INSTRUCTIONS FOR UPDATING YOUR ER

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CHAPTER 1 - PURPOSE OF THE PROPOSED FACILITY AND ASSOCIATED TRANSMISSION

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CHAPTER 1 - PURPOSE OF THE PROPOSED FACILITY AND ASSOCIATED TRANSMISSION

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CHAPTER 1 - PURPOSE OF THE PROPOSED FACILITY AND ASSOCIATED TRANSMISSION

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1.1 SYSTEM DEMAND AND RELIABILITY

The Illinois Power (IP) system is part of Mid-America Interpool Network (MAIN), one of nine regional reliability councils that comprise the National Electric Reliability Council (NERC). Membership in MAIN is voluntary and informal. Members of MAIN provide electric service to loads in Illinois, Missouri, Michigan, and Wisconsin. There are 12 member systems in MAIN. The MAIN response to Federal Power Commission (FPC) Order 383-3 (MAIN's Submittal on Coordinated Bulk Power Supply Program to the Department of Energy, Code ERA-411, April 1, 1981), therefore, includes resource data from its 12 member systems, and in addition, includes data from associate members made up of small municipalities, cooperatives, and other systems, each with 25 MW or more of generating capacity. In all, 21 interconnected systems within the MAIN region are included in the response to FPC Order 383-3. Figure 1.1-1 shows the region included within MAIN and its relationship to other NERC regions.

IP is a participant in an Interconnection Agreement Between Central Illinois Public Service Company (CIPS), Illinois Power Company, and Union Electric Company (UE), February 18, 1972. This more formal arrangement is known as the Ill-Mo Pool. The Ill-Mo Pool through its member companies provides electric service to customers in portions of Illinois and Missouri. Resource data for the Ill-Mo Pool is listed in the MAIN response to FPC Order 383-3. Figure 1.1-2 shows the region included within the Ill-Mo Pool.

The IP service territory comprises approximately 15,000 square miles in the southern two-thirds of Illinois, or approximately one-fourth of the state. The largest cities served are Galesburg, Kewanee, LaSalle, Monmouth, and Ottawa in north central Illinois; Bloomington, Champaign, Danville, Decatur, Jacksonville, Normal, and Urbana in central Illinois; and Belleville, Centralia, Collinsville, Granite City, Mt. Vernon, and Wood River in southwest Illinois. Figure 1.1-3 shows the other Illinois utilities and IP's relationship to them.

On January 1, 1981, IP furnished electric service to 522,166 customers in 422 communities. The area served by IP has a population approaching 1,405,000. Customers by service class include: 466,546 residential, 54,546 commercial and small power, 359 large power, and 715 others. Additionally, IP provided electric service to ten municipalities, (two full requirement, eight partial requirement) nine electric cooperatives, and one privately owned distribution company. Table 1.1-1 shows the breakdown of IP's customers for the years 1974 through 1980.

IP owns and operates electric generating facilities having a net summer capability of about 3,815 MW. These facilities include five steam generating stations with a net summer capability of 3,626 MW. IP owns other generating facilities with an aggregate capability of 189 MW, including one hydro station and internal combustion and gas turbine peaking units at six locations. In addition, the company has 55 MW of capacity available under contract from Electric Energy Inc. (EEI). EEI is a corporation owned by Union Electric Company (40% ownership), Illinois Power Company (20%), Central Illinois Public Service Company (20%), and Kentucky Utilities Company (20%). EEI operates the 1000 MW Joppa plant and supplies a portion of the Department of Energy (DOE) plant load near Paducah, Kentucky.

The generating stations owned and operated by IP are connected by an extensive transmission network to 775 substations. As of January 1, 1981, there were 4,057 pole miles of transmission lines at all voltages, including 428 miles operating at 345 kV. In addition, IP is interconnected with neighboring electric systems. The major interconnections are with Central Illinois Light Company (CILCO), Central Illinois Public Service Company (CIPS), Commonwealth Edison Company (CECO), Indiana and Michigan Electric Company (IME), Iowa-Illinois Gas and Electric Company (IIG&E), Tennessee Valley Authority (TVA), and Union Electric Company (UE).

Customer load is distributed via an extensive distribution system that includes 872 distribution feeders. Figure 1.1-4 shows major IP generation, transmission, and substation facilities as they existed on January 1, 1981, along with the proposed Clinton Power Station and its associated transmission ties.

Current IP expansion plans include the installation of two 950 MWe nuclear units at the Clinton Power Station. Clinton Station Ownership Participation Agreement, August 19, 1976, between IP, Soyland Power Cooperative, Inc. (Soyland), and Western Illinois Power Cooperative (WIPCO) provides that the Clinton Power Station Unit 1 shall be owned by the participants as tenants in common, on an undivided basis, with IP owning 80%, Soyland owning 10.5%, and WIPCO owning 9.5%. The Ownership Agreement further stipulates that Soyland and WIPCO may participate in Clinton Power Station Unit 2 on an identical basis subject to the availability of financing.

Effective with the in-service date of Clinton Unit 1, IP will no longer serve wholesale cooperative load except for about 15 MW of WIPCO load. Soyland will purchase unit deferral capacity (UDC) from IP until 1988. UDC will cover the needs of Soyland's member distribution cooperatives served from existing IP delivery points in excess of the amount served by Soyland's share of Clinton Unit 1. In addition, UDC includes Soyland's reserve obligation for its share of Clinton Unit 1. UDC will increase annually as a result of load growth until 1987, at which time it is scheduled to decrease because of capacity additions planned by Soyland. IP has no obligation to provide UDC after May 31, 1988.

It is expected that by 1984 (the first year in which Clinton Power Station Unit 1 will be in commercial service during the peak load season) IP's annual peak load will have increased 7.6% since 1980, to 3,390 MW; its energy requirements will have increased 6.5%, to 16,537 GWh; and its net usable owned capacity will have increased 20%, to 4,575 MW. After adjusting the projected demand for scheduled firm purchases and sales, total capacity will exceed load responsibility by 1,104 MW in 1984. IP's share of the 950 MW Clinton Unit 1 represents 100% of IP's capacity additions planned between 1981 and 1990 and 69% of its reserve capacity in 1984.

By 1984, it is anticipated that the net usable owned capability in the Ill-Mo Pool will have increased 21% since 1980 to 16,093 MW; its annual peak demand will have increased 6%, to 11,843 MW; and its energy requirements will have increased 7%, to 55,575 GWh. After adjustments for scheduled imports and exports, total capability will exceed load responsibility by 3,770 MW in 1984. Clinton Unit 1 represents 28% of the Ill-Mo Pool's projected capacity increase between 1981 and 1984 and 20% of its reserve margin at the time of the 1984 summer peak.

Similarly, by 1984 the annual peak demand for MAIN will have increased 13% since 1980, to 38,298 MW; its energy requirements will have increased 13%, to 187,253 GWh; and its net usable owned capacity will increase 8%, to 47,504 MW. After adjustments total capability will exceed load responsibility by 9,238 MW in 1984. Clinton Unit 1 will represent 12% of MAIN's capacity increase between 1981 and 1984 and 8% of its reserve margin at the time of the 1984 summer peak.

It is expected that by 1995, when the second unit of the Clinton Power Station is scheduled to begin operation, IP's annual peak load will have increased 65% since 1980, to 5,210 MW; its energy requirements will have increased 75%, to 27,247 GWh; and its net usable owned capacity will have increased 66% to 6,317 MW. Total adjusted capacity will exceed load responsibility by 1,164 MW in 1995. IP's share of the 950 MW Clinton Unit 2 represents 31% of IP's capacity additions planned between 1981 and 1995 and 65% of its reserve capacity in 1995.

Information for MAIN and L.C. is not available for 1995.

In the area of energy conservation and load management, IP has embarked on a number of programs involving advertising campaigns, innovative rate designs, load management techniques, and promotion of energy saving improvements. The major objective of the load management effort is to shift demand to off-peak periods, which results in more efficient use of generating capacity, and hence, lower per unit energy costs to the consumer.

The energy conservation program is designed to reduce demand and consumption by eliminating waste. This savings can be used to accommodate new customers and load growth without increasing IP's need for additional fuel and generating capacity.

IP has conducted "energy conservation audits" on the homes of residential customers requesting this service. During these audits customers' homes are checked for energy efficiency. Evaluations are made on excess heat loss or gain, attic ventilation, duct work insulation, and other factors. During the audit IP representatives may recommend energy saving improvements such as caulking, weatherstripping, adding insulation, or adding storm doors and windows.

In August 1977, Edison Electric Institute (EEI) introduced a national program called "National Energy Watch." Under this program, IP's energy-use personnel made free inspections of homes for energy efficiency and evaluate them according to guidelines approved by EEI. Energy saving improvements are suggested to the customer. Altogether, Illinois Power has conducted over 79,000 residential audits as of April 1, 1981.

Part 1 of Title II of the National Energy Conservation Policy Act mandated the Residential Conservation Services (RCS) Program.

In compliance with rules promulgated by the Department of Energy (DOE) Illinois submitted a plan for RCS to DOE. The Illinois Plan was approved by DOE on April 20, 1981.

Illinois Power Company helped develop the Illinois Plan, and IP is in compliance with the provisions of the plan.

IP advertises these services and other specific energy conservation information and suggestions for its residential customers. The goal of these programs is to assist IP's customers to use energy wisely and efficiently and to personally contact all residential customers within 10 years.

Company representatives also perform "energy audits" to help commercial customers manage their electrical use more efficiently. During these audits, the representative may recommend improvements such as load control devices, better ventilation, more efficient equipment, planned maintenance, different fuels, switching loads from on-peak to off-peak periods, or night setbacks for thermostats.

IP initiated an industrial load management program in 1975 to (1) improve system load factor and to control or direct the electric load on its system by voluntary and mutually beneficial customer actions and (2) to help industry utilize energy more efficiently. IP representatives assist industrial customers to develop programs for more efficient energy utilization, conduct energy audits of industrial customers' plants, and introduce industrial customers to energy efficient equipment and processes. IP also sponsors courses on energy management and technical seminars on load management techniques.

Other forms of load management are being used or experimented with. These include seasonal rates, solar water and space heating, direct control of domestic water heaters and cogeneration opportunities.

1.1.1 Load Characteristics

1.1.1.1 Load Analysis

1.1.1.1.1 Peak Demand and Energy Requirements

The past annual peak load demands of IP, Ill-Mo Pool, and MAIN are shown on Table 1.1-2 for the period from 1966 through 1980. Forecasted annual peak load demands are shown in Table 1.1-3 for 1981 through 2000.

The past annual energy requirements for IP, Ill-Mo Pool, and MAIN are shown on Table 1.1-4 for the period 1966 through 1980. Forecasted annual energy requirements are shown on Table 1.1-5 for the period 1981 through 2000.

1.1.1.1.2 Load Factor

Figure 1.1-5 shows IP's 1980 Load Duration Curve. This curve yields an annual load factor of 56%, which is representative of the load factor expected in the mid 1980's following the start of commercial operation of Clinton 1.

1.1.1.2 Energy and Demand Projections

The model utilized for the current peak load forecast uses econometric techniques and disaggregated system peak into the 5 components shown below:

LI = Large Industrial (customers with actual demands over 500 kW during the summer months);

RCOB = Residential, Commercial, and Other Base load (other consists of lighting, municipal service, and wholesale municipal);

RCOWS = Residential, Commercial and Other Weather-Sensitive load;

COOP = Wholesale (WIPCO and SOYLAND only); and

MUNI = Interconnected municipalities Load (Particle Requirements Contracts).

Figure 1.1-7 contains a flow diagram of this forecasting model.

Power curves were adopted for LI, RCOB, and RCOWS models. The COOP model is a growth rate applied to their historical load. MUNI is projected to grow at the same rate as RCOB and RCOWS. Ordinary least-squares regression analysis was used to determine the historical relationships on which the future was forecast. Figure 1.1-7 is a flow diagram depicting IP's econometric model used for the 1980-2000 peak load forecast.

The model for large industrial peak load LI is as follows:

$$\text{Summer: } LI = EXP\,(-35.4 - \underset{(2.03)}{0.215}\ \ln IPE + \underset{(24.08)}{2.64}\ \ln INC)$$

$$\text{Winter: } LI = EXP\,(-35.5 - \underset{(1.55)}{0.160}\ \ln IPE + \underset{(26.34)}{2.65}\ \ln INC)$$

where:

LI = Large Industrial peak load (MW);

IPE = Large Industrial Real Price of Electricity (¢/kWh); and

INC = Total Personal Income (thousands of dollars).

Statistics of Fit

Item	Value	
	Summer	Winter
r2	0.980	0.984
F-Statistic	298	348
Durbin-Watson	1.56	1.52
t-Statistic	*	*

Residential, Commercial, and Other Base load (RCOB) was modeled on a per residential customer basis. Base load is then the product of number of residential customers and base load per residential customer.

The model for Residential, Commercial, and Other Base load is as follows:

$$RCOB = RC \times BNC$$

Summer: $$BNC = EXP\left[-8.70 - \underset{(56.57)}{0.310} \ln \left(\frac{RPE}{PCI}\right)\right]$$

Winter: $$BNC = EXP\left[-8.58 - \underset{(9.02)}{0.297} \ln \left(\frac{RPE}{PCI}\right)\right]$$

where:

RCOB = Residential, Commercial, and Other Base load (MW);

RC = Number of Residential Customers;

BNC = Base Load per Residential Customer (MW/customer); and

RPE = Residential Average Annual Real Electricity Price (¢/kWh)

PCI = Real Per Capita Income ($).

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*t-Statistic are shown in parentheses below the equation coefficients.

Statistics of Fit

Item	Value	
	Summer	Winter
r^2	0.769	0.872
F-Statistic	43	81
Durbin-Watson	1.98	1.97
t-Statistic	*	*

The model for summer weather-sensitive load is as follows:

$$RCOWS = AC \times EXP\ (-4.76 - \underset{(5.01)}{0.811} \ln RSPE)$$

$$AC = ACSAT \times RC$$

$$ACSAT = C/\ [1 + EXP\ (+ 0.872 - \underset{(25.1)}{0.175} \times Year)]$$

where:

RCOWS = Residential, Commercial, and Other Weather Sensitive load (MW);

AC = Number of Air Conditioners (central equivalents);

ACSAT = Residential Air Conditioning Saturation (decimal form)(3 window units equals 1 central unit);

RSPE = Residential Summer real electricity price (¢/kWh);

C = Ceiling of ACSAT central equivalents (=0.75)

Year = 1965 is Year 1.

Statistics of Fit

Item	Value
r^2	0.659
F-Statistic	25

*t-Statistic are shown in parentheses below the equation coefficients.

Durbin-Watson	2.66
t-Statistic	*

The model for winter weather-sensitive load is as follows:

$$\text{RCOWS} = \text{REHE} \times \text{EXP}\ (-18.5 - \underset{(6.21)}{1.63}\ \ln \text{PCI})$$

where:

RCOWS = Residential, Commercial and other winter weather-sensitive load

REHE = Number of Residential Electric Space Heat Equivalent Customers

PCI = Real Per Capital Income ($)

Statistics of Fit

Item	Value
r^2	0.763
F-Statistic	39
Durbin-Watson	1.74

The model for system peak (SPEAK) is the sum of the three components shown above plus COOP and MUNI load.

SPEAK = RCOB + RCOWS + LI + COOP + MUNI

where:

SPEAK = System Peak (MW); and

COOP = Wholesale (WIPCO and SOYLAND only)(MW).

The COOP load is forecast using growth rates supplied by each cooperative.

Forecasts of the exogenous variables used in the peak load forecast are as follows:

IPE = Increase at a rate of 3% per year 1981-1984; 2% per year 1985-1989; 1% per year 1990-1994; and 0.0% per year 1995-2000.

*t-Statistic are shown in parentheses below the equation coefficients.

INC = Increase 2.0% per year 1981-1984; 2.2% per year 1985-1989; 2.3% per year 1990-1994; and 2.2% per year 1995-2000.

RC = Increase 2.0% per year 1981-1984; and at a declining rate from 1985 down to 0.9% per year in 2000.

PCI = Increase 1.7% per year 1981-2000.

C = 0.75

RPE = Increase 1.5% per year 1981-1984; 1.0% per year 1985-1989; 0.0% per year 1990-1994; and -1.0% per year 1995-2000.

This econometric methodology is an extension of previous forecasting methodologies. Table 1.1-6 compares earlier forecasts with the actual loads experienced on the IP system. Figure 1.1-6 provides a graphic comparison between earlier peak load forecasts and the current forecast.

Table 1.1-3 contains a tabulation of the peak load forecast using the econometric model.

It is anticipated that peak load growth rates will not return to their previous rates. For the period from 1980 through 1995 IP's peak load, excluding cooperative load, is expected to increase at approximately 3.9% per year. The forecast for the 1995-2000 period is approximately 4.8%. The peak load growth rate experienced between 1966 and 1973 was 8.8%. Figures 1.1-8 and 1.1-9 are plots that describe these demand and energy growth rates from 1966 through 2000.

Historical IP monthly peak demands for the period from 1966 through 1980 are shown on Table 1.1-7. Forecasted monthly peak demands are shown on Table 1.1-8. The historical relationship of monthly to annual peaks was used to establish forecasted monthly peaks. Monthly data showing actual IP energy consumption energy requirements are tabulated in Table 1.1-9.

1.1.1.3 Power Exchanges

Historical IP capacity entitlements and commitments at the time of the annual system peak demand are shown on Table 1.1-10. Economy and emergency transactions are not included.

Historical data show that, since 1966, the IP system power exchange has resulted in sizeable imports and exports. The forecasted power exchanges show that a substantial net export is expected in future years.

Table 1.1-11 shows the projected capacity entitlements and commitments for Ill-Mo Pool, MAIN, and IP during the period 1981-1999.

1.1.2 System Capacity

Generation system expansion planning at IP is affected through detailed analyses of environmental and social considerations, economics, technical uncertainties, and operating characteristics. These analyses are then merged to yield the optimized or most desirable expansion plan that satisfies the desired capacity and reserve margin.

IP is bound by the Ill-Mo Pool agreement to maintain sufficient capacity for its own load plus a reserve of at least 15% of its adjusted demand or 50% of the capacity of its largest generating source, whichever is greater. These minimum reserve requirements may be modified from time to time by mutual agreement of the parties to the agreement.

Analyses by the MAIN Guide #6 Working Group have indicated that an adequate reserve level for the member companies in the early 1980's is about 15%. Because of the characteristics of new units to be installed in the future and the greater magnitude of load forecast uncertainty, the IP Planning Department utilizes a 15% reserve margin until Clinton Unit 1 is installed and a 17% reserve thereafter.

The aforementioned "optimized" justification of expansion units is based solely on IP load growth. However, depending on the factors involved, IP may arrange for capacity transactions with its neighbors during the years for which it expects to have either a surplus or deficiency of reserve capacity to adjust the timing of a new unit installation. Although IP may be able to obtain periodic short-term capacity from other electric utilities, none of these utilities plans to be an exporter of power on a long-term basis. Therefore, power cannot be purchased indefinitely as an alternative to installing new electric generation facilities.

The capabilities of existing IP units are shown on Table 1.1-12. Fuel types, duty cycles, and capacity factor estimates (1984 and 1995) for these units and Clinton Units 1 and 2 are shown on Table 1.1-13. Capacity additions and retirements that are planned for IP, Ill-Mo Pool, and MAIN are shown on Table 1.1-14.

IP capability, both existing and planned, and planned capacity for Ill-Mo Pool and MAIN at the time of annual peak demand are tabulated on Table 1.1-15.

1.1.3 Reserve Margin

As noted in Subsection 1.1.2, IP's required reserve margin is 15% of its adjusted demand prior to the installation of Clinton 1 and 17% thereafter. These margins are based on the Ill-Mo Pool Interconnection Agreement, MAIN recommendations, and in-house study.

The Ill-Mo Pool 15% reserve requirement is founded on actual operating experience and supplemented by probability studies made from time to time by Pool members.

Analyses by the MAIN Guide #6 Working Group have recommended a 15% reserve level for the member companies in the early 1980's. This reserve level recognizes the value of the interconnected individual systems within MAIN and the assistance available from inter-tie with adjacent reliability councils. At this time, MAIN has not mandated a minimum reserve requirement for its members. The MAIN analysis was made using the Probability of Positive Margin (POPM) approach. This method relies on statistics to determine the reliability of MAIN's generating system.

Increased attention is being paid to the level of reserve that is considered adequate. Both IP and the MAIN Guide #6 are developing reliability indices using the Loss of Load Probability (LOLP) method. This approach uses statistics to calculate the number of occurrences of load exceeding capacity. The results of these studies are, as yet, unavailable.

Forced and scheduled unit outage rates are closely related to overall IP system security and reserve margins. The spring and fall months usually have the lowest monthly capacity requirements and are ideal for scheduling maintenance. Thus, the scheduled maintenance of generation capacity closely follows seasonal fluctuations in load. Generation maintenance is scheduled with the intent of levelizing reserve margins at a constant percentage of load responsibility each week during the maintenance season. Unexpected forced outages may cause the maintenance schedule to be revised. Many times, a forced outage on one unit will prevent others from coming off for scheduled maintenance because of reserve requirement limitations. In some instances when a unit is forced out, maintenance work planned for later in the year is done ahead of schedule since the unit is down anyway.

Generation and transmission maintenance plans are coordinated extensively within the Ill-Mo Pool. Maintenance is also coordinated with systems outside the Pool, and the effect of scheduled outages of major units and transmission lines in neighboring systems is considered in overall reliability planning.

Table 1.1-16 is a summary of IP actual load and capability data for the 1975 through 1980 period. The actual reserve may exceed the minimum required reserve because of (1) mismatches in annual growth rates and economical unit sizes and (2) differences between actual and forecasted loads.

Table 1.1-17 shows the adjustments to IP's load and capacity made to calculate the adjusted demand and adjusted capacity for the period from 1981 through 1999. Table 1.1-18 is a summary of forecasted loads and capability for IP, Ill-Mo Pool, and MAIN during the 1981 through 1999 period. These summaries indicate that in 1984 with the inclusion of Clinton Unit 1, IP will have reserves of 1,104 MW, Ill-Mo Pool will have reserves of 3,770 MW, and MAIN will have reserves of 9,238 MW. In 1995 with the inclusion of Clinton 2, IP will have reserves of 1,164 MW. Information for MAIN and Ill-Mo is unavailable.

1.1.4 External Supporting Studies

MAIN Guide #6, included in the Appendix to MAIN's response to FPC Order 383, adopts an adequacy criterion of a LOLP of 0.1 day per year. Preliminary results utilizing the LOLP criterion generally correspond to the POPM criterion used by MAIN prior to LOLP. Based on POPM, MAIN established that "current analysis and practices are consistent with an interim policy of maintaining a minimum reserve for MAIN as a whole of 15% each year for the next several years." At the time this interim policy was established (1976), it was recognized that further investigations of the parameters that influence reserve requirements should be made prior to adoption of a firm policy. This investigation is still under way.

Item 3B of the aforementioned report concludes that the forecasted reserves for the Ill-Mo Pool are "adequate for the report period," (1981-1985).

TABLE 1.1-1

ILLINOIS POWER COMPANY ELECTRIC OPERATING STATISTICS
Revised April 1981

	1980	1979	1978	1977	1976	1975	1974
Customers At End of Year							
Residential	466,546	461,966	455,014	445,130	435,611	426,062	419,742
Commercial and Small Power	54,546	53,804	53,051[a]	51,384	51,019	49,996	49,783
Large Power and Light	359	374	368[a]	1,305	1,340	1,309	1,273
Other	715	714	699	692	694	689	692
Total	522,166	516,858	509,132	498,511	488,664	478,056	471,490
Sales in Thousands of Kilowatt Hours							
Residential	4,003,563	3,737,245	3,770,703	3,632,898	3,271,719	3,277,664	2,935,760
Commercial and Small Power	2,492,930	2,408,131	2,383,521	1,696,894	1,405,389	1,380,771	1,249,478
Large Power and Light	6,507,468	6,738,321	6,271,872	6,541,429	6,412,648	5,759,317	5,692,809
Other	290,851	282,846	271,853	260,263	247,298	222,810	201,400
Sales-Ultimate Consumers	13,294,812	13,166,545	12,697,949	12,131,484	11,337,054	10,640,562	10,079,397
Rural Cooperatives and Municipal Utilities	1,189,702	1,057,113	874,432	817,334	736,834	683,026	619,363
Other Electric Utilities	1,961	1,874	2,004	2,035	1,836	1,650	1,448
Total	14,486,475	14,225,532	13,574,405	12,950,853	12,075,724	11,325,238	10,700,208

[a]Reclassification due to rate structure change.

POOR ORIGINAL

TABLE 1.1-2

PAST ANNUAL PEAK LOAD DEMAND EXCLUDING INTERRUPTIBLES
Revised April 1981

(All Values in Megawatts)

Year	MAIN[a]	ILL-MO[a]	IP[b]
1966			1,299
1967			1,338
1968			1,607
1969			1,709
1970			1,827
1971			1,974
1972			2,126
1973			2,349
1974			2,352
1975			2,476
1976			2,570
1977	33,404	10,135	2,846
1978	33,222	10,061	2,825
1979	33,803	10,421	3,019
1980	33,915	11,186	3,150

[a]Source: Appendices of MAIN yearly reports (MAIN 1970-1981).

[b]Source: IP historical data.

TABLE 1.1-3

FUTURE PROJECTED ANNUAL PEAK

LOAD DEMAND EXCLUDING INTERRUPTIBLES
Revised April, 1981

(All Values in Megawatts)

Year	MAIN[a]	ILL-MO[a]	IP[b]
1981	34,993	11,130	3,250
1982	36,207	11,497	3,395
1983	37,236	11,835	3,515
1984[c]	38,298	11,843	3,390
1985	39,405	12,191	3,500
1986	40,538	12,543	3,615
1987	41,781	12,718	3,730
1988	42,968	13,083	3,850
1989	44,158	13,444	3,970
1990	45,433	13,824	4,110
1991[d]	47,732	14,470	4,260
1992	49,205	14,973	4,485
1993	50,753	15,499	4,715
1994	52,381	16,063	4,955
1995	54,006	16,638	5,210
1996	55,728	17,232	5,475
1997	57,482	17,848	5,735
1998	59,321	18,488	6,005
1999	61,198	19,145	6,285
2000	63,156	19,825	6,580

[a] Source: MAIN (1981).

[b] Source: IP (1980).

[c] First year in which WIPCO and SOYLAND are excluded from IP native peak load.

[d] Year IP system becomes winter peaking.

TABLE 1.1-4

PAST ANNUAL ENERGY REQUIREMENTS: NET TO LOAD
Revised April 1981

(All Values in Gigawatt Hours)

Year	MAIN[a]	ILL-MO[a]	IP[b]
1966			6,574
1967			7,043
1968			7,900
1969			8,654
1970			9,158
1971			9,658
1972			10,484
1973			11,297
1974			11,439
1975			12,116
1976			13,036
1977	162,351	48,037	13,938
1978	168,803	49,096	14,550
1979	171,052	50,203	15,229
1980	166,170	51,724	15,530

[a]Source: Appendices of MAIN yearly reports (MAIN 1970-1981).

[b]Source: IP historical data.

TABLE 1.1-5

FUTURE PROJECTED ANNUAL ENERGY REQUIREMENTS: NET TO LOAD
Revised April, 1981

(All Values in Gigawatt Hours)

YEAR	MAIN[a]	ILL-MO[a]	IP[b]
1981	169,292	51,306	15,416
1982	175,250	53,431	16,097
1983	180,809	54,438	16,130
1984	187,253	55,575	16,537
1985	193,457	57,697	17,327
1986	200,010	59,854	18,151
1987	206,654	61,470	18,968
1988	213,540	63,323	19,796
1989	220,424	65,569	20,640
1990	227,605	67,786	21,509
1991			22,279
1992			23,455
1993			24,658
1994			25,913
1995			27,247
1996			28,633
1997			29,992
1998			31,404
1999			32,869
2000			34,412

[a]Source: MAIN (1981).

[b]Source: IP 1981-1990 Electric Energy Forecast (1980). The 1991 through 2000 energy forecast is estimated on the basis of a 59.7% annual system load factor.

TABLE 1.1-6

COMPARISON OF PAST LOAD FORECASTS WITH ACTUAL DEMAND
Revised April 1981

PREDICTION DATE	PREDICTED PEAK DEMAND (MW) - PERCENT ABOVE (BELOW) ACTUAL								
	1972	1973	1974	1975	1976	1977	1978	1979	1980
September 1972	2140 - 0.7	2328 - (0.9)	2523 - 7.3	2716 - 9.7	2917 - 13.5	3124 - 9.8	3345 - 1[illegible].4	3581 - 18.6	3820 - 21.3
January 1974	-- - --	-- - --	2525 - 7.4	2715 - 9.7	2915 - 13.4	3125 - 9.8	3345 - 18.4	3580 - 18.6	3830 - 21.6
December 1974	-- - --	-- - --	-- - --	2535 - 2.4	2715 - 5.6	2910 - 2.2	3095 - 9.6	3290 - 9.0	3495 - 11.0
January 1976	-- - --	-- - --	-- - --	-- - --	2685 - 4.5	2870 - 0.8	3055 - 8.1	3245 - 7.5	3445 - 9.4
December 1977	-- - --	-- - --	-- - --	-- - --	-- - --	-- - --	2985 - [illegible].7	3155 - 4.5	3330 - 5.7
September 1978	-- - --	-- - --	-- - --	-- - --	-- - --	-- - --	-- - --	3075 - 1.9	3260 - 3.5
December 1979	-- - --	-- - --	-- - --	-- - --	-- - --	-- - --	-- - --	-- - --	3100 - (1.6)
Actual Peak Demand[a]	2126	2349	2352	2476	2570	2846	2825	3019	3150

[a]Actual demand excludes any interruptible load served and is not corrected for weather variations.

POOR ORIGINAL

TABLE 1.1-7

HISTORICAL IP TOTAL SYSTEM MONTHLY INTEGRATED PEAK DEMAND

(All Values in Kilowatts)

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1966	1,0[illegible]6,280	984,945	949,828	928,025	937,627	1,140,1[illegible]5	*1,298,674	1,141,846	1,1[illegible]5,883	1,020,692	1,069,940	1,097,460
1967	1,083,090	1,082,320	1,028,550	978,305	1,127,870	1,307,630	1,29[illegible],730	*1,338,140	1,139,670	1,128,940	1,209,04[illegible]	1,198,080
1968	1,221,210	1,151,843	1,109,220	1,078,910	1,173,349	1,480,790	1,500,646	*1,607,369	1,222,440	1,221,270	1,226,280	1,304,850
1969	1,287,660	1,247,990	1,220,430	1,179,020	1,402,100	1,598,700	*1,709,093	1,638,110	1,492,010	1,294,480	1,338,210	1,380,210
1970	1,413,790	1,367,755	1,281,880	1,404,440	1,516,460	1,758,160	*1,827,350	1,697,855	1,732,760	1,294,380	1,440,645	1,417,390
1971	1,420,990	1,456,530	1,374,820	1,331,410	1,315,630	1,953,795	1,935,460	1,906,940	*1,973,670	1,707,620	1,451,060	1,490,320
1972	1,514,500	1,535,510	1,433,650	1,431,770	1,797,850	1,886,800	2,102,560	*2,126,680[a]	2,126,280	1,523,475	1,568,615	1,666,950
1973	1,630,250	1,617,550	1,523,250	1,532,525	1,507,285	2,071,660	2,179,900	*2,[illegible]9,135	1,916,790	1,747,830	1,640,540	1,694,760
1974	1,656,670	1,591,720	1,566,620	1,549,[illegible]0	1,874,310	2,187,800	*2,351,580	2,28[illegible],020	1,894,950	1,672,180	1,692,330	1,731,760
1975	1,746,990	1,769,160	1,725,510	1,595,100	2,167,130	2,411,480	2,425,140	*2,475,900	2,432,[illegible]0	1,774,670	1,824,020	1,992,950
1976	1,981,200	1,911,650	1,827,170	1,681,000	1,755,000	2,28[illegible],760	*2,570,395	2,557,240	2,289,000	1,906,395	2,063,000	2,189,000
1977	2,174,490	1,996,000	1,877,000	1,840,000	2,335,000	2,459,000	*2,846,260	2,616,160	2,578,000	1,862,000	2,063,000	2,152,000
1978	2,234,300	2,093,000	1,992,000	1,856,000	2,410,000	2,802,750	*2,832,500[b]	2,782,100	2,825,010	1,972,000	2,129,000	2,257,000
1979	2,372,770	2,351,000	2,104,000	2,047,000	2,168,400	2,720,000	2,812,000	*3,046,494[c]	2,591,000	2,110,300	2,339,000	2,349,000
1980	2,344,000	2,296,000	2,241,000	2,087,000	2,191,000	2,827,000	*3,150,450	3,100,000	2,898,000	2,098,000	2,171,000	2,362,000

Note: Asterisk (*) denotes peak load for year.

