with 4 hrs (0.0 percent) at less than 0.3 mps (0.0 percent of all hours).

TABLE 2.7-26

Joint Frequency Distribution of Wind Speed, Wind Direction, and Atmospheric Stability at Clinton Power Station Facility

Wind Level: 10 m (33 ft)

Stability Category: E (Delta Temperature Range = -0.4 to +1.5°C per 100 m)

Period of Record: 4/14/72-4/30/77

	Direction (3)																
Speed (mps)	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**SSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**	**N**	**Total**
0.3-1.4	38	42	49	47	33	53	62	69	60	60	48	44	41	28	19	32	725
(1)	0.35	0.39	0.45	0.43	0.31	0.49	0.57	0.64	0.55	0.55	0.44	0.41	0.38	0.26	0.15	0.30	6.70
(2)	0.09	0.10	0.12	0.12	0.08	0.13	0.15	0.17	0.15	0.15	0.12	0.11	0.10	0.07	0.05	0.08	1.78
1.5- 3.0	95	170	188	204	201	255	308	312	299	218	197	173	175	159	113	98	3,165
(1)	0.88	1.57	1.74	1.89	1.86	2.36	2.85	2.88	2.76	2.02	1.82	1.60	1.62	1.47	1.04	0.91	29.26
(2)	0.23	0.42	0.46	0.50	0.49	0.63	0.76	0.77	0.74	0.54	0.48	0.43	0.43	0.39	0.28	0.24	7.78
3.1- 5.0	119	156	162	187	197	246	367	530	518	343	241	242	223	148	116	151	3,946
(1)	1.10	1.44	1.50	1.73	1.82	2.27	3.39	4.90	4.79	3.17	2.23	2.24	2.06	1.37	1.07	1.40	36.49
(2)	0.29	0.38	0.40	0.46	0.48	0.60	0.90	1.30	1.27	0.84	0.59	0.59	0.55	0.36	0.29	0.37	9.70
5.1- 8.0	48	72	33	56	100	148	174	402	386	193	188	197	124	56	42	65	2,284
(1)	0.44	0.67	0.31	0.52	0.92	1.37	1.61	3.72	3.57	1.78	1.74	1.82	1.15	0.52	0.39	0.60	21.12
(2)	0.12	0.18	0.08	0.14	0.25	0.36	0.43	0.99	0.95	0.47	0.46	0.48	0.30	0.14	0.10	0.16	5.61
8.1-10.4	15	10	5	2	21	26	19	56	43	32	46	51	25	9	20	14	394
(1)	0.14	0.09	0.05	0.02	0.19	0.24	0.18	0.52	0.40	0.30	0.43	0.47	0.23	0.08	0.18	0.13	3.64
(2)	0.04	0.02	0.01	0.00	0.05	0.06	0.05	0.14	0.11	0.08	0.11	0.13	0.06	0.02	0.05	0.03	0.97
Over 10.4	4	9	9	17	24	15	20	31	36	24	24	23	13	13	4	9	275
(1)	0.04	0.08	0.08	0.16	0.22	0.14	0.18	0.29	0.33	0.22	0.22	0.21	0.12	0.12	0.04	0.08	2.54
(2)	0.01	0.02	0.02	0.04	0.06	0.04	0.05	0.08	0.09	0.06	0.06	0.06	0.03	0.03	0.01	0.02	0.68
All Speeds (4)	319	459	446	513	576	743	950	1,480	1,342	870	744	730	601	413	314	369	10,789
(1)	2.95	4.24	4.12	4.74	5.33	6.87	8.78	12.94	12.41	8.04	6.88	6.75	5.56	3.82	2.90	3.41	99.76
(2)	0.78	1.13	1.10	1.26	1.42	1.83	2.34	3.44	3.30	2.14	1.83	1.79	1.48	1.02	0.77	0.91	26.52

Source: CPS, 2002

Notes: (1) Percent of all good observations for this page; (2) Percent of all good observations for the period; (3) E=East, N=North, S=South, W=West; (4) 10,815 hrs on this page with 26 hrs (0.2 percent) at less than 0.3 mps (0.1 percent of all hours).

TABLE 2.7-27

Joint Frequency Distribution of Wind Speed, Wind Direction, and Atmospheric Stability at Clinton Power Station Facility

Wind Level: 10 m (33 ft)

Stability Category: F (Delta Temperature Range = 1.6 To 4.0°C per 100 m)

Period of Record: 4/14/72-4/30/77

	Direction (3)																
Speed (mps)	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**SSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**	**N**	**Total**
0.3-1.4	30	50	50	42	36	49	54	59	36	44	35	44	29	25	33	39	655
(1)	0.67	1.12	1.12	0.94	0.80	1.10	1.21	1.32	0.80	0.98	0.78	0.98	0.65	0.56	0.74	0.87	14.64
(2)	0.07	0.12	0.12	0.10	0.09	0.12	0.13	0.15	0.09	0.11	0.09	0.11	0.07	0.06	0.08	0.10	1.61
1.5- 3.0	75	125	134	153	161	197	216	222	248	209	152	139	163	113	63	83	2,453
(1)	1.68	2.79	3.00	3.42	3.60	4.40	4.83	4.96	5.54	4.67	3.40	3.11	3.64	2.53	1.41	1.86	54.83
(2)	0.18	0.31	0.33	0.38	0.40	0.48	0.53	0.55	0.61	0.51	0.37	0.34	0.40	0.28	0.15	0.20	6.03
3.1- 5.0	26	24	22	28	40	56	101	114	148	120	96	73	75	57	24	27	1,031
(1)	0.58	0.54	0.49	0.63	0.89	1.25	2.26	2.55	3.31	2.68	2.15	1.63	1.68	1.27	0.54	0.60	23.04
(2)	0.06	0.06	0.05	0.07	0.10	0.14	0.25	0.28	0.36	0.30	0.24	0.18	0.18	0.14	0.06	0.07	2.53
5.1- 8.0	0	0	0	0	0	5	4	4	8	14	10	16	10	3	4	2	80
(1)	0.00	0.00	0.00	0.00	0.00	0.11	0.09	0.09	0.18	0.31	0.22	0.36	0.22	0.07	0.09	0.04	1.79
(2)	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.02	0.04	0.02	0.01	0.01	0.00	0.20
8.1-10.4	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	0	5
(1)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.04	0.00	0.11
(2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Over 10.4	11	21	14	22	9	13	23	18	23	17	15	12	8	5	4	9	224
(1)	0.25	0.47	0.31	0.49	0.20	0.29	0.51	0.40	0.51	0.38	0.34	0.27	0.18	0.11	0.09	0.20	5.01
(2)	0.03	0.05	0.03	0.05	0.02	0.03	0.06	0.04	0.06	0.04	0.04	0.03	0.02	0.01	0.01	0.02	0.55
All Speeds (4)	142	220	220	245	246	320	398	417	463	404	308	285	286	204	130	160	4,448
(1)	3.17	4.92	4.92	5.48	5.50	7.15	8.90	9.32	10.35	9.03	6.88	6.37	6.39	4.56	2.91	3.58	99.42
(2)	0.35	0.54	0.54	0.60	0.60	0.79	0.98	1.03	1.14	0.99	0.76	0.70	0.70	0.50	0.32	0.39	10.93

Source: CPS, 2002

Notes: (1) Percent of all good observations for this page; (2) Percent of all good observations for the period; (3) E=East, N=North, S=South, W=West; (4) 4,474 hrs on this page with 24 hrs (0.6 percent) at less than 0.3 mps (0.1 percent of all hours).

TABLE 2.7-28

Joint Frequency Distribution of Wind Speed, Wind Direction, and Atmospheric Stability at Clinton Power Station Facility

Wind Level: 10 m (33 ft)

Stability Category: G (Delta Temperature Greater Than 4.0°C per 100 m)

Period of Record: 4/14/72-4/30/77

	Direction (3)																
Speed (mps)	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**SSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**	**N**	**Total**
0.3-1.4	53	73	73	79	52	57	69	98	78	63	58	58	55	49	41	37	993
(1)	1.45	1.99	1.99	2.16	1.42	1.56	1.89	2.68	2.13	1.72	1.58	1.58	1.50	1.34	1.12	1.01	27.13
(2)	0.13	0.18	0.18	0.19	0.13	0.14	0.17	0.24	0.19	0.15	0.14	0.14	0.14	0.12	0.10	0.09	2.44
1.5- 3.0	75	138	94	93	90	160	182	189	216	151	88	94	92	96	43	57	1,858
(1)	2.05	3.77	2.57	2.54	2.46	4.37	4.97	5.16	5.90	4.13	2.40	2.57	2.51	2.62	1.17	1.56	50.77
(2)	0.18	0.34	0.23	0.23	0.22	0.39	0.45	0.46	0.53	0.37	0.22	0.23	0.23	0.24	0.11	0.14	4.57
3.1- 5.0	8	9	9	10	13	19	23	23	55	28	13	17	22	27	12	7	295
(1)	0.22	0.25	0.25	0.27	0.36	0.52	0.63	0.63	1.50	0.77	0.36	0.46	0.60	0.74	0.33	0.19	8.06
(2)	0.02	0.02	0.02	0.02	0.03	0.05	0.06	0.06	0.14	0.07	0.03	0.04	0.05	0.07	0.03	0.02	0.73
5.1- 8.0	6	10	1	5	14	15	4	35	55	13	2	17	14	2	1	3	197
(1)	0.16	0.27	0.03	0.14	0.38	0.41	0.11	0.96	1.50	0.36	0.05	0.46	0.38	0.05	0.03	0.08	5.38
(2)	0.01	0.02	0.00	0.01	0.03	0.04	0.01	0.09	0.14	0.03	0.00	0.04	0.03	0.00	0.00	0.01	0.48
8.1-10.4	1	1	1	0	0	0	0	0	20	4	1	8	6	0	2	3	47
(1)	0.03	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.55	0.11	0.03	0.22	0.16	0.00	0.05	0.08	1.28
(2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.01	0.00	0.02	0.01	0.00	0.00	0.01	0.12
Over 10.4	8	30	27	25	15	9	16	27	16	13	16	2	5	5	2	5	221
(1)	0.22	0.82	0.74	0.68	0.41	0.25	0.44	0.74	0.44	0.36	0.44	0.05	0.14	0.14	0.05	0.14	6.04
(2)	0.02	0.07	0.07	0.06	0.04	0.02	0.04	0.07	0.04	0.03	0.04	0.00	0.01	0.01	0.00	0.01	0.54
All Speeds (4)	151	261	205	212	184	260	294	372	440	272	178	196	194	179	101	112	3,611
(1)	4.13	7.13	5.60	5.79	5.03	7.10	8.03	10.16	12.02	7.43	4.86	5.36	5.30	4.89	2.76	3.06	98.66
(2)	0.37	0.64	0.50	0.52	0.45	0.64	0.72	0.91	1.08	0.67	0.44	0.48	0.48	0.44	0.25	0.28	8.88

Source: CPS, 2002

Notes: (1) Percent of all good observations for this page; (2) Percent of all good observations for the period; (3) E=East, N=North, S=South, W=West; (4) 3,660 hrs on this page with 49 hrs (1.3 percent) at less than 0.3 mps (0.1 percent of all hours).