[a]Value includes 19,000 kW of interruptible load.

[b]Value includes 27,500 kW of interruptible load.

[c]Value includes 27,280 kW of interruptible load.

Table 1.1-8

ILLINOIS POWER COMPANY 1980-1990 MONTHLY PEAK FORECAST

(All Values in Megawatts)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
1981	2715	2640	2470	2210	2585	2980	3250	3135	2945	2365	2690	2830
1982	2875	2795	2615	2325	2700	3110	3395	3275	3075	2485	2845	
1983	3040	2955	2765	2435	2795	3220	3515	3390	2970[a]	2415	2775	2920
1984	2965	2885	2695	2365	2695	3105	3390	3270	3070	2520	2925	3075
1985	3125	3040	2840	2470	2780	3205	3500	3375	3170	2630	3085	3245
1986	3295	3205	2995	2580	2870	3310	3615	3485	3275	2745	3250	3415
1987	3470	3375	3155	2690	2965	3415	3730	3595	3380	2865	3415	3590
1988	3650	3550	3320	2805	3060	3525	3850	3710	3490	2990	3600	3745
1989	3845	3740	3495	2930	3155	3635	3970	3830	3595	3120	3785	3980
1990	4045	3930	3675	3060	3265	3765	4110	3960	3725	3260	3985	4190

Source: Illinois Power "Native Electric Peak Load Forecast 1980-2000." The values include interruptibles except for July.

[a]First month in which WIPCO and SOYLAND are excluded from IP native load.

TABLE 1.1-9

HISTORICAL IP PAST MONTHLY ENERGY REQUIREMENTS FROM 1966 TO 1980

(All Values in Kilowatt Hours)

YEAR	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY
1966	556,760,858	500,783,546	538,559,680	500,052,856	506,781,017	546,866,7[illegible]3	647,257,077
1967	583,174,523	542,629,949	572,457,298	528,111,960	548,907,526	608,165,468	612,049,640
1968	668,914,726	620,884,342	626,991,265	587,164,324	615,468,223	694,285,928	742,233,158
1969	715,894,707	633,618,301	689,956,390	644,073,677	684,521,934	720,375,887	872,021,705
1970	777,123,914	687,344,645	730,909,775	686,610,219	742,406,018	776,888,265	872,465,433
1971	796,026,240	729,065,945	781,515,639	712,986,815	725,084,880	950,549,938	880,819,313
1972	846,804,335	806,217,209	823,326,722	761,033,831	843,538,243	897,058,429	981,056,264
1973	928,353,434	836,177,116	879,164,866	826,768,365	859,999,275	1,000,688,370	1,128,195,370
1974	960,275,010	853,053,320	903,461,675	842,977,273	899,820,735	917,365,300	1,214,670,174
1975	1,015,141,690	899,007,126	981,683,683	886,956,723	936,587,399	1,069,450,925	1,168,921,407
1976	1,116,513,648	990,814,518	1,025,107,788	950,038,972	971,332,394	1,100,184,793	1,279,316,356
1977	1,261,084,861	1,051,658,010	1,090,391,189	997,988,055	1,152,106,033	1,176,130,985	1,418,180,474
1978	1,243,799,766	1,118,709,320	1,135,479,729	1,031,555,490	1,139,544,896	1,255,816,465	1,384,138,838
1979	1,391,230,814	1,242,636,586	1,242,244,460	1,114,575,569	1,156,692,810	1,292,243,150	1,372,142,230
1980	1,350,124,960	1,285,297,160	1,286,779,190	1,124,324,710	1,133,084,630	1,240,528,370	1,589,682,002

YEAR	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	ANNUAL
1966	570,394,224	521,732,966	542,414,487	551,243,271	591,305,824	6,574,152,519
1967	619,246,398	563,757,433	604,104,327	622,171,251	642,787,127	7,047,903,900
1968	767,330,656	609,731,250	649,182,031	632,089,934	686,086,393	7,900,362,230
1969	818,687,906	708,067,843	724,774.332	695,140,369	746,856,609	8,653,989,660
1970	852,893,300	798,651,200	737,179,447	719,930,924	775,701,007	9,158,104,147
1971	890,743,427	872,044,335	763,214,028	750,798,562	805,257,598	9,658,106,940
1972	1,011,236,704	895,631,061	848,164,823	854,764,662	914,178,330	10,483,610,613
1973	1,143,085,451	951,042,532	922,648,740	891,307,200	928,450,009	11,295,885,729
1974	1,088,735,186	906,780,248	947,506,200	921,822,310	972,562,710	11,429,029,141
1975	1,203,204,259	973,667,564	986,122,533	950,728,655	1,044,326,856	12,115,[illegible]98,820
1976	1,168,800,797	1,050,942,739	1,089,641,434	1,109,879,048	1,180,448,151	13,033,020,638
1977	1,262,145,940	1,137,624,832	1,089,309,518	1,114,344,155	1,183,974,543	13,934,938,595
1978	1,371,020,604	1,275,701,167	1,175,838,590	1,160,477,499	1,258,202,208	14,550,284,644
1979	1,445,729,132	1,207,247,880	1,251,293,300	1,241,496,695	1,268,829,717	15,226,362,343
1980	1,552,171,047	1,269,585,370	1,209,058,130	1,177,560,510	1,310,766,905	15,528,962,984

TABLE 1.1-10

HISTORIC IP CAPACITY ENTITLEMENTS AND

COMMITMENTS AT TIME OF SUMMER PEAK

(All Values in Megawatts)

YEAR	ENTITLEMENTS[a]	COMMITMENTS	NET ENTITLEMENTS
1969	711	188	523
1970	867	220	647
1971	480	340	140
1972	530	275	255
1973	444	660	(216)
1974	243	100	143
1975	220	312	(92)
1976	270	592	(322)
1977	282	34	248
1978	123	88	35
1979	187	156	31
1980	132	6	126

Source: Illinois Power (various dates).

[a]EEI surplus included as an entitlement.

TABLE 1.1-11

PROJECTED CAPACITY ENTITLEMENTS AND COMMITMENTS

FOR MAIN, ILL-MO, AND IP

(All Values in Megawatts)

YEAR	MAIN	ILL-MO	IP[a]
1981	(759)	(59)	161
1982	(403)	301	118
1983	(93)	303	118
1984	(91)	510	284
1985	131	753	356
1986	159	799	372
1987	157	624	234
1988	466	583	137
1989	464	584	137
1990	462	587	137
1991			146
1992			146
1993			146
1994			146
1995			146
1996			146
1997			146
1998			146
1999			146

Source: MAIN (1981).

Note: Import values are in parentheses; export values are not.

[a]Excludes EEI capacity and includes DOE load. 1981-1983 and 1987 reflect changes to IP entitlements and commitments since issuance of 1981 main report.

TABLE 1.1-12

ILLINOIS POWER COMPANY ACCREDITED CAPABILITY EFFECTIVE DECEMBER 13, 1978

Month	Baldwin				Havana			Hennepin			Vermilion			Wood River				Major Steam Plant Total	Oglesby GT 1-4	Stallings GT 1-4	Vermilion GT 1	Jacksonville JT 1	Diesel Plants			Hydro	GT, JT, Diesel, & Hydro Cap. Total	System Total
	**1	**2	***3	Total	1-5	***6	Total	1	2	Total	*1	2	Total	*1-3	4	**5	Total						Vandalia	Bloomington	Jacksonville	Marseilles		
January	605	605	605	1815	264	434	698	77	243	320	76	108	184	152	104	405	661	3678	71	107	14	14	2	4.6	4	2.4	219	3897
February	605	605	605	1815	264	434	698	77	243	320	76	108	184	152	104	405	661	3678	70	108	14	14	2	4.6	4	2.4	219	3897
March	605	605	605	1815	264	430	694	77	243	320	76	108	184	152	104	405	661	3674	67	101	13	14	2	4.6	4	2.4	208	3882
April	605	605	605	1815	263	428	691	77	242	319	76	108	184	152	104	405	661	3670	64	99	13	14	2	4.6	4	2.4	203	3873
May	604	604	604	18[illegible]	262	427	689	76	239	315	76	108	184	152	103	402	657	3657	62	95	12	13	2	4.6	4	2.4	195	3852
June	60[illegible]	601	601	1803	260	426	686	76	235	311	75	107	182	151	103	399	653	3635	60	93	12	13	2	4.6	4	2.4	191	3826
July	600	600	600	1800	260	426	686	75	233	308	75	107	182	150	103	357	650	3626	60	91	12	13	2	4.6	4	2.4	139	3815
August	600	600	600	1800	260	426	686	75	233	308	75	107	182	150	103	397	650	3626	61	93	12	13	2	4.6	4	2.4	192	3818
September	603	603	603	1809	261	428	689	76	237	[illegible]	76	108	184	151	103	401	655	3650	62	95	12	13	2	4.6	4	2.4	195	3845
October	605	605	605	1815	262	430	692	77	24[illegible]	317	76	108	184	152	104	403	659	3667	63	95	12	13	2	4.6	4	2.4	196	3863
November	605	605	605	1815	264	434	698	77	[illegible]43	320	76	108	184	152	104	405	661	3678	67	103	13	14	2	4.6	4	2.4	210	3888
December	605	605	605	1815	264	434	698	77	2[illegible]3	320	76	108	[illegible]	152	104	405	661	3678	69	107	14	14	2	4.6	4	2.4	217	3895

Note: All outputs in net MW; GT = Gas Turbine; JT = Jet Turbine.

* Accrediting is based on top high pressure heater removed from service.
** Accrediting is based on top high pressure heater removed from service and 5% over pressure.
*** Accrediting is based on 5% over pressure.

Rating Changes: Havana Unit No. 6 accredited 12:01 A.M., June 22, 1978
Jacksonville Diesel Nos. 4, 5 & 5 accredited July and August, 1978
(Note: The output from the Jacksonville Diesels is temporarily limited to a maximum output of approximately 2.5MW due to substation transformers)

POOR ORIGINAL

TABLE 1.1-13

ILLINOIS POWER COMPANY UNIT WORK DATA FOR 1984 AND 1995

UNIT NAME	ACCREDITED CAPABILITY (MW)	DUTY	FUEL TYPE	ESTIMATED CAPACITY FACTORS (in percent) 1984[a]	1995[a]
Clinton 1	760	Base	Nuclear	79	70
Clinton 2	760	Base	Nuclear	N/A	80
Baldwin 1	600	Base	Illinois Coal	62	64
Baldwin 2	600	Base	Illinois Coal	56	65
Baldwin 3	600	Base	Illinois Coal	52	59
Wood River 1-3	150	Cycling	Oil #2	1	3
Wood River 4	103	Cycling	Low Sulfur Coal	27	26
Wood River 5	397	Base	Low Sulfur Coal	30	32
Hennepin 1	75	Cycling	Illinois Coal	14	14
Hennepin 2	233	Base	Illinois Coal	43	47
Vermilion 1	75	Cycling	Illinois Coal	16	40
Vermilion 2	107	Cycling	Illinois Coal	19	38
Havana 1-5	260	Cycling	Oil #6	3	6
Havana 6	426	Cycling	Low Sulfur Coal	4	5
Stallings 1-4	91	Peaking	Oil #2	2	2
Oglesby 1-4	60	Peaking	Oil #2	2	2
Vermilion GT	12	Peaking	Oil #2	1	2
Jacksonville[b]	26	Peaking	Oil #2	0	2

[a]First full year of operation at maximum capacity.

[b]Modeled t include Jacksonville jet engine, all other small diesel capacity, and Marseilles hydro.

TABLE 1.1-14

FUTURE GENERATION INSTALLATIONS FROM 1981 TO 1999

FOR MAIN, ILL-MO, IP

YEAR	MAIN	ILL-MO	IP
1981	71	81	0
1982	1433	85	0
1983	2509	1670	0
1984	2457	870	760*
1985	1730	0	0
1986	1090	0	0
1987	1977	0	0
1988	(10)	0	0
1989	643	0	0
1990	1095	1150	0
1991			450
1992			0
1993			450
1994			0
1995			760
1996			0
1997			600
1998			
1999			600

*Installed August 1983.

Source: MAIN (1981).

TABLE 1.1-15

INSTALLED GENERATING CAPACITY

DURING SUMMER FROM 1970 TO 1999

(All Values in Megawatts)

YEAR	MAIN[a]	ILL-MO[a]	IP[b]
1970			2,199
1971			2,199
1972			2,151
1973			2,796
1974			2,813
1975			3,388
1976			3,412
1977			3,412
1978			3,839
1979			3,839
1980			3,815
1981	41,106	13,468	3,815
1982	42,539	13,553	3,815
1983	45,048	15,223	3,815
1984	47,504	16,093	4,575
1985	49,234	16,093	4,575
1986	50,724	16,093	4,575
1987	52,301	16,093	4,575
1988	53,441	17,243	4,575
1989	54,084	17,243	4,575
1990	54,084	17,243	4,575
1991			5,107[c]
1992			5,107
1993			5,557
1994			5,557
1995			6,317
1996			6,317
1997			6,917
1998			6,917
1999			7,517

[a]Source: MAIN Appendices to Yearly Reports (MAIN 1970-1978, 1981).

[b]Source: IP Historical and Forecasted System Data. Does not include IP's share of EEI capability or 20 percent other company ownership of Clinton - Units 1 and 2.

[c]Includes 82 MW increase in system capability due to use of winter ratings.

TABLE 1.1-16

IP LOAD AND CAPABILITY SUMMARY FOR 1975-1980

YEAR	PARAMETER	VALUE
1975	Adjusted Capability (MW)	3,293
	Adjusted Demand (MW)	2,467
	Reserve (MW)	826
	Reserve (%)	33.5
1976	Adjusted Capability (MW)	3,106
	Adjusted Demand (MW)	2,586
	Reserve (MW)	520
	Reserve (%)	20.1
1977	Adjusted Capability (MW)	3,629
	Adjusted Demand (MW)	2,815
	Reserve (MW)	814
	Reserve (%)	28.9
1978	Adjusted Capability (MW)	3,846
	Adjusted Demand (MW)	2,793
	Reserve (MW)	1,053
	Reserve (%)	37.7
1979	Adjusted Capability (MW)	3,784
	Adjusted Demand (MW)	2,954
	Reserve (MW)	830
	Reserve (%)	28.1
1980	Adjusted Capability (MW)	3,866
	Adjusted Demand (MW)	3,085
	Reserve (MW)	781
	Reserve (%)	25.3

Note: Values have been calculated from Power Production Data. (Illinois Power, various dates).

TABLE 1.1-17

IP PROJECTED CAPACITY AND DEMAND AT SYSTEM PEAK

(All Values in Megawatts)

PARAMETER	1981	1982	1983	1984	1985	1986	1987[a]	1988[a]	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Units Added				760							532[b]		450		760		600		600
Units Retired																			
Owned Capacity	3815	3815	3815	4575	4575	4575	4575	4575	4575	4575	5107	5107	5557	5557	6317	6317	6917	6917	7517
Joppa Capacity	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203
DOE Surplus	-	37	37																
System Capacity	4018	4055	4055	4778	4778	4778	4778	4778	4778	4778	5310	5310	5760	5760	6520	6520	7120	7120	7720
Unreserved Purchase North Counties Hydro	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Unreserved Sales DOE Load	(28)	(0)	(0)	(148)	(148)	(148)	(148)	(148)	(148)	(148)	(148)	(148)	(148)	(148)	(148)	(148)	(148)	(148)	(148)
CE	(200)	(185)	(185)																
Adjusted Capacity	3792	3872	3872	4632	4632	4632	4632	4632	4632	4632	5164	5164	5614	5614	6374	6374	6974	6974	7574
Net System Demand	3250	3395	3515	3390	3500	3615	3730	3850	3970	4110	4260	4485	4715	4955	5210	5475	5735	6005	6285
Reserved Sales Soyland				203	219	235	97												
Reserved Purchases TVA	(65)	(65)	(65)	(65)	(9)	(9)	(9)	(9)	(9)	(9)									
Adjusted Demand	3185	3330	3450	3528	3710	3841	3818	3841	3961	4101	4260	4485	4715	4955	5210	5475	5735	6005	6285
Reserve with Scheduled Units	607	542	422	1104	922	791	814	791	671	531	904	679	899	659	1164	899	1239	969	1289
Percent Reserve	19.1	16.3	12.2	31.3	24.9	20.6	21.3	20.6	16.9	12.9	21.2	15.1	19.1	13.3	22.3	16.4	21.6	16.1	20.5

[a]1987 and 1988 reduction in CIPS and IP delivery points.

[b]Reflects change to winter ratings (+82 MW).

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TABLE 1.1-18

FUTURE PROJECTED DEMAND AND CAPABILITY SUMMARY

MAIN, ILL-MO, AND IP FROM 1981 to 1999

YEAR	PARAMETER	MAIN[a]	ILL-MO[a]	IP[b]
1981	Adjusted Capability (MW)	41,648	13,527	3,792
	Adjusted Demand (MW)	34,890	11,100	3,185
	Reserve (MW)	6,758	2,427	607
	Reserve (%)	19.4	21.9	19.1
1982	Adjusted Capability (MW)	42,725	13,252	3,872
	Adjusted Demand (MW)	36,072	11,467	3,330
	Reserve (MW)	6,653	1,785	542
	Reserve (%)	18.4	15.6	16.3
1983	Adjusted Capability (MW)	44,924	14,920	3,872
	Adjusted Demand (MW)	37,100	11,805	3,450
	Reserve (MW)	7,824	3,115	422
	Reserve (%)	21.1	26.4	12.2
1984	Adjusted Capability (MW)	47,398	15,583	4,632
	Adjusted Demand (MW)	38,160	11,813	3,528
	Reserve (MW)	9,238	3,770	1,104
	Reserve (%)	24.2	31.9	31.3
1985	Adjusted Capability (MW)	48,906	15,340	4,632
	Adjusted Demand (MW)	39,265	12,161	3,710
	Reserve (MW)	9,641	3,179	922
	Reserve (%)	24.6	26.1	24.9
1986	Adjusted Capability (MW)	50,565	15,294	4,632
	Adjusted Demand (MW)	40,397	12,513	3,841
	Reserve (MW)	10,168	2,781	791
	Reserve (%)	25.2	22.2	20.6
1987	Adjusted Capability (MW)	52,144	15,469	4,632
	Adjusted Demand (MW)	41,637	12,688	3,818
	Reserve (MW)	10,507	2,781	814
	Reserve (%)	25.2	21.9	21.3
1988	Adjusted Capability (MW)	52,975	16,660	4,632
	Adjusted Demand (MW)	42,823	13,053	3,841
	Reserve (MW)	10,152	3,607	791
	Reserve (%)	23.7	27.6	20.6
1989	Adjusted Capability (MW)	53,620	16,659	4,632
	Adjusted Demand (MW)	44,009	13,414	3,961
	Reserve (MW)	9,611	3,245	671
	Reserve (%)	21.8	24.2	16.9

[a]Source: MAIN (1981)

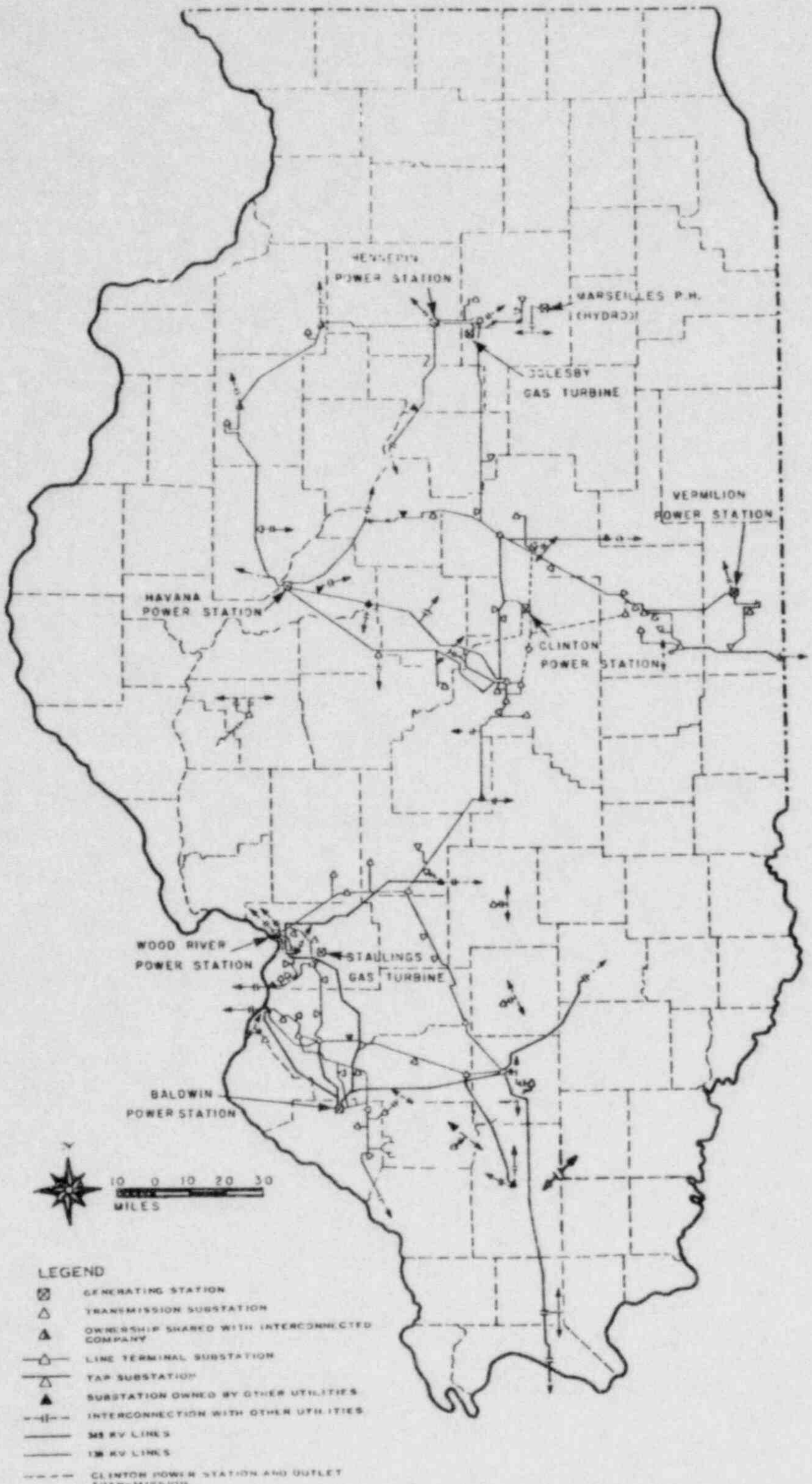
[b]Source: Table 1.1-17.

TABLE 1.1-18 (Cont'd)

YEAR	PARAMETER	MAIN	ILL-MO	IP
1990	Adjusted Capability (MW)	53,622	16,656	4,632
	Adjusted Demand (MW)	45,284	13,794	4,101
	Reserve (MW)	8,338	2,862	531
	Reserve (%)	18.4	20.7	12.9
1991	Adjusted Capability (MW)			5,164
	Adjusted Demand (MW)			4,260
	Reserve (MW)			904
	Reserve (%)			21.2
1992	Adjusted Capability (MW)			5,164
	Adjusted Demand (MW)			4,485
	Reserve (MW)			679
	Reserve (%)			15.1
1993	Adjusted Capability (MW)			614
	Adjusted Demand (MW)			4,715
	Reserve (MW)			899
	Reserve (%)			19.1
1994	Adjusted Capability (MW)			5,614
	Adjusted Demand (MW)			4,955
	Reserve (MW)			659
	Reserve (%)			13.3
1995	Adjusted Capability (MW)			6,374
	Adjusted Demand (MW)			5,210
	Reserve (MW)			1,164
	Reserve (%)			22.3
1996	Adjusted Capability (MW)			6,374
	Adjusted Demand (MW)			5,475
	Reserve (MW)			899
	Reserve (%)			16.4
1997	Adjusted Capability (MW)			6,974
	Adjusted Demand (MW)			5,735
	Reserve (MW)			1,239
	Reserve (%)			21.6
1998	Adjusted Capability (MW)			6,974
	Adjusted Demand (MW)			6,005
	Reserve (MW)			969
	Reserve (%)			16.1

TABLE 1.1-18 (Cont'd)

YEAR	PARAMETER	MAIN	ILL-MO	IP
1999	Adjusted Capability (MW)			7,574
	Adjusted Demand (MW)			6,285
	Reserve (MW)			1,289
	Reserve (%)			20.5

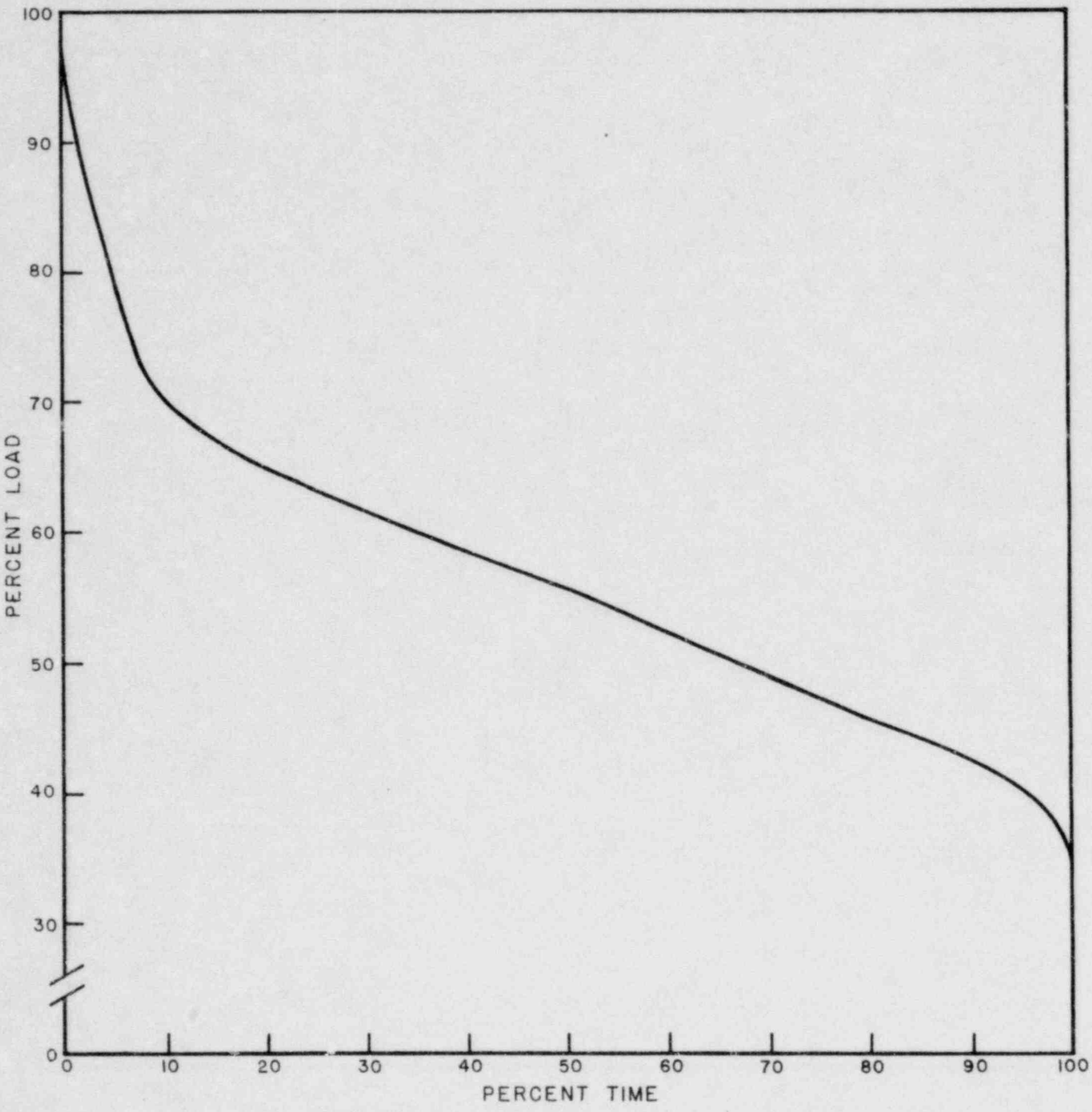


CLINTON POWER STATION
UNITS 1 AND 2
ENVIRONMENTAL REPORT-OPERATING LICENSE STAGE

FIGURE 1.1-4

ELECTRIC TRANSMISSION LINES AND SUBSTATIONS OF ILLINOIS POWER COMPANY AS OF 1981

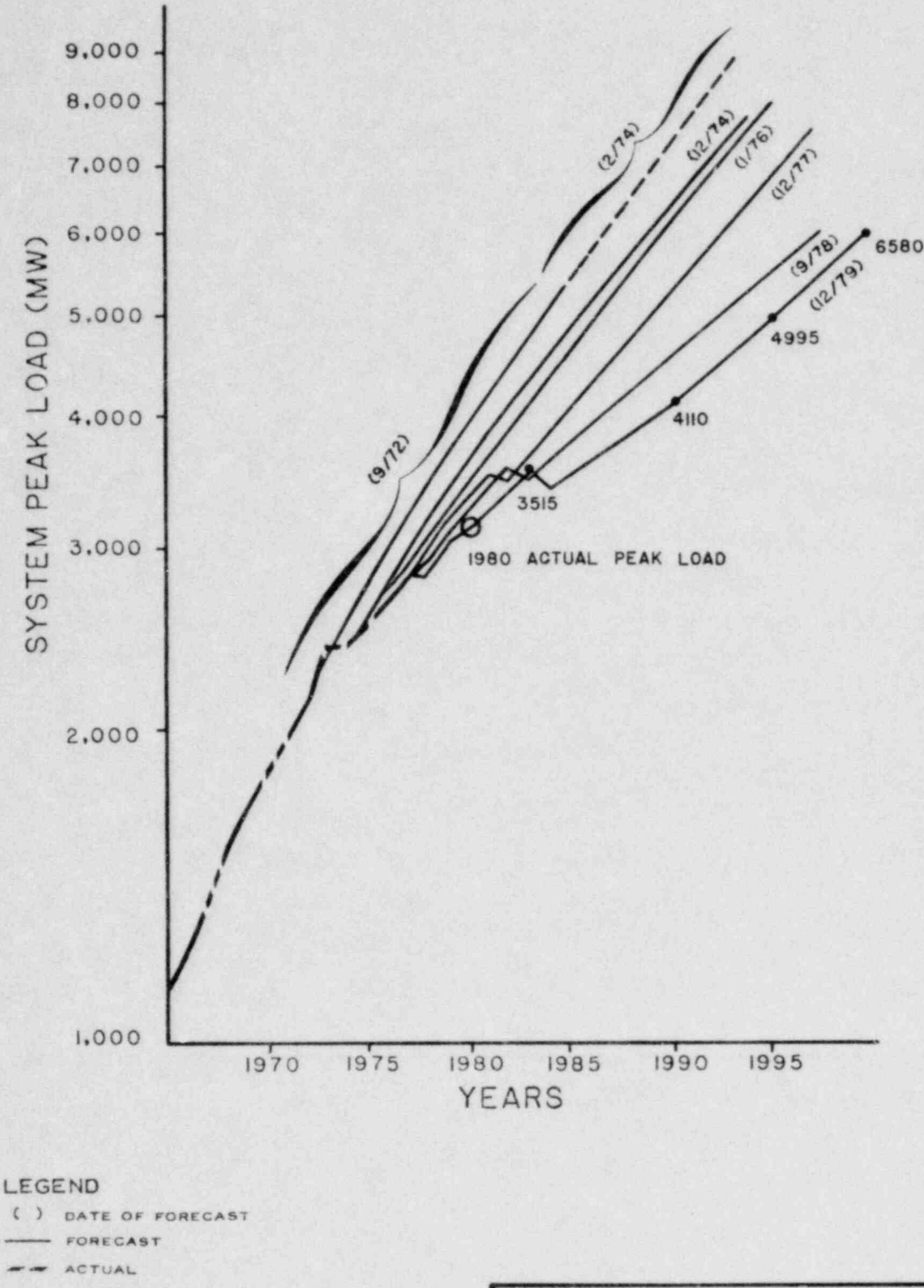
POOR ORIGINAL



CLINTON POWER STATION
UNITS 1 AND 2
ENVIRONMENTAL REPORT-OPERATING LICENSE STAGE

FIGURE 1.1-5

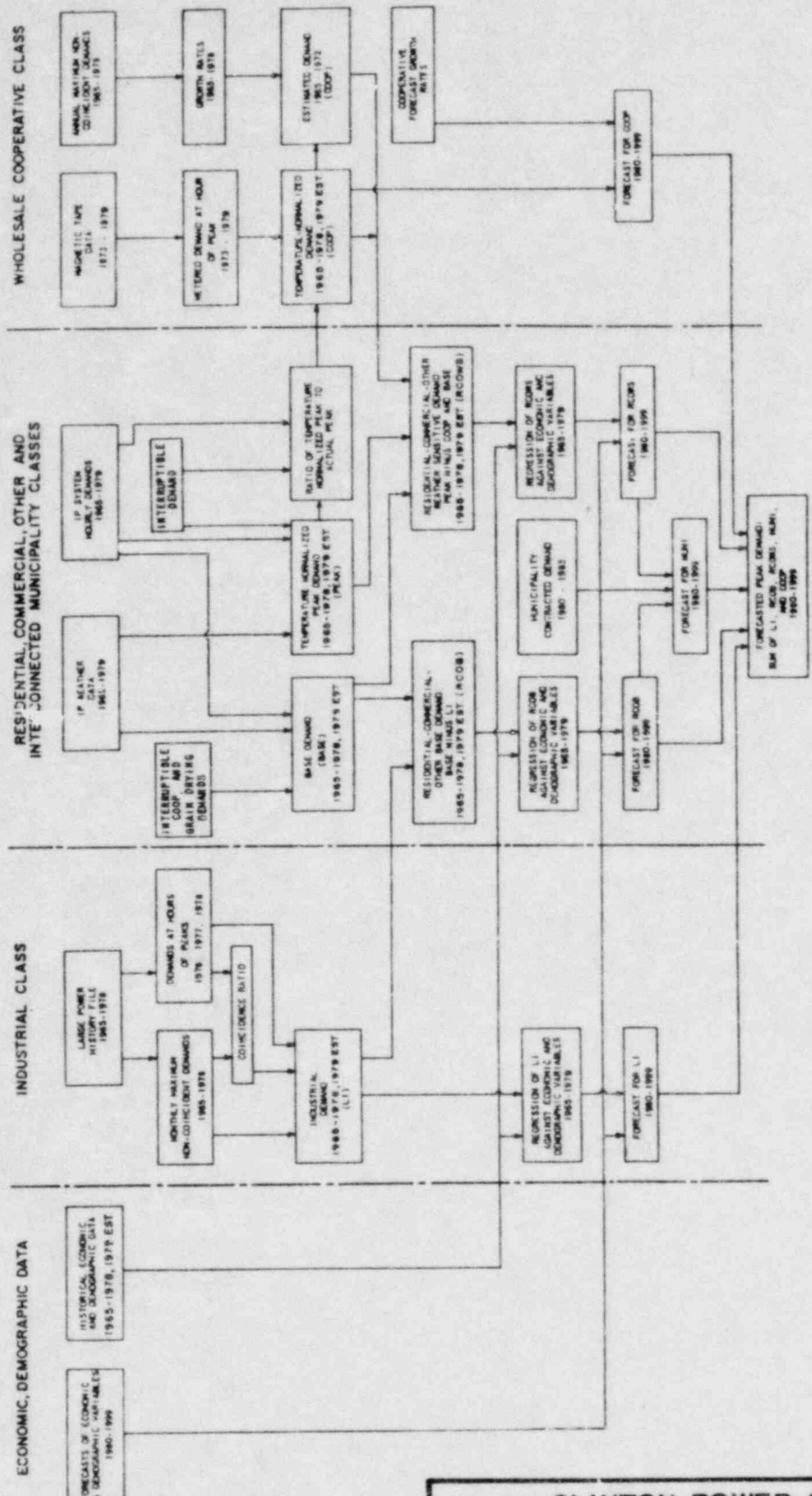
TYPICAL IP LOAD CURVE WITH
56% LOAD FACTOR



CLINTON POWER STATION
UNITS 1 AND 2
ENVIRONMENTAL REPORT-OPERATING LICENSE STAGE

FIGURE 1.1-6

ILLINOIS POWER COMPANY
COMPARISON OF RECENT FORECASTS

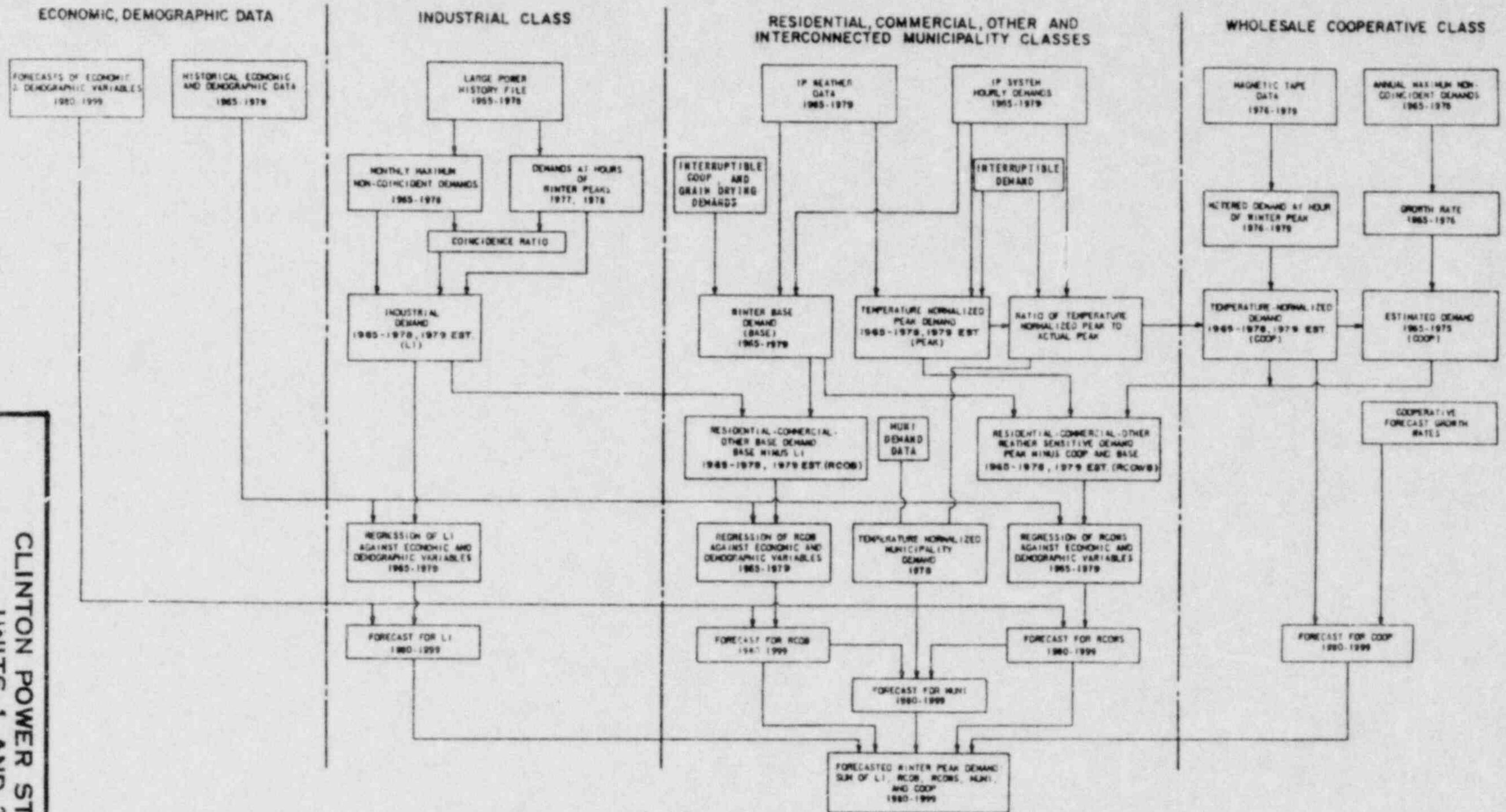


CLINTON POWER STATION
UNITS 1 AND 2
ENVIRONMENTAL REPORT-OPERATING LICENSE STAGE

FIGURE 1.1-7

ILLINOIS POWER COMPANY
FLOW DIAGRAM FOR 1980-2000
SUMMER PEAK LOAD MODEL LONG-TERM FORECAST
SHEET 1 OF 2

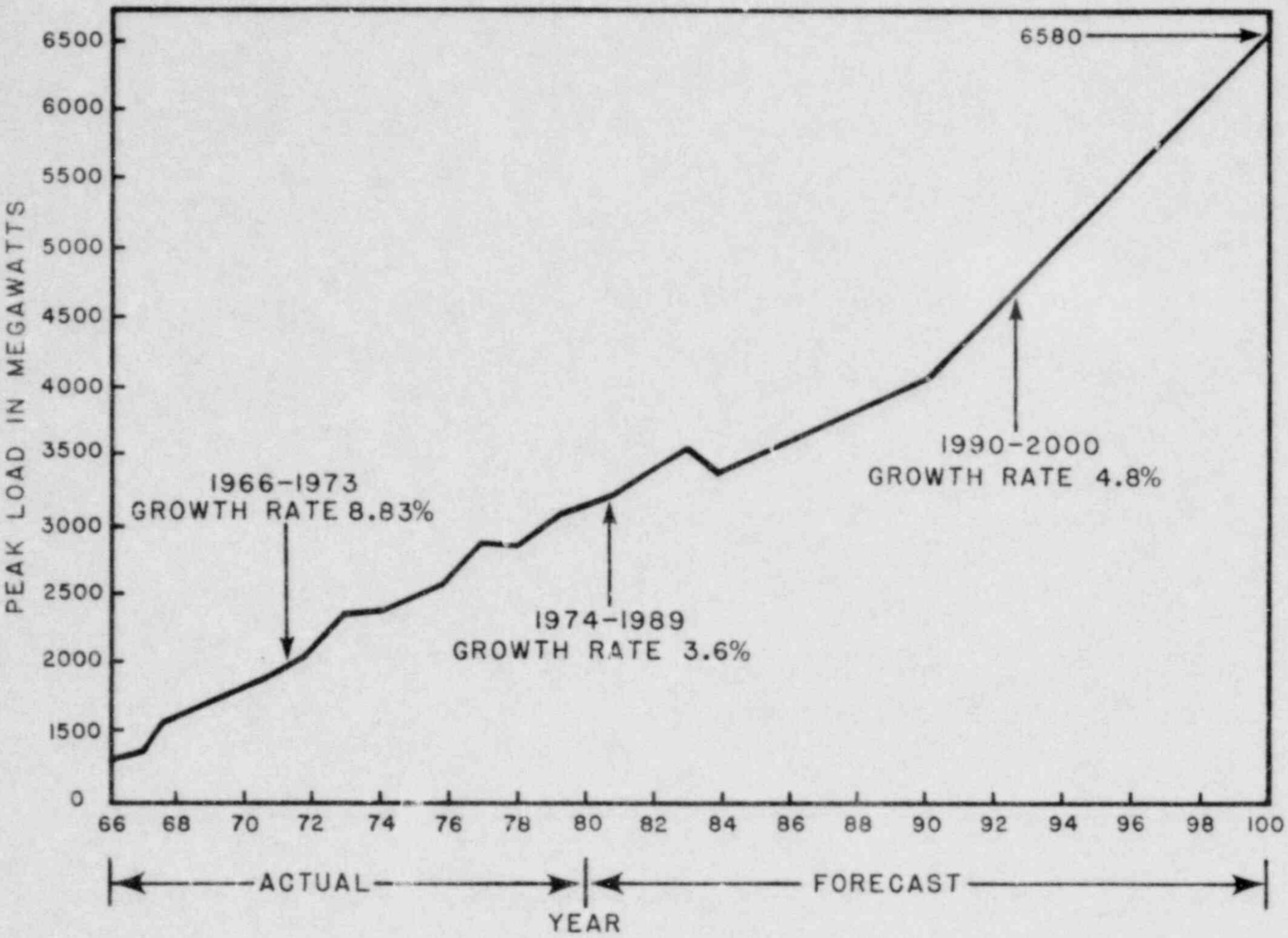
POOR ORIGINAL



CLINTON POWER STATION
UNITS 1 AND 2
ENVIRONMENTAL REPORT-OPERATING LICENSE STAGE

FIGURE 1.1-7
ILLINOIS POWER COMPANY
FLOW DIAGRAM FOR 1980-2000
WINTER PEAK LOAD MODEL LONG-TERM FORECAST
SHEET 2 OF 2

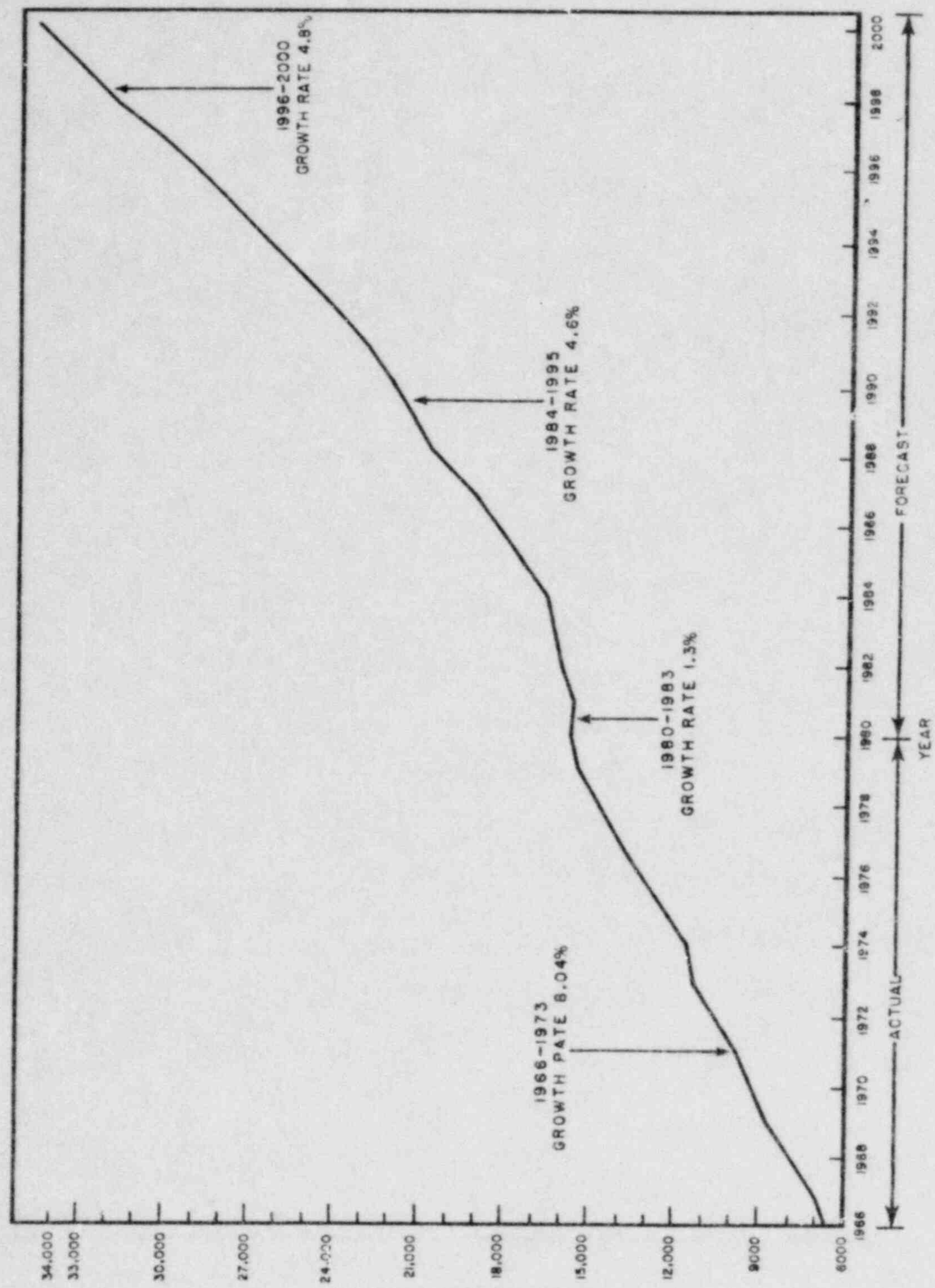
POOR ORIGINAL



CLINTON POWER STATION
UNITS 1 AND 2
ENVIRONMENTAL REPORT-OPERATING LICENSE STAGE

FIGURE 1.1-8

ILLINOIS POWER COMPANY ACTUAL AND FORECASTED ANNUAL PEAK LOAD DEMAND FROM 1966 TO 2000



CLINTON POWER STATION
UNITS 1 AND 2
ENVIRONMENTAL REPORT-OPERATING LICENSE STAGE

FIGURE 1.1-9

ILLINOIS POWER COMPANY ACTUAL AND FORECASTED ANNUAL ENERGY REQUIREMENTS FROM 1966 TO 2000

1.3 CONSEQUENCES OF DELAY

IP, under existing state and federal laws, has the legal responsibility and obligation to supply electricity to meet the demand in its service area, and must, therefore, plan to satisfy the forecasted demand. The effects of delays in the commercial operation of Clinton Unit 1 on reserve margins are shown on Table 1.3-1. The reserve margins of IP, Ill-Mo Pool, and MAIN that result from delays of 1, 2, 3, and 4 years are also shown.

For IP, Table 1.3-1 shows that delays of 1, 2, 3, and 4 years in the commercial operation of Clinton Unit 1 will reduce IP reserve margins to 9.8% in 1984, 4.4% in 1985, 0.8% in 1986, and 1.4% in 1987. All reserve margins are reduced below the planned 15%. Even with a delay of only 1 year, the failure of any one of the three Baldwin 600 MW units, Havana Unit 6, or Wood River Unit 5 will lower IP capacity below peak demand.

Similarly, delays of 1, 2, 3, and 4 years in the commercial operation of Clinton Unit 1 will reduce Ill-Mo reserve margins to 25.5% in 1984, 19.9% in 1985, 16.2% in 1986, and 15.9% in 1987. These delays will reduce the MAIN reserve margins to 21.7% in 1984, 22.1% in 1985, 22.8% in 1986, and 23.0% in 1987.

Delays of 1, 2, 3, and 4 years in the commercial operation of Clinton Unit 2, as shown in Table 1.3-2, will reduce IP reserve margins to 7.8% in 1995, 2.5% in 1996, 8.4% in 1997, and 3.5% in 1998. These reserve margins are substantially below the planned 17%. Furthermore, these delays will reduce Ill-Mo Pool and MAIN reserve margins.

In addition to jeopardizing reliability, delays in the commercial operation of Clinton Unit 1 and Clinton Unit 2 will increase IP's reliance on oil and other fossil fuels. Additional burning of these fuels will increase dependence on oil; increase emissions to the environment; and increase the overall electric energy cost to the customer. Customer costs will also increase because of the effects of escalation and interest charges for funds used during construction.

Table 1.3-3 shows how the variable production costs change if the Clinton Power Station is delayed or unavailable. Without Unit 1, the annual production costs increase by $21.4 million in 1983, $96.5 million in 1984, $215.1 million in 1985, $290.8 million in 1986, $294.4 million in 1987, $334.5 million in 1988. Without Unit 2, the annual production costs increase by $429.2 million in 1995, $527.3 million in 1996, $345.1 million in 1997, $473.4 million in 1998, and $394.0 million in 1999. Also shown on Table 1.3-3 are the projected annual Clinton Power Station capacity factors. Table 1.3-4 shows the cost of replacement energy by fuel category (i.e., coal, oil, etc.) on the IP system if Clinton Power Station is delayed. Table 1.3-5 shows how the replacement energy was distributed among the other fuel categories. Tables

1.3-3 through 1.3-5 were developed using a probabilistic production cost computer program. This program uses a generation model and a load model to determine the expected cost (including fuel and variable O&M) for future years. The system was modeled with Units 1 and 2 installed in 1983 and 1995, respectively. Each unit was then delayed five years so that the distribution and cost of the replacement energy could be determined. The results reflect the operation of 100% of Clinton Power Station (i.e., two 950 MW units). All costs are in current year dollars. Tables 1.3-3 through 1.3-5 are based upon an analysis which includes the expected IP load growth. Tables 1.3-6 - 1.3-8 are similar, except that a zero load growth rate was assumed.

The following costs are expected for the first year of operation of Clinton Unit 1 (commercial operation beginning August 31, 1983):

	Millions of Dollars	Mills/KWh
Fixed Charges	371.2	70.3
Fuel[1]/	60.7	11.5
O&M	7.6	1.4
TOTAL	439.5	83.2

1/The estimated fuel load date for Unit 1 is January 1983.
The estimated date of criticality is February 1983.
The estimated date of commercial operation is August 1983.

In the event of non-operation of Clinton Unit 1, the following costs would be expected:

	Costs in Millions of Dollars	
	1984	1985
Replacement Power Cost	77.2	172.1
Interest on Capital	118.0	127.3
Fuel Carrying Charges	6.9	7.5
TOTAL	202.1	306.9

The above costs are for IP's 80% share of the Clinton Unit. The total cost of a delay would be even greater because of costs to the owners of the remaining 20% of the unit.

The installed costs of IP's 80% share of Clinton Unit 1 is estimated to be $1,455,537,000. This cost includes AFUDC and assumes a commercial operation date of August 31, 1983.

The fuel carrying charges are only for the initial core. Since a delay could also affect subsequent batches of fuel, the total impact may be much greater than that shown above.

TABLE 1.3-1

FUTURE PROJECTED LOAD AND CAPABILITY SUMMARY

WITHOUT IP CLINTON - UNIT 1

FOR MAIN, ILL-MO AND IP FROM 1984 TO 1987

YEAR	PARAMETER	MAIN	ILL-MO	IP
1984	Adjusted Capability (MW)	46,448	14,823	3,872
	Adjusted Demand (MW)	38,160	11,813	3,528
	Reserve (MW)	8,288	3,010	344
	Reserve (%)	21.7	25.5	9.8
1985	Adjusted Capability (MW)	47,956	14,580	3,872
	Adjusted Demand (MW)	39,265	12,161	3,710
	Reserve (MW)	8,691	2,419	162
	Reserve (%)	22.1	19.9	4.4
1986	Adjusted Capability (MW)	49,615	14,534	3,872
	Adjusted Demand (MW)	40,397	12,513	3,841
	Reserve (MW)	9,218	2,021	[illegible]
	Reserve (%)	22.8	16.2	0.8
1987	Adjusted Capability (MW)	51,194	14,709	3,872
	Adjusted Demand (MW)	41,637	12,688	3,818
	Reserve (MW)	9,557	2,021	54
	Reserve (%)	23.0	15.9	1.4

Note: Derived from Table 1.1-18 by removing 760 MW capability from IP system and Ill-Mo and 950 MW (Soyland included) from MAIN.

TABLE 1.3-2

FUTURE PROJECTED LOAD AND CAPABILITY SUMMARY

WITHOUT IP CLINTON - UNIT 2

FOR MAIN, ILL-MO AND IP FROM 1995 TO 1998

YEAR	PARAMETER	MAIN	ILL-MO	IP
1995	Adjusted Capability (MW)	Not Available		5,614
	Adjusted Demand (MW)			5,210
	Reserve (MW)			404
	Reserve (%)			7.8
1996	Adjusted Capability (MW)	Not Available		5,614
	Adjusted Demand (MW)			5,475
	Reserve (MW)			139
	Reserve (%)			2.5
1997	Adjusted Capability (MW)	Not Available		6,214
	Adjusted Demand (MW)			5,735
	Reserve (MW)			479
	Reserve (%)			8.4
1998	Adjusted Capability (MW)	Not Available		6,214
	Adjusted Demand (MW)			6,005
	Reserve (MW)			209
	Reserve (%)			3.5

Note: Derived from Table 1.1-18 by removing a 760 MW IP capacity from IP and Ill-Mo and 950 MW (Soyland included) from MAIN.

TABLE 1.3-3

PRODUCTION COST ANALYSIS FOR

OFFICIAL LOAD FORECAST

YEAR	CLINTON UNITS IN OPERATION		SYSTEM PRODUCTION COST (millions of dollars)			CPS CAPACITY FACTOR (%)	
	BASE	DELAY	BASE	DELAY	DIFFERENCE	BASE	DELAY
1983	1		393.2	414.6	21.4	79	
1984	1		385.2	481.7	96.5	79	
1985	1		486.7	701.8	215.1	66	
1986	1		593.2	884.0	290.8	70	
1987	1		662.3	956.7	294.4	70	
1988	1		754.3	1088.8	334.5	71	
1989	1	1	938.1	905.8	(32.3)	71	80
1990	1	1	1086.9	1111.0	24.1	71	66
1991	1	1	1242.7	1239.3	(3.4)	71	71
1992	1	1	1342.7	1344.0	1.2	71	71
1993	1	1	1413.5	1411.8	(1.6)	71	71
1994	1	1	1662.2	1660.7	(1.5)	71	71
1995	1,2	1	1502.0	1931.2	429.2	75	71
1996	1,2	1	1846.5	2373.8	527.3	68	71
1997	1,2	1	1951.2	2296.3	345.1	70	71
1998	1,2	1	2230.5	2703.9	473.4	70	71
1999	1,2	1	2489.9	2883.8	394.0	70	71

Notes: 1. Results reflect impact of 100% of Unit (i.e., 950 MW).

2. All cost figures are in current year dollars.

3. Base case has Clinton Unit 1 installed in August 1983 and Clinton Unit 2 installed in January 1995. Delay case has Unit 1 installed in January 1989 and Unit 2 installed in January 2000.

TABLE 1.3-4

VARIABLE COSTS FOR OFFICIAL

LOAD FORECAST

YEAR	CLINTON POWER STATION FUEL	CLINTON POWER STATION O&M	HIGH SULFUR COAL FUEL	HIGH SULFUR COAL O&M	LOW SULFUR COAL FUEL	LOW SULFUR COAL O&M	OIL FUEL	OIL O&M	NATURAL GAS FUEL	NATURAL GAS O&M	EMERGENCY POWER
1983	11.5	1.4	15.5	1.0	32.6	1.7	111.4	1.1	59.3	2.6	37.8
1984	11.5	1.4	17.6	1.1	36.9	1.9	117.0	1.3	66.8	2.8	41.8
1985	10.0	1.6	20.0	1.2	43.2	2.0	149.8	1.7			45.4
1986	10.0	1.7	21.6	1.4	47.9	2.2	176.1	2.0			50.7
1987	10.6	1.9	23.5	1.5	51.9	2.4	189.7	2.1			54.6
1988	11.5	2.1	25.5	1.6	56.7	2.6	209.2	2.3			60.0
1989	12.4	2.3	27.9	1.7	62.3	3.0	228.5	2.5			65.7
1990	13.3	2.5	30.3	1.9	67.3	3.2	243.1	2.7			71.2
1991	14.3	2.7	33.6	2.9	74.7	3.5	269.9	3.0			77.8
1992	15.3	2.9	36.5	3.0	80.4	3.8	298.2	3.3			84.8
1993	16.5	3.2	40.3	3.6	85.6	4.3	328.3	3.5			92.0
1994	17.7	3.5	43.9	4.1	93.5	4.7	355.4	3.8			101.2
1995	19.1	3.8	47.6	4.4	104.8	4.9	390.0	4.3			109.7
1996	20.6	4.1	52.2	5.1	113.1	5.4	428.6	4.7			119.5
1997	22.4	4.5	57.4	5.7	121.7	6.0	473.1	5.0			130.6
1998	24.6	4.9	62.4	6.3	135.3	6.5	510.2	5.5			142.9
1999	27.0	5.3	68.9	7.4	143.3	7.3	564.6	5.9			155.4

Note: All cost figures are in current year dollars in mills/kWh.

TABLE 1.3-5

REPLACEMENT ENERGY FOR OFFICIAL LOAD FORECAST

YEAR	CLINTON POWER STATION		HIGH SULFUR COAL		LOW SULFUR COAL		OIL		NATURAL GAS		EMERGENCY POWER	
	GWh	%	GWh	%	GWh	%	GWh	%	GWh	%	GWh	%
1983	(2193)	(100.0)	1644	75.0	451	20.6	25	1.1	65	3.0	8	.4
1984	(6600)	(100.0)	4581	69.4	1572	23.8	200	2.8	186	3.0	61	.9
1985	(5482)	(100.0)	2670	48.7	1747	31.9	848	15.5			217	4.0
1986	(5865)	(100.0)	2561	43.7	2007	34.2	1004	17.1			293	5.0
1987	(5863)	(100.0)	2701	46.1	2013	34.3	904	15.4			244	4.2
1988	(5884)	(100.0)	2668	45.4	1985	33.7	960	16.3			271	4.6
1989	759	100.0	(491)	(64.7)	(158)	(20.8)	(96)	(12.7)			(13)	(1.8)
1990	(381)	(100.0)	197	51.5	90	23.5	79	20.6			17	4.4
1991	0		(9)		48		(31)				(7)	
1992	0		1		(4)		7				(3)	
1993	0		(11)		20		(9)				(1)	
1994	0		1		(4)		(1)				4	
1995	(6555)	(100.0)	4783	73.0	1203	18.4	432	6.6			137	2.1
1996	(5466)	(100.0)	3428	62.7	1136	20.8	673	12.3			229	4.2
1997	(5841)	(100.0)	5045	86.4	532	9.1	201	3.4			63	1.1
1998	(5851)	(100.0)	4514	77.2	901	15.4	326	5.6			111	1.9
1999	(5860)	(100.0)	5174	88.3	491	8.4	147	2.5			49	.8

Note: Percent columns indicate percent of total replacement energy provided by each source.

TABLE 1.3-6

PRODUCTION COST ANALYSIS FOR

NO LOAD GROWTH

YEAR	CLINTON UNITS IN OPERATION BASE	CLINTON UNITS IN OPERATION DELAY	SYSTEM PRODUCTION COST (millions of dollars) BASE	SYSTEM PRODUCTION COST (millions of dollars) DELAY	SYSTEM PRODUCTION COST (millions of dollars) DIFFERENCE	CPS CAPACITY FACTOR (%) BASE	CPS CAPACITY FACTOR (%) DELAY
1983	1		370.1	390.2	20.2	78	
1984	1		360.3	436.9	76.6	78	
1985	1		408.3	557.7	149.4	66	
1986	1		444.3	585.7	141.4	70	
1987	1		480.4	648.6	168.1	69	
1988	1		528.4	660.7	132.3	69	
1989	1	1	579.1	568.7	(10.5)	69	77
1990	1	1	631.8	634.5	2.7	69	65
1991	1	1	699.3	687.8	(11.5)	69	69
1992	1	1	741.7	744.2	2.5	69	69
1993	1	1	808.1	809.6	1.5	69	68
1994	1	1	885.2	884.1	(1.1)	69	69
1995	1,2	1	816.9	963.6	146.7	61	69
1996	1,2	1	906.6	1049.6	143.1	58	69
1997	1,2	1	980.8	1135.5	154.7	59	69
1998	1,2	1	1079.2	1238.3	159.0	58	69
1999	1,2	1	1178.5	1353.8	175.3	58	68

Notes:
1. Results reflect impact of 100% of Unit (i.e., 950 MW)
2. All cost figures are in current year dollars.
3. Base case has Clinton Unit 1 installed in August 1983 and Clinton Unit 2 installed in January 1995. Delay case has Unit 1 installed in January 1989 and Unit 2 installed in January 2000.
4. Assumes load held constant at 1980 level.