TABLE 2.7-29

Joint Frequency Distribution of Wind Speed, Wind Direction, and Atmospheric Stability at Clinton Power Station Facility

Wind Level: 10 m (33 ft)

Stability Category: ALL Stabilities Combined

Period of Record: 4/14/72-4/30/77

	Direction (3)																
Speed (mps)	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**SSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**	**N**	**Total**
0.3-1.4	152	212	215	209	164	195	248	290	233	235	187	195	185	137	137	146	3,140
(1)	0.37	0.52	0.53	0.51	0.40	0.48	0.61	0.71	0.57	0.58	0.46	0.48	0.45	0.34	0.34	0.36	7.72
(2)	0.37	0.52	0.53	0.51	0.40	0.48	0.61	0.71	0.57	0.58	0.46	0.48	0.45	0.34	0.34	0.36	7.72
1.5- 3.0	433	690	671	692	629	839	1,033	1,071	1,054	912	654	635	703	594	433	434	11,477
(1)	1.06	1.70	1.65	1.70	1.55	2.06	2.54	2.63	2.59	2.24	1.61	1.56	1.73	1.46	1.06	1.07	28.21
(2)	1.06	1.70	1.65	1.70	1.55	2.06	2.54	2.63	2.59	2.24	1.61	1.56	1.73	1.46	1.06	1.07	28.21
3.1- 5.0	538	599	568	575	554	618	911	1,240	1,319	1,096	803	820	909	788	572	562	12,472
(1)	1.32	1.47	1.40	1.41	1.36	1.52	2.24	3.05	3.24	2.69	1.97	2.02	2.23	1.94	1.41	1.38	30.66
(2)	1.32	1.47	1.40	1.41	1.36	1.52	2.24	3.05	3.24	2.69	1.97	2.02	2.23	1.94	1.41	1.38	30.66
5.1- 8.0	377	472	229	243	314	418	503	956	1,000	834	673	937	1,011	668	470	420	9,635
(1)	0.93	1.16	0.56	0.60	0.77	1.03	1.24	2.42	2.66	2.05	1.65	2.30	2.49	1.64	1.16	1.03	23.69
(2)	0.93	1.16	0.56	0.60	0.77	1.03	1.24	2.42	2.66	2.05	1.65	2.30	2.49	1.64	1.16	1.03	23.69
8.1-10.4	96	79	19	20	37	51	64	233	227	183	228	339	280	134	131	106	2227
(1)	0.24	0.19	0.05	0.05	0.09	0.13	0.16	0.57	0.56	0.45	0.56	0.83	0.69	0.33	0.32	0.26	5.47
(2)	0.24	0.19	0.05	0.05	0.09	0.13	0.16	0.57	0.56	0.45	0.56	0.83	0.69	0.33	0.32	0.26	5.47
Over 10.4	51	95	65	96	81	70	88	124	150	121	177	207	135	56	40	61	1,617
(1)	0.13	0.23	0.16	0.24	0.20	0.17	0.22	0.30	0.37	0.30	0.44	0.51	0.33	0.14	0.10	0.15	3.98
(2)	0.13	0.23	0.16	0.24	0.20	0.17	0.22	0.30	0.37	0.30	0.44	0.51	0.33	0.14	0.10	0.15	3.98
All Speeds (4)	1,647	2,147	1,767	1,835	1,779	2,191	2,847	3,944	4,063	3,381	2,722	3,133	3,223	2,377	1,783	1,729	40,568
(1)	4.05	5.28	4.34	4.51	4.37	5.39	7.00	9.70	9.99	8.31	6.69	7.70	7.92	5.84	4.38	4.25	99.73
(2)	4.05	5.28	4.34	4.51	4.37	5.39	7.00	9.70	9.99	8.31	6.69	7.70	7.92	5.84	4.38	4.25	99.73

Source: CPS, 2002

Notes: (1) Percent of all good observations for this page; (2) Percent of all good observations for the period; (3) E=East, N=North, S=South, W=West; (4) 40,677 good hours with 109 hrs (0.3 percent) at less than 0.3 mps, 44,208 hrs in the time period, 92.0 percent data recovery.

5TABLE 2.7-30

Joint Frequency Distribution of Wind Speed, Wind Direction, and Atmospheric Stability at Clinton Power Station Facility

Wind Level: 10 m (33 ft)

Stability Category: A (Delta Temperature Less Than -1.8°C per 100 m)

Period of Record: 01/01/2000-08/31/2002

Hours observed at each indicated wind direction and wind speed

	Direction																
Speed (mps)	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**SSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**	**N**	**Total**
< 1.5	0	3	6	3	9	12	19	6	4	7	6	3	1	3	1	2	85
1.6 – 3.3	6	59	56	62	82	89	94	128	83	95	38	36	40	40	17	15	940
3.4 – 5.5	28	90	25	22	12	42	32	130	129	113	64	84	77	85	35	34	1,002
5.6 – 8.2	12	22	3	3	0	9	25	67	58	56	38	73	79	51	19	16	531
8.3 – 10.9	0	1	0	0	0	1	2	8	1	2	4	18	20	9	5	1	72
> 11.0	0	0	0	0	0	0	1	0	0	0	2	3	0	0	0	0	6
All Speeds	46	175	90	90	103	153	173	339	275	273	152	217	217	188	77	68	2,636

Source: CPS, 2002

Notes: 2,636 hrs on this page, 2 hrs calm winds (less than 0.3 mps), 0.1 percent of all hours.

TABLE 2.7-31

Joint Frequency Distribution of Wind Speed, Wind Direction, and Atmospheric Stability at Clinton Power Station Facility

Wind Level: 10 m (33 ft)

Stability Category: B (Delta Temperature Range = -1.8 to –1.7°C per 100 m)

Period of Record: 01/01/2000-08/31/2002

Hours observed at each indicated wind direction and wind speed

	Direction																
Speed (mps)	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**SSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**	**N**	**Total**
≤ 1.5	0	4	5	6	12	14	7	12	8	9	7	3	4	2	0	2	95
1.6 – 3.3	17	43	28	18	16	38	36	52	49	48	30	37	38	36	14	23	523
3.4 – 5.5	29	28	14	6	1	12	33	43	55	75	55	51	55	57	21	23	558
5.6 – 8.2	5	10	1	2	1	2	17	28	41	17	22	25	23	16	6	12	228
8.3 – 10.9	1	0	0	0	0	0	2	7	2	2	3	8	7	2	3	1	38
≥ 11.0	0	0	0	0	0	0	0	1	0	0	1	4	0	0	0	0	6
All Speeds	52	85	48	32	30	66	95	143	155	151	118	128	127	113	44	61	1,448

Source: CPS, 2002

Notes: 1,448 hrs on this page, 2 hrs calm winds (less than 0.3 mps), 0.1 percent of all hours.

TABLE 2.7-32

Joint Frequency Distribution of Wind Speed, Wind Direction, and Atmospheric Stability at Clinton Power Station Facility

Wind Level: 10 m (33 ft)

Stability Category: C (Delta Temperature Range = -1.6 to –1.5°C per 100 m)

Period of Record: 01/01/2000-08/31/2002

Hours observed at each indicated wind direction and wind speed

	Direction																
Speed (mps)	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**SSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**	**N**	**Total**
< 1.5	2	8	5	5	9	6	9	8	5	10	6	2	7	8	3	2	95
1.6 – 3.3	16	49	34	17	20	34	30	34	24	33	22	30	38	36	35	21	473
3.4 – 5.5	35	27	15	5	8	19	32	57	44	51	41	49	49	36	25	30	523
5.6 – 8.2	16	16	0	1	0	7	10	21	20	16	23	29	51	28	11	15	264
8.3 – 10.9	8	5	0	0	0	0	1	8	4	2	13	5	12	6	1	0	65
> 11.0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	3
All Speeds	77	105	54	28	37	66	82	128	97	112	106	116	158	114	75	68	1,423

Source: CPS, 2002

Notes: 1,423 hrs on this page, 0 hrs calm winds (less than 0.3 mps), 0.0 percent of all hours.

TABLE 2.7-33

Joint Frequency Distribution of Wind Speed, Wind Direction, and Atmospheric Stability at Clinton Power Station Facility

Wind Level: 10 m (33 ft)

Stability Category: D (Delta Temperature Range = -1.4 to -0.5°C per 100 m)

Period of Record: 01/01/2000-08/31/2002

Hours observed at each indicated wind direction and wind speed

	Direction																
Speed (mps)	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**SSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**	**N**	**Total**
≤ 1.5	23	32	39	54	71	36	41	22	32	38	20	32	29	26	21	20	536
1.6 – 3.3	131	198	152	145	177	202	227	170	169	143	96	152	137	154	121	124	2,498
3.4 – 5.5	186	206	74	35	57	128	237	347	319	156	156	262	296	244	157	166	3,026
5.6 – 8.2	53	60	4	1	2	25	64	176	177	50	70	187	195	113	36	51	1,264
8.3 – 10.9	9	8	0	0	0	0	3	44	24	9	24	38	35	10	4	1	209
≥ 11.0	1	0	0	0	0	0	0	0	0	1	1	6	0	0	0	0	9
All Speeds	403	504	269	235	307	391	572	759	721	397	367	677	692	547	339	362	7,542

Source: CPS, 2002

Notes: 7,542 hrs on this page, 0 hrs calm winds (less than 0.3 mps), 0.0 percent of all hours.

TABLE 2.7-34

Joint Frequency Distribution of Wind Speed, Wind Direction, and Atmospheric Stability at Clinton Power Station Facility

Wind Level: 10 m (33 ft)

Stability Category: E (Delta Temperature Range = -0.4 to +1.5°C per 100 m)

Period of Record: 01/01/2000-08/31/2002

Hours observed at each indicated wind direction and wind speed

	Direction																
Speed (mps)	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**SSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**	**N**	**Total**
≤ 1.5	35	67	69	82	104	88	69	62	68	53	53	39	30	30	23	15	887
1.6 – 3.3	82	184	137	131	147	204	338	383	300	185	153	147	151	112	91	65	2,810
3.4 – 5.5	29	25	17	10	12	57	148	311	305	125	83	107	89	31	45	22	1,416
5.6 – 8.2	4	1	0	0	0	5	14	99	61	26	17	32	7	10	13	0	289
8.3 – 10.9	0	0	0	0	0	0	2	18	6	0	1	1	2	2	0	0	32
≥ 11.0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
All Speeds	153	280	223	223	263	354	571	873	740	389	307	326	279	185	172	102	5,440

Source: CPS, 2002

Notes: 5,440 hrs on this page, 0 hrs calm winds (less than 0.3 mps), 0.0 percent of all hours.

TABLE 2.7-35

Joint Frequency Distribution of Wind Speed, Wind Direction, and Atmospheric Stability at Clinton Power Station Facility

Wind Level: 10 m (33 ft)

Stability Category: F (Delta Temperature Range = 1.6 to 4.0°C per 100 m)

Period of Record: 01/01/2000-08/31/2002

Hours observed at each indicated wind direction and wind speed

	Direction																
Speed (mps)	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**SSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**	**N**	**Total**
≤ 1.5	43	78	46	52	51	50	49	45	59	44	49	45	38	32	14	19	714
1.6 – 3.3	73	114	61	29	16	79	88	88	106	88	73	72	49	71	23	27	1,057
3.4 – 5.5	7	8	16	11	1	3	10	23	20	17	30	5	12	11	6	1	181
5.6 – 8.2	0	0	1	0	0	0	0	0	0	4	13	2	0	1	4	1	26
8.3 – 10.9	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	3
≥ 11.0	1	3	0	0	0	0	0	1	0	0	0	0	0	0	0	4	9
All Speeds	124	203	124	92	68	132	147	157	185	153	168	124	99	115	47	52	1,990

Source: CPS, 2002

Notes: 1,990 hrs on this page, 3 hrs calm winds (less than 0.3 mps), 0.2 percent of all hours.

TABLE 2.7-36

Joint Frequency Distribution of Wind Speed, Wind Direction, and Atmospheric Stability at Clinton Power Station Facility

Wind Level: 10 m (33 ft)

Stability Category: G (Delta Temperature Greater Than 4.0°C per 100 m)

Period of Record: 01/01/2000-08/31/2002

Hours observed at each indicated wind direction and wind speed

	Direction																
Speed (mps)	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**SSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**	**N**	**Total**
≤ 1.5	52	88	35	35	31	25	21	20	23	28	39	38	46	41	15	14	551
1.6 – 3.3	50	70	13	15	2	14	13	19	13	22	24	14	22	51	7	7	356
3.4 – 5.5	1	1	5	4	0	0	0	0	0	4	3	0	0	5	2	0	25
5.6 – 8.2	0	0	2	4	0	0	0	0	0	4	4	0	0	0	0	1	15
8.3 – 10.9	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
≥ 11.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3
All Speeds	103	159	55	58	33	39	34	39	36	58	71	52	68	97	24	25	951

Source: CPS, 2002

Notes: 951 hrs on this page, 2 hrs calm winds (less than 0.3 mps), 0.2 percent of all hours.

TABLE 2.7-37
Joint Frequency Distribution of Wind Speed, Wind Direction, and Atmospheric Stability at Clinton Power Station Facility

Wind Level: 10 m (33 ft)

Stability Category: ALL Stabilities Combined

Period of Record: 01/01/2000-08/31/2002

Hours observed at each indicated wind direction and wind speed

	Direction																
Speed (mps)	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**SSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**	**N**	**Total**
≤ 1.5	155	280	205	237	287	231	215	175	199	189	180	162	155	142	77	74	2,963
1.6 – 3.3	375	717	481	417	460	660	826	874	744	614	436	488	475	500	308	282	8,657
3.4 – 5.5	315	385	166	93	91	261	492	911	872	541	432	558	578	469	291	276	6,731
5.6 – 8.2	90	109	11	11	3	48	130	391	357	173	187	348	355	219	89	96	2,617
8.3 – 10.9	18	14	0	0	0	1	10	85	37	15	49	70	76	29	13	3	420
≥ 11.0	5	6	0	0	0	0	1	2	0	1	5	14	1	0	0	7	42
All Speeds	958	1,511	863	758	841	1,201	1,674	2,438	2,209	1,533	1,289	1,640	1,640	1,359	778	738	21,430

Source: CPS, 2002

Notes: 21,430 hrs on this page, 9 hrs calm winds (less than 0.3 mps), 0.03 percent of all hours.