TABLE 1.3-7

VARIABLE COSTS FOR NO LOAD GROWTH

YEAR	CLINTON POWER STATION FUEL	CLINTON POWER STATION O&M	HIGH SULFUR COAL FUEL	HIGH SULFUR COAL O&M	LOW SULFUR COAL FUEL	LOW SULFUR COAL O&M	OIL FUEL	OIL O&M	NATURAL GAS FUEL	NATURAL GAS O&M	EMERGENCY POWER
1983	11.5	1.4	15.5	1.0	32.4	1.7	113.5	1.1	60.6	2.6	38.2
1984	11.5	1.4	17.6	1.1	36.3	1.9	117.0	1.3	66.8	2.8	41.8
1985	10.0	1.6	20.0	1.2	42.9	2.1	145.1	1.6			45.7
1986	10.0	1.7	21.[illegible]	1.4	46.8	2.3	166.3	1.8			50.5
1987	10.7	1.9	23.5	1.5	50.2	2.6	178.6	1.9			54.1
1988	11.5	2.1	25.4	1.6	54.8	2.8	201.4	2.0			59.8
1989	12.4	2.3	28.1	1.8	59.4	3.2	247.4	2.0			65.3
1990	13.4	2.5	30.3	1.9	64.9	3.4	258.8	2.3			71.0
1991	14.3	2.7	33.2	2.1	70.9	3.7	284.5	2.4			77.4
1992	15.3	2.9	36.3	2.3	76.6	4.1	317.3	2.6			84.0
1993	16.5	3.2	39.5	2.5	83.6	4.5	347.7	2.8			91.9
1994	17.8	3.5	43.0	2.7	91.4	4.9	374.0	3.1			100.3
1995	19.1	3.8	46.8	2.9	99.8	5.3	407.3	3.4			109.6
1996	20.6	4.1	51.0	3.2	109.3	5.7	436.6	3.8			119.1
1997	22.5	4.5	55.8	3.5	117.9	6.3	490.1	3.9			129.8
1998	24.6	4.9	60.8	3.8	129.3	6.9	536.2	4.3			141.2
1999	27.0	5.3	66.3	4.1	140.2	7.5	586.8	4.7			153.5

Notes: 1. All cost figures are in current year dollars in mills/kWh.

2. Assumes load held constant at 1980 level.

TABLE 1.3-8

REPLACEMENT ENERGY FOR NO LOAD GROWTH

YEAR	CLINTON POWER STATION GWh	CLINTON POWER STATION %	HIGH SULFUR COAL GWh	HIGH SULFUR COAL %	LOW SULFUR COAL GWh	LOW SULFUR COAL %	OIL GWh	OIL %	NATURAL GAS GWh	NATURAL GAS %	EMERGENCY POWER GWh	EMERGENCY POWER %
1983	(2176)	(100.0)	1670	76.7	409	18.8	25	1.1	65	3.0	8	.4
1984	(6508)	(100.0)	4969	76.4	1239	19.0	120	1.8	137	2.1	43	.7
1985	(5455)	(100.0)	3435	63.0	1458	26.7	478	8.8			84	1.5
1986	(5825)	(100.0)	4309	74.0	1122	19.3	333	5.7			61	1.0
1987	(5759)	(100.0)	3921	68.1	1402	24.3	376	6.5			59	1.0
1988	(5731)	(100.0)	4606	80.4	911	15.9	186	3.2			28	.5
1989	683	100.0	(635)	(92.8)	(47)	(6.8)	(2)	(.3)			(1)	(.1)
1990	(356)	(100.0)	363	101.9	(4)	(1.1)	(2)	(.7)			(1)	(.1)
1991	(14)	(100.0)	114	851.4	(58)	(435.5)	(38)	(284.1)			(4)	(31.8)
1992	(14)	(100.0)	(14)	(102.8)	24	175.0	3	24.1			1	3.7
1993	(22)	(100.0)	(5)	(20.3)	28	120.9	0	(.5)			0	0.0
1994	24	100.0	(21)	(88.6)	(5)	(21.2)	2	8.3			0	1.6
1995	(4392)	(100.0)	4012	91.4	321	7.3	52	1.2			7	.2
1996	(3864)	(100.0)	3530	91.4	269	7.0	57	1.5			8	.2
1997	(4032)	(100.0)	3724	92.4	263	6.5	39	1.0			5	.1
1998	(3921)	(100.0)	3699	94.4	175	4.5	41	1.0			6	.1
1999	(4085)	(100.0)	3882	95.0	166	4.1	32	.8			5	.1

Notes: 1. Percent columns indicate percent of total replacement energy provided by each source.

2. Assumes load held constant at 1980 level.

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CHAPTER 2 - THE SITE AND ENVIRONMENTAL INTERFACES

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recreation. The recreational development of the site is described in Subsection 2.1.3.

The boundary line of the station exclusion area (as defined in 10 CFR 100) is shown in Figures 2.1-5 and 2.1-6. The exclusion area is entirely within the station property and is the area encompassed by a circle of 975 meters radius centered on the station standby gas treatment system vent. Figure 2.1-5 also shows the low population zone as defined in 10 CFR 100.

The Clinton Power Station exclusion area meets the requirements of 10 CFR 100.11 (a). The engineered safety features maintain the integrity of the containment under postulated accident conditions and limit exposures at the exclusion area and low population zone boundaries to levels well within the guidelines of 10 CFR 100.

Figures 2.1-2 and 2.1-4 show the highway and railway networks that traverse or are adjacent to the site. The nearest major highways are State Highways 54, 10, and 48, all of which cross the site. Other major thoroughfares are U. S. Highway 51, located about 6 miles west of the plant, and Interstate Highway 74, located about 11 miles northeast of the plant. The nearest railroad is the Illinois Central Gulf Railroad (ICG), which crosses the site east to west and comes within about 0.75 mile to the north of the reactors' centerlines. Another ICG track is located approximately 3.5 miles south of the station. Railroads surrounding the site are depicted in Figures 2.1-8 and 2.1-9. Major transportation routes and pipelines surrounding the site are shown in Figure 2.1-9.

2.1.1.3 Boundaries for Establishing Effluent Release Limits

The boundary of the restricted area (as defined in 10 CFR 20) is shown in Figure 2.1-10. There are no residential quarters in the restricted area. The radiation dose limits given in 10 CFR 20.105 and the concentration limits of radioactive material in effluents given in 10 CFR 20.106 are met at the restricted area boundary.

Access to the restricted area is prevented by a cyclone fence with "No Trespassing" signs posted at regular intervals. In addition, there will be periodic surveillance to ensure that no unauthorized entry to the restricted area takes place.

The distance in meters (and feet) from the normal gaseous effluent release point (i.e., the common station HVAC vent) to the nearest site boundary by compass sectors is shown in Figure 2.1-5. The guidelines for keeping the radiation exposures as low as is reasonably achievable (ALARA), as given in 10 CFR 50 Annex to Appendix I, are applied at the site boundary. The station gaseous and liquid effluent release points are shown in Figure 2.1-7.

The liquid effluents from the static are discharged into Lake Clinton, the outfall of which joins the Sangamon River approximately 56 miles downstream. The Sangamon River joins the Illinois River approximately 80 miles west of the site. The closest sizeable lake is Lake Decatur, located approximately 20 miles south of the site. There is no plausible way for liquid effluents to get to Lake Decatur.

The liquid effluents from the station are discharged into Lake Clinton through the discharge flume to the unrestricted area. The routine gaseous effluents discharged from the common station HVAC vent are released to the unrestricted area at the boundary of the restricted area in all of the sectors. Solid radioactive material is shipped from the CPS site via truck or rail in special containers or casks.

2.1.2 Population Distribution

2.1.2.1 Population within 10 Miles

The population within 5 miles of the site is shown in Figure 2.1-11. These statistics as well as the 5-to-10-mile statistics are based on an actual onsite house count conducted by Sargent & Lundy (S&L) in 1972 and 1973. The total 1972 population within 5 miles of the site was 1199. As indicated by a population density of 15 persons per square mile, the area within 5 miles of the site is very sparsely populated. There are two small residential groupings within 5 miles of the site: one is DeWitt, approximate population of 199, located 2.5 miles east-northeast; and the other is Lane, estimated population of 150, located 3.5 miles south-southwest.

As indicated in Figure 2.1-12, the population within 10 miles of the site is quite low. A large proportion of the population lives in the city of Clinton (1970 population 7570), 6 to 7 miles west and west-southwest of the site. Most of the surrounding area within 10 miles . rural, with a population density of 42 persons per square mile.

The total 1970 population within a 10-mile radius of the station location is 13,143. Projections indicate that this area is expected to experience a slight decrease in population by 1980 and then gradually increase. The projected population for the year 2020 is 18,608.

There are few cities within 10 miles of the site, and no major population centers (cities with populations greater than 25,000). Table 2.1-2 includes all the communities within 50 miles along with their 1980 populations.

As seen in the following list, the percent population age distribution within DeWitt County in 1970 was similar to the national distribution (U.S. Department of Commerce 1971a, 1975).

Age Group	DeWitt County	United States	
1970		1970	2000
0-11	21.1	22.4	17.5
12-18	12.8	13.7	11.1
19 and over	66.1	63.9	71.4

Applying the projected U.S. age distribution for the year 2000 (the approximate midpoint of station operating life) to the projected population within 10 miles of the station yields the following expected population:

Age Group	Projected Population
0-11	2,679
12-18	1,699
19 and over	10,928
TOTAL	15,306

The U.S. projected age distribution is used because in 1970 DeWitt County was not significantly different from the total U.S. age distribution, when the significance test described in Appendix D of Regulatory Guide 4.2 was applied. Thus, it was assumed that the area within a 10-mile radius of the station (most of which lies within DeWitt County) will have an age distribution similar to that projected for the United States as a whole.

2.1.2.2 Population between 10 and 50 Miles

The total population within 50 miles of the station is 720,998 and is expected to grow to 988,491 by 2000. More than 90% of the total 1970 population within 50 miles lives outside of a 20-mile radius of the station. Figure 2.1-13 shows the 1970 population and projections to the year 2020 for the area within 10 to 50 miles of the site. Figure 2.1-14 shows the locations of the major cities within 50 miles of the site; the population of these cities for 1980 is included in Table 2.1-2.

The most heavily populated sector within 50 miles of the site is the south-southwest sector with a 1970 population of 119,510. The high population in this sector is due primarily to Decatur, Illinois, which is located between 20 and 30 miles from the site and had a 1970 population of 90,397. The northeast sector, which is predominately rural, has the lowest 1970 population.

The age distribution in the year 2000 within 50 miles of the station is expected to be similar to the projected national age distribution. The age distribution of counties within a 50-mile radius is shown in Table 2.1-3. Since the 1970 age distributions in these counties were similar to the national distribution, the U.S. projected age distribution shown previously for the year 2000 was used to project the following age distribution for the year 2000 for the area within 50 miles:

Age Group	Number	Percentage
0-11	172,986	17.5
12-18	109,722	11.1
19 and over	705,783	71.4
TOTAL	988,491	100.0

2.1.2.3 Transient Population

Recreation is the only significant source of transient population. Weldon Springs State Park, located about 5.5 miles southwest of the site, had 488,982 visitors in 1976 (Illinois Department of Conservation 1976). The peak attendance occurs on Independence Day when it may reach 11,000 for the fireworks display (Herzog 1977). The 370-acre park, 28 acres of which is lake, offers facilities for fishing, boating, and hiking (Illinois Department of Conservation 1976). The park is popular because of the lack of other facilities in the county. Average and peak daily attendance is given in Table 2.1-4.

The Clinton Country Club, 6.3 miles southwest, has a membership of approximately 210. During the golfing season, approximately 75 to 80 golfers may use the course on a weekend day. On a peak attendance day, up to 200 people may use the facilities, which include the golf course, pool, tennis courts, and dining room (Hoffman 1978).

Arrowhead Acres Camp, located about 6.5 miles southwest of the site, operates from April through October and has about 25 long-term campers during the season and up to 50 campers on a weekend (Ferguson 1977).

The Little Galilee Christian Assembly Church Camp (located approximately 6 miles southwest of the city of Clinton, off U.S. Route 51) operates a summer camp between June nd September. About 2000 people attend during the season, with about 125 children in attendance during each week. A peak attendance of approximately 300 people occurs on weekends when parents pick up and drop off children (Johnson 1977).

miles west of the Clinton Power Station. The Sangamon-Illinois River confluence is approximately 80 miles west of the station.

There are no public or private water supplies taken from Salt Creek downstream from the station to its confluence with the Sangamon River. There are no users of the Salt Creek or the North Fork of the Salt Creek upstream of the station (Beauchamp 1977; Bunch 1977; Burris 1977; Combs 1977; Glithero 1977; Selburg 1977; Smith 1977). In addition, there is no municipal water use of either the Sangamon River from the confluence of Salt Creek to the confluence with the Illinois River or the Illinois River from its confluence with the Sangamon River to the confluence with the Mississippi River. The nearest public water supply which uses the Mississippi River as a water source is Alton, Illinois, approximately 242 river miles downstream of the Clinton Power Station. The 1976 average rate of pumping at the Alton intake was 11.7 million gallons per day (Selburg 1977). The 1970 population of Alton was 39,700 (U.S. Department of Commerce 1971b).

No industries or water and sewage treatment facilities take water from Salt Creek, and no local or state agency contacted had any record of planned industrial use of Salt Creek except for the Clinton Power Station. Salt Creek water is not used for irrigation within 50 radial miles downstream from the station. Water supplies for industrial, municipal, and irrigation purposes in the region are obtained from groundwater sources (Beauchamp 1977; Bunch 1977; Burris 1977; Combs 1977; Cruthis 1978; Glithero 1977; Smith 1977).

There is no commercial fishing on Salt Creek. Sport fishing is the major recreational use of Salt Creek and its tributaries. Small and large mouth bass, crappie, sunfish, channel catfish, and rough fish such as carp are the primary fish caught in Salt Creek. Sport fishing access on Salt Creek and the North Fork of Salt Creek is generally at the road crossings near county bridges. No catch data is available for Salt Creek or the North Fork of Salt Creek (Allen 1978).

The estimated consumptive water use and downstream release for 1955, a 1-in-50 year drought, is shown in Table 2.1-24. The assumed seepage from the lake is 0.5% of the lake capacity per month. When Salt Creek average flow is less than the evaporation and seepage losses, a minimum release of 5 cfs from the lake will be the flow downstream of the dam.

The effects of station effluents on Lake Clinton and water released from the lake are discussed in Chapter 5.

2.1.3.2.2 Groundwater

Public water supplies in the regional area are derived exclusively from groundwater sources. Public wells between 5 and 15 miles of the site are listed in Table 2.4-20 and shown in Figure 2.4-16. Public water supply systems within 15 miles of the station are summarized in Table 2.4-19.

Table 2.4-21 lists the private water wells within 5 miles of the station and Figure 2.4-17 locates them. Two wells are located on site property. One is owned by Illinois Power Company and is located at the Visitors' Center (see Figure 2.1-15). The other is owned and used for water supply by the village of DeWitt. The location of this well is shown on Figures 2.1-5 and 2.4-17.

A further discussion of private and public groundwater use near the Clinton Power Station is contained in Subsection 2.4.2.2. There will be no groundwater used for the Clinton Power Station.

2.1.3.3 Recreational Development Plan

The primary purpose of Clinton Power Station and the 4,895-acre cooling lake is to provide energy for the future needs of the people of central Illinois. It has been recognized by IP that, in addition to providing energy, the Clinton Power Station site has the potential to supply a wide variety of quality recreation opportunities.

IP and the co-owners of CPS are demonstrating multipurpose utilization of finite resources by leasing about 10,208 acres of the site property to the Illinois Department of Conservation for public recreational facilities. The lease agreement is discussed in Section 5.6. Figure 2.1-15 shows the recreation development plan, and Table 2.1-5 lists the planned recreation facilities. Figure 2.1-15A shows the stage of completion of the planned recreational facilities as of June 1, 1981.

In August 1979 the site was opened to fishing, powerboating, water skiing, and wildlife observation and study. Snowmobiling may be allowed on the lake but not on park grounds. Some camping, hiking, and picnicking facilities were opened in 1980 and others will be opened later as finished. Ice skating will be allowed in designated areas. Swimming is not authorized at the present time.

The Illinois Department of Conservation has estimated that in 1980 the site was visited by 520,212 people. Their projected estimates for the next five years are as follows:

1981	-	650,000
1982	-	750,000 (includes campers)
1983 and beyond	-	1,000,000

The "Final Environmental Statement Related to the Proposed Clinton Power Station Units 1 and 2, October, 1974," states: "Hunting will not be permitted anywhere on the applicant's property." This would have resulted in the annual loss of 15,000 user-days of hunting. A partial recovery of this loss will be undertaken by provision for wildlife hunting under state control on upland tracts that surround Lake Clinton, such as the northern end of the North Fork arm (North Fork Canoe Access Area and Illinois Prairie Access Area). Waterfowl hunting is provided from numbered blind sites on the North Fork arm from the North Fork boat ramp north to the Prairie Restoration Area, and on the

TABLE 2.1-2

CITIES, TOWNS, AND VILLAGES WITHIN 50 MILES OF CLINTON POWER STATION

CITY OR TOWN	COUNTY	1980 POPULATION	DISTANCE AND DIRECTION FROM THE SITE
DeWitt	DeWitt	232	2.5 miles ENE
Weldon	DeWitt	531	5.3 miles ESE
Clinton	DeWitt	8,014	6.3 miles W
Wapella	DeWitt	768	7.4 miles WNW
Deland	Piatt	509	10.1 miles ESE
Maroa	Macon	1,760	10.7 miles SW
Farmer City	DeWitt	2,252	11.2 miles ENE
Cisco	Piatt	333	11.7 miles SSE
Heyworth	McLean	1,598	12.3 miles NW
Argenta	Macon	994	12.4 miles S
Le Roy	McLean	2,870	13.1 miles NNE
Kenney	DeWitt	443	13.6 miles WSW
Oreana	Macon	999	15.6 miles S
Downs	McLean	561	15.7 miles N
Waynesville	DeWitt	569	15.7 miles WNW
Monticello	Piatt	4,753	16.6 miles SE
Mansfield	Piatt	921	17.0 miles E
Forsyth	Macon	1,072	17.0 miles SSW
Cerro Gordo	Piatt	1,553	19.6 miles SSE
Warrensburg	Macon	1,372	19.8 miles SW
McLean	McLean	836	19.9 miles WNW
Bellflower	McLean	421	19.9 miles NE
Ellsworth	McLean	244	20.2 miles NNE
Atlanta	Logan	1,807	21.3 miles WNW
Bement	Piatt	1,770	21.4 miles SE
Latham	Logan	564	21.5 miles SW
Arrowsmith	McLean	292	21.9 miles NNE
Mahomet	Champaign	1,986	22.1 miles E
Decatur	Macon	94,081	22.4 miles SSW
Bloomington	McLean	44,189	22.7 miles NNW
Saybrook	McLean	882	23.8 miles NE
Ivesdale	Champaign	339	24.5 miles SE
Normal	McLean	35,672	24.6 miles NNW
Foosland	Champaign	153	24.7 miles ENE
Mount Pulaski	Logan	1,783	25.3 miles WSW
Cooksville	McLean	259	26.3 miles NNE
Mount Zion	Macon	4,563	26.5 miles S
Fisher	Champaign	1,572	26.8 miles ENE
Stanford	McLean	720	26.8 miles NW
Armington	Tazewell	292	27.0 miles WNW
Lincoln	Logan	16,327	27.1 miles W
Niantic	Macon	761	27.2 miles SW
Towanda	McLean	630	27.2 miles N
Hammond	Piatt	556	28.1 miles SSE

TABLE 2.1-2 (Cont'd)

CITY OR TOWN	COUNTY	POPULATION	DISTANCE AND DIRECTION FROM THE SITE
Sadorus	Champaign	435	28.6 miles ESE
Colfax	McLean	920	29.4 miles NNE
Illiopolis	Sangamon	1,118	29.8 miles SW
Champaign	Champaign	58,133	29.9 miles E
Danvers	McLean	921	30.2 miles NW
Minier	Tazewell	1,261	30.3 miles NW
Savoy	Champaign	2,126	30.7 miles ESE
Dalton City	Moultrie	574	30.8 miles S
Hudson	McLean	929	30.9 miles NNW
Gibson City	Ford	3,498	31.0 miles NE
Anchor	Mclean	192	31.2 miles NNE
Atwood	Douglas/Piatt	1,464	31.3 miles SE
Hartsburg	Logan	379	31.5 miles W
Tolono	Champaign	2,434	31.7 miles ESE
Broadwell	Logan	183	31.7 miles WSW
Carlock	McLean	410	32.0 miles NNW
Urbana	Champaign	35,978	32.2 miles E
Macon	Macon	1,300	32.2 miles SSW
Lovington	Moultrie	1,313	32.4 miles SSE
Lexington	McLean	1,806	32.4 miles N
Garrett	Douglas	205	32.7 miles SE
Pesotum	Champaign	651	33.5 miles ESE
Thomasboro	Champaign	1,242	33.5 miles E
Hopedale	Tazewell	913	34.2 miles WNW
Emden	Logan	527	34.3 miles WNW
Elkhart	Logan	493	34.5 miles WSW
Mount Auburn	Christian	598	34.8 miles SW
Blue Mound	Macon	1,338	35.0 miles SSW
Elliott	Ford	370	35.2 miles NE
Dappa	Woodford	170	35.8 miles NNW
Arthur	Douglas/Moultrie	2,122	35.9 miles SSE
Bethany	Moultrie	1,550	36.0 miles S
Congerville	Woodford	373	36.1 miles NNW
Buffalo	Sangamon	514	36.3 miles SW
Philo	Champaign	973	36.3 miles ESE
Mackinaw	Tazewell	1,354	36.5 miles NW
Rantoul	Champaign	20,161	36.6 miles ENE
Sibley	Ford	370	36.9 miles NE
Tuscola	Douglas	3,839	37.6 miles SE
Mechanicsburg	Sangamon	515	37.7 miles SW
Moweaqua	Shelby	1,922	38.0 miles SSW
New Holland	Logan	295	38.1 miles W
Dawson	Sangamon	532	38.2 miles WSW
Delavan	Tazewell	1,973	38.8 miles WNW
Goodfield	Woodford	500	38.8 miles WNW
Middletown	Logan	503	38.8 miles W
Williamsville	Sangamon	996	39.2 miles WSW

TABLE 2.1-2 (Cont'd)

CITY OR TOWN	COUNTY	1980 POPULATION	DISTANCE AND DIRECTION FROM THE SITE
Gridley	McLean	1,246	39.2 miles N
Ludlow	Champaign	397	39.3 miles ENE
Chenoa	McLean	1,847	39.8 miles N
El Paso	Woodford	2,676	40.1 miles NNW
Villa Grove	Douglas	2,707	40.2 miles ESE
Sullivan	Moultrie	4,526	40.2 miles SSE
Stonington	Christian	1,184	40.3 miles SSW
Sidney	Champaign	886	40.3 miles ESE
Deer Creek	Tazewell	688	40.3 miles NW
San Jose	Logan/Mason	784	40.4 miles WNW
Melvin	Ford	519	40.6 miles NE
St. Joseph	Champaign	1,900	40.7 miles E
Spaulding	Sangamon	428	41.4 miles WSW
Tremont	Tazewell	2,096	41.4 miles NW
Riverton	Sangamon	2,783	42.0 miles WSW
Secor	Christian	488	42.1 miles NNW
Camargo	Douglas	428	42.3 miles SE
Arcola	Douglas	2,714	42.4 miles SE
Paxton	Ford	4,258	42.7 miles ENE
Fairbury	Livingston	3,544	42.7 miles NNE
Gifford	Champaign	848	42.7 miles ENE
Strawn	Livingston	143	42.7 miles NNE
Panola	Coles	31	43.0 miles NNW
Sherman	Sangamon	1,501	43.5 miles WSW
Eureka	Woodford	4,306	43.6 miles NNW
Morton	Tazewell	14,178	43.7 miles NW
Longview	Champaign	207	43.8 miles ESE
Mason City	Mason	2,719	44.0 miles W
Findlay	Shelby	868	44.1 miles S
Royal	Champaign	274	44.1 miles E
Allenville	Moultrie	204	44.2 miles SSE
Green Valley	Tazewell	768	44.3 miles WNW
Clear Lake	Sangamon	236	44.4 miles WSW
Edinburg	Christian	1,231	44.6 miles SW
Roberts	Ford	422	45.1 miles NE
Forrest	Livingston	1,246	45.2 miles NNE
Ogden	Champaign	818	45.2 miles E
Assumption	Christian	1,283	45.3 miles SSW
Loda	Iroquois	486	45.3 miles ENE
Cantrall	Sangamon	141	45.7 miles WSW
Homer	Champaign	1,279	44.8 miles ESE
Rochester	Sangamon	2,488	45.9 miles SW
Greenview	Menard	830	46.3 miles W
Broadlands	Champaign	346	46.4 miles ESE
Humboldt	Coles	499	46.4 miles SE
Grandview	Sangamon	1,794	46.4 miles WSW

TABLE 2.1-2 (Cont'd)

CITY OR TOWN	COUNTY	1980 POPULATION	DISTANCE AND DIRECTION FROM THE SITE
Roanoke	Woodford	2,001	46.7 miles NNW
Washington	Tazewell	10,364	46.8 miles NW
South Pekin	Tazewell	1,243	47.2 miles WNW
Athens	Menard	1,371	47.4 miles WSW
Taylorville	Christian	11,386	48.1 miles SSW
Flanagan	Livingston	978	48.3 miles N
Hindsboro	Douglas	407	48.6 miles SE
Springfield	Sangamon	99,637	48.6 miles WSW
Benson	Woodford	460	48.7 miles NNW
Chatsworth	Livingston	1,187	48.7 miles NE
Pekin	Tazewell	33,967	49.0 miles NW
Kincaid	Christian	1,591	49.1 miles SW
Allerton	Vermillion	303	49.1 miles ESE
Fithian	Vermillion	540	49.1 miles E
Bulpitt	Christian	301	49.3 miles SW
Pontiac	Livingston	11,227	49.5 miles NNE
East Peoria	Tazewell	22,385	49.5 miles NW
Jeiseyville	Christian	178	49.5 miles SW
Marquette Heights	Tazewell	3,386	49.8 miles NW
Owaneco	Christian	285	49.9 miles SSW

Source: U.S. Department of Commerce, 1981.

TABLE 2.1-24

CONSUMPTIVE WATER USE AND DOWNSTREAM RELEASE

FOR CLINTON POWER STATION - UNITS 1 & 2

USING 1955 WEATHER DATA

MONTH	LOAD FACTOR (%)	CONSUMPTIVE WATER USE (cfs)	DOWNSTREAM RELEASE (cfs)
January	80	33.0	5
February	70	25.1	5
March	70	38.7	5
April	70	41.0	5
May	70	62.4	11
June	92	83.6	122
July	92	91.4	5
August	92	105.6	5
September	80	88.7	5
October	70	69.3	5
November	70	49.4	5
December	80	31.8	5

PUBLIC USE AREA	PARKING-CAR	PARKING-CAR TRAILER	VAULT TOILET	FLUSH TOILET	WATER	BEACH	TRAILER CAMPING	TENT CAMPING	SANITARY DUMP STATION	PICNIC SHELTER	PICNIC SITES	PLAY STRUCTURES	SHOWERS	BOAT RAMP	BOAT DOCKS	OVERNIGHT BOAT MOORING	CONCESSION	AMPHITHEATER	FISHING PIER	FISH CLEANING STATION	HUNTER CHECK STATION	OFFICE & MAINTENANCE	STORAGE BUILDING	SEWAGE TREAT. PLANT	BATH HOUSE
CLINTON MARINA	X	X		X	X									X	X	X	X			X				80	
MASCOUTIN STATE PARK	10	0	70	0	/	80	45	0	0	25	/		60	0	0				0	70		X	X	/	/
MARINA CAMP GROUND					25	80																			
WEST SIDE ACCESS AREA	X	X	90		95					X	50			X											
NORTHFORK ACCESS AREA	X	X	90		95									X						90					
WELDON ACCESS AREA	X	X	90		95					X	50			X						90	X				
PARNELL ACCESS AREA	X	X	90		X									X											
LANE DAY USE AREA	X		90		X					X	50														
PENINSULA USE AREA	X		90		X																				
NORTH FORK CANOE ACCESS	X																								
CAMP QUEST GROUP CAMP	X		90		95																				
FULLERTON FISHING ACCESS																									
SALT CREEK FISHING ACCESS																									
SPILLWAY FISHING ACCESS	/		90																						
NATURAL AREA																									

50 1981 DEVELOPMENT (% COMPLETE)

/ 1982 DEVELOPMENT

X COMPLETED

DATE June 1, 1981

CLINTON POWER STATION
UNITS 1 AND 2
ENVIRONMENTAL REPORT-OPERATING LICENSE STAGE

FIGURE 2.1-15A

STATUS OF COMPLETION OF RECREATIONAL DEVELOPMENT AT LAKE CLINTON

POOR ORIGINAL

2.4.1.4.2 Lake Filling Analysis

A lake filling analysis was done, assuming filling to start in the month of October with an average runoff condition on Salt Creek. Filling of the lake to the normal pool elevation of 690 feet was estimated to take 7 months. The analysis was done based on a constant reservoir release of 5 cubic feet per second and a seepage loss of 0.5% of the lake capacity per month. Using runoff values for historic drought and 100-year drought conditions, the time to fill the lake was estimated at 31 and 34 months, respectively.

The main dam was closed on October 12, 1977, and lake filling was begun. By the end of December 1977, with reservoir releases varying from 40 to 130 cubic feet per second, the lake level was observed at elevation 683 feet. This is about 7 feet higher than the water level expected in the lake with the average runoff conditions used in the lake filling analysis. The runoff on Salt Creek during the months of October, November, and December of 1977 was greater than the average flow. The lake water level reached elevation 690 feet on May 17, 1978.

2.4.1.4.3 Flooding Conditions

The flood water surface elevations in the lake were determined by routing the floods through the lake using the "SPRAT" computer program (U.S. Army Corps of Engineers 1966). The once-in-100-year flood level in the lake at the dam site is elevation 697 feet. The routed peak outflow through the service spillway is 11,610 cubic feet per second. Based on the flood frequency analysis, the once-in-100-year flood flow at the dam site is 26,400 cubic feet per second. The magnitude of the flood flows downstream from the dam is reduced due to the flood absorption effect of the lake. The probable maximum flood level with an antecedent standard project flood is elevation 708.8 feet at the dam.

The flooding effects on the headwater area of the cooling lake were determined by backwater computations using the U. S. Corps of Engineers' computer program "Water Surface Profiles" (WASP) (U.S. Army Corps of Engineers 1968). Figures 2.4-9 and 2.4-10 show the water surface profiles of the 100-year flood and probable maximum flood under natural conditions both with and without the reservoir for Salt Creek and the North Fork of Salt Creek, respectively.

The backwater effect of a once-in-100 year flood in the lake terminates at the Township Road Bridge (Iron Bridge), 76,000 feet or 14.5 miles upstream from the dam and 1.5 miles southwest of Farmer City. Flooding in the lake does not affect the residential area of Farmer City. For the North Fork of Salt Creek, the backwater effect of a once-in-100-year flood in the lake terminates at 39,000 feet or 7.5 miles upstream from the dam. There are no residential areas along the North Fork of Salt

Creek. The once-in-100-year flood level was a criterion used in the property acquisition for the lake area. The power station is at a grade elevation of 736 feet and will not be affected by floods in the lake.

The Trenkle Slough Drainage District drains into a creek that joins Salt Creek 0.5 mile upstream from the Iron Bridge. The analysis for the flooding effects of the lake shows that the flood level in the Trenkle Slough is not increased by the once-in-100-year flood in the lake. However, the time for the flood water to recede is increased by about 3 days at the confluence of the creeks and by about 7 hours at a point 3 miles upstream from the mouth of the Trenkle Slough. This effect on the flood recession period decreases for smaller floods. The Salt Creek channel from the Iron Bridge to the mouth of the Trenkle Slough was widened to improve the drainag conditions in the Trenkle Slough area and to avoid any adverse effect.