TABLE 2.7-38
Summary of Frequency of Occurrence of Stability Class at Clinton Power Station Facility

1972 – 1977 Period of Record [a]

A	B	C	D	E	F	G
4.34	3.58	5.38	40.10	26.52	10.93	8.88

Summary:

Unstable (A, B, C) 13.30%

Neutral (D) 40.10%

Stable (E, F, G) 46.33%

2000 – 2002 Period of Record [b]

A	B	C	D	E	F	G
12.30	6.75	6.64	35.19	25.39	9.29	4.44

Summary:

Unstable (A, B, C) 25.69%

Neutral (D) 35.19%

Stable (E, F, G) 39.12%

[a] CPS, 2002
[b] Campbell, 2002

Notes: Refer to ER Tables 2.7-37 through Table 2.7-44

TABLE 2.7-39
Clinton Power Station Site Accident Chi/Q Calculations (*1-hr Averaging Period)*

Downwind Sector	Exclusion Area Boundary (EAB) Distance (m)	5 Percent Chi/Q	50 Percent Chi/Q
N	975	0.163E-03	0.291E-04
NNE	975	0.151E-03	0.311E-04
NE	975	0.154E-03	0.289E-04
ENE	975	0.153E-03	0.279E-04
E	975	0.150E-03	0.254E-04
ESE	975	0.143E-03	0.248E-04
SE	975	0.149E-03	0.258E-04
SSE	975	0.164E-03	0.254E-04
S	975	0.156E-03	0.277E-04
SSW	975	0.182E-03	0.274E-04
SW	975	0.190E-03	0.294E-04
WSW	975	0.210E-03	0.349E-04
W	975	0.211E-03	0.376E-04
WNW	975	0.169E-03	0.361E-04
NW	975	0.177E-03	0.377E-04
NNW	975	0.168E-03	0.350E-04
All Direction Case		0.178E-03	0.305E-04

Source: CPS, 2002

Notes: Period of Record: May 1972-April 1977; E=East, N=North, S=South, W=West; Chi/Q=sec/m^3

TABLE 2.7-40
Clinton Power Station Site Accident Chi/Q Calculations (*1-hr Averaging Period)*

Downwind Sector	Low Population Zone (LPZ) Distance (m)	5 Percent Chi/Q	50 Percent Chi/Q
N	4,018	0.342E-04	0.377E-05
NNE	4,018	0.336E-04	0.425E-05
NE	4,018	0.344E-04	0.374E-05
ENE	4,018	0.354E-04	0.363E-05
E	4,018	0.310E-04	0.315E-05
ESE	4,018	0.282E-04	0.303E-05
SE	4,018	0.331E-04	0.313E-05
SSE	4,018	0.372E-04	0.304E-05
S	4,018	0.367E-04	0.353E-05
SSW	4,018	0.427E-04	0.347E-05
SW	4,018	0.449E-04	0.379E-05
WSW	4,018	0.475E-04	0.488E-05
W	4,018	0.476E-04	0.528E-05
WNW	4,018	0.379E-04	0.505E-05
NW	4,018	0.401E-04	0.527E-05
NNW	4,018	0.379E-04	0.473E-05
All Direction Case		0.415E-04	0.426E-05

Source: CPS, 2002

Notes: Period of Record: May 1972-April 1977; E=East, N=North, S=South, W=West; Chi/Q=sec/m^3

TABLE 2.7-41
Clinton Power Station Site Accident Chi/Q Calculations (*2-hr Averaging Period)*

Downwind Sector	Exclusion Area Boundary (EAB) Distance (m)	5 Percent Chi/Q	50 Percent Chi/Q
N	975	0.124E-03	0.214E-04
NNE	975	0.115E-03	0.226E-04
NE	975	0.113E-03	0.198E-04
ENE	975	0.101E-03	0.197E-04
E	975	0.982E-04	0.181E-04
ESE	975	0.945E-04	0.177E-04
SE	975	0.102E-03	0.173E-04
SSE	975	0.107E-03	0.169E-04
S	975	0.112E-03	0.200E-04
SSW	975	0.120E-03	0.193E-04
SW	975	0.137E-03	0.223E-04
WSW	975	0.141E-03	0.247E-04
W	975	0.141E-03	0.251E-04
WNW	975	0.118E-03	0.247E-04
NW	975	0.137E-03	0.247E-04
NNW	975	0.131E-03	0.241E-04
All Direction Case		0.126E-03	0.231E-04

Source: CPS, 2002

Notes: Period of Record: May 1972-April 1977; E=East, N=North, S=South, W=West; Chi/Q=sec/m^3

TABLE 2.7-42
Clinton Power Station Site Accident Chi/Q Calculations (*2-hr Averaging Period)*

Downwind Sector	Low Population Zone (LPZ) Distance (m)	5 Percent ChiI/Q	50 Percent Chi/Q
N	4,018	0.247E-04	0.279E-05
NNE	4,018	0.246E-04	0.299E-05
NE	4,018	0.247E-04	0.261E-05
ENE	4,018	0.230E-04	0.264E-05
E	4,018	0.217E-04	0.236E-05
ESE	4,018	0.194E-04	0.229E-05
SE	4,018	0.217E-04	0.220E-05
SSE	4,018	0.234E-04	0.216E-05
S	4,018	0..237E-04	0.264E-05
SSW	4,018	0.284E-04	0.256E-05
SW	4,018	0.315E-04	0.287E-05
WSW	4,018	0.317E-04	0.346E-05
W	4,018	0.305E-04	0.366E-05
WNW	4,018	0.248E-04	0.356E-05
NW	4,018	0.294E-04	0.357E-05
NNW	4,018	0.266E-04	0.331E-05
All Direction Case		0.272E-04	0.308E-05

Source: CPS, 2002

Notes: Period of Record: May 1972-April 1977; E=East, N=North, S=South, W=West; Chi/Q=sec/m^3

TABLE 2.7-43
Clinton Power Station Site Accident Chi/Q Calculations (*8-hr Averaging Period)*

Downwind Sector	Exclusion Area Boundary (EAB) Distance (m)	5 Percent Chi/Q	50 Percent Chi/Q
N	975	0.596E-04	0.108E-04
NNE	975	0.605E-04	0.102E-04
NE	975	0.548E-04	0.890E-05
ENE	975	0.489E-04	0.804E-05
E	975	0.464E-04	0.833E-05
ESE	975	0.490E-04	0.887E-05
SE	975	0.450E-04	0.836E-05
SSE	975	0.431E-04	0.734E-05
S	975	0.488E-04	0.890E-05
SSW	975	0.517E-04	0.891E-05
SW	975	0.660E-04	0.104E-04
WSW	975	0.606E-04	0.113E-04
W	975	0.647E-04	0.124E-04
WNW	975	0.529E-04	0.111E-04
NW	975	0.605E-04	0.111E-04
NNW	975	0.621E-04	0.111E-04
All Direction Case		0.600E-04	0.104E-04

Source: CPS, 2002

Notes: Period of Record: May 1972-April 1977; E=East, N=North, S=South, W=West; Chi/Q=sec/m^3

TABLE 2.7-44
Clinton Power Station Site Accident Chi/Q Calculations (8-hr Averaging Period)

Downwind Sector	Low Population Zone (LPZ) Distance (m)	5 Percent Chi/Q	50 Percent Chi/Q
N	4,018	0.118E-04	0.147E-05
NNE	4,018	0.117E-04	0.139E-05
NE	4,018	0.112E-04	0.121E-05
ENE	4,018	0.964E-05	0.113E-05
E	4,018	0.946E-05	0.115E-05
ESE	4,018	0.100E-04	0.118E-05
SE	4,018	0.931E-05	0.114E-05
SSE	4,018	0.943E-05	0.101E-05
S	4,018	0.921E-05	0.123E-05
SSW	4,018	0.118E-04	0.123E-05
SW	4,018	0.142E-04	0.147E-05
WSW	4,018	0.129E-04	0.162E-05
W	4,018	0.134E-04	0.179E-05
WNW	4,018	0.104E-04	0.162E-05
NW	4,018	0.125E-04	0.160E-05
NNW	4,018	0.124E-04	0.155E-05
All Direction Case		0.125E-04	0.147E-05

Source: CPS, 2002

Notes: Period of Record: May 1972-April 1977; E=East, N=North, S=South, W=West; Chi/Q=sec/m^3

TABLE 2.7-45
Clinton Power Station Site Accident Chi/Q Calculations (*16-hr Averaging Period)*

Downwind Sector	Exclusion Area Boundary (EAB) Distance (m)	5 Percent Chi/ Q	50 Percent Chi/ Q
N	975	0.407E-04	0.771E-05
NNE	975	0.403E-04	0.693E-05
NE	975	0.380E-04	0.580E-05
ENE	975	0.320E-04	0.513E-05
E	975	0.312E-04	0.565E-05
ESE	975	0.342E-04	0.602E-05
SE	975	0.307E-04	0.537E-05
SSE	975	0.289E-04	0.469E-05
S	975	0.290E-04	0.584E-05
SSW	975	0.327E-04	0.588E-05
SW	975	0.403E-04	0.719E-05
WSW	975	0.396E-04	0.714E-05
W	975	0.434E-04	0.859E-05
WNW	975	0.332E-04	0.727E-05
NW	975	0.393E-04	0.725E-05
NNW	975	0.406E-04	0.753E-05
All Direction Case		0.403E-04	0.710E-05

Source: CPS, 2002

Notes: Period of Record: May 1972-April 1977; E=East, N=North, S=South, W=West; Chi/Q=sec/m^3

TABLE 2.7-46
Clinton Power Station Site Accident Chi/Q Calculations (*16-hr Averaging Period)*

Downwind Sector	Low Population Zone (LPZ) Distance (m)	5 Percent Chi/Q	50 Percent Chi/Q
N	4,018	0.797E-05	0.111E-05
NNE	4,018	0.770E-05	0.997E-06
NE	4,018	0.758E-05	0.815E-06
ENE	4,018	0.647E-05	0.736E-06
E	4,018	0.661E-05	0.792E-06
ESE	4,018	0.673E-05	0.841E-06
SE	4,018	0.610E-05	0.740E-06
SSE	4,018	0.596E-05	0.633E-06
S	4,018	0.579E-05	0.810E-06
SSW	4,018	0.712E-05	0.860E-06
SW	4,018	0.869E-05	0.107E-05
WSW	4,018	0.824E-05	0.105E-05
W	4,018	0.905E-05	0.131E-05
WNW	4,018	0.669E-05	0.112E-05
NW	4,018	0.775E-05	0.109E-05
NNW	4,018	0.764E-05	0.113E-05
All Direction Case		0.820E-05	0.100E-05

Source: CPS, 2002

Notes: Period of Record: May 1972-April 1977; C=Central, E=East, N=North, S=South, W=West; Chi/Q=sec/m^3

TABLE 2.7-47
Clinton Power Station Site Accident Chi/Q Calculations (*72-hr Averaging Period)*

Downwind Sector	Exclusion Area Boundary (EAB) Distance (m)	5 Percent Chi/Q	50 Percent Chi/Q
N	975	0.185E-04	0.399E-05
NNE	975	0.182E-04	0.370E-05
NE	975	0.157E-04	0.307E-05
ENE	975	0.135E-04	0.244E-05
E	975	0.128E-04	0.269E-05
ESE	975	0.144E-04	0.269E-05
SE	975	0.136E-04	0.228E-05
SSE	975	0.123E-04	0.191E-05
S	975	0.130E-04	0.204E-05
SSW	975	0.125E-04	0.228E-05
SW	975	0.174E-04	0.318E-05
WSW	975	0.148E-04	0.303E-05
W	975	0.162E-04	0.350E-05
WNW	975	0.132E-04	0.305E-05
NW	975	0.151E-04	0.312E-05
NNW	975	0.181E-04	0.358E-05
All Direction Case		0.171E-04	0.320E-05

Source: CPS, 2002

Notes: Period of Record: May 1972-April 1977;E=East, N=North, S=South, W=West; Chi/Q=sec/m^3

TABLE 2.7-48
Clinton Power Station Site Accident Chi/Q Calculations (*72-hr Averaging Period)*

Downwind Sector	Low Population Zone (LPZ) Distance (m)	5 Percent Chi/Q	50 Percent Chi/Q
N	4,018	0.343E-05	0.600E-06
NNE	4,018	0.335E-05	0.575E-06
NE	4,018	0.329E-05	0.457E-06
ENE	4,018	0.268E-05	0.392E-06
E	4,018	0.254E-05	0.391E-06
ESE	4,018	0.277E-05	0.390E-06
SE	4,018	0.262E-05	0.327E-06
SSE	4,018	0.239E-05	0.267E-06
S	4,018	0.246E-05	0.317E-06
SSW	4,018	0.258E-05	0.360E-06
SW	4,018	0.348E-05	0.478E-06
WSW	4,018	0.317E-05	0.489E-06
W	4,018	0.354E-05	0.551E-06
WNW	4,018	0.248E-05	0.487E-06
NW	4,018	0.292E-05	0.521E-06
NNW	4,018	0.356E-05	0.541E-06
All Direction Case		0.330E-05	0.490E-06