Figure 2.4-10A shows the once-in-100-year flood prone area that would exist in the vicinity of Clinton Power Station without Lake Clinton in place (preconstruction flood prone area), as outlined by the US.S Geological Survey (1974). This flood prone area is along Salt Creek and the North Fork of Salt Creek. A review of maps prepared by the Federal Emergency Management Agency of the U.S. Department of Housing and Urban Development indicates that there is no flood prone area in the vicinity of the station other than that shown in Figure 2.4-10A. Figure 2.4-10B shows the property line of the Clinton Power Station site compared to the preconstruction flood prone area. As can be seen, the property line encloses the flood prone area.

Impounding Salt Creek and the North Fork of the Salt Creek to form Lake Clinton altered natural flood levels. Figure 2.4-10C shows the preconstruction flood prone area, the property line, and the once-in-100-year flooded area with Lake Clinton in place. The details of the determination of the once-in-100-year flood elevation with the lake in place are given earlier in this subsection. Figure 2.4-10C shows that the once-in-100-year flooded area with Lake Clinton in place is well within the station property line. Beyond the property line, in the upper reaches of Salt Creek and the North Fork of Salt Creek, the lake does not increase the flooded area as compared to the preconstruction once-in-100-year flood. Flood flows downstream of the Lake Clinton dam are lowered compared to preconstruction flood flows; hence, the once-in-100-year flood levels are lower.

No station structures were built in the preconstruction once-in-100-year flood prone area except for the dam that was built across Salt Creek to create Lake Clinton. Obviously, there was no alternative location for the dam outside of the flood prone area. Several structures have been built along the edges of the post-construction flood prone area (with Lake Clinton in place). These include the intake and discharge structures, modified highway bridges, a marina, and seven boat ramps. Again, there were no feasible locations for these structures outside of the flood prone area. Construction of these structures is complete, and their presence will not cause any alteration in flood levels that would extend beyond the site property lines. There will be no effect on downstream facilities of debris generated from the site during floods.

2.4.1.4.4 Effects of Drought

A design drought with a recurrence interval of 100 years was used in the determination of minimum water level in the cooling lake. The once-in-100-year drought runoff data with a duration up to 60 months are given in Table 2.4-8. Net lake evaporation values for a 100-year recurrence interval are given in Table 2.4-9. The average monthly forced evaporation data with the plant operating at 70% load factor are given in Table 2.4-10.

Lake drawdown analyses were made starting at a normal pool elevation of 690 feet, using a minimum reservoir release of 5 cubic feet per second and assuming a seepage loss of 0.5% of the lake capacity per month. The minimum water level obtained for the once-in-100-year drought is elevation 682.3 feet. The plant will be able to withstand the effect of the once-in-100-year drought without interruption of normal operations.

Similarly, the effect of the historic drought on the lake was analyzed using precipitation and evaporation values obtained from the U.S. Department of Commerce (U.S. Department of Commerce 1943-1977). The water level in the lake for a historic drought condition is elevation 684.1 feet.

In the event of a drought more severe than the once-in-100-year drought that will lower the lake level to elevation 677 feet, the ultimate heat sink will supply water for the emergency core cooling system.

2.4.1.4.5 Lake Sedimentation

Studies were made on sediment distribution and deposition in the lake to determine the effect on the lake capacity, depth, and shoreline area. On Salt Creek near Rowell, an average turbidity of 16 parts per million and a discharge of 0.35 cubic feet per second per square mile were observed from 1950 to 1956 (see a drop of 18 feet. The second is designed for a drop of 26 feet.

Natural drainage in the area of the discharge flume is maintained by culverts under the flume (see Figure 3.4-7). Barriers are provided along both sides of the flume and near the discharge structure to prevent public access.

The discharge structure at the lake shore end of the discharge flume is shown in Figure 3.4-8. This structure is designed to minimize erosion by means of the energy dissipating "teeth" located on the ramp surface. Flow into the lake is smooth (about 1.3 ft/sec) and will cause no disturbances to boating in the vicinity of the discharge area.

3.4.4 Supplemental Cooling System

Waste heat is transferred primarily to the atmosphere through the 4895-acre (3880 acres, effective) cooling lake (Lake Clinton), which will be augmented by a supplemental cooling system within the discharge flume. The supplemental system will be operated when the temperature of the water discharge from the condenser exceeds 96° F. It is designed to maintain the temperature of the water at the discharge structure at 96° F or less during normal summer operation. To achieve this, system modules (see Figure 3.4-9) will operate as follows. In the late spring when the condenser discharge temperature reaches 92° F or on June 1, whichever comes first, the supplemental cooling system will begin operation at approximately 1/15 of the total capacity. Each day thereafter another 1/15 of the system will begin operation, until by June 15, at the latest, all spray modules will be operating. In the late summer when the condenser discharge temperature reaches 92° on the declining side of the time/temperature curve, or on September 19, whichever comes last, the supplemental cooling system will begin to be sequenced off, with approximately 1/15 of the modules being shutdown for the first 6 days. Each day thereafter another 2/15 or less of the modules will be shut off, until by September 30, at the earliest, the complete system will be turned off.

The applicant is currently updating the thermal modeling of the lake. Subsection 3.4.5 presents a brief description of the LARM model being used. It is planned that the modeling results along with current biological data will be evaluated to determine if a thermal standard different than that presently in effect might be appropriate for Lake Clinton. If Illinois Power Company feels that an alternate thermal standard would be acceptable, the appropriate proceedings will be initiated before the Region V U.S. EPA and/or the Illinois Pollution Control Board (IPCB) as allowed under the Clean Water Act.

3.4.5 The Cooling Lake and Water Temperatures

The water from the discharge flume will be discharged into Lake Clinton for cooling. The physical features of Lake Clinton are described in Subsection 2.4.1.4.

Meteorological data for 1955, 1962, and 1964 were used with the LAKET computer program. Based on the analysis of 23 years of meteorological data, 1962 was selected as a typical year, 1955 as a 1-in-50-year drought year, and 1964 as 1-in-10-year hot summer. The predicted lake temperatures during these years are shown in Tables 5-4 through 5-8 and in Figures 5-8 through 5-12 from the Clinton Power Station Section 316(a) application. These figures and tables are included in Appendix 5.1A of this report. The predicted values were calculated using the loading schedule discussed in Subsection 3.4.1. The temperatures listed in these figures and tables are based on a maximum canal discharge temperature constrained to 96° F and do not include the effects of the supplemental cooling system.

For comparison, Figures 3.4-10 and 3.4-11 show the temperature/time transients expected for two-unit operation during a typical year (1962) and a 1-in-10-year hot summer (1964) including the effects of the supplemental cooling system. These figures demonstrate that a discharge temperature of 96° F will occasionally occur for short durations during the 1-in-10-year hot summer. The maximum temperature during the summer of an average year (such as 1962) will be approximately 92° F, with the temperature for the most part being less than 90° F.

Illinois Pollution Control Board (IPCB) Rules and Regulations (Chapter 3: Water Pollution, Part II: Water Quality Standards) Rule 203(i) specifies that water temperatures must not exceed 90° F from April through November and 60° F during the remainder of the year. However, Rule 203(i) (11) exempts the Clinton cooling lake from the general provisions of the rule and sets a limit of 96° F, with the provision that the supplemental cooling system operate in the manner described in Subsection 3.4.4. Available data from the Section 316(a) application for adverse conditions (see Tables 5-7 and 5-3 and Figure 5-12 provided in Appendix 5.1A) indicate that water temperatures at the discharge of the spillway will comply with the ruling set forth by the IPCB. The operation of Clinton Power Station will also be in compliance with the U.S. EPA thermal discharge effluent limitations specified in 40 CFR 423.13(1)(2).

The applicant is presently having the hydrodynamic and temperature distribution of Lake Clinton remodeled using the Laterally Averaged Reservoir Model (LARM). LARM has features that represent the longitudinal and vertical equations of fluid motion, continuity and heat transport and incorporates a coupling of buoyancy between the temperature distribution and the equations of motion as well as surface wind forces. LARM has been developed for the analysis and prediction of two dimensional (longitudinal and vertical) hydrodynamics and temperature structure

CHAPTER 5 - ENVIRONMENTAL EFFECTS OF STATION OPERATION

LIST OF FIGURES

CHAPTER 5 - ENVIRONMENTAL EFFECTS OF STATION OPERATION

5.1 EFFECTS OF OPERATION OF HEAT DISSIPATION SYSTEM

5.1.1 Effluent Limitations and Water Quality Standards

Federal and state of Illinois thermal standards applicable to effluent from Clinton Power Station - Units 1 and 2 into Lake Clinton are discussed in this subsection.

The thermal limitation currently applicable to the condenser cooling water discharge from Units 1 and 2 into Lake Clinton is contained in Chapter 3, Section 203(i) (11) of the Illinois Pollution Control Board (IPCB) Rules and Regulations. This limitation has been imposed by three different regulatory bodies. The U.S. Nuclear Regulatory Commission (U.S. NRC) imposed the limit in the construction permit based on certification from the Illinois Environmental Protection Agency (Illinois EPA) pursuant to Section 401 of the Federal Water Pollution Control Act. This certification, in turn, was based on the initial variance grant from IPCB for Lake Clinton and subsequent rule changes specifically for Lake Clinton. The U.S. EPA also imposed the same requirements through the National Pollutant Discharge Elimination System permit process and a Section 316(a) "alternate" thermal standard that was granted for Lake Clinton and incorporated into the permit.

Chapter 3, Section 203(i) (11) of the IPCB Rules and Regulations as it applies to Lake Clinton is as follows:

(aa) Lake Clinton

The thermal discharge to Lake Clinton shall meet the following standards and conditions:

1. The effluent temperature shall not exceed 96° F.

2. All conditions adopted by Board Order in PCB 75-31 (July 31, 1975).

Due to the site distance from the state border, it is not anticipated that the effluent will, in any way, affect other states.

5.1.2 Physical Effects of Operation of Heat Dissipation System

Surface temperatures at different times and locations on 4895-acre Lake Clinton were analyzed by a one-dimensional mathematical lake transient model called LAKET (see Appendix 6A of the Construction Permit Stage - Environmental Report [CPS-ER]). The model performs a mass and energy balance on the lake by representing the lake as a long rectangular channel with the length being the actual distance from flume discharge to plant intake, the width being the average width of the lake, and the depth being the average depth of the lake. The lake effective area is defined as the total area of the lake minus two-thirds of the lake finger area, or 3880 acres at a lake level of 690 feet above mean sea level (MSL). The effective volume at 690 feet MSL is 66,300 acre-feet, resulting in an average effective depth of 17.09 feet.

Data for the model were taken from meteorological records for the area and loading schedules for the station. Peoria, Illinois, meteorological records from 1962 were used as a typical year, with 1955 chosen as the worst conditions (1-in-50-year drought) and 1964 chosen as a 1-in-10-year hot summer. The data set used was recorded at the surface station at the Peoria airport, which is located on a flat tableland, set back a mile from the rim of the Illinois River valley and about 200 feet above the river, and the instruments are well exposed. This separation of the station from the river and its valley suggested that there would not be a significant effect of the river on the Peoria airport weather records. The following loading schedule was used: 92% load in June, July, and August; 80% load in January, September, and December; and 70% load in February, March, April, May, October, and November. Lake surface temperatures that would occur under varying meteorological and hydrological conditions are shown in Appendix 5.1A.

The IPCB rule 203(i) specifies that water temperatures must not exceed 90° F from April through November and 60° F during the rest of the year. However, rule 203(i) (11) exempts Lake Clinton from the general provisions of rule 203(i) and sets a yearly limit of 96° F, with provisions for a supplemental cooling system.

Illinois Power Company is committed to install 112 spray modules with Unit 1 and 120 spray modules with Unit 2, along the 3.4-mile-long effluent discharge canal. When the discharge temperature reaches 92° F or on June 1, whichever occurs first, approximately 1/15 of the spray system capacity will be switched on, with approximately 1/15 of the system capacity switched on every day thereafter. When the discharge temperature is lower than 92° F, or on September 19, whichever occurs last, approximately 1/15 of the spray system capacity will be shut down on each of the first 6 days. Each day thereafter, approximately 2/15 or less of the capacity will be shut off, until on September 30 at the earliest, the complete system will be off. Using this spray system, it is estimated that the discharge temperature will peak at 96° F during a 1-in-10-year hot summer and at 92° F during an average year.

Natural warming of waters in the spring and summer and the addition of the heated circulating water from the Clinton Power Station will cause thermal stratification in Lake Clinton. During the preoperational period, Lake Clinton has been stratified from June to September with the thermocline at about 8 to 10 meters deep at the main dam (Location 8). During station operation, thermal loading will tend to cause stratification earlier in the year and extend stratification later into the fall. It will also extend the thermocline below its normal depth. Colder autumn and winter temperatures will cause a breakdown in the thermal stratification. Stratification was not taken into account in the LAKET model, but the layer of hot water on top will increase heat dispersion to the air and, hence, decrease the overall lake temperature estimated in the model.

Estimates of the discharge plume characteristics for the worst thermal conditions in a typical year were assessed using the "Workbook of Thermal Plume Prediction," by M. A. Shirizi and L. R. Davis (1972), and the following input parameters: 96° F discharge temperaute; 84° F maximum ambient lake temperature; 2000 feet from discharge structure to opposite shoreline; and 20-foot maximum lake depth at discharge. The thermal plume is expected to extend completely across the 2000-foot Salt Creek area, with a maximum temperature of 93.6° F on the shore opposite the discharge plume.

Since the thermal plume generally will float over the cooler lake water and since southwesterly winds predominate in July and August at the Clinton site, the plume could possibly be blown upstream to a portion of Salt Creek not normally part of the cooling loop. With an assumed average wind velocity of 10 mph, a shallow 0.2 mph current is expected. However, a countercurrent will occur due to the circulating water pattern and the natural flow in Salt Creek. The temperature of the shallow layer will be reduced to ambient in a short time as the shallow layer mixes with cooler upstream water and evaporation and heat dissipation to the atmosphere take effect. The temperature profiles given in Figures 5.1-0A, 5.1-0B, and 5.1-0C of the Clinton Power Station Thermal Demonstration to the Illinois Pollution Control Board, July 1980, indicate that thermal plume intrusion into the region upstream on Salt Creek, are minimal. For further details see the response to Question 240.8 in Supplement 1.

5.1.3 Biological Effects

Projected impacts on aquatic biota due to thermal discharges from Clinton Power Station (CPS) into Lake Clinton are discussed in Section 5.1 of the CPS-ER; in the U.S. Atomic Energy Commission's Final Environmental Statement (FES); in the Application for Thermal Effluent Limitations Pursuant to Federal Water Pollution Control Act, PL-92-500, Section 316(a), Type 2 Demonstration; and in the Illinois Pollution Control Board's Opinion and Order PCB 75-31. See also Section 2.2 of this report for the baseline ecological data summary.

Projected impacts on aquatic biota due to operation of the intake and discharge structures, including condenser passage, are discussed in Section 5.1 of the CPS-ER, the FES, and the 316(a) demonstration. See also Section 3.4 of this report.

The conclusions presented in the earlier documents concerning thermal discharges and operation of intake and discharge structures at CPS are unchanged.

5.1.4 Effects of Heat Dissipation Facilities

Operation of the station will influence the local micrometeorology as a result of discharging warm water into Lake Clinton. The principal meteorological effect of this will be to produce a steam fog over the lake when cold air (41° F or less) moves over the significantly warmer (∿59° F or higher) lake water. The rate of condensation of the evaporated water vapor (and thus the formation of steam fog) will be greatest at the lower ambient air temperature durii. winter. With heavy steam fog and relatively light wind speeds (approximately 2 meters per second - 5 mph - or less), noticeable drift of the steam fog off the lake surface is possible. The characteristics of such steam fog will vary with the water temperature, the distance traveled over the water, and the low-level ambient air temperature, relative humidity, vertical stability, horizontal wind direction fluctuation, and the transporting wind speed.

An analytical model was used that acocunts for the processes of evaporation, condensation, and diffusion downwind and includes the variables listed previously as input conditions. A description of the model is provided in Subsection 6.1.3.2.

Icing caused by condensed water vapor from the lake will have an effect primarily on vertical surfaces adjacent to the lake shores. Horizontal surfaces will accumulate much less rime. Observations of icing conditions from the Dresden Nuclear Power Station in Illinois indicate that icing on horizontal surfaces is not a significant problem beyond the first 200 feet from the edge of the lake.

The increases in water temperature in portions of Lake Clinton due to station operation were determined by use of the LAKET (Transient Lake Temperature Prediction) computer model. The variations of temperatures with time and natural and forced evaporation were also predicted by LAKET. This program simulated the effects of varying weather conditions and station heated-water discharge on the surface temperature and evaporation rates of a lake or river. The time-varying temperature distribution along the water body's central axis is computed against time, along with the natural and forced evaporation. In the case of lakes, the variation in the lake level is also computed.

Inputs to the computer program include data on the lake, the station, and the weather. Lake data include total surface area, salt content, seepage rate, initial temperature, and the length and width of the segments used in the analysis. Station data include temperature rises, flow rates, latitude, longitude, and altitude. Weather data include dates, wind speed, dry bulb temperatures, relative humidity, dew point, barometric pressure, air vapor pressure, cloud cover, and precipitation.

Output from the program provides time-varying temperature along the water body, natural and forced evaporation, and plots of temperature vs. time at nine locations.

The computational approach consists of modeling the body of water into an idealized system of prismatic volumes, each having geometric and physical characteristics (i.e., width, depth, area, and flow) unique to its location and time. Using input weather data, the natural water temperature is determined,

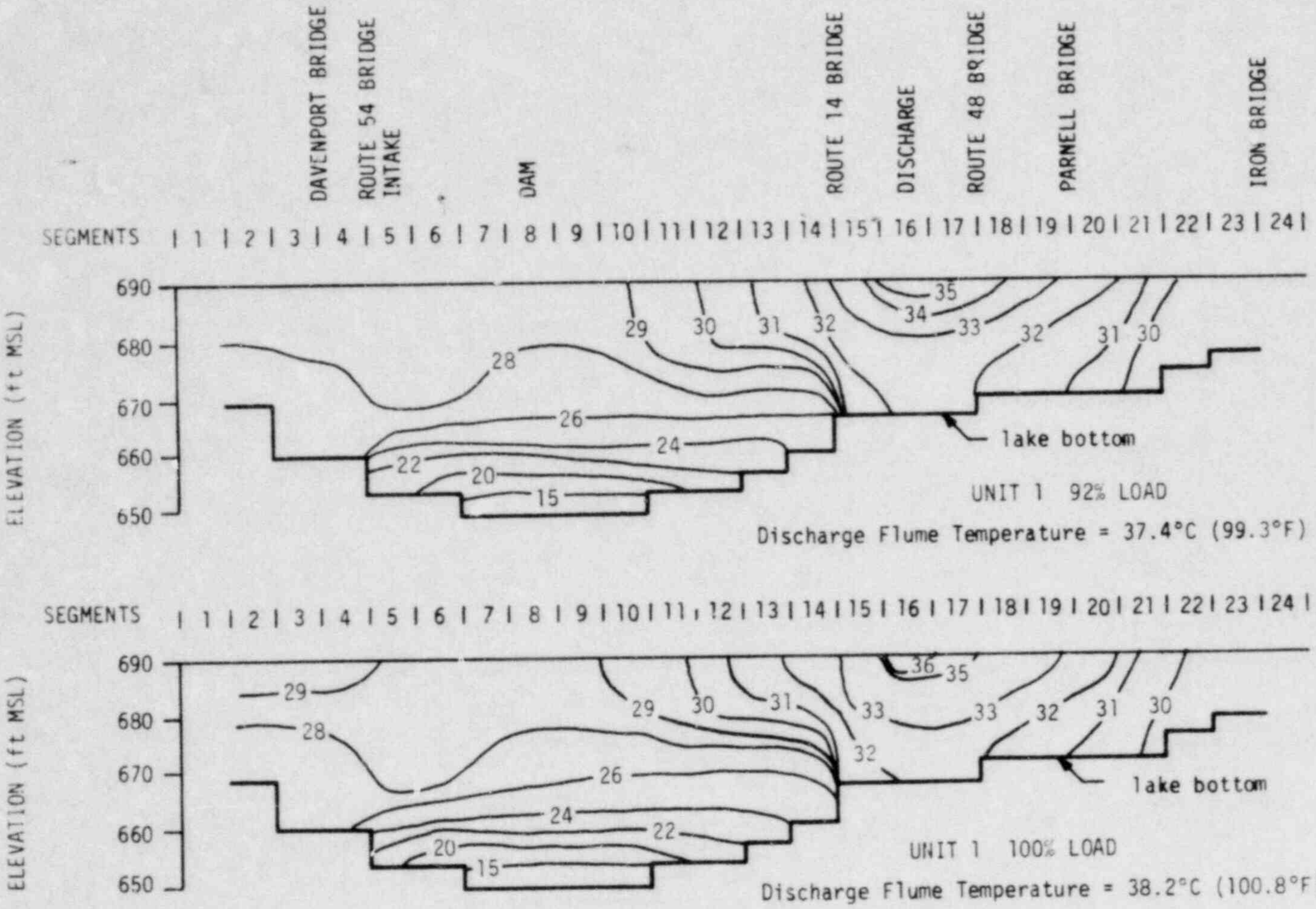


Figure 6-3. Longitudinal and Vertical Temperatures (°C) of Clinton Lake on July 23 (Julian Day 204) 1978 Under Unit 1 Operation at 92 and 100 Percent Load.

CLINTON POWER STATION
UNITS 1 AND 2
ENVIRONMENTAL REPORT-OPERATING LICENSE STAGE

FIGURE 5.1-0A

THERMAL DEMONSTRATION
FIGURE 6-3

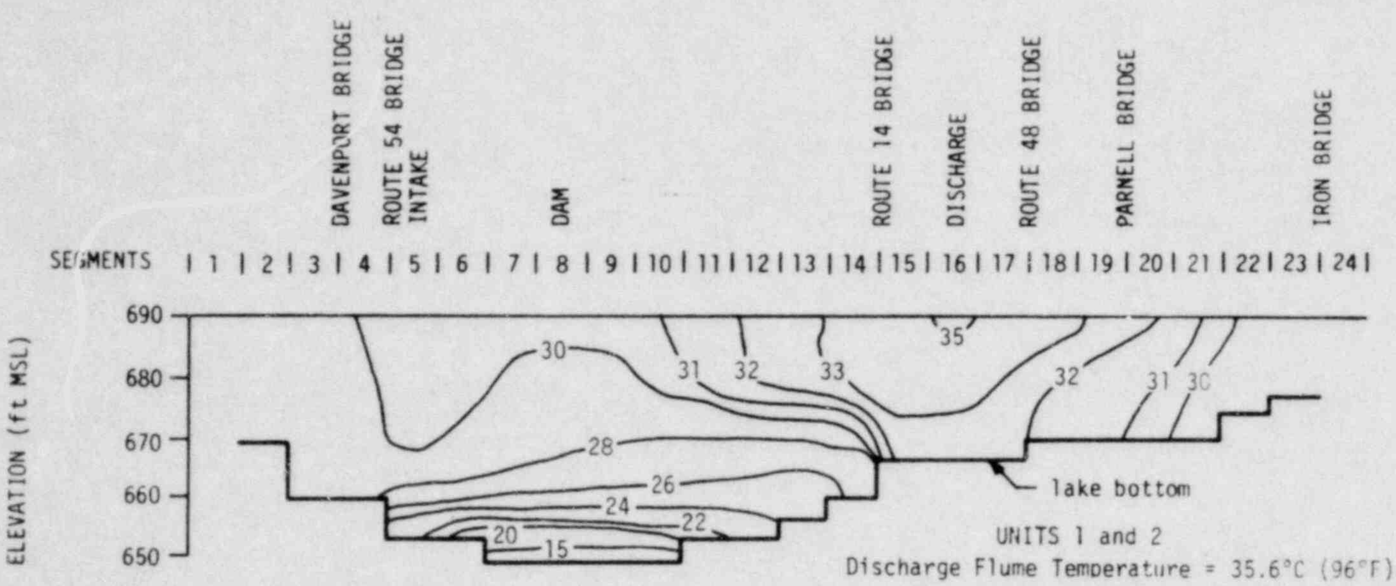
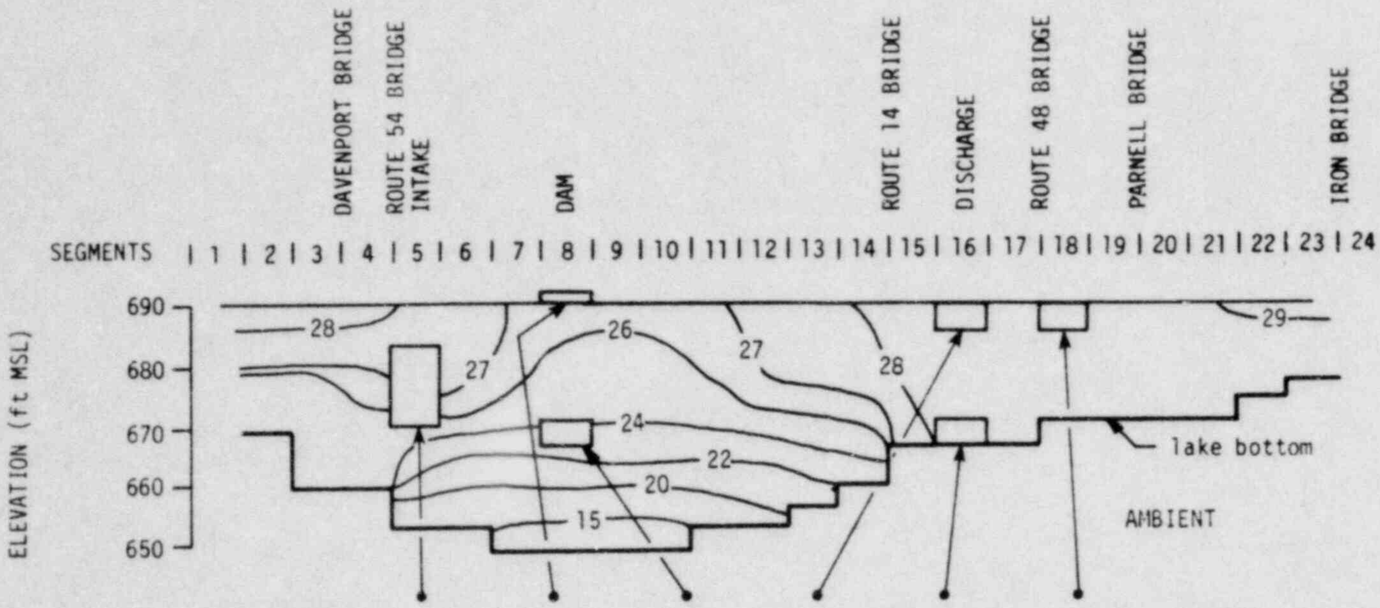


Figure 6-8. Longitudinal and Vertical Temperatures (°C) of Clinton Lake on July 23 (Julian Day 204), 1978 Under Units 1 and 2 Operation at 92 Percent Load and Discharge Temperature Constrained to Less Than or Equal to 35.6°C (96°F).

CLINTON POWER STATION UNITS 1 AND 2 ENVIRONMENTAL REPORT-OPERATING LICENSE STAGE
FIGURE 5.1-0B THERMAL DEMONSTRATION FIGURE 6-8



ZEROTH PERCENTILE	23.30	24.90	22.00	25.60	24.90	26.00
FIFTH PERCENTILE	23.48	25.02	22.00	25.60	24.96	26.06
TENTH PERCENTILE	23.70	25.12	22.08	26.32	25.10	26.58
TWENTIETH PERCENTILE	24.10	25.34	22.70	26.54	25.10	26.94
THIRTIETH PERCENTILE	24.30	25.56	22.90	26.86	25.20	27.16
FORTIETH PERCENTILE	24.40	25.96	23.30	27.00	25.46	27.36
MEDIAN	24.50	26.10	23.40	27.20	25.60	27.40
SIXTIETH PERCENTILE	25.00	26.42	23.52	27.40	25.94	27.64
SEVENTIETH PERCENTILE	25.24	26.60	23.80	27.44	26.84	27.90
EIGHTIETH PERCENTILE	25.86	26.76	24.02	27.60	26.96	28.20
NINETIETH PERCENTILE	26.28	27.00	24.20	27.98	27.40	28.50
NINETY-FIFTH PERCENTILE	27.00	27.14	24.36	28.34	27.78	28.64
HUNDREDTH PERCENTILE	27.30	27.20	24.60	28.40	28.20	28.70
MEAN	24.87	26.10	23.34	27.12	25.98	27.51
STANDARD DEVIATION	0.98	0.68	0.70	0.67	0.94	0.69

Figure 6-2. Graphic Presentation of Longitudinal and Vertical Ambient Temperatures (°C) of Clinton Lake on July 23 (Julian Day 204), 1978 and Tabulated Summary Statistics for July 1978.

CLINTON POWER STATION
UNITS 1 AND 2
ENVIRONMENTAL REPORT-OPERATING LICENSE STAGE

FIGURE 5.1-0C

THERMAL DEMONSTRATION
FIGURE 6-2

APPENDIX 5.1A - PREDICTED LAKE CLINTON TEMPERATURES

Lake surface temperatures that would occur under varying meteorological and hydrological conditions are shown in the following: Tables (5-4, 5-5, 5-6, 5-7, 5-8, 5-9, 5-10) and Figures (5-6, 5-7, 5-8, 5-9, 5-10, 5-11, 5-12) taken from the Illinois Power Company (IP) 316(a) application to the Illinois Pollution Control Board.

These are as close as we can come, at present, to the specified three-dimensional isotherms, since LAKET provided only a two-demensional graph. However, IP is in process of developing a new model which will better protray these conditions.