Source: CPS, 2002

Notes: Period of Record: May 1972-April 1977; E=East, N=North, S=South, W=West; Chi/Q=sec/m^3

TABLE 2.7-49
Clinton Power Station Site Accident Chi/Q Calculations (*624-hr Averaging Period)*

Downwind Sector	Exclusion Area Boundary (EAB) Distance (m)	5 Percent Chi/Q	50 Percent Chi/Q
N	975	0.984E-05	0.402E-05
NNE	975	0.886E-05	0.401E-05
NE	975	0.750E-05	0.351E-05
ENE	975	0.706E-05	0.229E-05
E	975	0.654E-05	0.287E-05
ESE	975	0.826E-05	0.275E-05
SE	975	0.568E-05	0.215E-05
SSE	975	0.493E-05	0.152E-05
S	975	0.551E-05	0.153E-05
SSW	975	0.488E-05	0.159E-05
SW	975	0.670E-05	0.229E-05
WSW	975	0.643E-05	0.244E-05
W	975	0.711E-05	0.258E-05
WNW	975	0.584E-05	0.235E-05
NW	975	0.746E-05	0.312E-05
NNW	975	0.888E-05	0.322E-05
All Direction Case		0.810E-05	0.296E-05

Source: CPS, 2002

Notes: Period of Record: May 1972-April 1977; E=East, N=North, S=South, W=West; Chi/Q=sec/m^3

TABLE 2.7-50
Clinton Power Station Site Accident Chi/Q Calculations *(624-hr Averaging Period)*

Downwind Sector	**Low Population Zone (LPZ) Distance (m)**	**5 Percent Chi/Q**	**50 Percent Chi/Q**
N	4,018	0.178E-05	0.661E-06
NNE	4,018	0.155E-05	0.664E-06
NE	4,018	0.149E-05	0.605E-06
ENE	4,018	0.139E-05	0.386E-06
E	4,018	0.122E-05	0.491E-06
ESE	4,018	0.153E-05	0.422E-06
SE	4,018	0.104E-05	0.333E-06
SSE	4,018	0.926E-06	0.231E-06
S	4,018	0.103E-05	0.246E-06
SSW	4,018	0.101E-05	0.270E-06
SW	4,018	0.138E-05	0.382E-06
WSW	4,018	0.120E-05	0.402E-06
W	4,018	0.149E-05	0.435E-06
WNW	4,018	0.114E-05	0.391E-06
NW	4,018	0.145E-05	0.533E-06
NNW	4,018	0.167E-05	0.552E-06
All Direction Case		0.155E-05	0.480E-06

Source: CPS, 2002

Notes: Period of Record: May 1972-April 1977; E=East, N=North, S=South, W=West; Chi/Q=sec/m^3

TABLE 2.7-51
Summary and Comparison of Short Term Chi/Q Calculations

	Maximum Sector Values (sec/m^3)						
	CPS USAR Results [a]	PAVAN Results	PAVAN Results	PAVAN Results	CPS USAR Results [a]	PAVAN Results	PAVAN Results
	EAB = 975 m		EAB 1,025 m		LPZ 4,018 m	LPZ 4,018 m	LPZ 4,018 m
Averaging Period	**Building Wake**	**No Building Wake**	**Building Wake**	**No Building Wake**	**Building Wake**	**Building Wake**	**No Building Wake**
0 - 2 hr	1.78E-04	1.98E-04	1.85E-04	1.85E-04	4.15E-05	5.47E-05	5.47E-05
0 - 8 hr	6.00E-05	9.78E-05	9.09E-05	9.89E-05	1.25E-05	2.36E-05	2.49E-05
8 – 24 hr	4.03E-05	6.87E-05	6.37E-05	7.23E-05	8.20E-06	1.55E-05	1.68E-05
1 - 4 days	1.71E-05	3.20E-05	2.95E-05	3.66E-05	3.30E-06	6.24E-06	7.18E-06
4 – 30 days	0.81E-05	1.06E-05	0.98E-05	1.38E-05	1.55E-06	1.68E-06	2.11E-06

[a] CPS, 2002

TABLE 2.7-52
Summary of EGC ESP Chi/Q Calculations at Low Population Zone Distance (50% Probability Level)

	EGC ESP Site Chi/Q Values (Maximum Sector, 50% Probability Value, [sec/m^3])		
Averaging Period	**Exclusion Area Boundary Distance**	**Low Population Zone Distance**	**Source**
0 - 2 hr	3.6E-05	5.10E-06	PAVAN Model
0 - 8 hr	--	3.40E-06	Interpolation
8 - 24 hr	--	2.85E-06	Interpolation
1 - 4 days	--	1.85E-06	Interpolation
4 - 30 days	--	1.00E-06	Interpolation
Annual Average	--	4.72E-07	PAVAN Model

TABLE 2.7-53
Long-Term Average Chi/Q (sec/m^3) Calculations for Routine Releases

	Actual Site Boundary		Exclusion Area Boundary		Low Population Zone		Nearest Cow Milk		Nearest Goat Milk		Nearest Garden	
Downwind Sector	**Distance (m)**	**Chi/Q**	**Distance (m)**	**Chi/Q**	**Distance (m)**	**Chi/Q**	**Distance (m)**	**Chi/Q**	**Distance (m)**	**Chi/Q**	**Distance (m)**	**Chi/Q**
N	1,767	8.61E-07	1,025	1.96E-06	4,018	2.54E-07	1,500	1.10E-06	8,000	9.47E-08	1,500.	1.10E-06
NNE	1,527	1.11E-06	1,025	2.04E-06	4,018	2.65E-07	2,050	7.20E-07	8,000	9.90E-08	4,610	2.16E-07
NE	1,400	1.12E-06	1,025	1.81E-06	4,018	2.35E-07	5,530	1.47E-07	8,000	8.88E-08	3,460.	2.93E-07
ENE	1,297	1.07E-06	1,025	1.55E-06	4,018	2.02E-07	7,740	8.06E-08	8,000	7.71E-08	4,210	1.89E-07
E	1,710	6.93E-07	1,025	1.52E-06	4,018	1.97E-07	1,670	7.18E-07	8,000	7.52E-08	1,670	7.18E-07
ESE	4,540	1.65E-07	1,025	1.54E-06	4,,018	1.97E-07	8,000	7.47E-08	8,000	7.47E-08	5,300	1.32E-07
SE	3,184	2.66E-07	1,025	1.49E-06	4,018	1.90E-07	8,000	7.22E-08	7,010	8.64E-08	7,010	8.64E-08
SSE	3,084	2.02E-07	1,025	1.08E-06	4,018	1.37E-07	8,000	5.17E-08	8,000	5.17E-08	4,450	1.18E-07
S	3,032	1.49E-07	1,025	7.76E-07	4,018	9.79E-08	8,000	3.65E-08	8,000	3.65E-08	4,840	7.43E-08
SSW	4,353	1.28E-07	1,025	1.12E-06	4,018	1.44E-07	5,470	9.22E-08	8,000	5.50E-08	8,000	5.50E-08
SW	4,891	1.82E-07	1,025	1.85E-06	4,018	2.41E-07	5,870	1.42E-07	8,000	9.36E-08	5,870	1.42E-07
WSW	3,784	2.39E-07	1,025	1.69E-06	4,018	2.20E-07	5,530	1.39E-07	8,000	8.44E-08	3,620	2.55E-07
W	2,277	3.92E-07	1,025	1.32E-06	4,018	1.72E-07	3,310	2.27E-07	8,000	6.53E-08	3,320	2.26E-07
WNW	1,934	5.21E-07	1,025	1.37E-06	4,018	1.77E-07	8,000	6.69E-08	8,000	6.69E-08	2,640	3.28E-07
NW	1,356	9.73E-07	1,025	1.50E-06	4,018	1.94E-07	3,850	2.07E-07	8,000	7.30E-08	4,700	1.54E-07
NNW	2,023	6.18E-07	1,025	1.73E-06	4,018	2.24E-07	2,050	6.06E-07	8,000	8.42E-08	8,000	8.42E-08
All		8.694E-06		2.436E-05		3.146E-06		4.479E-06		1.206E-06		4.168E-06

TABLE 2.7-53
Long-Term Average Chi/Q (sec/m^3) Calculations for Routine Releases

	Nearest Meat Animal		Nearest Residence		Downwind Distance (mi)							
Downwind Sector	**Distance (m)**	**Chi/Q**	**Distance (m)**	**Chi/Q**	**0.5**	**1.0**	**1.5**	**2.0**	**2.5**	**3.0**	**3.5**	**4.0**
N	1,500	1.10E-06	1,500	1.10E-06	2.88E-06	9.89E-07	5.42E-07	3.53E-07	2.53E-07	1.93E-07	1.54E-07	1.28E-07
NNE	2,050	7.20E-07	1,590	1.05E-06	3.00E-06	1.91E-06	5.65E-07	3.68E-07	2.64E-07	2.02E-07	1.60E-07	1.34E-07
NE	5,530	1.47E-07	2,070	6.24E-07	2.67E-06	1.69E-06	4.96E-07	3.26E-07	2.35E-07	1.80E-07	1.44E-07	1.20E-07
ENE	7,740	8.06E-08	2,860	3.29E-07	2.30E-06	1.45E-06	4.21E-07	2.78E-07	2.01E-07	1.55E-07	1.24E-07	1.03E-07
E	1,670	7.18E-07	1,670	7.18E-07	2.25E-06	1.42E-06	4.12E-07	2.72E-07	1.97E-07	1.51E-07	1.21E-07	1.01E-07
ESE	8,000	7.47E-08	5,140	1.38E-07	2.27E-06	1.44E-06	4.15E-07	2.73E-07	1.97E-07	1.51E-07	1.21E-07	1.01E-07
SE	7,010	8.64E-08	4,440	1.64E-07	2.20E-06	1.40E-06	3.97E-07	2.62E-07	1.89E-07	1.45E-07	1.16E-07	9.70E-08
SSE	4,890	1.03E-07	2,900	2.21E-07	1.59E-06	1.01E-06	2.89E-07	1.90E-07	1.37E-07	1.05E-07	8.37E-08	6.97E-08
S	8,000	3.65E-08	4,780	7.57E-08	1.14E-06	7.26E-07	2.08E-07	1.36E-07	9.77E-08	7.46E-08	5.94E-08	4.93E-08
SSW	5,470	9.22E-08	4,680	1.15E-07	1.65E-06	1.05E-06	2.99E-07	1.98E-07	1.43E-07	1.10E-07	8.85E-08	7.38E-08
SW	5,870	1.42E-07	1,170	1.50E-06	2.74E-06	1.73E-06	4.95E-07	3.29E-07	2.40E-07	1.86E-07	1.50E-07	1.25E-07
WSW	4,600	1.81E-07	2,520	4.28E-07	2.49E-06	1.58E-06	4.56E-07	3.02E-07	2.19E-07	1.69E-07	1.36E-07	1.13E-07
W	3,310	2.27E-07	2,630	3.17E-07	1.94E-06	1.23E-06	3.59E-07	2.37E-07	1.71E-07	1.31E-07	1.05E-07	8.77E-08
WNW	8,000	6.69E-08	2,630	3.30E-07	2.01E-06	1.28E-06	3.74E-07	2.45E-07	1.77E-07	1.35E-07	1.08E-07	9.00E-08
NW	3,850	2.07E-07	2,650	3.58E-07	2.20E-06	1.40E-06	4.11E-07	2.69E-07	1.94E-07	1.48E-07	1.18E-07	9.83E-08
NNW	2,050	6.06E-07	2,780	3.86E-07	2.54E-06	1.62E-06	4.76E-07	3.11E-07	2.24E-07	1.71E-07	1.36E-07	1.14E-07
All		4.586E-06		7.848E-06	3.582E-05	2.192E-05	6.612E-06	4.347E-06	3.140E-06	2.407E-06	1.924E-06	1.603E-06

TABLE 2.7-53
Long-Term Average Chi/Q (sec/m^3) Calculations for Routine Releases

Downwind Sector	Downwind Distance (mi)												
	4.5	5.0	6.0	8.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	47.5
N	1.09E-07	9.39E-08	7.31E-08	5.01E-08	3.72E-08	2.12E-08	1.44E-08	1.07E-08	8.39E-09	6.86E-09	5.76E-09	4.94E-09	4.60E-09
NNE	1.14E-07	9.82E-08	7.64E-08	5.24E-08	3.89E-08	2.22E-08	1.50E-08	1.12E-08	8.79E-09	7.19E-09	6.04E-09	5.18E-09	4.82E-09
NE	1.02E-07	8.81E-08	6.87E-08	4.73E-08	3.52E-08	2.02E-08	1.37E-08	1.02E-08	8.04E-09	6.58E-09	5.54E-09	4.76E-09	4.43E-09
ENE	8.82E-08	7.65E-08	5.98E-08	4.13E-08	3.09E-08	1.78E-08	1.21E-08	9.05E-09	7.13E-09	5.85E-09	4.93E-09	4.24E-09	3.96E-09
E	8.60E-08	7.46E-08	5.82E-08	4.02E-08	3.00E-08	1.73E-08	1.18E-08	8.75E-09	6.90E-09	5.65E-09	4.76E-09	4.09E-09	3.82E-09
ESE	8.56E-08	7.41E-08	5.78E-08	3.98E-08	2.96E-08	1.70E-08	1.16E-08	8.58E-09	6.75E-09	5.53E-09	4.65E-09	4.00E-09	3.73E-09
SE	8.27E-08	7.16E-08	5.59E-08	3.86E-08	2.88E-08	1.66E-08	1.13E-08	8.38E-09	6.59E-09	5.40E-09	4.55E-09	3.91E-09	3.65E-09
SSE	5.93E-08	5.13E-08	4.00E-08	2.75E-08	2.05E-08	1.17E-08	7.96E-09	5.91E-09	4.64E-09	3.80E-09	3.20E-09	2.75E-09	2.56E-09
S	4.19E-08	3.62E-08	2.81E-08	1.92E-08	1.43E-08	8.13E-09	5.49E-09	4.07E-09	3.20E-09	2.61E-09	2.19E-09	1.88E-09	1.75E-09
SSW	6.29E-08	5.45E-08	4.26E-08	2.94E-08	2.20E-08	1.27E-08	8.62E-09	6.40E-09	5.04E-09	4.13E-09	3.48E-09	2.99E-09	2.79E-09
SW	1.07E-07	9.29E-08	7.28E-08	5.06E-08	3.80E-08	2.21E-08	1.51E-08	1.12E-08	8.85E-09	7.26E-09	6.13E-09	5.28E-09	4.93E-09
WSW	9.66E-08	8.38E-08	6.55E-08	4.53E-08	3.39E-08	1.96E-08	1.34E-08	9.96E-09	7.85E-09	6.44E-09	5.42E-09	4.67E-09	4.35E-09
W	7.47E-08	6.47E-08	5.05E-08	3.48E-08	2.60E-08	1.50E-08	1.02E-08	7.57E-09	5.96E-09	4.88E-09	4.11E-09	3.53E-09	3.29E-09
WNW	7.67E-08	6.64E-08	5.18E-08	3.56E-08	2.65E-08	1.52E-08	1.03E-08	7.67E-09	6.03E-09	4.93E-09	4.15E-09	3.56E-09	3.32E-09
NW	8.37E-08	7.24E-08	5.64E-08	3.88E-08	2.89E-08	1.65E-08	1.12E-08	8.32E-09	6.54E-09	5.35E-09	4.50E-09	3.86E-09	3.60E-09
NNW	9.65E-08	8.35E-08	6.50E-08	4.46E-08	3.32E-08	1.90E-08	1.29E-08	9.57E-09	7.53E-09	6.16E-09	5.17E-09	4.44E-09	4.13E-09
All	1.366E-06	1.183E-06	9.224E-07	6.354E-07	4.739E-07	2.724E-07	1.849E-07	1.375E-07	1.082E-07	8.862E-08	7.457E-08	6.407E-08	5.971E-08

Source: CPS, 2002

Notes: Wind Reference Level: 10 m; Stability Type: Delta Temperature (60 – 10 m); Release Type: Ground Level – 10 m; Building Height/Cross Section: 57.2 m/2,090 m^2

TABLE 2.7-54
Long-Term Average D/Q (m^{-2}) Calculations for Routine Releases

	Actual Site Boundary		Exclusion Area Boundary		Low Population Zone		Nearest Milk Cow		Nearest Goat Milk		Nearest Garden	
Downwind Sector	Distance (m)	D/Q	Distance (m)	D/Q	Distance (m)	D/Q	Distance (m)	D/Q	Distance (m)	D/Q	Distance (m)	D/Q
N	1,767	5.08E-09	1,025	1.28E-08	4,018	1.24E-09	1,500	6.76E-09	8,000	3.69E-10	1,500	6.76E-09
NNE	1,527	7.47E-09	1,025	1.46E-08	4,018	1.42E-09	2,050	4.47E-09	8,000	4.21E-10	4,610	1.13E-09
NE	1,400	6.87E-09	1,025	1.16E-08	4,018	1.12E-09	5,530	6.53E-10	8,000	3.33E-10	3,460	1.45E-09
ENE	1,297	6.01E-09	1,025	8.85E-09	4,018	8.59E-10	7,740	2.71E-10	8,000	2.55E-10	4,210	7.94E-10
E	1,710	3.86E-09	1,025	9.20E-09	4,018	8.93E-10	1,670	4.02E-09	8,000	2.65E-10	1,670	4.02E-09
ESE	4,540	8.17E-10	1,025	1.04E-08	4,018	1.01E-09	8,000	2.98E-10	8,000	2.98E-10	5,300	6.29E-10
SE	3,184	1.35E-09	1,025	9.41E-09	4,018	9.13E-10	8,000	2.71E-10	7,010	3.45E-10	7,010	3.45E-10
SSE	3,084	9.82E-10	1,025	6.46E-09	4,018	6.27E-10	8,000	1.86E-10	8,000	1.86E-10	4,450	5.28E-10
S	3,032	7.50E-10	1,025	4.80E-09	4,018	4.66E-10	8,000	1.38E-10	8,000	1.38E-10	4,840	3.40E-10
SSW	4,353	4.67E-10	1,025	5.51E-09	4,018	5.35E-10	5,470	3.17E-10	8,000	1.59E-10	8,000	1.59E-10
SW	4,891	5.44E-10	1,025	7.82E-09	4,018	7.59E-10	5,870	3.97E-10	8,000	2.25E-10	5,870	3.97E-10
WSW	3,784	7.56E-10	1,025	7.04E-09	4,018	6.83E-10	5,530	3.98E-10	8,000	2.03E-10	3,620	8.15E-10
W	2,277	1.30E-09	1,025	5.09E-09	4,018	4.94E-10	3,310	6.86E-10	8,000	1.47E-10	3,320	6.82E-10
WNW	1,934	1.71E-09	1,025	5.06E-09	4,018	4.91E-10	8,000	1.46E-10	8,000	1.46E-10	2,640	1.00E-09
NW	1,356	4.02E-09	1,025	6.39E-09	4,018	6.21E-10	3,850	6.67E-10	8,000	1.84E-10	4,700	4.76E-10
NNW	2,023	2.82E-09	1,025	9.00E-09	4,018	8.74E-10	2,050	2.75E-09	8,000	2.59E-10	8,000	2.59E-10
All		4.480E-08		1.340E-07		1.300E-08		2.243E-08		3.933E-09		1.977E-08

TABLE 2.7-54
Long-Term Average D/Q (m^{-2}) Calculations for Routine Releases

	Nearest Meat Animal		Rearest Residence		Downwind Distance (mi)							
Downwind Sector	Distance (m)	D/Q	Distance (m)	D/Q	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
N	1,500	6.76E-09	1,500	6.76E-09	1.88E-08	5.98E-09	2.95E-09	1.81E-09	1.24E-09	9.12E-10	7.02E-10	5.50E-10
NNE	2,050	4.47E-09	1,590	6.96E-09	2.15E-08	1.37E-08	3.36E-09	2.07E-09	1.42E-09	1.04E-09	8.01E-10	6.27E-10
NE	5,530	6.53E-10	2,070	3.47E-09	1.70E-08	1.08E-08	2.66E-09	1.63E-09	1.12E-09	8.22E-10	6.33E-10	4.96E-10
ENE	7,740	2.71E-10	2,860	1.53E-09	1.30E-08	8.27E-09	2.04E-09	1.25E-09	8.57E-10	6.30E-10	4.85E-10	3.80E-10
E	1,670	4.02E-09	1,670	4.02E-09	1.35E-08	8.60E-09	2.11E-09	1.30E-09	8.91E-10	6.54E-10	5.04E-10	3.94E-10
ESE	8,000	2.98E-10	5,140	6.62E-10	1.52E-08	9.67E-09	2.38E-09	1.46E-09	1.00E-09	7.36E-10	5.67E-10	4.44E-10
SE	7,010	3.45E-10	4,440	7.71E-10	1.38E-08	8.79E-09	2.16E-09	1.33E-09	9.11E-10	6.69E-10	5.15E-10	4.04E-10
SSE	4,890	4.50E-10	2,900	1.09E-09	9.50E-09	6.04E-09	1.49E-09	9.13E-10	6.26E-10	4.60E-10	3.54E-10	2.77E-10
S	8,000	1.38E-10	4,780	3.47E-10	7.05E-09	4.48E-09	1.10E-09	6.78E-10	4.65E-10	3.41E-10	2.63E-10	2.06E-10
SSW	5,470	3.17E-10	4,680	4.13E-10	8.09E-09	5.15E-09	1.27E-09	7.78E-10	5.33E-10	3.92E-10	3.02E-10	2.36E-10
SW	5,870	3.97E-10	1,170	6.33E-09	1.15E-08	7.31E-09	1.80E-09	1.10E-09	7.57E-10	5.56E-10	4.28E-10	3.35E-10
WSW	4,600	5.43E-10	2,520	1.50E-09	1.03E-08	6.58E-09	1.62E-09	9.94E-10	6.82E-10	5.01E-10	3.85E-10	3.02E-10
W	3,310	6.86E-10	2,630	1.01E-09	7.48E-09	4.76E-09	1.17E-09	7.19E-10	4.93E-10	3.62E-10	2.79E-10	2.18E-10
WNW	8,000	1.46E-10	2,630	1.01E-09	7.44E-09	4.73E-09	1.16E-09	7.15E-10	4.90E-10	3.60E-10	2.77E-10	2.17E-10
NW	3,850	6.67E-10	2,650	1.26E-09	9.40E-09	5.98E-09	1.47E-09	9.03E-10	6.19E-10	4.55E-10	3.50E-10	2.74E-10
NNW	2,050	2.75E-09	2,780	1.63E-09	1.32E-08	8.41E-09	2.07E-09	1.27E-09	8.72E-10	6.40E-10	4.93E-10	3.86E-10
All		2.291E-08		3.876E-08	1.969E-07	1.192E-07	3.080E-08	1.893E-08	1.297E-08	9.530E-09	7.336E-09	5.745E-09