TABLE 5-4

PREDICTED CLINTON LAKE TEMPERATURES AT INDICATED ACRES (1962)

DATE/LOAD FACTOR	ACRES	TEMPERATURE AT START OF INDICATED DAY - °F 0	37	768	1500	2231	2962	3694	3880
Jan.	1	61	61	55	51	48	45	42	42
80%	10	59	59	53	49	45	43	40	40
	19	56	56	51	46	42	40	37	37
	28	55	55	50	45	42	39	36	36
Feb.	1	53	54	50	46	42	40	37	36
70%	10	54	54	49	46	43	40	38	37
	19	56	56	50	46	43	42	40	39
	28	55	55	50	46	43	41	38	38
Mar.	1	55	54	50	46	43	40	38	38
70%	10	55	55	50	46	44	41	39	38
	19	57	57	52	48	45	43	41	40
	28	62	61	57	53	50	47	45	45
Apr.	1	64	64	58	55	52	49	47	47
70%	10	67	67	61	58	55	52	50	50
	19	69	69	63	59	56	54	52	52
	28	76	75	70	66	63	61	59	59
May	1	78	78	72	68	66	63	61	61
70%	10	81	81	74	71	68	66	64	64
	19	88	87	81	77	74	72	71	71
	28	90	90	82	78	76	74	73	73
June	1	93	92	84	79	77	75	74	74
92%		Supplemental Cooling Effective June 10 to September 10 - See Table 5-5							
Sept.	10	96	96	88	84	81	78	77	77
80%	19	95	94	87	82	79	77	76	76
	28	91	91	84	80	76	74	72	72
Oct.	1	88	88	84	79	76	73	71	71
70%	10	86	86	30	77	74	71	70	69
	19	87	87	80	76	74	72	70	70
	28	80	80	74	70	70	65	63	63
Nov.	1	78	78	72	68	65	63	61	61
70%	10	74	73	68	64	61	59	57	57
	19	71	71	65	62	58	56	55	54
	28	68	67	62	58	55	53	51	51
Dec.	1	70	69	63	58	55	53	51	51
80%	10	66	66	59	54	51	49	47	46
	19	62	62	57	52	48	45	43	43
	28	59	59	54	50	46		41	40

Note: Two Units operating at indicated load factors

TABLE 5-7

PREDICTED CLINTON LAKE TEMPERATURES AT INDICATED ACRES (1955)

DATE/LOAD FACTOR		ACRES	0	37	768	1500	2231	2962	3694	3880
			TEMPERATURE AT START OF INDICATED DAY - °F							
Jan. 1			60	60	53	49	46	43	41	41
80%	10		62	62	56	52	48	45	43	43
	19		59	59	53	48	46	43	41	40
	28		57	56	50	45	42	40	38	37
Feb. 1			53	53	50	45	41	38	39	36
70%	10		54	54	49	46	43	40	38	37
	19		54	54	49	44	41	40	38	37
	28		57	57	53	49	46	43	41	40
Mar. 1			58	58	53	49	46	43	41	41
70%	10		61	61	55	52	49	47	45	45
	19		65	65	59	55	52	50	49	48
	28		62	62	56	52	49	47	46	45
Apr. 1			64	64	60	55	52	50	48	[illegible]
70%	10		70	70	64	60	58	55	53	53
	19		76	76	70	66	64	62	60	60
	28		80	80	73	69	66	65	63	63
May 1			81	81	75	71	68	66	65	64
70%	10		83	83	77	73	70	68	67	66
	19		85	85	79	75	72	70	69	68
	28		89	89	81	78	75	74	72	72
			Supplemental Cooling Effective June 1 to September 14 - See Table 5-8							
Sept. 14			95	95	87	83	80	78	76	76
80%	19		95	95	87	82	80	78	76	76
	23		95	95	88	83	80	78	76	76
	28		93	92	85	80	77	75	74	73
Oct. 1			90	90	85	80	77	75	73	73
70%	10		87	87	80	78	74	72	71	70
	19		82	82	76	71	68	67	66	65
	28		78	78	71	68	65	63	62	61
Nov. 1			75	75	68	64	62	60	58	58
70%	10		70	69	63	59	56	54	53	53
	19		67	67	61	58	55	52	51	50
	28		64	65	59	55	52	50	48	48
Dec. 1			64	63	55	52	49	47	45	45
80%	10		61	61	56	50	47	44	42	42
	19		59	58	53	49	46	42	40	39
	28		60	60	54	50	46	44	41	41

Note: Two units operating at indicated load factors

TABLE 5-8

PREDICTED CLINTON LAKE TEMPERATURES WITH SUPPLEMENTAL COOLING - SUMMER 1955

	DATE	ACRES	0	415	780	1150	1520	1890	2250	2640	2980	3340	3480
						TEMPERATURE AT START OF INDICATED DAY - °F							
June	7		96	89	85	82	81	80	79	77	76	75	-
	10		96	89	85	82	80	78	77	77	76	75	-
	13		96	87	84	81	78	77	75	74	74	73	73
	16		96	89	85	93	80	78	76	75	74	73	73
	19		96	92	89	86	83	82	79	78	78	78	78
	22		96	92	91	88	86	84	82	82	82	82	82
	25		96	92	89	88	87	85	84	82	81	81	81
	28		96	92	90	88	87	86	84	83	82	82	82
		ACRES	0	420	800	1178	1555	1935	2315	2690	3070	3450	3578
July	4		96	93	90	88	87	86	85	85	84	83	83
	7		96	93	92	89	87	87	85	85	84	84	83
	10		96	93	91	90	88	87	86	85	85	84	84
	13		96	93	91	90	89	88	86	86	85	84	84
	16		96	93	91	90	89	88	87	86	85	85	85
	19		96	93	91	90	89	88	87	86	86	85	85
	22		96	95	93	91	90	89	88	87	87	86	86
	25		96	93	93	92	90	89	88	87	87	86	86
	28		96	94	93	92	91	90	89	89	88	87	87
	31		96	95	94	93	92	91	91	90	89	89	88

(Sheet 1 of 2)

Radionuclides released to the lake may be adsorbed on or absorbed by suspended particles and bottom sediment. The suspended matter will settle to the bottom of the lake, with the point of settling and the time of settling depending on the size of the particles and the currents in the lake. As a result, radionuclides may accumulate in lake sediments in the vicinity of the Clinton Power Station discharge for the life of the station. Benthic organisms that live on or in this sediment could be exposed to the emitted radiation.

In addition, shoreline exposure of terrestrial organisms may result from gamma radiation from sedimentary deposits that accumulate near the bank and have only a shallow covering of water.

5.2.1.2 Exposure Pathways for Man

The various possible radiation exposure pathways for man are shown in Figure 5.2-2.

5.2.1.2.1 Terrestrial Pathways

Radioactive effluents could be distributed in the terrestrial environment as discussed in Subsection 5.2.1.1.1. The important terrestrial pathways for radiation exposure to man are the same as for terrestrial organisms and are listed below:

a. immersion in a cloud of gaseous effluents;

b. inhalation of gaseous and particulate effluents;

c. direct radiation exposure from radionuclide deposition on vegetation, soil, and exposed surfaces;

d. ingestion of contaminated water and food chain components; and

e. direct radiation exposure from the facility.

The gaseous effluent concentrations were calculated for each 22.5° sector within 50 miles of the Clinton Power Station based on 5 years of meteorological data gathered at the site. Resultant skin, thyroid, inhalation, and whole-body dose rates were calculated for the predicted population in each section for the year 2020 and for the hypothetical individual exposed continuously to the gaseous effluents at that section of the site boundary where the maximum effluent concentration is found. The resultant calculated exposure rates are conservative estimates since occupancy factors and the shielding afforded by terrain and structures, such as houses, were ignored.

Some of the most important gaseous effluents include radioactive noble gases and halogens released during normal operation of the power station. These effluents could become attached to particles in the air and deposit on vegetation, on the ground, or on a body of water. These radioactive materials could then be assimilated by land plants or animals, resulting in radiation exposure to man if the biota is in man's food chain. Because a milk cow concentrates iodine in its milk and the human thyroid also concentrates it, the air-grass-cow-milk pathway can be used to evaluate the thyroid dose to man that results from the deposition of halogens.

Direct radiation exposure from the facility is of little consequence beyond the site boundary.

5.2.1.2.2 Aquatic Pathways

The aquatic pathways of radiation exposure for man will be essentially the same as those described for biota other than man in Subsection 5.2.1.1.2. The important exposure pathways for man are the following:

a. internal exposure from ingestion of water or contaminated food chain components;

b. external exposure from the surface of contaminated water or from shoreline sediment; and

c. external exposure from immersion in contaminated water.

Water from Lake Clinton will be utilized for station potable water, but it will not be utilized in any way for public consumption. There are no municipal or industrial water intakes on Salt Creek or the Sangamon River within 50 miles downstream from the Clinton Power Station (Englehardt 1981; Falkerson 1981; Hardy 1981; TeRonde 1981). Kenny, Illinois, is the nearest town downstream from the Clinton Power Station. It is located approximately 13.5 miles downstream but does not derive its municipal water from Salt Creek. Commercial fishing is allowed on the Sangamon River but not on Salt Creek. Sport fishing is the major recreational use of Salt Creek and its tributaries. Therefore, the only possible pathway for radiation exposure of the public through the aquatic food chain is the consumption of fish caught by sport fishermen in Lake Clinton or Salt Creek or by commercial fishermen in the Sangamon River. Statistics on the number of fish caught by sport fishermen are not available. The reported commercial fish harvest from the Sangamon River in 1979, the most recent available year, was as follows (Fritz 1981):

Buffalo	1,330;
Catfish	850;
Carp	820; and
Drum	100.

External dose rates were estimated for individuals boating or swimming in Lake Clinton at the discharge point. The exposure rate from contaminated shoreline sediments was also calculated. A drinking-water dose was estimated, although consumption of water near the discharge is not anticipated. Evaluation of each pathway was based on maximized conditions; no credit was taken for dilution of the effluents by mixing in the lake. All interactions were assumed to occur with the radionuclide concentrations that will occur at the point of discharge.

which the drop size distribution is different than for cold fogs. Therefore, the data for natural fog are used when the ambient air temperature is 36°F or higher. For cold fogs, a mean drop size radius of 10 μm was used with a factor of k = 1.2 in Equation 6.1-4 (Hippler 1972). This produces a curve that is used when the air temperature is 28° of less, and is in good agreement with the results of a U.S. Army study on arctic fogs (Kumai 1972). A log-log plot of Equation 6.1-4 is presented in Figure 6.1-6 for the warm fog and cold fog cases. An interpolation is used between the two curves for transition temperatures between 28° and 36° F.

Occurrences of overpredicting downwind concentrations of water vapor were investigated as part of the model development. The problem was related to the evaporative processes on a parcel of air as it travels across the lake. That is, the term (q_1 - q_2) from Equation 6.1-2 decreases with travel time because of the following dynamic effects:

a. The specific humidity of the air, q_2, is initially a function of the dew point and is normally less than the saturation specific humidity. As the air receives water vapor from the pond, saturation is reached, increasing the value of q_2.

b. As further moisture is received by the air after it has reached saturation, the water vapor condenses into liquid water, releasing the latent heat of condensation of the water vapor and further increasing q_2.

c. As fog is formed, heat radiated from the pond is reflected and absorbed by the water droplets, further increasing the air temperature and, hence, q_2.

d. Convection of heat from the pond surface to the atmosphere still further increases q_2.

As the value of q_2 increases by the previous methods, the term (q_1 - q_2) decreases, and hence, the evaporation into a parcel of air decreases as the parcel travels across the lake. The first two mechanisms are quantifiable and were used to determine the weighting factor for adjusting the evaporation rate with travel time. Radiation and convective effects were not computed and thus were empirically accounted for in the calibration of the model.

6.1.3.2.3.2 Model Use

Predicted water temperatures for six areas of the lake evaluated to date are reduced to representative (monthly) values. The lake is divided into adjoining rectangular blocks that present an edge perpendicular to the wind direction to be evaluated.

Each of these blocks is used as a source area to compute the evaporation-condensation-diffusion process over the lake and surrounding areas of interest.

To evaluate the potential for steam fog and subsequent drift off the lake, an ambient air temperature, relative humidity, wind direction, wind speed, and atmospheric stability are used as input to the model for a given lake source area and water temperature. The model output is water vapor concentration at orthogonal gridpoints that cover the area of interest. A grid mesh of 500 meters was normally used, but frequently the size was varied to determine the location of critical values of water vapor concentration.

Five to ten years of surface meteorological data from the Peoria, Illinois, National Weather Service surface station were used as input to the analytical fog model. The period of record used was within the period of record used for the Lake Clinton temperature analyses (1949-1971).

After seven areas of interest were identified in the immediate vicinity of Lake Clinton, the Peoria meteorological data was screened for conditions that would significantly reduce visibility at the seven locations. Parameters considered in the screening process included wind direction, wind speed, stability category, and temperature-dew point difference. The fog analysis was then conducted under the conditions that would affect the areas of interest.

6.1.4 Land

6.1.4.1 Geology and Soils

The basic geologic and soil data for the site obtained from the field data and laboratory testing were described in the CPS-ER and the Preliminary Safety Analysis Report. Additional information obtained since that time is presented in the Final Safety Analysis Report.

6.1.4.2 Land Use and Demographic Surveys

The methodology employed in the land use and demographic surveys were described in the CPS-ER. These methods were also employed to update the data; the results are discussed in Section 2.1 of this report.

6.1.4.3 Ecological Parameters

The CPS-ER discussion of the terrestrial ecological monitoring program described the baseline study that had been conducted during 1972. This section provides a summary description of the program conducted beginning in May 1974. The schedule for this program was in accordance with the frequencies listed in Table 6.1-4A of the CPS-ER and as described in the FES. This program is related to the three phases of site development described at the beginning of Section 6.1.

This program was designed to monitor the wildlife and vegetation communities in the site area. The program provides data on naturally occurring year-to-year variations within these communities during the preconstruction, construction, and lake filling and development phases. All work was performed by NALCO Environmental Sciences of Northbrook, Illinois (formerly Industrial Bio-Test Laboratories).

6.1.4.3.1 Flora

The five plant communities sampled during baseline study were sampled in May of each year (see Figures 6.1-3 and 6.1-4).

These communities included the Abandoned Pasture (Site 1), Upland White Oak Woods (Site 2), Mesic Woods (Site 3), Floodplain Woods (Site 4), and Xeric Woods (Site 5). The plant communities were sampled quantitatively once to determine the frequency of occurrence, density, and dominance of individual species. The entire vegetational structure including trees, shrubs, herbs and grasses was sampled. Importance value was computed according to Curtis and McIntosh (1951) for individual tree species.

Sampling methods included the quadrant, quarter, and transect methods (Curtis and Cottam 1962). Sampling points have been distributed systematically (Oosting 1965). The degree of sampling intensity (i.e., number of sampling points in each community) is adequate to assess each community. Nomenclature follows Gleason (1968).

6.1.4.3.2 Fauna

6.1.4.3.2.1 Birds

Surveys were conducted during May, July, November, and February to determine species composition and relative abundance of resident and migratory game and nongame birds.

Birds were censused along a 20-mile wildlife survey route on two consecutive days each quarter. (see Figures 6.1-3 and 6.1-4) Surveys were initiated each day during the hour following official sunrise. Observations of birds were reported during a 3-minute period at each of 20 stops and between stops along the route.

Species composition and relative abundance of birds were recorded in the five plant communities. Sight counts and auditory censuses were used along quarter-mile transect routes that followed the small mammal trapping lines. Nomenclature follows the American Ornithologists Union (1957, 1973, 1976).

6.1.4.3.2.2 Mammals

Surveys of small and medium-sized mammal populations were conducted during May and November of each year in the Abandoned Pasture (Site 1), Floodplain Woods (Site 4), and Xeric Woods (Site 5) (see Figures 6.1-3 and 6.1-4). A series of traplines using live- and snap-traps were set to census the resident small and medium-sized mammal populations. Cottontail rabbits were censused by standard roadside counts. Time-area counts were used to census squirrels during February in the wooded habitats. Nomenclature follows Jones et al. (1975).

In addition to the described surveys, records were kept of all observations of mammals and/or their sign (tracks or scats) during each field trip. In general, all the described census techniques are standard techniques to determine the abundance and distribution of wildlife species (Giles 1971). Table 6.1-7 provides a summary schedule for the terrestrial ecological monitoring.

6.1.5 Radiological Monitoring

The preoperational radiological environmental monitoring program for the Clinton Power Station will consist of activities to monitor airborne, direct radiation, waterborne, and ingestion pathways. The Radiological Environmental Program has been patterned after the Branch Technical Position of the U.S. NRC, "An Acceptable Radiological Environmental Monitoring Program." dated March, 1978. Some of the important items of the Branch Technical Position that are included in the program are the following:

a. During preoperational and operational monitoring annual reports will be prepared and sent to the U.S. NRC. Deviations from the sampling schedule shall be documented in the annual report.

b. The laboratory performing the analysis shall participate in the U.S. EPA Crosscheck Program. The results of the crosscheck analysis shall be included in the annual report.

c. An annual census shall be conducted to determine the location of nearby milk animals and vegetable gardens (greater than 500 sq. ft.). If the census results in changes in the sample locations during the operational phase, a written report shall be sent to the Director of Operating Reactors, NRR, within 30 days.

Figure 6.1-7 indicates locations where environmental samples will be taken Table 6.1-8 indicates the direction and distance, the type of sample, the frequency start date, and the duration of sampling for all samples. Table 6.1-9 gives the lower limits of detection for the various analysis techniques.

Radiological sampling Locations 1 and 8 are at the communities of Birkbeck and DeWitt respectively. Locations 2, 3, 4, and 6 are near the exclusion area boundary in sectors that have relatively high χ/Q values. Location 7 is the Lake Clinton State Recreational Area (IP land leased to the Illinois Department of Conservation). Location 9 is near the point where the Clinton Power Station discharge flume empties into Lake Clinton. Location 10 is upstream of the state Route 48 bridge and will be used as the control location for water samples. Location 11 is 16 miles south of the station and will serve as a control location. Location 12 is the site of the deep well supplying water for the community of DeWitt. Location 13 is on Salt Creek downstream of the Lake Clinton dam.

Location 14 is at the Clinton Power Station makeup water pump house. Locations 15, 16, and 17 will be determined by the annual census of milk animals; their exact locations will be provided in the first annual report. Location 19 will be in the general lake area of the discharge flume.

Once every 3 years soil samples will be collected at the airborne detector locations, and these samples will undergo gamma isotopic analysis.

6.1.6 Proposed Changes to Existing Preoperational Program

Since the lake is full and experience has been gained in sampling it as it exists now, the applicant feels that some changes should be made in the existing preoperation monitoring program. These proposed changes and the supporting rationale are presented in this subsection. The proposed changes consist of additions, deletions, reduction, and other modifications. Most of the additions proposed have already been implemented. The implementation of these changes began when IP took over monitoring in early 1978, and these additions were thus included in the description of the monitoring program given in Subsection 6.1.1.

6.1.6.1 Water Chemistry

The following changes are proposed:

a. add - Location 16 for all parameters (see Figure 6.1-2);

b. add - vertical profile at 1 meter intervals at Locations 2, 4, 8, and 16 for dissolved oxygen, temperature, pH, and conductivity;

c. add - all chemical parameters to Locations 6 and 9;

d. reduce - chlorine measurement to Locations 9 and 3 during the preoperational period, add Locations 2, 3, 4, 8, and 9 after operation;

e. reduce - duplicate sample collection and analysis to only one location each month; and

f. move - temperature station from 5,000 feet upstream to Location 16.

These proposed changes have the following rationale:

a. Location 16 should be added to provide a control location for lake water prior to any effluent addition by the plant. Location 3 indicates the quality of the water entering the lake, and Location 2 represents the site of the power plant discharge into the lake.

The water chemistry could be altered by physical, chemical and biological factors characteristic of the lake environments between Location 3 and Location 2. The State Route 48 bridge because of its long causeways and narrow waterways should somewhat isolate Location 16 from direct influence of plant effluents. This location will provide a control location for the lake water prior to any plant influence. This location will also serve as an important control site for biological samples.

b. Vertical profiles at 1-meter intervals at the lake location will provide additional information about the thermostratification pattern of the lake. This information will be helpful in more accurately defining the epilimnion, metalimnion, and hypolimnion for the collection of water samples for all chemical parameters.

c. Locations 6 and 9 will be analyzed for all the same chemical parameters as the other locations. This uniformity will be helpful in comparing information between locations. It will also allow measurement of effects of the Farmer City sewage treatment plant discharge, the only potential source of chlorine into the lake aside from Clinton Power Station. Location 3 is downstream of Location 9 and will provide a check point for any residual chlorine from the sewage treatment plant discharge.

d. During the operational period, Locations 2, 8, and 4 will likely be added for chlorine. Location 2 is at the only potential source of chlorine into the lake from the power plant. The present limitation of only 2 hours of chlorination per day at 0.2 mg/liter is so low it probably will not be detectable at Location 2. Location 8 is a potential source of discharge from the lake and will validate the lack of chlorine. Location 4 will provide validation that there is no residual chlorine in the cooling loop.

e. Collection of duplicate samples from different location each month will provide a 10% duplication on the sample collection. Replicate analyses are performed on approximately 10% of the samples as a quality control on the precision of the analysis. Spiked samples are also run approximately 10% of the time as a quality control on the accuracy of the analysis. This quality control program generally follows the recommendations contained in the Handbook for Analytical Quality Control in Water and Wastewater Laboratories (U.S. EPA 1979). The effort required for complete duplication in the collection of water samples is disproportionate to the additional

TABLE 6.1-7

ENVIRONMENTAL MONITORING SCHEDULE FOR PRECONSTRUCTION CONSTRUCTION, AND LAKE FILLING AND DEVELOPMENT PHASES

PRECONSTRUCTION PHASE

SAMPLE	1974												1975								
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S
TERRESTRIAL ECOLOGY																					
Vegetation[a]					X												X				
Avifauna[b]					X		X				X			X			X		X		
Mammals[c]					X						X						X				
AQUATIC ECOLOGY																					
Water Chemistry[d]					X			X			X			X			X			X	
Sediment Chemistry[e]																	X				
Aquatic Biology[f]																					
Periphyton					X			X			X				X		X			X	
Benthos					X			X			X				X		X			X	
Fisheries[g]					X			X			X				X		X			X	

CONSTRUCTION PHASE

SAMPLE	1975			1976												1977									
	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O
TERRESTRIAL ECOLOGY																									
Vegetation[a]								X												X					
Avifauna[b]		X			X			X		X				X			X			X		X			
Mammals[c]		X						X						X						X					
AQUATIC ECOLOGY																									
Water Chemistry[d]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sediment Chemistry[e]								X												X					
Aquatic Biology[f]																									
Periphyton		X			X			X			X			X				X		X			X		
Benthos		X			X			X			X			X				X		X			X		
Fisheries[g]		X			X			X			X			X				X		X			X		

LAKE FILLING AND DEVELOPMENT PHASE

SAMPLE	1977		1978											
	N	D	J	F	M	A	M	J	J	A	S	O	N	D
TERRESTRIAL ECOLOGY														
Vegetation[a]							X							
Avifauna[b]	X			X			X		X				X	
Mammals[c]	X						X						X	
AQUATIC ECOLOGY														
Water Chemistry[h]	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Aquatic Biology														
Periphyton[f]	X			X			X			X			X	
Benthos[f,i]	X			X			X			X			X	
(beginning in 5/78)														
Plankton[j]							X			X			X	
(beginning in 5/78)														
Fisheries[g,k]	X					X	X			X			X	

SAMPLE	1979												1980											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
TERRESTRIAL ECOLOGY																								
Vegetation[a]					X																			
Avifauna[b]		X			X		X				X			X										
Mammals[c]					X						X													
AQUATIC ECOLOGY																								
Water Chemistry[h]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Aquatic Biology																								
Periphyton[f]			X		X			X			X				X		X			X			X	
Benthos[f,i]			X		X			X			X				X		X			X			X	
(beginning in 5/78)																								
Plankton[j]			X		X			X			X				X		X			X			X	
(beginning in 5/78)																								
Fisheries[g,k]			X		X			X			X				X		X			X			X	

[a]Sampled at locations 1-5 (see Figure 6.1-3).
[b]Sampled at locations 1-5 and along 20-mile survey route (see Figure 6.1-3).
[c]Sampled at locations 1-5 and along 20-mile survey route (see Figure 6.1-3). (Small mammal trapping at locations 1, 4, and 5 only.)
[d]Sampled at locations 1, 3, 5, and 7 (see Figure 6.1-1).
[e]Sampled at location 1 (see Figure 6.1-1).
[f]Sampled at locations 1 and 7 (see Figure 6.1-1).
[g]Sampled at locations 1, 2, 3, 4, 5, and 7 (see Figure 6.1-1).
[h]Sampled at locations 1-9 (see Figure 6.1-2).
[i]Sampled at locations 1, 2, 4, 7, 13, and 16 (see Figure 6.1-2).
[j]Sampled at locations 1, 2, 3, 4, 4.5, 5, 6, 7, 8, 9, and 16 (see Figure 6.1-2).
[k]Sampled at locations 1, 2, 4, 4.5, 5, 7, 8, 16, and 17 (see Figure 6.1-2).

TABLE 6.1-8

PREOPERATIONAL RADIOLOGICAL MONITORING PROGRAM

SAMPLE LOCATION NUMBER	LOCATION RELATIVE TO STATION-DIRECTION/DISTANCE (feet)	ANALYSIS TO BE PERFORMED ON EACH SAMPLE	GENERAL TYPE OF COLLECTION EQUIPMENT	COLLECTION FREQUENCY/ANALYSIS FREQUENCY	STARTING DATE	APPROX. DURATION (months)	SAMPLE TYPE
1	NNW/9,750	I-131 Gross β γ isotopic	Air Particulate Monitor	7 days/7 days 7 days/7 days 7 days/92 days	10/81 7/81 7/81	15 18 18	Airborne
		γ dose	TLD	92 days	4/80	33	Direct Radiation
2	NNE/3,000	I-131 Gross β γ isotopic	Air Particulate Monitor	7 days/7 days 7 days/7 days 7 days/92 days	10/81 7/81 7/81	15 18 18	Airborne
		γ dose	TLD	92 days	4/80	33	Direct Radiation
3	NE/3,000	I-131 Gross β γ isotopic	Air Particulate Monitor	7 days/7 days 7 days/7 days 7 days/92 days	10/81 7/81 7/81	15 18 18	Airborne
		γ dose	TLD	92 days	4/80	33	Direct Radiation
4	WSW/3,000	I-131 Gross β γ isotopic	Air Particulate Monitor	7 days/7 days 7 days/7 days 7 days/92 days	10/81 7/81 7/81	15 18 18	Airborne
		γ dose	TLD	92 days	4/80	33	Direct Radiation
6	SW/3,000	I-131 Gross β γ isotopic	Air Particulate Monitor	7 days/7 days 7 days/7 days 7 days/92 days	10/81 7/81 7/81	15 18 18	Airborne
		γ dose	TLD	92 days	4/80	33	Direct Radiation
7	SE/11,750	I-131 Gross β γ isotopic	Air Particulate Monitor	7 days/7 days 7 days/7 days 7 days/92 days	10/81 7/81 7/81	15 18 18	Airborne
		γ dose	TLD	92 days	4/80	33	Direct Radiation
		γ isotopic	Grab Samples	182 days/182 days	4/80	33	Shoreline Sediment
		γ isotopic	Grab Samples	182 days/182 days	4/80	33	Bottom Sediment
		γ isotopic	Grab Samples	182 days/182 days	4/80	33	Slime
		Gross β γ isotopic tritium	Grab Samples	31 days/31 days 31 days/31 days 31 days/92 days	7/81 7/81 7/81	18 18 18	Well Water
8	ENE/13,750	I-131 Gross β γ isotopic	Air Particulate Monitor	7 days/7 days 7 days/7 days 7 days/92 days	10/81 7/81 7/81	15 18 18	Airborne
		γ dose	TLD	92 days	4/80	33	Direct Radiation
9	E/7,500	γ isotopic tritium	Grab Samples	31 days/31 days 31 days/92 days	7/81 7/81	18 18	Surface Water

POOR ORIGINAL

TABLE 6.1-8 (Cont'd)

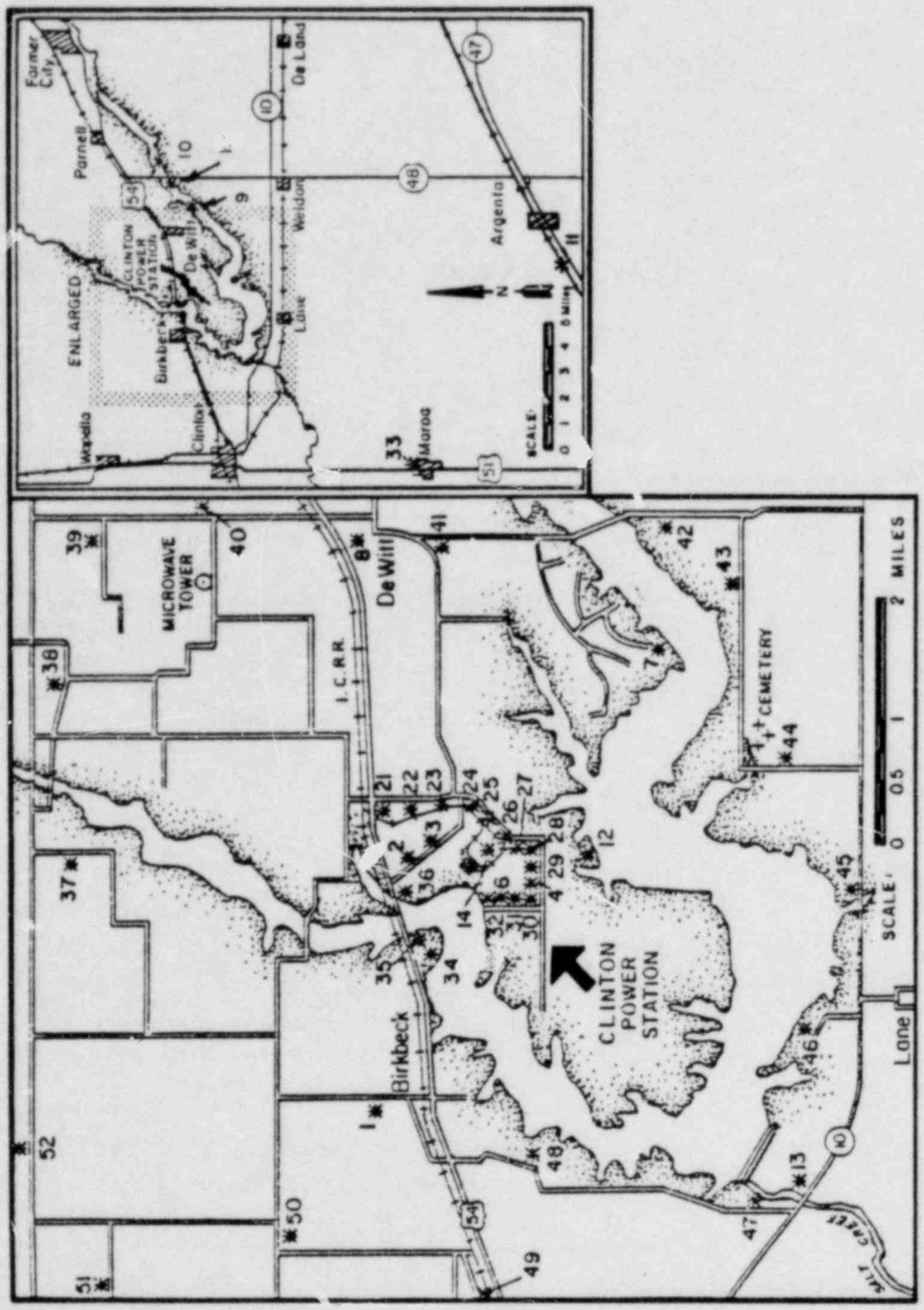
SAMPLE LOCATION NUMBER	LOCATION RELATIVE TO STATION-DIRECTION/DISTANCE (feet)	ANALYSIS TO BE PERFORMED ON EACH SAMPLE	GENERAL TYPE OF COLLECTION EQUIPMENT	COLLECTION FREQUENCY/ANALYSIS FREQUENCY	STARTING DATE	APPROX. DURATION (MONTHS)	SAMPLE TYPE
10	ENE/26,250	γ isotopic tritium	Grab Samples	31 days/31 days 31 days/92 days	7/81 7/81	18 18	Surface Water
		γ isotopic	Grab Samples	182 days/182 days	4/80	33	Slime
		γ isotopic	Grab Samples	182 days/182 days	4/80	33	Shoreline Sediment
		γ isotopic	Grab Samples	182 days/182 days	4/80	33	Bottom Sediment
11	S/approximately 16 mi.	I-131 Gross β γ isotopic	Air Particulate Monitors	7 days/7 days 7 days/7 days 7 days/92 days	10/81 7/81 7/81	15 18 18	Airborne
		γ dose	TLD	92 days	4/80	33	Direct Radiation
		I-131 γ isotopic	2 gallons per Location	14 days/14 days on pasture 31 days/31 days other	10/81	15	Milk
12	S/5,250	I-131 Gross β γ isotopic tritium	Grab Samples	14 days/14 days 31 days/31 days 31 days/31 days 31 days/92 days	7/81 7/81 7/81 7/81	18 18 18 18	Well Water
13	SW/20,000	γ isotopic tritium	Grab Samples	31 days/31 days 31 days/92 days	7/8 7/81	18 18	Surface Water
14	NNW/1,000	I-131 Gross β γ isotopic tritium	Composite Water Samples	14 days/14 days 31 days/31 days 31 days/31 days 31 days/92 days	7/81 7/81 7/81 7/81	18 18 18 18	Well Water
15 16 17	To be determined on the basis of census results	I-131 γ isotopic	2 gallons per Location	14 days/14 days animals on pasture 31 days/31 days other	10/81 7/81	15 18	Milk
18	To be determined on the basis of census results	γ isotopic	Grab Samples	365 days/365 days	7/81	18	Green Leafy Vegetables and Tuberous Veg.
19	Discharge flume area	γ isotopic	Net	182 days/182 days	4/80	33	Fish
21-52	16 sectors in an inner ring near site boundary 16 sectors in an outer ring 4-5 miles range from site	γ dose	TLD	92 days	4/80	33	Direct Radiation

POOR ORIGINAL

TABLE 6.1-9

LOWER LIMITS OF DETECTION FOR ENVIRONMENTAL SAMPLE ANALYSIS

ANALYSIS	WATER (pCi/liter)	AIRBORNE PARTICULATE OR GAS (pCi/m^3)	FISH (pCi/kg, wet)	MILK (pCi/liter)	FOOD PRODUCTS (pCi/kg, wet)	SEDIMENT (pCi/kg, dry)
Gross Beta	2	1×10^{-2}				
H-3	330					
Mn-54	15		130			
Fe-59	30		260			
Co-58; Co-60	15		130			
Zn-65	30		260			
Zr-95; Nb-95	10					
I-131	0.5	7×10^{-2}		8.8		
Cs-134; Cs-137	15	1×10^{-2}	130	15		150
Ba-140; La-140	15			15		



CLINTON POWER STATION
UNITS 1 AND 2
ENVIRONMENTAL REPORT-OPERATING LICENSE STAGE

FIGURE 6.1-7

LOCATION OF RADIOLOGICAL MONITORING POINTS

POOR ORIGINAL

CHAPTER 8 - ECONOMIC AND SOCIAL EFFECTS OF STATION CONSTRUCTION AND OPERATION

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CHAPTER 8 - ECONOMIC AND SOCIAL EFFECTS OF STATION CONSTRUCTION AND OPERATION

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CHAPTER 8 - ECONOMIC AND SOCIAL EFFECTS OF STATION CONSTRUCTION AND OPERATION

Most information on the economic and social effects of station construction and operation is included in Chapter 8 of the Clinton Power Station - Units 1 and 2: Environmental Report - Construction Permit Stage (CPS-ER) and in Sections 4.4 and 5.6 of the Clinton Final Environmental Statement (FES) published by the U.S. Atomic Energy Commission in October 1979. Only additional information is included in this chapter.