TABLE 2.7-54
Long-Term Average D/Q (m^{-2}) Calculations for Routine Releases

Downwind Sector	Downward Distance (mi)												
	4.5	5.0	6.0	8.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	47.5
N	4.43E-10	3.65E-10	2.62E-10	1.70E-10	1.19E-10	5.67E-11	3.35E-11	2.23E-11	1.60E-11	1.20E-11	9.36E-12	7.43E-12	6.68E-12
NNE	5.05E-10	4.17E-10	2.98E-10	1.94E-10	1.36E-10	6.47E-11	3.82E-11	2.54E-11	1.82E-11	1.37E-11	1.07E-11	8.48E-12	7.62E-12
NE	3.99E-10	3.29E-10	2.36E-10	1.53E-10	1.08E-10	5.12E-11	3.02E-11	2.01E-11	1.44E-11	1.09E-11	8.44E-12	6.70E-12	6.02E-12
ENE	3.06E-10	2.52E-10	1.81E-10	1.17E-10	8.24E-11	3.92E-11	2.31E-11	1.54E-11	1.10E-11	8.31E-12	6.46E-12	5.13E-12	4.61E-12
E	3.18E-10	2.62E-10	1.88E-10	1.22E-10	8.56E-11	4.07E-11	2.40E-11	1.60E-11	1.14E-11	8.64E-12	6.71E-12	5.33E-12	4.79E-12
ESE	3.58E-10	2.95E-10	2.11E-10	1.37E-10	9.64E-11	4.58E-11	2.70E-11	1.80E-11	1.29E-11	9.72E-12	7.56E-12	6.00E-12	5.39E-12
SE	3.25E-10	2.68E-10	1.92E-10	1.25E-10	8.76E-11	4.16E-11	2.46E-11	1.63E-11	1.17E-11	8.84E-12	6.87E-12	5.46E-12	4.90E-12
SSE	2.23E-10	1.84E-10	1.32E-10	8.57E-11	6.02E-11	2.86E-11	1.69E-11	1.12E-11	8.04E-12	6.07E-12	4.72E-12	3.75E-12	3.37E-12
S	1.66E-10	1.37E-10	9.79E-11	6.36E-11	4.47E-11	2.12E-11	1.25E-11	8.33E-12	5.97E-12	4.51E-12	3.50E-12	2.78E-12	2.50E-12
SSW	1.90E-10	1.57E-10	1.12E-10	7.30E-11	5.13E-11	2.44E-11	1.44E-11	9.56E-12	6.85E-12	5.17E-12	4.02E-12	3.19E-12	2.87E-12
SW	2.70E-10	2.23E-10	1.60E-10	1.04E-10	7.28E-11	3.46E-11	2.04E-11	1.36E-11	9.73E-12	7.34E-12	5.71E-12	4.53E-12	4.07E-12
WSW	2.43E-10	2.01E-10	1.44E-10	9.33E-11	6.55E-11	3.12E-11	1.84E-11	1.22E-11	8.76E-12	6.61E-12	5.14E-12	4.08E-12	3.67E-12
W	1.76E-10	1.45E-10	1.04E-10	6.75E-11	4.74E-11	2.25E-11	1.33E-11	8.84E-12	6.33E-12	4.78E-12	3.72E-12	2.95E-12	2.65E-12
WNW	1.75E-10	1.44E-10	1.03E-10	6.71E-11	4.71E-11	2.24E-11	1.32E-11	8.79E-12	6.30E-12	4.75E-12	3.69E-12	2.93E-12	2.64E-12
NW	2.21E-10	1.82E-10	1.31E-10	8.48E-11	5.95E-11	2.83E-11	1.67E-11	1.11E-11	7.96E-12	6.01E-12	4.67E-12	3.71E-12	3.33E-12
NNW	3.11E-10	2.57E-10	1.84E-10	1.19E-10	8.38E-11	3.98E-11	2.35E-11	1.56E-11	1.12E-11	8.46E-12	6.57E-12	5.22E-12	4.69E-12
All	4.630E-09	3.818E-09	2.734E-09	1.776E-09	1.247E-09	5.929E-10	3.501E-10	2.327E-10	1.667E-10	1.258E-10	9.779E-11	7.767E-11	6.977E-11

Source: CPS, 2002

Notes: Wind Reference Level: 10 m; Stability Type: Delta Temperature (60 – 10 m); Release Type: Ground Level – 10 m; Building Height/Cross Section: 57.2 m/2,090 m^2.

TABLE 2.7-55
Long-Term Average Chi/Q (sec/m³) Calculations (2.26 Day Decay) for Routine Releases

	Actual Site Boundary		Exclusion Area Boundary		Low Population Zone		Nearest Cow Milk		Nearest Goat Milk		Nearest Garden	
Downwind Sector	Distance (m)	Chi/Q	Distance (m)	Chi/Q	Distance (m)	Chi/Q	Distance (m)	Chi/Q	Distance (m)	Chi/Q	Distance (m)	Chi/Q
N	1,767	8.58E-07	1,025	1.96E-06	4,018	2.51E-07	1,500	1.10E-06	8,000	9.29E-08	1,500	1.10E-06
NNE	1,527	1.11E-06	1,025	2.04E-06	4,018	2.62E-07	2,050	7.16E-07	8,000	9.72E-08	4,610	2.14E-07
NE	1,400	1.12E-06	1,025	1.81E-06	4,018	2.33E-07	5,530	1.45E-07	8,000	8.69E-08	3,460	2.90E-07
ENE	1,297	1.07E-06	1,025	1.55E-06	4,018	1.99E-07	7,740	7.88E-08	8,000	7.53E-08	4,210	1.86E-07
E	1,710	6.90E-07	1,025	1.52E-06	4,018	1.95E-07	1,670	7.15E-07	8,000	7.35E-08	1,670	7.15E-07
ESE	4,540	1.63E-07	1,025	1.54E-06	4,018	1.95E-07	8,000	7.31E-08	8,000	7.31E-08	5,300	1.30E-07
SE	3,184	2.64E-07	1,025	1.49E-06	4,018	1.88E-07	8,000	7.06E-08	7,010	8.48E-08	7,010	8.48E-08
SSE	3,084	2.00E-07	1,025	1.08E-06	4,018	1.36E-07	8,000	5.06E-08	8,000	5.06E-08	4,450	1.17E-07
S	3,032	1.47E-07	1,025	7.74E-07	4,018	9.67E-08	8,000	3.56E-08	8,000	3.56E-08	4,840	7.33E-08
SSW	4,353	1.26E-07	1,025	1.12E-06	4,018	1.42E-07	5,470	9.08E-08	8,000	5.37E-08	8,000	5.37E-08
SW	4,891	1.80E-07	1,025	1.85E-06	4,018	2.38E-07	5,870	1.39E-07	8,000	9.14E-08	5,870	1.39E-07
WSW	3,784	2.37E-07	1,025	1.68E-06	4,018	2.17E-07	5,530	1.37E-07	8,000	8.25E-08	3,620	2.52E-07
W	2,277	3.89E-07	1,025	1.31E-06	4,018	1.69E-07	3,310	2.25E-07	8,000	6.37E-08	3,320	2.24E-07
WNW	1,934	5.18E-07	1,025	1.36E-06	4,018	1.75E-07	8,000	6.52E-08	8,000	6.52E-08	2,640	3.25E-07
NW	1,356	9.69E-07	1,025	1.49E-06	4,018	1.92E-07	3,850	2.04E-07	8,000	7.12E-08	4,700	1.52E-07
NNW	2,023	6.15E-07	1,025	1.72E-06	4,018	2.22E-07	2,050	6.03E-07	8,000	8.23E-08	8,000	8.23E-08
All		8.648E-06		2.429E-05		3.110E-06		4.444E-06		1.180E-06		4.133E-06

TABLE 2.7-55
Long-Term Average Chi/Q (sec/m³) Calculations (2.26 Day Decay) for Routine Releases

	Nearest Meat Animal		Rearest Residence		Downwind Distance (mi)							
Downwind Sector	Distance (m)	Chi/Q	Distance (m)	Chi/Q	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
N	1,500	1.10E-06	1,500	1.10E-06	2.87E-06	9.86E-07	5.39E-07	3.50E-07	2.51E-07	1.91E-07	1.52E-07	1.26E-07
NNE	2,050	7.16E-07	1,590	1.05E-06	2.99E-06	1.91E-06	5.62E-07	3.66E-07	2.62E-07	1.99E-07	1.59E-07	1.32E-07
NE	5,530	1.45E-07	2,070	6.21E-07	2.66E-06	1.69E-06	4.93E-07	3.23E-07	2.32E-07	1.78E-07	1.42E-07	1.18E-07
ENE	7,740	7.88E-08	2,860	3.27E-07	2.29E-06	1.45E-06	4.18E-07	2.75E-07	1.99E-07	1.53E-07	1.22E-07	1.02E-07
E	1,670	7.15E-07	1,670	7.15E-07	2.24E-06	1.42E-06	4.09E-07	2.69E-07	1.95E-07	1.49E-07	1.19E-07	9.92E-08
ESE	8,000	7.31E-08	5,140	1.36E-07	2.27E-06	1.44E-06	4.12E-07	2.70E-07	1.95E-07	1.49E-07	1.19E-07	9.88E-08
SE	7,010	8.48E-08	4,440	1.62E-07	2.19E-06	1.39E-06	3.95E-07	2.59E-07	1.87E-07	1.44E-07	1.15E-07	9.53E-08
SSE	4,890	1.01E-07	2,900	2.19E-07	1.58E-06	1.01E-06	2.87E-07	1.88E-07	1.35E-07	1.03E-07	8.24E-08	6.84E-08
S	8,000	3.56E-08	4,780	7.47E-08	1.13E-06	7.24E-07	2.07E-07	1.35E-07	9.65E-08	7.35E-08	5.85E-08	4.84E-08
SSW	5,470	9.08E-08	4,680	1.14E-07	1.64E-06	1.04E-06	2.97E-07	1.96E-07	1.42E-07	1.09E-07	8.71E-08	7.24E-08
SW	5,870	1.39E-07	1,170	1.49E-06	2.73E-06	1.73E-06	4.91E-07	3.26E-07	2.38E-07	1.83E-07	1.47E-07	1.23E-07
WSW	4,600	1.79E-07	2,520	4.25E-07	2.48E-06	1.57E-06	4.53E-07	2.99E-07	2.17E-07	1.67E-07	1.33E-07	1.11E-07
W	3,310	2.25E-07	2,630	3.15E-07	1.93E-06	1.23E-06	3.57E-07	2.34E-07	1.69E-07	1.30E-07	1.03E-07	8.60E-08
WNW	8,000	6.52E-08	2,630	3.27E-07	2.00E-06	1.27E-06	3.71E-07	2.42E-07	1.74E-07	1.33E-07	1.06E-07	8.81E-08
NW	3,850	2.04E-07	2,650	3.55E-07	2.19E-06	1.40E-06	4.08E-07	2.66E-07	1.91E-07	1.46E-07	1.16E-07	9.64E-08
NNW	2,050	6.03E-07	2,780	3.83E-07	2.53E-06	1.61E-06	4.73E-07	3.08E-07	2.21E-07	1.69E-07	1.34E-07	1.12E-07
All		4.551E-06		7.804E-06	3.574E-05	2.185E-05	6.570E-06	4.307E-06	3.104E-06	2.375E-06	1.895E-06	1.575E-06

TABLE 2.7-55

Long-Term Average Chi/Q (sec/m³) Calculations (2.26 Day Decay) for Routine Releases

Downwind Sector	Downwind Distance (mi)												
	4.5	5.0	6.0	8.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	47.5
N	1.07E-07	9.21E-08	7.14E-08	4.86E-08	3.58E-08	2.00E-08	1.33E-08	9.71E-09	7.50E-09	6.02E-09	4.96E-09	4.18E-09	3.86E-09
NNE	1.12E-07	9.64E-08	7.48E-08	5.09E-08	3.75E-08	2.10E-08	1.40E-08	1.02E-08	7.89E-09	6.34E-09	5.23E-09	4.41E-09	4.07E-09
NE	9.98E-08	8.62E-08	6.69E-08	4.57E-08	3.37E-08	1.89E-08	1.26E-08	9.17E-09	7.08E-09	5.68E-09	4.68E-09	3.94E-09	3.64E-09
ENE	8.64E-08	7.47E-08	5.81E-08	3.98E-08	2.95E-08	1.66E-08	1.11E-08	8.07E-09	6.23E-09	5.00E-09	4.12E-09	3.47E-09	3.20E-09
E	8.43E-08	7.29E-08	5.67E-08	3.88E-08	2.87E-08	1.61E-08	1.07E-08	7.82E-09	6.03E-09	4.83E-09	3.98E-09	3.35E-09	3.09E-09
ESE	8.39E-08	7.25E-08	5.63E-08	3.84E-08	2.83E-08	1.59E-08	1.06E-08	7.67E-09	5.91E-09	4.73E-09	3.89E-09	3.27E-09	3.02E-09
SE	8.10E-08	7.01E-08	5.45E-08	3.72E-08	2.75E-08	1.55E-08	1.03E-08	7.50E-09	5.78E-09	4.63E-09	3.82E-09	3.22E-09	2.97E-09
SSE	5.81E-08	5.02E-08	3.89E-08	2.65E-08	1.95E-08	1.09E-08	7.25E-09	5.26E-09	4.05E-09	3.24E-09	2.67E-09	2.24E-09	2.07E-09
S	4.10E-08	3.54E-08	2.73E-08	1.85E-08	1.36E-08	7.56E-09	4.99E-09	3.62E-09	2.77E-09	2.21E-09	1.82E-09	1.52E-09	1.40E-09
SSW	6.16E-08	5.32E-08	4.14E-08	2.83E-08	2.09E-08	1.18E-08	7.83E-09	5.69E-09	4.37E-09	3.50E-09	2.88E-09	2.42E-09	2.24E-09
SW	1.05E-07	9.07E-08	7.08E-08	4.87E-08	3.62E-08	2.06E-08	1.37E-08	9.98E-09	7.70E-09	6.18E-09	5.10E-09	4.29E-09	3.97E-09
WSW	9.46E-08	8.18E-08	6.37E-08	4.37E-08	3.24E-08	1.83E-08	1.22E-08	8.88E-09	6.85E-09	5.50E-09	4.53E-09	3.82E-09	3.52E-09
W	7.31E-08	6.32E-08	4.91E-08	3.35E-08	2.48E-08	1.39E-08	9.23E-09	6.71E-09	5.16E-09	4.13E-09	3.40E-09	2.86E-09	2.63E-09
WNW	7.48E-08	6.46E-08	5.02E-08	3.42E-08	2.52E-08	1.41E-08	9.29E-09	6.73E-09	5.16E-09	4.12E-09	3.38E-09	2.83E-09	2.60E-09
NW	8.18E-08	7.06E-08	5.48E-08	3.73E-08	2.74E-08	1.53E-08	1.01E-08	7.34E-09	5.64E-09	4.50E-09	3.69E-09	3.09E-09	2.85E-09
NNW	9.46E-08	8.17E-08	6.33E-08	4.31E-08	3.18E-08	1.78E-08	1.18E-08	8.56E-09	6.60E-09	5.28E-09	4.35E-09	3.65E-09	3.37E-09
All	1.338E-06	1.156E-06	8.981E-07	6.132E-07	4.528E-07	2.543E-07	1.689E-07	1.229E-07	9.470E-08	7.589E-08	6.250E-08	5.256E-08	4.849E-08

Source: CPS, 2002

Notes: Wind Reference Level: 10 m; Stability Type: Delta Temperature (60 – 10 m); Release Type: Ground Level – 10 m; Building Height/Cross Section: 57.2 m/2,090 m^2.

TABLE 2.7-56
Long-Term Average Chi/Q (sec/m^3) Calculations (Depleted and 8-Day Decayed) for Routine Releases

	Actual Site Boundary		Exclusion Area Boundary		Low Population Zone		Nearest Cow Milk		Nearest Goat Milk		Nearest Garden	
Downwind Sector	**Distance (m)**	**Chi/Q**	**Distance (m)**	**Chi/Q**	**Distance (m)**	**Chi/Q**	**Distance (m)**	**Chi/Q**	**Distance (m)**	**Chi/Q**	**Distance (m)**	**Chi/Q**
N	1,767	7.46E-07	1,025	1.77E-06	4,018	2.04E-07	1,500	9.63E-07	8,000	6.96E-08	1,500	9.63E-07
NNE	1,527	9.76E-07	1,025	1.84E-06	4,018	2.13E-07	2,050	6.17E-07	8,000	7.28E-08	4,610	1.71E-07
NE	1,400	9.86E-07	1,025	1.63E-06	4,018	1.89E-07	5,530	1.14E-07	8,000	6.53E-08	3,460	2.39E-07
ENE	1,297	9.50E-07	1,025	1.40E-06	4,018	1.62E-07	7,740	5.95E-08	8,000	5.66E-08	4,210	1.51E-07
E	1,710	6.02E-07	1,025	1.37E-06	4,018	1.58E-07	1,670	6.25E-07	8,000	5.52E-08	1,670	6.25E-07
ESE	4,540	1.31E-07	1,025	1.39E-06	4,018	1.58E-07	8,000	5.49E-08	8,000	5.49E-08	5,300	1.03E-07
SE	3,184	2.19E-07	1,025	1.34E-06	4,018	1.52E-07	8,000	5.30E-08	7,010	6.48E-08	7,010	6.48E-08
SSE	3,084	1.67E-07	1,025	9.72E-07	4,018	1.10E-07	8,000	3.80E-08	8,000	3.80E-08	4,450	9.37E-08
S	3,032	1.23E-07	1,025	6.98E-07	4,018	7.86E-08	8,000	2.68E-08	8,000	2.68E-08	4,840	5.85E-08
SSW	4,353	1.02E-07	1,025	1.01E-06	4,018	1.15E-07	5,470	7.17E-08	8,000	4.04E-08	8,000	4.04E-08
SW	4,891	1.43E-07	1,025	1.67E-06	4,018	1.93E-07	5,870	1.09E-07	8,000	6.88E-08	5,870	1.09E-07
WSW	3,784	1.93E-07	1,025	1.52E-06	4,018	1.76E-07	5,530	1.08E-07	8,000	6.20E-08	3,620	2.07E-07
W	2,277	3.33E-07	1,025	1.18E-06	4,018	1.38E-07	3,310	1.86E-07	8,000	4.79E-08	3,320	1.85E-07
WNW	1,934	4.48E-07	1,025	1.23E-06	4,018	1.42E-07	8,000	4.91E-08	8,000	4.91E-08	2,640	2.75E-07
NW	1,356	8.59E-07	1,025	1.35E-06	4,018	1.56E-07	3,850	1.67E-07	8,000	5.36E-08	4,700	1.22E-07
NNW	2,023	5.31E-07	1,025	1.55E-06	4,018	1.80E-07	2,050	5.20E-07	8,000	6.19E-08	8,000	6.19E-08
All		7.508E-06		2.189E-05		2.525E-06		3.761E-06		8.875E-07		3.468E-06

TABLE 2.7-56
Long-Term Average Chi/Q (sec/m^3) Calculations (Depleted and 8-Day Decayed) for Routine Releases

	Nearest Meat Animal		Rearest Residence		Downwind Distance (mi)							
Downwind Sector	**Distance (m)**	**Chi/Q**	**Distance (m)**	**Chi/Q**	**0.5**	**1.0**	**1.5**	**2.0**	**2.5**	**3.0**	**3.5**	**4.0**
N	1,500	9.63E-07	1,500	9.63E-07	2.62E-06	8.63E-07	4.59E-07	2.90E-07	2.03E-07	1.52E-07	1.19E-07	9.70E-08
NNE	2,050	6.17E-07	1,590	9.16E-07	2.73E-06	1.72E-06	4.78E-07	3.03E-07	2.12E-07	1.59E-07	1.24E-07	1.01E-07
NE	5,530	1.14E-07	2,070	5.35E-07	2.43E-06	1.52E-06	4.20E-07	2.68E-07	1.89E-07	1.42E-07	1.11E-07	9.08E-08
ENE	7,740	5.95E-08	2,860	2.74E-07	2.09E-06	1.30E-06	3.56E-07	2.28E-07	1.62E-07	1.22E-07	9.60E-08	7.85E-08
E	1,670	6.25E-07	1,670	6.25E-07	2.05E-06	1.28E-06	3.49E-07	2.23E-07	1.58E-07	1.19E-07	9.37E-08	7.66E-08
ESE	8,000	5.49E-08	5,140	1.08E-07	2.07E-06	1.30E-06	3.51E-07	2.24E-07	1.58E-07	1.19E-07	9.35E-08	7.63E-08
SE	7,010	6.48E-08	4,440	1.30E-07	2.00E-06	1.25E-06	3.36E-07	2.15E-07	1.52E-07	1.14E-07	9.01E-08	7.36E-08
SSE	4,890	8.09E-08	2,900	1.84E-07	1.45E-06	9.07E-07	2.45E-07	1.56E-07	1.10E-07	8.25E-08	6.48E-08	5.29E-08
S	8,000	2.68E-08	4,780	5.96E-08	1.04E-06	6.51E-07	1.76E-07	1.12E-07	7.84E-08	5.87E-08	4.60E-08	3.74E-08
SSW	5,470	7.17E-08	4,680	9.11E-08	1.50E-06	9.38E-07	2.53E-07	1.62E-07	1.15E-07	8.69E-08	6.85E-08	5.60E-08
SW	5,870	1.09E-07	1,170	1.34E-06	2.49E-06	1.55E-06	4.19E-07	2.71E-07	1.93E-07	1.46E-07	1.16E-07	9.49E-08
WSW	4,600	1.43E-07	2,520	3.61E-07	2.27E-06	1.41E-06	3.86E-07	2.48E-07	1.76E-07	1.33E-07	1.05E-07	8.59E-08
W	3,310	1.86E-07	2,630	2.66E-07	1.76E-06	1.10E-06	3.04E-07	1.94E-07	1.37E-07	1.03E-07	8.14E-08	6.65E-08
WNW	8,000	4.91E-08	2,630	2.76E-07	1.83E-06	1.15E-06	3.16E-07	2.01E-07	1.42E-07	1.06E-07	8.36E-08	6.83E-08
NW	3,850	1.67E-07	2,650	3.00E-07	2.00E-06	1.26E-06	3.48E-07	2.21E-07	1.55E-07	1.17E-07	9.14E-08	7.46E-08
NNW	2,050	5.20E-07	2,780	3.22E-07	2.31E-06	1.45E-06	4.03E-07	2.56E-07	1.80E-07	1.35E-07	1.06E-07	8.62E-08
All		3.851E-06		6.746E-06	3.264E-05	1.963E-05	5.599E-06	3.571E-06	2.519E-06	1.895E-06	1.490E-06	1.217E-06

TABLE 2.7-56
Long-Term Average Chi/Q (sec/m³) Calculations (Depleted and 8-Day Decayed) for Routine Releases

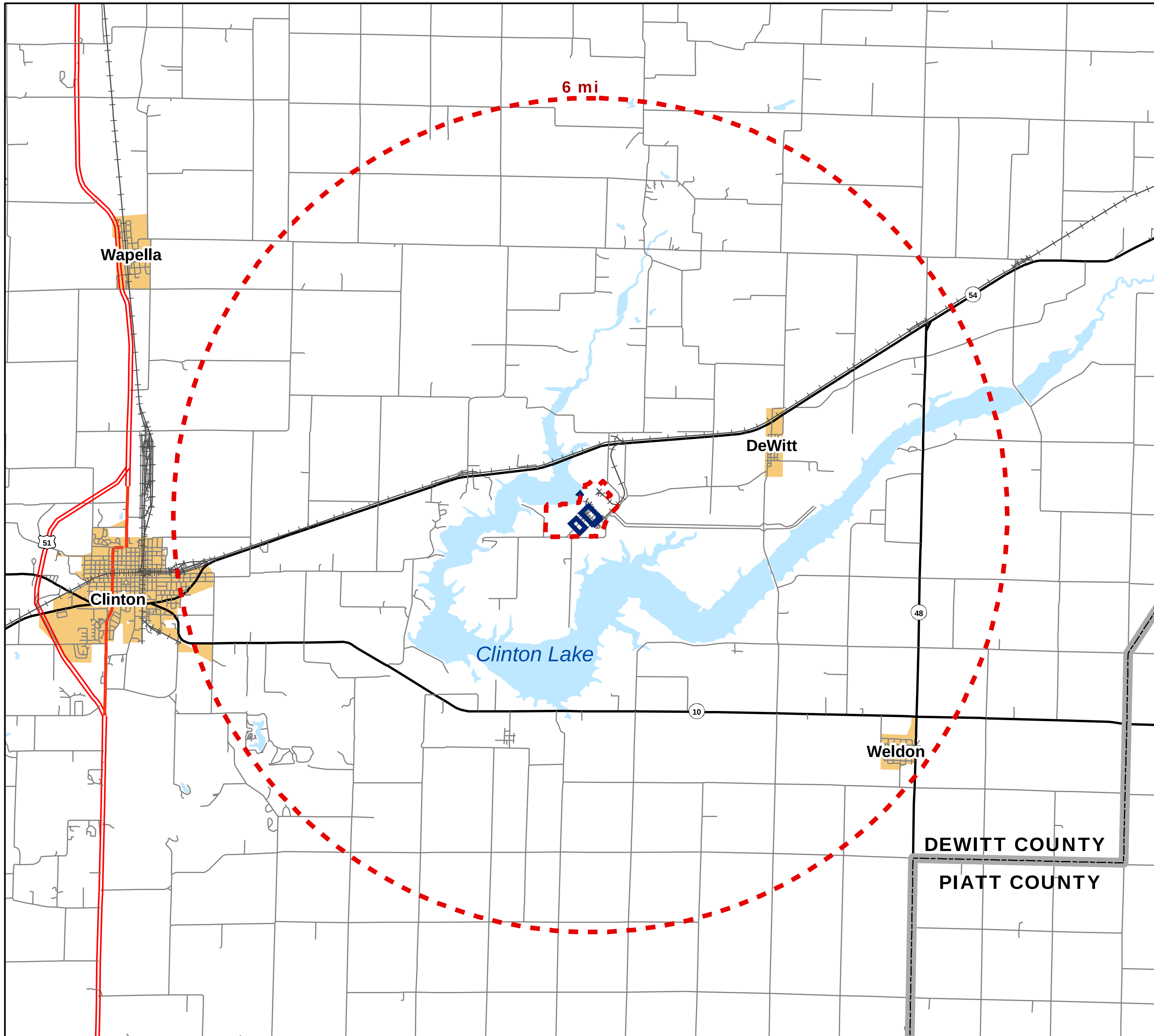
Downwind Sector	Downwind Distance (mi)												
	4.5	5.0	6.0	8.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	47.5
N	8.11E-08	6.90E-08	5.22E-08	3.45E-08	2.47E-08	1.29E-08	8.17E-09	5.72E-09	4.26E-09	3.31E-09	2.64E-09	2.16E-09	1.96E-09
NNE	8.47E-08	7.21E-08	5.46E-08	3.61E-08	2.59E-08	1.36E-08	8.57E-09	6.00E-09	4.47E-09	3.47E-09	2.78E-09	2.27E-09	2.06E-09
NE	7.59E-08	6.47E-08	4.91E-08	3.25E-08	2.34E-08	1.23E-08	7.78E-09	5.45E-09	4.06E-09	3.16E-09	2.53E-09	2.06E-09	1.88E-09
ENE	6.58E-08	5.61E-08	4.27E-08	2.84E-08	2.05E-08	1.08E-08	6.88E-09	4.82E-09	3.60E-09	2.80E-09	2.24E-09	1.83E-09	1.67E-09
E	6.42E-08	5.47E-08	4.16E-08	2.76E-08	1.99E-08	1.05E-08	6.67E-09	4.67E-09	3.48E-09	2.70E-09	2.16E-09	1.77E-09	1.61E-09
ESE	6.38E-08	5.44E-08	4.13E-08	2.74E-08	1.97E-08	1.04E-08	6.55E-09	4.58E-09	3.41E-09	2.65E-09	2.12E-09	1.73E-09	1.57E-09
SE	6.16E-08	5.26E-08	3.99E-08	2.65E-08	1.91E-08	1.01E-08	6.39E-09	4.47E-09	3.33E-09	2.59E-09	2.07E-09	1.69E-09	1.54E-09
SSE	4.42E-08	3.77E-08	2.86E-08	1.89E-08	1.36E-08	7.14E-09	4.51E-09	3.15E-09	2.34E-09	1.82E-09	1.45E-09	1.19E-09	1.08E-09
S	3.12E-08	2.66E-08	2.01E-08	1.32E-08	9.46E-09	4.94E-09	3.11E-09	2.17E-09	1.61E-09	1.25E-09	9.94E-10	8.10E-10	7.36E-10
SSW	4.69E-08	4.00E-08	3.04E-08	2.02E-08	1.46E-08	7.70E-09	4.88E-09	3.41E-09	2.54E-09	1.97E-09	1.58E-09	1.29E-09	1.17E-09
SW	7.97E-08	6.82E-08	5.20E-08	3.48E-08	2.52E-08	1.34E-08	8.54E-09	5.98E-09	4.46E-09	3.47E-09	2.78E-09	2.28E-09	2.08E-09
WSW	7.20E-08	6.15E-08	4.68E-08	3.12E-08	2.25E-08	1.19E-08	7.58E-09	5.31E-09	3.96E-09	3.08E-09	2.47E-09	2.02E-09	1.84E-09
W	5.57E-08	4.75E-08	3.61E-08	2.40E-08	1.72E-08	9.09E-09	5.76E-09	4.03E-09	3.00E-09	2.33E-09	1.86E-09	1.52E-09	1.39E-09
WNW	5.71E-08	4.87E-08	3.69E-08	2.45E-08	1.76E-08	9.23E-09	5.83E-09	4.07E-09	3.02E-09	2.34E-09	1.87E-09	1.53E-09	1.39E-09
NW	6.24E-08	5.31E-08	4.03E-08	2.67E-08	1.91E-08	1.00E-08	6.33E-09	4.42E-09	3.29E-09	2.55E-09	2.04E-09	1.66E-09	1.51E-09
NNW	7.20E-08	6.13E-08	4.64E-08	3.07E-08	2.20E-08	1.16E-08	7.30E-09	5.10E-09	3.80E-09	2.95E-09	2.36E-09	1.92E-09	1.75E-09
All	1.018E-06	8.681E-07	6.587E-07	4.373E-07	3.144E-07	1.656E-07	1.048E-07	7.332E-08	5.459E-08	4.243E-08	3.393E-08	2.772E-08	2.524E-08