8.1 EFFECT OF CLINTON POWER STATION OPERATING STAFF ON SURROUNDING COMMUNITIES

The presently authorized plant staffing level for one unit operation is 221. Of this total 38% are involved in operations activities and 37% are involved in maintenance activities. This number (221) does not include security guards, who should number about 80. The size of the staff may increase somewhat as minor adjustments are made before fuel loading.

The two unit-staff is estimated to be 50% larger than the one-unit staff, and the contractor personnel required during outages will be consistent with the present industry use of contractor personnel during outages. The estimated annual payroll for the first full year of operation for each unit is as follows:

	1982 Dollars
Unit 1-1984	$9,490,000
Unit 2-1996	5,160,000

These values represent the cost of labor if purchased in 1982.

8.1.1 Anticipated Impacts on Affected Communities from Workers' Residences

Approximately 60% of the operating staff for the Clinton Power Station is already at the site. It is expected that the current residential pattern of these workers will be the typical pattern for the total operating staff. The residential location of present operating employees is as follows:

Community	Clinton Power Station Employees Number	Percent
Decatur	57	42.5
Clinton	18	13.4
Maroa	9	6.7
Champaign-Urbana	8	6.0
Farmer City	6	4.5
Warrensburg	6	4.5
Other Communities	30	22.4

With the exception of Bloomington, "Other Communities" include small towns and villages within a 25-mile radius of the Clinton Power Station. Only from one to four employees reside in any one of these small communities. Bloomington, which has three operating personnel residing there, is an SMSA located approximately 23 miles northwest of the station.

Assuming that the preceding residential pattern proves typical of the total operating staff, approximately 40% of the staff is expected to reside in Decatur. Thus the number of additional workers expected to relocate to Decatur is about 30. Decatur is an SMSA located approximately 23 miles southwest of the station, with a 1980 population of 94,081. The additional workers and their families are not expected to have any significant impact on the city's services and facilities. Similarly the small number of additional workers expected to relocate to Champaign-Urbana (which had a population of 94,111 in 1980) and Bloomington-Normal (which had a population of 79,861 in 1980) should have insignificant impacts on those cities services.

The town of Clinton (8,014 in 1980) is the only community near the station in which a significant percentage of the Clinton Power Station workers are expected to reside: about 13%. The additional residents should amount to approximately 10 workers and their families. The additional residents should not require any addition to community services and facilities. In 1980 Clinton had a total of 3,354 housing units (a 16% increase over 1970) of which 2,214 were owner occupied. Of the 1,140 rental units 28% were single family units. Between 1975 and 1979 DeWitt County (excluding Clinton) granted 235 permits for new single family homes, and 142 permits for mobile homes. In the town of Clinton, between 1975 and 1979, permits were granted for 133 single family units and 91 multi-family units. It is not expected that there will be a shortage of available housing in DeWitt County or the town of Clinton.

Educational and health facilities in Clinton and the other nearby small communities should experience little impact from the Clinton Power Station staff and their families. There are three school districts in DeWitt County: Clinton School District, consisting of one high school, one junior high, and four grade schools; Wapella School District, consisting of a combined junior high and high school and one grade school; and the Farmer City-Mansfield School District, consisting of one high school, one junior high, and three grade schools. Table 8.1-1 gives the 1979-1980 enrollment, capacity, and staff for each school district. The largest school district is Clinton, which had a total of 2,203 students in the 1979-1980 school year. The Farmer City-Mansfield District had 914 students, and the Wapella District had 344 students in 1979-1980.

The present capacity of each school district indicates that there will be no need for additional school facilities to accommodate the school-age children of CPS operating personnel who relocate to the area. The Clinton School District is the only district whose 1979-1980 enrollment was near capacity. Enrollment in the other two districts was approximately 50% of capacity. Since a relatively small number of additional operating personnel with a relatively small number of school-age children are expected to move to the area, there should be no need for additional school facilities.

The John Warner Hospital, located in the town of Clinton approximately 3.8 miles from the station, has a capacity of 52 beds with a staff of approximately 165. Additional health care is provided at Crest View Nursing Home - 98 residents and 65 staff members; DeWitt County Nursing Home - 72 residents and 41 staff members, and DeWitt Mental Center - out patients only (10 to 50 per day) and 15 staff members. No additional health care facilities should be needed.

8.1.2 Anticipated Impacts on Affected Communities from Clinton Power Station

The Clinton Fire Department will provide fire protection for the Clinton Power Station, and the DeWitt County Sheriff Department will provide police protection. As discussed previously, the John Warner Hospital, the only hospital facility in the vicinity of the station, will be providing health care for station personnel. In addition to the hospital, emergency health care assistance will be available from the following:

DeWitt County Emergency Services Disaster Area
Illinois State Department of Public Health
State of Illinois Emergency Services Disaster Agency
Illinois Department of Conservation
Clinton Ambulance Service

It is not anticipated that any of these five agencies will require expansion to existing facilities or additional staff to meet the Clinton Power Station demand.

From the experience of Illinois Power Company with an 1800 MW coal-fired generating station in central Illinois, annual local expenditures can be expected to average approximately $122,000 (1980 dollars). Local purchases are expected to be made primarily in Decatur with smaller purchases being made in Clinton, Bloomington-Normal, and Champaign-Urbana.

The Clinton Power Station will be subject to locally assessed real estate taxes which are largely a matter of conjecture at this time. Such taxes are levied annually based upon the requirements of the districts. Assessed valuations beginning in the first full year of operation, which is now expected to be 1984, can only be estimated in a very general way. A number of revisions in Illinois property tax law have occurred in recent years and can be expected to continue. For example, Illinois farmland is now assessed at lower levels than other property, which has shifted some of the tax burden to non-agricultural properties. Limited exemptions have been granted on residential properties to reduce taxes on such property. In the corporate sector personal property taxes were abolished in 1979 and were replaced by a statewide income tax and a tax on the invested capital of public utilities. An unresolved controversy exists over what property is currently assessable as real estate subsequent to the abolition of personal property.

It is therefore impossible to accurately forecast the tax liabilities requested. The figures presented in Table 8.1-2 should be considered within these limitations. These figures relate to Clinton Unit 1 only since too many unsettled questions exist to allow tax estimates on Unit 2. The taxing districts shown in the table will be the ones primarily effected by Clinton Unit 1. The site including the lake area is located in certain other taxing districts which are not materially effected and are therefore not listed.

TABLE 8.1-1

DEWITT COUNTY SCHOOL SYSTEMS

(1979-1980)

SCHOOL	CAPACITY[a]	ENROLLMENT[b]	STAFF[c]
Clinton School District			
Clinton High School	900	694	51
Clinton Junior High School	800	500	34
Douglas Grade School	210	209	13
Lincoln Grade School	210	202	12
Washington Grade School	345	352	18
Webster Grade School	245	246	15
Wapella School District (Piatt County)			
Wapella Junior High and High School	250	157	17
Wapella Grade School	225	187	13
Farmer City-Mansfield School District			
Farmer City-Mansfield High School	720	317	23
Farmer City-Mansfield Junior High	275	135	9
Schneider Grade School	525	140	9
Franklin Grade School	350	150	8
Mansfield Grade School	375	172	12

[a]Source: Chaska (1980).

[b]Source: Stockel (1980).

[c]Source: Corrigan (1980).

TABLE 8.1-2

ESTIMATED CLINTON POWER STATION

UNIT 1 REAL ESTATE TAXES

TAXING DISTRICT	ESTIMATED REAL ESTATE TAXES (in thousands) 1984 PAYABLE IN 1985	1985 PAYABLE IN 1986	1986 PAYABLE IN 1987	1987 PAYABLE IN 1988	1988 PAYABLE IN 1989	ESTIMATED PERCENTAGE OF REAL ESTATE TAXES REPRESENTED BY CLINTON UNIT 1
DeWitt County[a]	$1,600	$1,600	$1,600	$1,700	$1,700	50%-55%
Harp Township	300	400	400	400	500	90%-95%
Unit 15 School District	4,900	5,200	5,500	5,800	6,000	65%-70%
Jr. College District 537	500	500	500	500	500	20%-25%
TOTALS	$7,300	$7,700	$8,000	$8,400	$8,700	

[a]DeWitt County distributes their funds to the following categories: general corporate fund, highway, health, mental health, Illinois municipal retirement fund, insurance, matching federal aid (highways), audit, bridges, extension education, tax assessments, election, nursing home bonds, tax collection, civil defense, and tuberculosis.

8.2 RECREATIONAL DEVELOPMENT PLAN

The recreational development plan for Lake Clinton and its associated recreational area is discussed in Subsection 2.1.3.3. The recreational activities provided include boating, swimming, fishing, camping, picnicking, hunting, hiking trails, and snowmobiling.

DeWitt County is in a 16-county Illinois Department of Conservation (DOC) administrative region (Region 3B) consisting of the following counties: DeWitt, Piatt, Macon, Shelby, Moultrie, Coles, Cumberland, Clark, Edgar, Douglas, Champaign, Ford, McLean, Livingston, Iroquois, and Vermillion. The DOC divides Illinois into seven regions and ranks each region by the adequacy of outdoor recreation opportunities available in the region in 1976. The DOC ranking showed that Region 3B was inadequately supplied in most water sports, and ranked sixth or seventh in such activities as swimming, motorboating, canoeing, and sailing; all of which are offered at Lake Clinton. In 1976 the 16-county region was served by 8 public and 10 private beaches, and on lakes and ponds on which motorboating was allowed there were 11,100 acres for unrestricted motorboating and 12,710 acres for motorboating restricted to 10 horsepower or less. There were 24,312 acres of lakes and ponds for fishing, and 6,978 acres of river fishing area (Illinois Department of Conservation 1978). The DOC statistics indicate that the Lake Clinton recreational facilities will fill a need and improve the adequacy of outdoor recreational opportunities in the region.

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NRC REQUEST FOR ADDITIONAL INFORMATION

QUESTIONS AND RESPONSES

This section contains the NRC requests for additional information followed by the response to the question, which in some cases includes a reference to the applicable updated sections of the text.

Pages S.1-1 and S.1-2 respond to NRC questions submitted in the letter of August 29, 1980, and pages S.1-3 through S.1-69 respond in numerical order to NRC questions submitted in the letter of May 22, 1981.

QUESTION

Section 2.2 of the Environmental Report should be modified to include the following information.

1. Provide descriptions of the floodplains of all water bodies, including intermittant water courses; within or adjacent to the site. On a suitable scale map provide delineations of those areas that will be flooded during the one-percent chance flood in the absence of plant effects (i.e., pre-construction floodplain).

2. Provide details of the methods used to determine the floodplains in response to 1. above. Include your assumptions of and bases for the pertinent parameters used in the computation of the one-percent flood flow and water elevation. If studies approved by Flood Insurance Administration (FIA), Housing and Urban Development (HUD) or the Corps of Engineers are available for the site or adjoining area, the details of analyses need not be supplied. You can instead provide the reports from which you obtained the floodplain information.

3. Identify, locate on a map, and describe all structures, construction activities and topographic alterations in the floodplains. Indicate the status of each structure, construction activity and topographic alteration (in terms of start and completion dates) and work presently completed.

4. Discuss the hydrologic effects of all items identified in 3. above. Discuss the potential for altered flood flows and levels, both upstream and downstream. Include the potential effect of debris accumulating on the plant structures. Additionally, discuss the effects of debris generated from the site on downstream facilities.

5. Provide the details of your analysis used in response to 4. above. The level of detail is similar to that identified in item 2. above.

6. Identify non-floodplain alternatives for each of the items (structures, construction activities and topographic alterations) identified in 3. above. Alternately, justify why a specific item must be in the floodplain.

7. For each item in 6. above that cannot be justified as having to be in the floodplain either show that all

non-floodplain alternatives are not practicable or commit to re-locating the structure, construction activity or topographic alteration out of the floodplain.

RESPONSE

Figure 2.4-10A in the ER-OLS shows the once-in-100-year flood prone area that would exist in the vicinity of Clinton Power Station without Lake Clinton in place (preconstruction flood prone area), as outlined by the U.S. Geological Survey (1974). The details of the determination of the once-in-100-year flood elevation with the lake in place are given in Subsection 2.4.1.4.3. Figure 2.4-10C shows that the once-in-100-year flooded area with Lake Clinton in place is well within the station property line. Beyond the property line, in the upper reaches of Salt Creek and the North Fork of Salt Creek, the lake does not increase the flooded area as compared to the once-in-100-year flood. Flood flows downstream of the Lake Clinton dam are lowered compared to preconstruction flood flows; hence, the once-in-100-year flood levels are lower.

No station structures were built in the preconstruction once-in-100-year flood prone area except for the dam that was built across Salt Creek to create Lake Clinton. Obviously, there was no alternative location for the dam outside of the flood prone area. Several structures have been built along the edges of the post-construction flood prone area (with Lake Clinton in place). These include the intake and discharge structures, modified highway bridges, a marina, and seven boat ramps. Again, there was no feasible location for these structures outside of the flood prone area. Construction of these structures is complete, and their presence will not cause any alteration in flood levels that will extend beyond the site property lines. There will be no effect on downstream facilities of debris generated from the site during floods.

This response is incorporated into the text of the report in greater detail in Subsection 2.4.1.4.3

Question 100.1

In addition to responses to other specifically requested information, provide a summary and brief discussion in table form, by section, of differences between currently projected environmental effects of the nuclear power station (including those that would degrade, and those that would enhance environmental conditions) and the effects discussed in the environmental report submitted at the construction stage.

Response

The environmental effects of the CPS are discussed in Chapters 4, 5, and 7 of the Environmental Report - Operating Licensing Stage (ER-OLS). The differences from the construction permit stage report (ER-CP) that are not addressed in the answers to specific NRC questions are summarized in Table 100.1-1. Chapter 8 of the ER-CP addresses socioeconomics effects. Since this chapter was not rewritten for the ER-OLS, any differences in currently projected impacts will be discussed in the answers to NRC Questions 310.1, 310.2, 310.3, 310.4, 310.5, and 310.6.

TABLE 100.1-1

DIFFERENCES BETWEEN CURRENTLY PROJECTED ENVIRONMENTAL EFFECTS (CPS ER-OLS)

AND EFFECTS DISCUSSED IN THE CONSTRUCTION STAGE ENVIRONMENTAL REPORT

SECTION	ITEM DISCUSSED	ER-OLS	ER-CP
4.1	Site Preparation	Specific data presented for the following: 1. Acres of land used for the lake and associated facilities, 2. Numbers of construction workers employed by crafts; and 3. Mitigative measures associated with building the lake and associated facilities, and site preparation.	General discussion of site work to be done.
		Section 4.1.3 discusses specific programs for terrestrial and aquatic monitoring.	Monitoring program absent.
4.3	Resources Committed	Table 4.3-1 was added to give comparison of preconstruction and present station land use.	Not discussed.
4.4	Radioactivity	Table 4.4-1 added to show person-rem exposures to Unit 2 construction workers with Unit 1 operating.	Not discussed.
4.5	Construction Impact Control	Details presented on control measures for erosion, dust, noise, transportation, rainfall runoff, channel blockage, and groundwater. Specific discussion of tree planting program under "Habitat Improvement Program."	Not required by Reg. Guide 4.2 at the time the ER-CP was prepared.

TABLE 100.1-1 (Cont'd)

SECTION	ITEM DISCUSSED	ER-OLS	ER-CP
5.1	Thermal Effluent Limit	There is now a thermal effluent limit for 1 unit operation. The rationale for this is discussed in the Thermal Demonstration Report, which as been submitted to the NRC (see question 240.7).	Not discussed.
5.2	Radiological Impact	Section 5.2 discusses the following: 1. New site boundary χ/Q values and relative deposition rates (Table 5.2-1) 2. Relative deposition values by downwind sector (Table 5.2-3) 3. Expected individual doses from gaseous effluents (Table 5.2-4) 4. Estimated annual population dose from direct radiation (Table 5.2-10) 5. Estimated whole-body doses to the general population within 50 miles of the site from CPS operation (Table 5.2-12) 6. Estimated whole-body doses to the population within 50 miles of the site resulting from the natural background and man-made radiation sources (Table 5.2-13) 7. Dose from all CPS-related sources and natural and man-made background radiation.	With the exception of χ/Q values and wind deposition rates (Table 5.2-1), none of the new tables were included in the ER-CP. Calculations were given for total-body dose rates from liquid and gaseous effluents.
7.1	Plant Accidents Involving Radioactivity	Radioactivity released to the environment for the different classes of accidents have been recalculated and presented in Table 7.1-2. Values for population exposure from natural and man-made background compared with nuclear radiological effects were also recalculated.	Values presented were somewhat lower than recalculated values.
7.3/7.5	Chemicals to be Stored on Site	The quantities of H_2SO_4 of NaOH have been reduced to 9500 gal each.	Quantities of H_2SO_4 and NaOH were given as 15,000 gal each.

Question 240.1

P. 2.1-11, Sec. 2.1.3.2. The consumptive water use of the station was calculated based on a two-unit operating condition at 70% load factor. However, it is indicated in Sec. 3.4.1 (p. 3.4-1) that the plant loading schedule will be 92% during June, July and August, 80% during January, September and December, and 70% during the other six months. Please provide the consumptive water use for an appropriate loading schedule.

Question 240.2

P. 2.1-11, Sec. 2.1.3.2. Please indicate for the year 1955, the rates of downstream water releases with 1 unit and 2 units operating at an appropriate loading schedule.

Response

The consumptive water use of the station (Question 240.1) and downstream water releases (Question 240.2) are shown on Table 2.1-24. This response is incorporated into the text on page 2.1-11 and a revised Table 2.1-24 is provided.

Question 240.3

Page 3.4-1, Section 3.4.1 and Page 5.1-2, Section 5.1.2. It is stated that the load factor in December will be 80%. However, in Tables 5-4 and 5-7 (in Appendix 5.1A), the load factor used in December for predicting Clinton Lake temperature is 70% rather than 80%. Please clarify this discrepancy.

Response

The 70% figure in Tables 5-4 and 5-7 is a typographical error. An 80% load factor was used in predicting the lake temperature for December. The correction is made to these tables in the text.

Question 240.4

P. 3.4-2, Sec. 3.4.3 and P. 5.1-1, Sec. 5.1.2. Please indicate the average depth for the portion of the lake between the cooling water discharge and intake structures.

Response

At 690 ft MSL, the effective volume of the lake is 66,300 acre-ft and the effective area is 3,880 acres. These values result in an average depth of 17.09 ft. This response is incorporated into the text on page 5.1-2.

Question 240.5

Page 3.4-4, Section 3.4.5. The year 1955 is stated as a 1-in-50 year drought year in this section, but is stated as a 1-in-100 year drought year in Section 5.1.2 (Page 5.1-2). Please clarify this discrepancy.

Response

The drought in 1955 is considered to be the 1-in-50 year drought. The 1-in-100 year statement is an error. The correction is made on page 5.1-2.

Question 240.6

Page 3.4-4, Section 3.4.5 and Page 5.1-2, Section 5.1.2. It is indicated that the maximum temperature during the summer of an average year (such as 1962) will be approximately 92° F. However, the temperature data shown in Tables 5-4 and 5-5 (in Appendix 5.1A) show that the water temperature will be higher than 92° F in some areas of the lake. Please clarify this discrepancy.

Response

All of the tables shown in Appendix 5.1A are reproduced from the 316(a) thermal variance demonstration that was prepared for Clinton Power Station in 1975. The lake temperature modeling that was done at that time assumed a discharge temperature from the discharge canal to the lake of 96° F, the maximum allowable temperature. The more recent study that is reported in Subsection 3.4.5 used discharge temperatures based on the use of cooling sprays in the discharge canal. The difference in discharge temperature accounts for the discrepancy. Appendix 5.1A is included solely for additional information. This response is incorporated into the text on page 3.4-4.

Question 240.7

Page 3.4-4, Section 3.4.5. Please provide the lake temperature data predicted by the Laterally Averaged Reservoir Model (LARM) and also provide a copy of the manual describing the LARM model.

Response

This requested information was provided to the NRC by letter dated August 27, 1980, from G. W. Wuller, IPC, to Ronald L. Ballard, NRC. This information was also provided to the NRC and to Argonne National Laboratory at the site visit on April 28, 1981. An additional four copies of the report that presents the LARM model are provided to the NRC for use in preparing the Environmental Impact Statement.

Question 240.8

P. 5.1-1, Sec. 5.1.2. Please calculate for the cases with 1 unit and 2 units operation, the extent of the thermal plume intrusion into the region upstream from the discharge point on Salt Creek and also provide the basis for the calculations.

Response

The Salt Creek inflow enters Lake Clinton at Segment 23 on the included figures as defined by the LARM model. These figures, obtained from the Clinton Power Station Thermal Demonstration, July 1980 to the Illinois Pollution Control Board, indicate that the temperatures at this point resulting from unconstrained one-unit operation (see Figure 5.1-0A) and two-unit operation constrained to 99° F (see Figure 5.1-0B) are within 2° F of ambient lake temperatures (see Figure 5.1-0C). These temperature profiles, calculated by the LARM model, clearly indicate that the effects of thermal plume intrusion on Salt Creek are minimal.

There will be an increase in temperature above ambient in the region upstream from the discharge canal, within Lake Clinton, i.e., Segments 16 through 22. However, the included temperature profiles and the temperature data listed in Appendix B.1 of the Thermal Demonstration show a sharp vertical temperature gradient in regions near the canal discharge, indicated that the effects of the thermal plume are confined primarily to the surface of the lake.

This response is incorporated into the text on page 5.1-3.

Question 240.9

Page 5.1-2, Section 5.1.2. Please explain why the meteorological records at Peoria, Illinois, station rather than the Springfield, Illinois, station were used in the LAKET model to predict lake surface temperatures. These two stations are located at about the same distance ($\sim$50 miles) to the plant site. However, it appears that the Peoria station is very close to the Illinois River which could significantly affect the meteorological condition at the station and thus make it less similar to the meteorological condition at plant site than the Springfield station.

Response

The decision was made in 1972 to use data from the Peoria station for environmental studies such as the LAKET model for the following reasons: (1) it was reasonably near to and representative of the Clinton site; (2) it had a sufficiently long period of detailed surface records available for environmental studies; and (3) it was also the site of an upper-air station for which a long period of record of measurements were available, should they be required. The Springfield surface station did not have a coincident upper-air measurement station.

The data set used was recorded at the surface station at the Peoria airport, which is located on a flat tableland, set back a mile from the rim of the Illinois River valley and about 200 feet above the river, and the instruments are well exposed. This separation of the station from the river and its valley suggested that there would not be a significant effect of the river on the Peoria airport weather records.

This response is incorporated into the text on page 5.1-2.

Question 290.1

To provide continuity between construction and operational phases of the plant, questions remain about the fate of the spoil placement areas. Several spoil placement areas were designated in Fig. 4.1 of the FES-CP. How much of these spoil areas remain, where, and what is their composition? If these spoil piles remain during the operation phase, how does the applicant intend to protect spoil areas from erosion?

Response

Only one active spoil area remains. This spoil area is located just northwest of the station. All other spoil areas have been used for construction or have been contoured, and revegatation is proceeding. The composition of the only active spoil area is glacial till composed largely of silts and clays. If this spoil area remains during operation, proper erosion control measures will be employed. These control measures would likely include terracing and/or seeding with appropriate grasses. It is planned, however, to retire this active spoil area and use it as a parking area.

Question 290.2

The drainage tile system outlets of certain farms bordering Lake Clinton are at or very close to the 690 ft MSL of the lake. A 10-year frequency flood condition has the potential of reducing crop production in these areas if blowouts occur. This may also result in soil erosion of the cropland and sedimentation buildup along the lake banks. What specific corrective measures has the applicant undertaken to reduce or prevent these possibilities? (FES-CP 4.2).

Response

Danner & Associates, Inc., consulting engineers for Illinois Power Company conducted an investigation of field tile and drainage pipes around the Clinton Plant Site beginning in 1974. They used infrared aerial photography, interviews, existing records, and field surveys to locate and document all known facilities so that tiles or pipes below the 698' elevation could be opened to the atmosphere. This study was supplemented in 1977 with Company questionnaire survey mailed to all adjoining landowners. We received a 92% reply to our inquiry about existing drain tile. We have had only one complaint about interference with field tile. The damage was caused by construction, and it was repaired.

Question 290.3

Some of site habitat improvements are to be a cooperative effort between the Illinois Department of Conservation and Illinois Power, such as mentioned in Subsection 4.5.3.11. What are the plans for continuing, discontinuing or broadening such efforts. What are the plans for maintaining the Silphium Prairie? Please provide an Illinois Power and/or Illinois Department of Conservation Wildlife Management plan if available.

Response

Habitat improvements have been taken over by the Illinois Department of Conservation. The Silphium Prairie was burned in the spring of 1978, 1980, and 1981. Maintaining the Silphium Prairie is also the responsibility of the Illinois Department of Conservation. This agency did conduct the burn in 1981 and will continue to do so as needed in the future to maintain this prairie.

A specific Wildlife Management plan is being developed by the Illinois Department of Conservation and should be available in early 1982. Annual meetings between Illinois Power and the Illinois Department of Conservation are conducted to discuss the effectiveness of existing management techniques and to make any modifications that are deemed necessary for lands under control of the Illinois Department of Conservation.

Question 290.4

With the creation of Lake Clinton, the numbers of waterfowl utilizing the site are expected to increase markedly. In addition to the cooperative waterfowl survey (Illinois Department of Conservation and Illinois Natural History) of in-season monthly aerial sightings what other type of monitoring is planned, especially in regard to waterfowl disease? Although conditions favoring the development of botulism and the transmittal of blood parasites are not prevalent, these are subject to change with the operation of the plant, and elevated temperatures of the lake.

Response

A wildlife management plan is being developed and should be available in early 1982. Contingency plans for waterfowl disease will be addressed in this management plan. Also, the Illinois Department of Conservation has established a hunter check station for monitoring hunting effort and success.

During 10 years of operation of IP's Baldwin Power Station and its associated 2000-acre cooling pond, no outbreak of waterfowl disease has been experienced. The Baldwin cooling pond is also under the management of the Illinois Department of Conservation and experiences a heavier thermal loading than is expected at Lake Clinton. Based on experience at Baldwin it is not expected that waterfowl disease will be of concern at Lake Clinton.

Question 291.1

The OL-ER includes aquatic sampling results for May 1974 through April 1978. Please update ER-OL data by providing additional data relative to the abundance and distribution of plankton, benthic invertebrates, and fishes. These data should include North Fork and Salt Creek sample sites as well as Lake Clinton. Also, include a figure showing sample sites.

Response

Illinois Power Company has included copies of the Thermal Demonstration Pursuant to Illinois Pollution Control Board Rules and Regulations Chapter 3, Rule 203(i)(10). Section 4.4.1 of this report contains data on the abundance and distribution of fish from the summer of 1978 (August) through the winter of 1979 (February). Station 5 is located in the North Fork just upstream of Lake Clinton and is a stream habitat. Station 17 is located on the Salt Creek at the upper end of Lake Clinton. Two of the four substations for electrofishing at Station 17 are stream habitats, the other two are more representative of the upper end of the lake. Subsections 4.4.2 and 4.4.3 contain information on the benthic invertebrates and zooplankton, respectively. Data is presented on the abundance and distribution of these organisms from the spring of 1978 (May) through the fall of 1978 (November). Subsection 4.4.4 contains information on the abundance and distribution of phytoplankton from the winter of 1978 (February) through the fall of 1978 (November).

A short discussion of each community is presented in each subsection along with the information on abundance and distribution. Figure 4-5 on page 4-21 of the report illustrates the sample sites on Lake Clinton. The 1980 data is in the early stages of report preparation and is not available at this time.

Question 291.2

Please provide information describing Lake Clinton with respect to morphometry and substrate. Also, provide information as to where bulldozing occurred and where trees were simply left standing prior to inundation.

Response

The topography or shape of the lake bottom is shown on Figure 2.4-5 of the CPS Environmental Report-Operating License Stage [CPS-ER(OLS)]. The contours shown on this figure indicate that the landform of the lake bottom is primarily a floodplain of Salt Creek. This landform is a recent modification of Quaternary landforms due to flooding.

A discussion of the agricultural soil associations is presented in Subsection 2.5.3.1.1 of the CPS-ER(OLS). The locations of the agricultural soil associations are shown on Figure 2.5-3. The soil associations of the lake bottom are the Huntsville-Sawmill Association, the Alexis-Littleton-Camden Association, and the Strawn-Hennepin Association. Subsection 2.5.3.1.1 discusses the geologic units from which the soils developed. The agricultural soils are generally developed in the upper 5 feet of the Quaternary deposits (Smith and Smith 1940).