Source: CPS, 2002

Notes: Wind Reference Level: 10 m; Stability Type: Delta Temperature (60 – 10 m); Release Type: Ground Level – 10 m; Building Height/Cross Section: 57.2 m/2,090 m²

Environmental Report for the EGC Early Site Permit

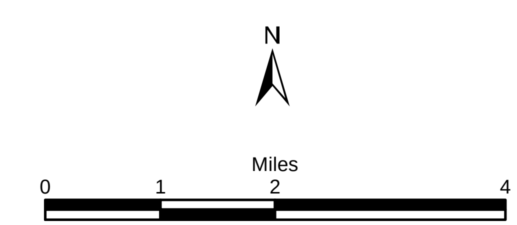
Figure 2.1-1
Site/Vicinity Location Map



Legend

- Site Boundary: Fenceline
- Vicinity: 6-mi radius around site
- Proposed Areas for EGC ESP Facility Structures
- U.S. Highway, Multilane divided
- U.S. Highway
- State Route
- County or other minor road
- Railroads
- Water: Lakes and Rivers
- Incorporated/Designated Places
- County Boundary

Data Sources:
U.S. Census Bureau, 2000
U.S. Census Bureau, 2002
U.S. Census Bureau, 2002a



Environmental Report for the EGC Early Site Permit

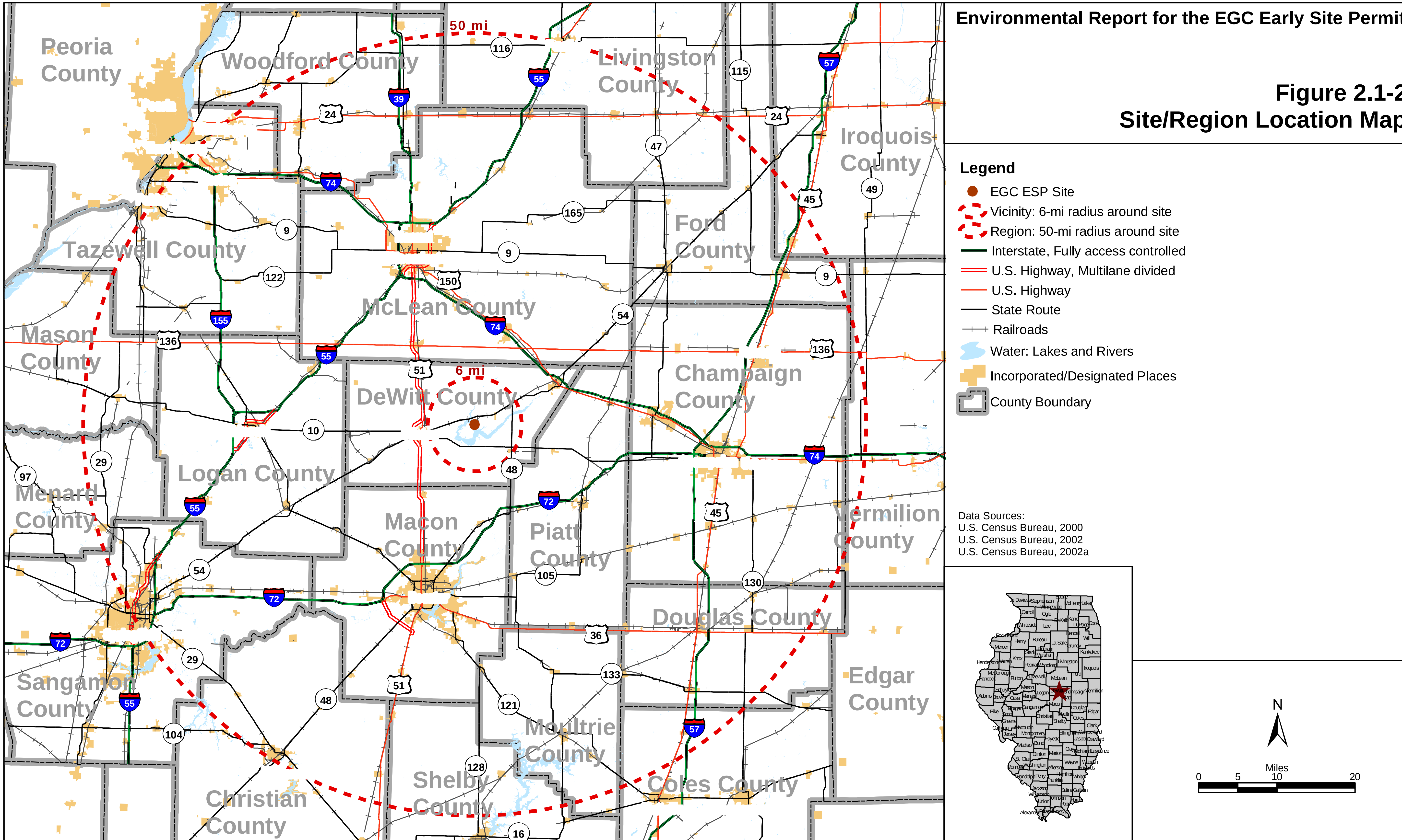
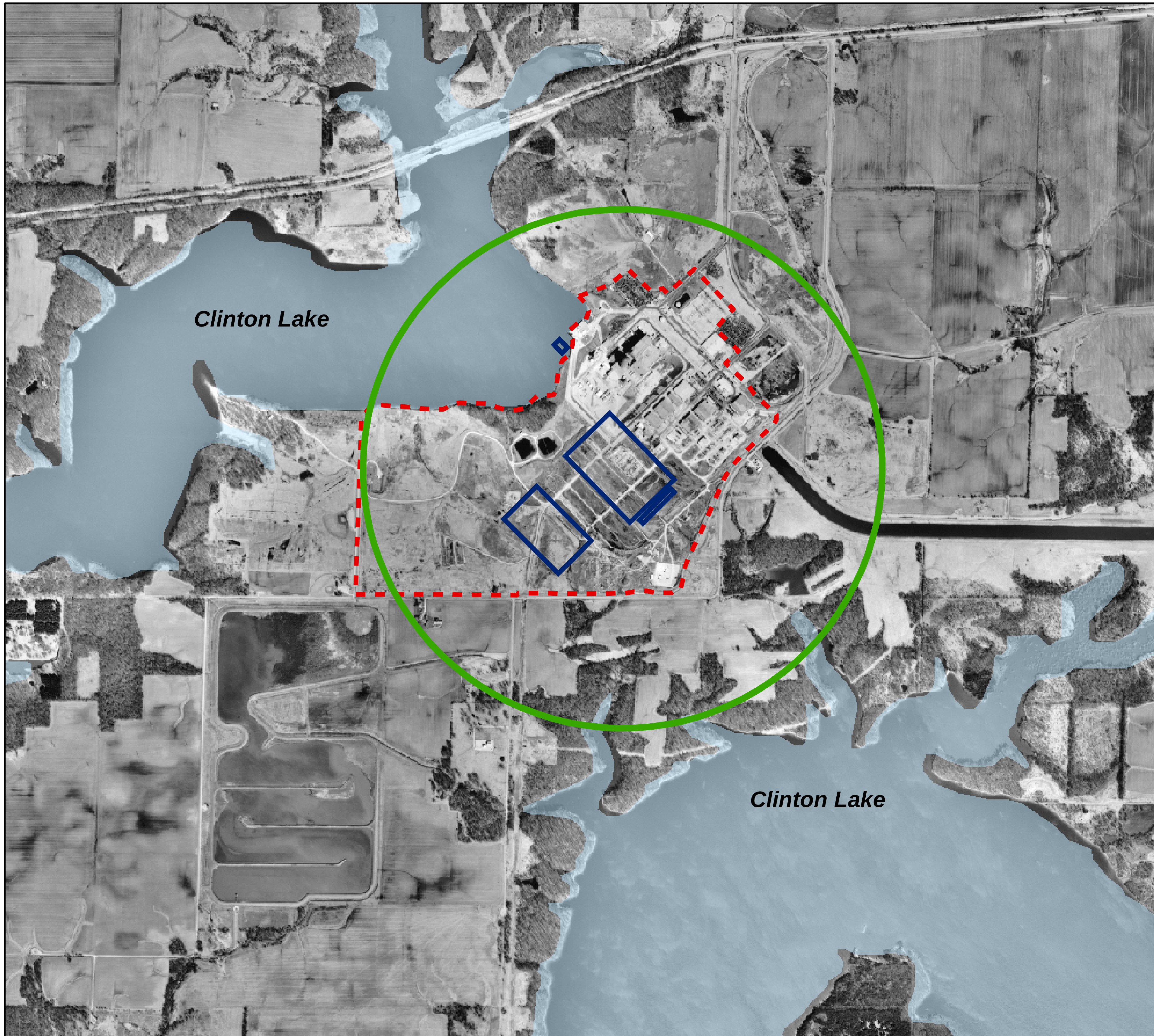


Figure 2.1-2
Site/Region Location Map

Environmental Report for the EGC Early Site Permit

Figure 2.1-3
Aerial View of Site



Legend

- Site Boundary: Fenceline
- Proposed Areas for EGC ESP Facility Structures
- ESP Exclusion Area Boundary (1025 meters)
- Water: Lakes and Rivers

Data Sources:
IDNR, 1998 and 1999

N

Miles
0 0.125 0.25 0.5