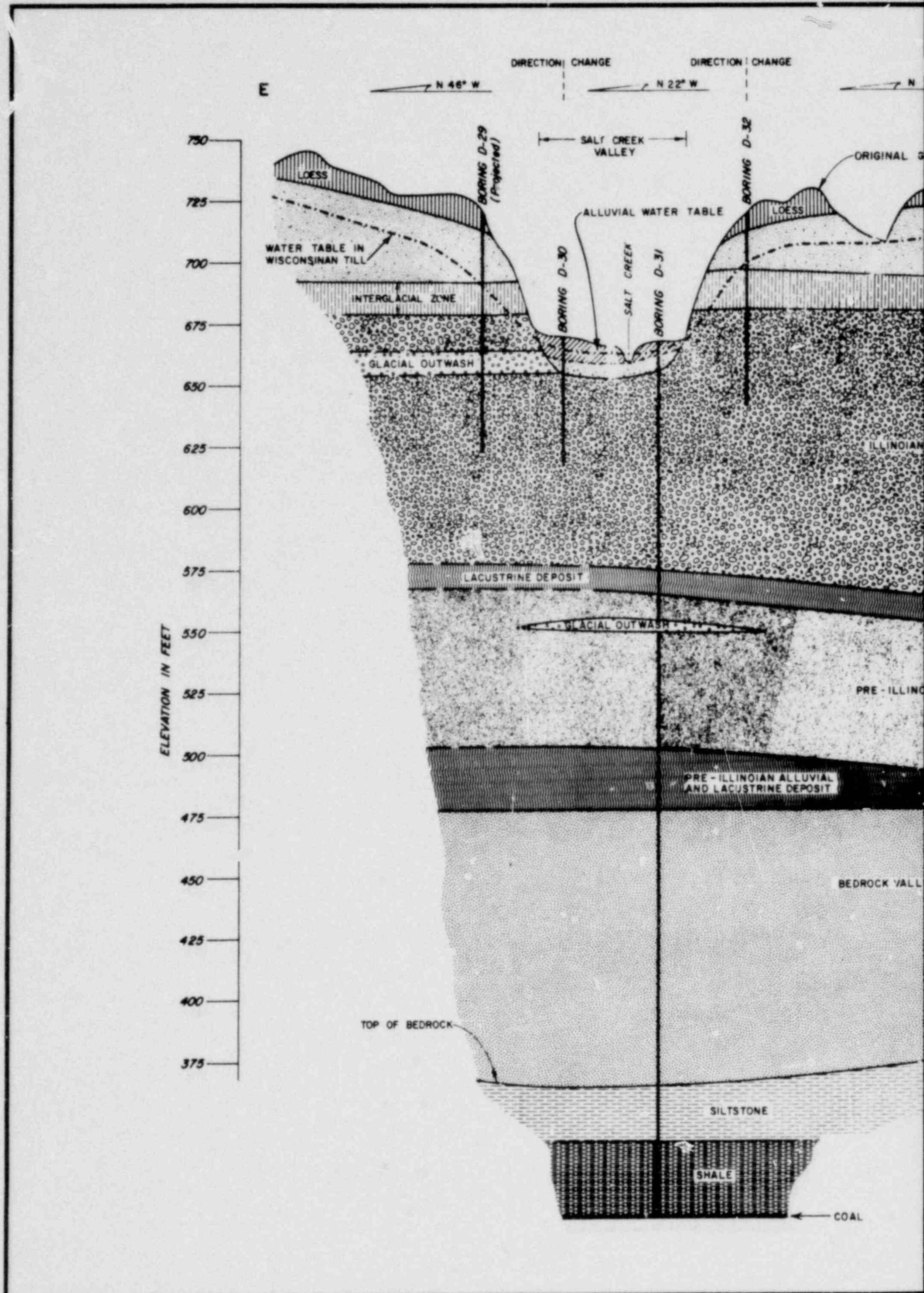
The Huntsville-Strawn Association shows little or no profile development and varies in character according to the recent sediments of which it is composed. The Alexis-Littleton-Camden Association has an upper layer 3 to 8 inches thick composed of silt loam. The subsoil begins at 10 to 15 inches and is composed of yellowish-brown clay loam. Below 40 to 60 inches, stratified sands and gravels are found. The Strawn-Hennepin Association has an upper soil layer of silt loam. The subsurface is a grayish-yellow silt loam, and the subsoil, which begins at a depth of about 10 to 12 inches, is a yellow silty clay loam that often contains considerable gravel. Below 20 to 40 inches, friable calcareous till is found. The Strawn-Hennepin Association makes up less than 400 acres of the entire lake bottom.

Below the agricultural soils are various Quaternary deposits overlying Pennsylvanian-age bedrock. Figures 2.5-278 and 2.5-279 from the CPS Final Safety Analysis Report (FSAR) have been included in this response to show the typical relationship of the Quaternary units. A complete discussion of site stratigraphy is presented in FSAR Subsection 2.5.1.2.2.

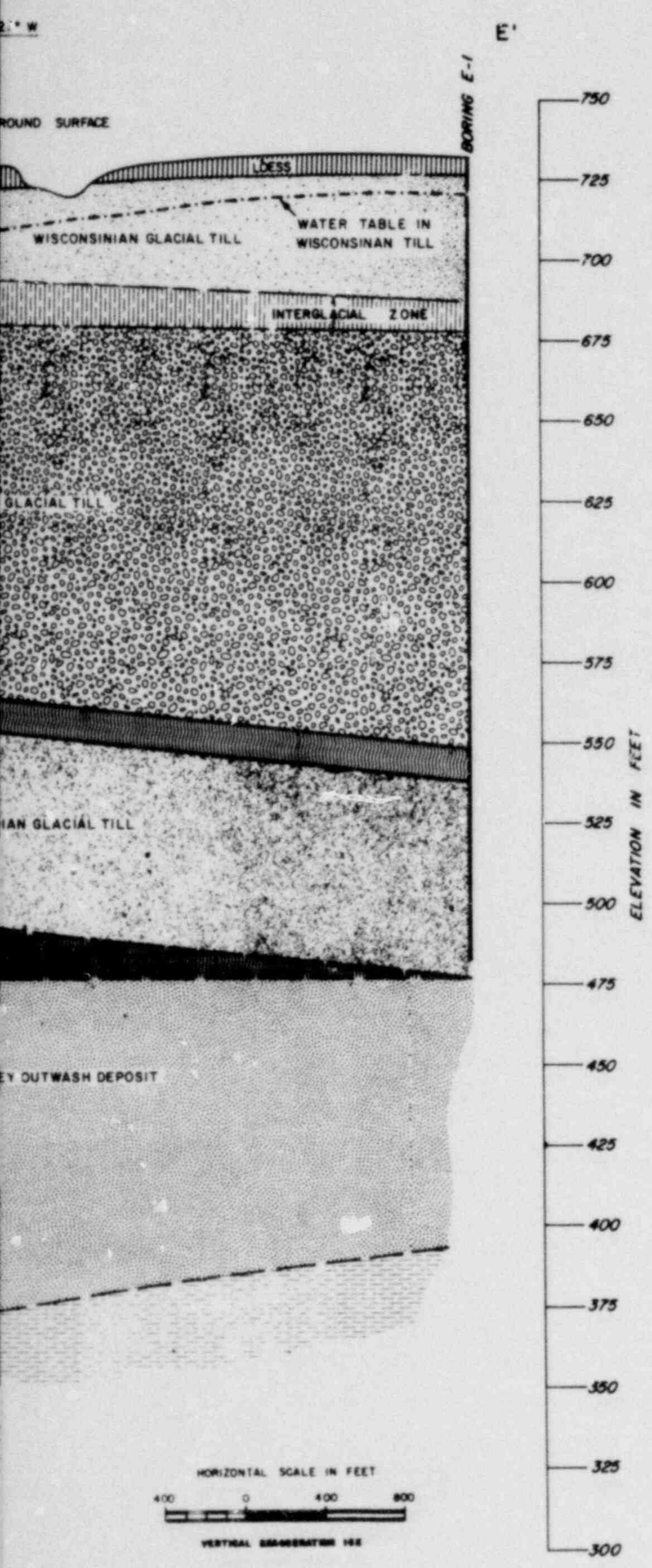
In constructing Lake Clinton, Illinois Power conducted extensive clearing and bulldozing only as required near the dam site, where roads and bridges were relocated, in the ultimate heat sink area, crib house area, discharge canal area, gravel pit area, and the Trinkle Slough area. Several farmsteads were also cleared and some grading occurred for construction and maintenance of haul and logging roads within the lake basin. Approximately 60% of the lake basin was in agricultural production before impoundment and required minimal clearing.

Areas above the 690-foot MSL level were left in a natural condition as much as possible to minimize impact and because the lake was planned to be a recreation area. This action has produced a lake with the appearance of a natural shoreline. Numerous coves were left with standing timber to provide as much habitat as possible for aquatic and terrestrial wildlife. This technique also provides an aestethically pleasing appearance.

In general, small coves (less than 125 feet wide) were left timbered. Coves larger than 125 feet wide were cleared at their opening to the lake to allow boat access but timber was left further up in the coves for fish and wildlife enhancement.



POOR ORIGINAL



LEGEND

QUATERNARY

HOLOCENE

SALT CREEK ALLUVIUM - BROWN TO GRAY SILTY CLAY, CLAYEY SILT AND FINE TO COARSE SAND, SILTY TO GRAVELLY IN ZONES; OVERLAIN BY ORGANIC TOPSOIL

BROWN SILTY CLAY AND CLAYEY SILT

BROWN TO GRAY FINE TO COARSE SAND AND GRAVEL

WISCONSINAN

LOESS - BROWN TO MOTTLED BROWN AND GRAY CLAYEY SILT OR SILTY CLAY WITH TRACE OF FINE SAND, WEATHERED

WISCONSINAN GLACIAL TILL - BROWNISH-GRAY TO GRAY CLAYEY SILT OR SILTY CLAY WITH SAND AND GRAVEL, CONTAINS IRREGULAR AND DISCONTINUOUS LENSES OF SAND AND SILT THROUGHOUT (GLACIAL OUTWASH AND POSSIBLY LOCAL LACUSTRINE DEPOSITS)

SANGAMONIAN

INTERGLACIAL ZONE - INCLUDES DARK GRAY TO GRAY ORGANIC CLAYEY SILT OR SILTY CLAY (COLLUVIAL SOILS), GREENISH TO BLUISH-GRAY CLAYEY SILT WITH SAND AND GRAVEL (REWORKED AND WEATHERED ILLINOIAN GLACIAL TILL)

ILLINOIAN

ILLINOIAN GLACIAL TILL - BROWNISH-GRAY TO GRAY CLAYEY SILT WITH SAND AND GRAVEL TO VERY SANDY SILT OR SILTY SAND WITH SOME CLAY AND GRAVEL; INTERBEDDED OUTWASH DEPOSITS IN UPPER HORIZONS.

YARMOUTHIAN

LACUSTRINE DEPOSIT - BROWNISH-GRAY TO BLACK AND GRAY CLAYEY SILT TO SILT, ORGANIC IN ZONES; INCLUDES GREENISH TO BLUISH-GRAY CLAYEY SILT WITH SAND AND GRAVEL (REWORKED AND WEATHERED PRE-ILLINOIAN GLACIAL TILL); ASSIGNMENT TO YARMOUTHIAN GLACIAL STAGE IS TENTATIVE

KANSAN

PRE-ILLINOIAN GLACIAL TILL - GRAYISH-BROWN TO BROWN SILTY CLAY AND CLAYEY SILT WITH SOME SAND AND GRAVEL; BROWN COLOR AND RELATIVELY HIGH CLAY CONTENT IS CHARACTERISTIC; TENTATIVELY ASSIGNED TO KANSAN GLACIAL STAGE ON THE BASIS OF CLAY ANALYSIS BY ILLINOIS STATE GEOLOGICAL SURVEY

PRE-ILLINOIAN ALLUVIAL AND LACUSTRINE DEPOSIT - CONSISTS OF GRAYISH-BROWN, BROWN AND GREEN CLAYEY SILT AND SILTY CLAY WITH SAND AND SOME GRAVEL (REWORKED GLACIAL TILL) AND GRAY TO BROWN CLAYEY SILT WITH ORGANIC DEBRIS (LACUSTRINE OR LOW ENERGY ALLUVIAL DEPOSIT); INCLUDED AS PART OF THE MAHOMET BEDROCK DEPOSIT IN AREAS WHERE IT IS UNDERLAIN BY SANDY OUTWASH DEPOSITS

BEDROCK VALLEY OUTWASH DEPOSIT - GRAY FINE TO MEDIUM SAND WITH SOME COARSE SAND AND OCCASIONAL GRAVEL IN ZONES, CLEAN (MAHOMET VALLEY DEPOSIT)

PENNSYLVANIAN

BEDROCK - INTERBEDDED LAYERS OF LIMESTONE, SHALE AND SILTSTONE ASSIGNED TO THE MCLEANSBORO GROUP, MODESTO FORMATION ON THE BASIS OF SPORE ANALYSIS OF THE COAL ENCOUNTERED IN BORING D-31

LIMESTONE - GREENISH-GRAY, GRAY AND BROWN, FINE TO COARSELY CRYSTALLINE, SILTY, THIN BEDDED TO MASSIVE, NUMEROUS SHALE PARTINGS IN ZONES, FOSSILIFEROUS

SHALE - GRAY TO DARK GRAY SHALE, CARBONACEOUS TO CALCAREOUS; CLAYEY IN ZONES, EXPANSIVE, SLICKENSIDES, OCCASIONAL CONCRETION

SILTSTONE - LIGHT GRAY SILTSTONE, MICACEOUS, FINE SANDY; CROSS-BEDDED IN ZONES, OCCASIONAL INTERBEDDED LAYER OF SILTY SANDSTONE

COAL - BLACK COAL, THIN BEDDED, IMPURE

NOTES:

1. GROUNDWATER LEVELS INDICATED ON THE SUBSURFACE SECTION WERE OBTAINED BY INTERPOLATING BETWEEN BORINGS WITH PIEZOMETERS. INFORMATION ON ACTUAL GROUNDWATER LEVELS EXIST ONLY AT BORING LOCATIONS WITH PIEZOMETERS. IT IS POSSIBLE THAT GROUNDWATER LEVELS BETWEEN BORINGS WITH PIEZOMETERS MAY VARY FROM THOSE INDICATED.
2. THE DEPTH AND THICKNESS OF SOIL AND ROCK STRATA INDICATED ON THE SUBSURFACE SECTION WERE OBTAINED BY INTERPOLATING BETWEEN BORINGS. INFORMATION ON ACTUAL SOIL AND ROCK CONDITIONS EXIST ONLY AT BORING LOCATIONS. IT IS POSSIBLE THAT SOIL AND ROCK CONDITIONS MAY VARY FROM THOSE INDICATED.
3. THE DISCUSSION IN THE TEXT IS NECESSARY FOR PROPER UNDERSTANDING OF THE NATURE OF THE SUBSURFACE MATERIALS.
4. ELEVATIONS REFER TO U.S.G.S. DATUM.
5. REFER TO FIGURE 2.5-273 FOR LOCATION OF SUBSURFACE PROFILES.
6. FOR DETAILED WATER LEVEL DATA REFER TO FIGURES 2.4-37, 2.4-38, 2.4-41 AND 2.4-42.
7. STRATIGRAPHIC NOMENCLATURE OF THE QUATERNARY DEPOSITS USED IN THE FSAR TEXT DIFFERS FROM THAT USED ON THIS FIGURE AND ON THE BORING LOGS, AND IS CROSS REFERENCED ON FIGURE 2.5-274.

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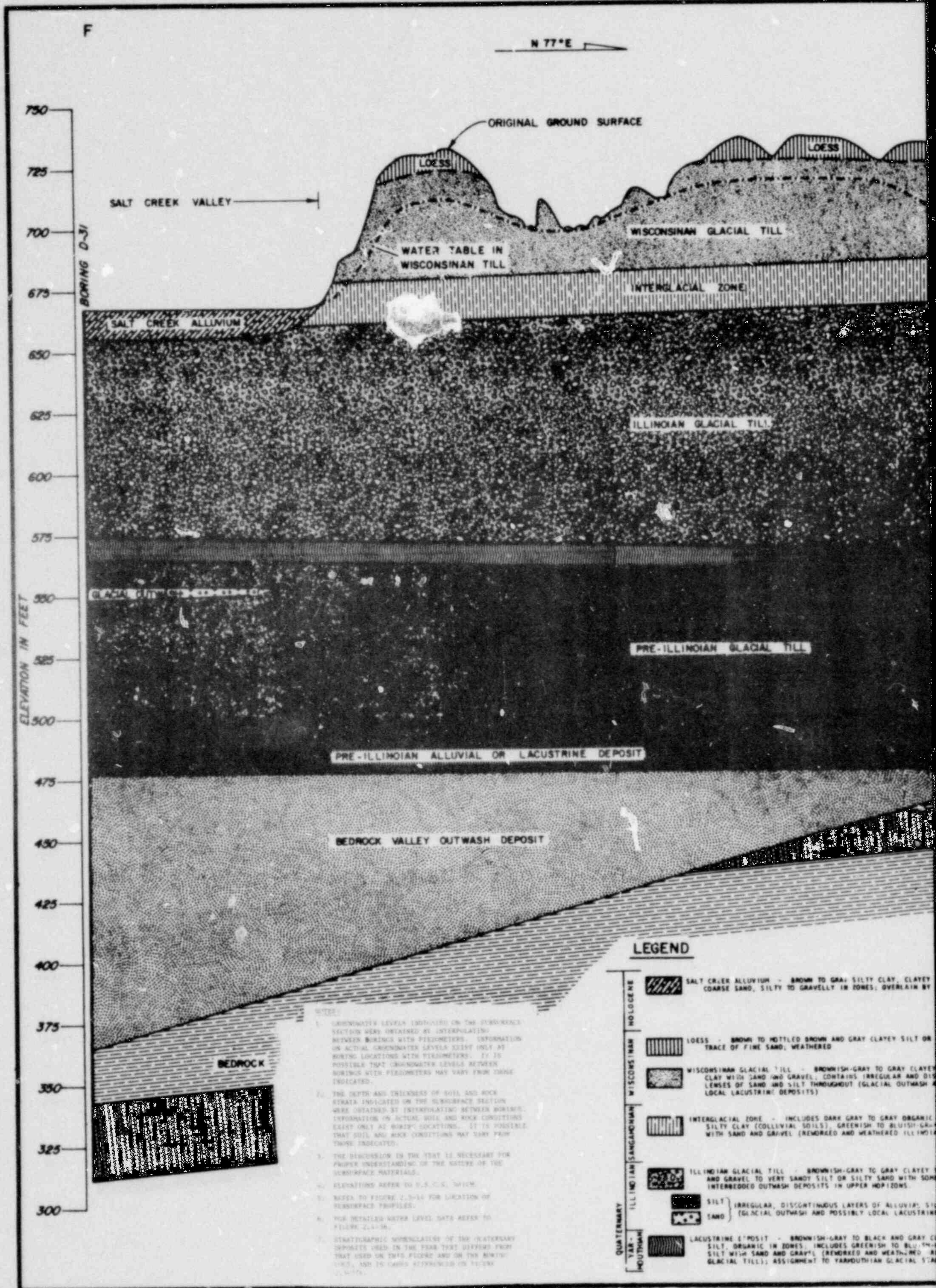
FIGURE 2.5-278

GEOLOGIC SECTION E-E' - ALONG NORTH FORK OF SALT CREEK



POOR ORIGINAL

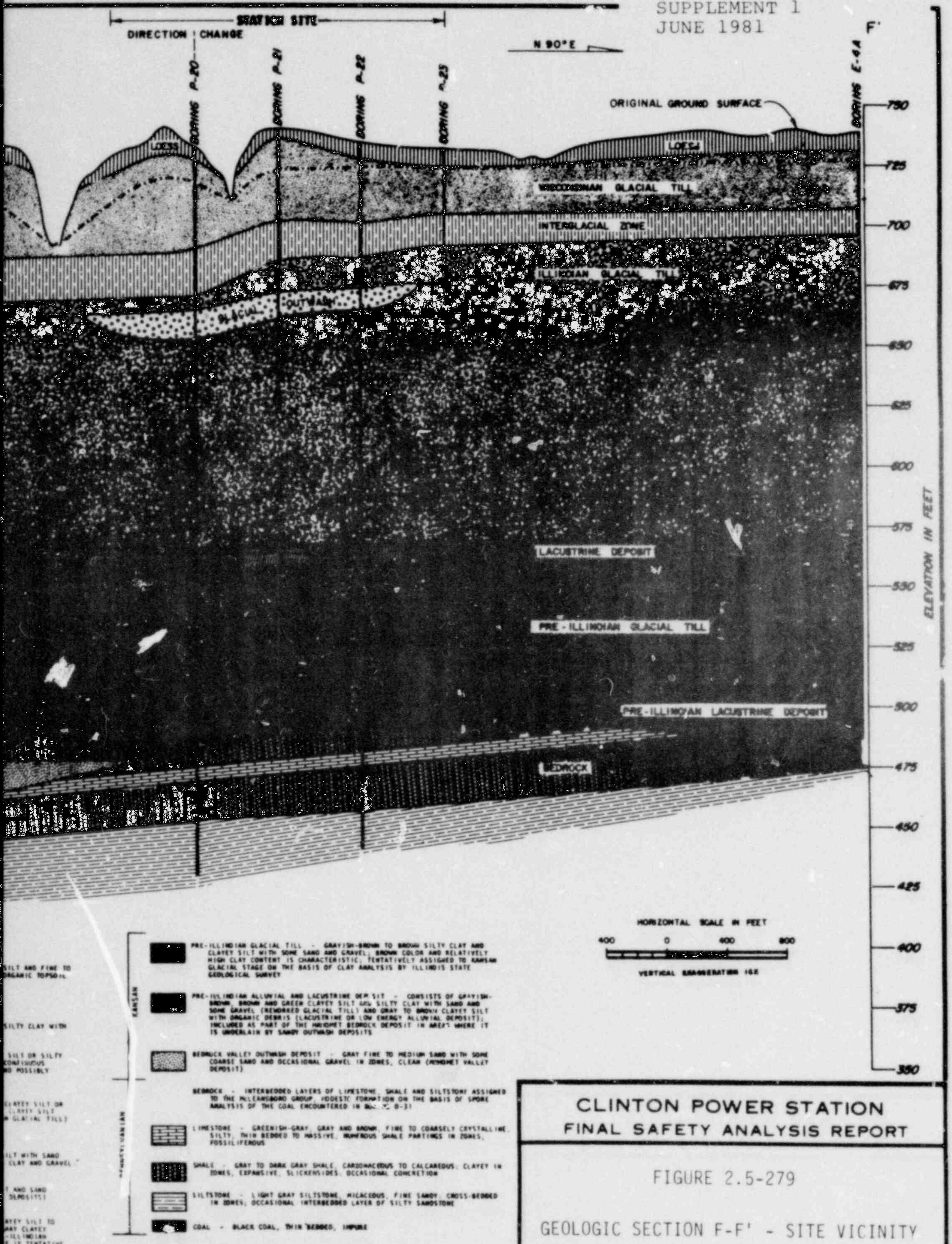


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FIGURE 2.5-279

GEOLOGIC SECTION F-F' - SITE VICINITY

POOR ORIGINAL

Question 291.3

Please provide information on the survival of fishes at elevated temperatures based on operational experiences at the applicant's Baldwin power plant.

Response

Two copies of the testimony presented at a public hearing on the Thermal Demonstration Pursuant to Illinois Pollution Control Board Rules and Regulations Chapter 3, Rule 203(i)(10) is provided for the NRC. This testimony provides operational information on the survival of fishes at elevated water temperatures in Baldwin cooling pond.

Question 291.4

Please provide a copy of Page 3.4-2A of the CP-ER as well as Figure 3.4-4 of the CP-ER.

Response

Two copies each of Page 3.4-2A and Figure 3.4-4 are provided for the NRC.

Question 291.5

Please provide a copy of the Cl'nton Thermal Demonstration report prepared by EIA consultants.

Response

Four copies of the Clinton Thermal Demonstration report are provided for use by the NRC.

Question 291.6

Please provide a copy of the NPDES permit and 316(b) plan of study.

Response

Two copies of the NPDES permit which is currently in effect as well as the application for the new permit is provided for the NRC. Page 20 of the current permit has guidelines for the monitoring program associated with a 316(b) study. We will conduct a study to comply with the conditions of the new permit.

Question 291.7

The preoperational water quality analysis, quoted in the ER-OL, does not include the common mineral ions (calcium, magnesium, sodium, sulfate, chloride, etc.), which were reported at the CP stage. Please provide complete analyses, including these ions, on a maximum, average and minimum basis, for the lake water composition expected under operating conditions. If not available individually, calcium and magnesium concentrations may be combined as a hardness value.

Response

Ca, Mg, Na, SO_4, and Cl were not included in the scope of preoperational water quality analysis.

Calculations have been made for water quality compositions expected under operating conditions in order to properly size the demineralizers for the station. Water quality parameters used for this determination are as follows:

Ca	270 mg/l as $CaCO_3$	NO_3	6 mg/l
Mg	210 mg/l as $CaCO_3$	pH	7-8
Na	35 mg/l as $CaCO_3$	COD	15 mg/l
SO_4	43 mg/l as $CaCO_3$	SiO_2	10 mg/l
Cl	85 mg/l as $CaCO_3$	TDS	630 mg/l
Alk	381 mg/l as $CaCO_3$	Fe	1.2 mg/l
		Turbidity	50-200 NTU

Because of the variability of the inputs to Lake Clinton, average composition of parameters from all of our sample sites would not be very useful. Until circulating water pumps go into service, analyses at the condenser inlet (heat sink) will reflect mostly water from North Fork and will not necessarily represent average lake quality.

Question 291.8

It was stated at the CP stage that condenser scaling is not expected to be a problem, and that no plans have been made for chemical treatment to control it, beyond possible condenser cleansing on an intermittent basis. If this statement is still applicable, please confirm it.

Response

No plans have been made to chemically control scale. The only chemical treatment of the circulating water will be periodic chlorination to control biological growths and slime buildup.

Question 291.9

In the absence of water treatment for scale control, what methods of condenser cleaning will be used, and how frequently will cleaning be necessary? If chemical methods are used, please quote the volume and composition of the chemical waste generated by condenser cleaning, and the methods proposed for treatment and disposal of this waste. Please include a discussion of land (amount and location) required for additional disposal pits, etc. required for condenser cleaning waste disposal.

Response

(a) Based on our experience at fossil plants, we predict that condenser cleaning will not be required until after 5 to 7 years of operation.

(b) The need for cleaning will be assessed by condenser performance tests and calculation of the Langelier and Ryznar indexes of the cooling water.

(c) The current state of the art uses sulfuric, phosphoric, or formic acid for condenser chemical cleaning in strengths ranging from 5% to 15% of acid. The choice of acid will depend on analysis of the tube deposit and trial cleaning of a few selected tubes.

(d) One chemical cleaning will produce about 500,000 gallons of acid waste plus rinse water.

(e) We believe that our existing waste treatment ponds will be of adequate size to hold and treat these wastes. Treatment would consist of neutralization, precipitation, and settling of any heavy metals and sand filtration before discharge to the lake.

(f) If the tests of paragraph (b) show that we are developing scale problems or reduction in cooling capacity sooner than expected, we would pursue and evaluate the options of chemical scale control.

Question 310.1

Provide an estimate of the average annual number of workers (plant employees and contractor employees) that will be required during operation of the two units.

Response

The presently authorized plant staffing level for one unit operation is 221. Of this total 38% are involved in operations activities and 37% are involved in maintenance activities. This number (221) does not include security guards, who should number about 80. The size of the staff may increase somewhat as minor adjustments are made before fuel loading.

The two-unit staff is estimated to be 50% larger than the one-unit staff, and the contractor personnel required during outages will be consistent with the present industry use of contractor personnel during outages.

This response is incorporated into the text on page 8.1-1.

Question 310.2

Identify the likely residential location (i.e., names of communities, counties) of the workers.

Response

Approximately 60% of the CPS operating staff is already at the site. It is expected that the current residential pattern of these workers will be the typical pattern for the total operating staff. The residential location of present CPS operating employees is as follows:

Community	CPS Employees Number	CPS Employees Percent
Decatur	57	42.5
Clinton	18	13.4
Maroa	9	6.7
Champaign-Urbana	8	6.0
Farmer City	6	4.5
Warrensburg	6	4.5
Other Communities	30	22.4

With the exception of Bloomington, "Other Communities" include small towns and villages within a 25-mile radius of the CPS. Only from one to four employees reside in any one of these small communities. Bloomington, which has three operating personnel residing there, is an SMSA located approximately 23 miles northwest of the station.

This response is incorporated into the text on pages 8.1-1 to 8.1-2.

Question 310.3

Identify any anticipated impacts on the affected communities facilities and services (i.e., schools, hospitals, water and waste treatment fire, police) that would result from the workers residence. List facilities and services that would require expansion or additions to capacity. Provide the same information for any Clinton Power Station demands on community services.

Response

A. Anticipated Impacts on Affected Communities from Workers Residence

Assuming that the residential pattern given in response to Question 310.2 proves typical of the total operating staff, approximately 40% of the CPS staff is expected to reside in Decatur. Thus the number of additional workers expected to relocate to Decatur is about 30. Decatur is an SMSA located approximately 23 miles southwest of the station, with a 1980 population of 94,091. The additional workers and their families are not expected to have any significant impact on the city's services and facilities. Similarly the small number of additional workers expected to relocate to Champaign-Urbana (which had a population of 94,111 in 1980) and Bloomington-Normal (which had a population of 79,861 in 1980) should have insignificant impacts on those cities services.

The town of Clinton (8,014 in 1980) is the only community near the station in which a significant percentage of the CPS workers are expected to reside: about 13%. The additional residents should amount to approximately 10 workers and their families. The additional residents should not require any addition to community services and facilities. In 1980 Clinton had a total of 3,354 housing units (a 16% increase over 1970) of which 2,214 were owner occupied. Of the 1,140 rental units 28% were single family units. Between 1975 and 1979 DeWitt County (excluding Clinton) granted 235 permits for new single family homes, and 142 permits for mobile homes. In the town of Clinton, between 1975 and 1979, permits were granted for 133 single family units and 91 multi-family units. It is not expected that there will be a shortage of available housing in DeWitt County or the town of Clinton.

Educational and health facilities in Clinton and the other nearby small communities should experience little impact from CPS staff and their families. There are three school districts in DeWitt County: Clinton School District, consisting of one high school, one junior high, and four grade schools; Wapella School District, consisting of a combined junior high and high school and one grade school; and the Farmer City-Mansfield School District, consisting of one high school, one junior high, and three grade schools. Table 8.1-1 gives the 1979-1980 enrollment, capacity, and staff for each school district. The largest school district is Clinton, which had a total of 2,203 students in the 1979-1980 school year. The Farmer City-Mansfield District had 914 students, and the Wapella District had 344 students in 1979-1980.

The present capacity of each school district indicates that there will be no need for additional school facilities to accomodate the school-age children of CPS operating personnel who relocate to the area. The Clinton School District is the only district whose 1979-1980 enrollment was near capacity. Enrollment in the other two districts was approximately 50% of capacity. Since a relatively small number of additional operating personnel with a relatively small number of school-age children are expected to move to the area, there should be no need for additional school facilities.

The John Warner Hospital, located in the town of Clinton approximately 3.8 miles from the station, has a capacity of 52 beds with a staff of approximately 165. Additional health care is provided at Crest View Nursing Home - 98 residents and 65 staff members; DeWitt County Nursing Home - 72 residents and 41 staff members; and DeWitt Mental Center - out patients only (10 to 50 per day) and 15 staff members. No additional health care facilities should be needed.

B. Anticipated Impacts on Affected Communities from Clinton Power Station

The Clinton Fire Department will provide fire protection for the CPS and the DeWitt County Sheriff Department will provide police protection. As discussed in Part A of this response, the John Warner Hospital, the only hospital facility in the vicinity of the station, will be providing health care for station personnel. In addition to the hospital, emergency health care assistance will be available from the following:

DeWitt County Emergency Services Disaster Area
Illinois State Department of Public Health
State of Illinois Emergency Services Disaster Agency
Illinois Department of Conservation
Clinton Ambulance Service

It is not anticipated that any of these five agencies will require expansion to existing facilities or additional staff to meet CPS demand.

This response is incorporated into the text on pages 8.1-2 to 8.1-3.

Question 310.4

Provide an estimate of the average annual workers payroll for the two units (give the year in which the dollars are stated).

Response

The estimated annual payroll for the first full year of operation for each unit is as follows:

	1982 Dollars
Unit 1-1984	$9,490,000
Unit 2-1996	5,160,000

These values represent the cost of labor if purchased in 1982.

This response is incorporated into the text on page 8.1-1.

Question 310.5

Provide an estimate of the average annual dollar amount of local purchases of materials and supplies resulting from the operation of the two units. Include a definition of the local area in preparing the estimate (i.e., counties, major towns, SMSA). Give the year in which the dollars are stated.

Response

From the experience of Illinois Power Company with an 1800 MW coal-fired generating station in central Illinois, annual local expenditures can be expected to average approximately $122,000 (1980 dollars). Local purchases are expected to be made primarily in Decatur with smaller purchases being made in Clinton, Bloomington-Normal, and Champaign-Urbana.

This response is incorporated into the text on page 8.1-3.

Question 310.6

In tabular form provide a dollar estimate of the taxes attributable to the two units of Clinton Power Station. For each of the units first five full years of operation, provide the dollar estimates by type of tax and by taxing jurisdictions. Estimate what percent of the jurisdictions total tax revenues are represented by the taxes attributable to the Clinton Power Station (give the year in which the dollars are stated).

Response

The Clinton Power Station will be subject to locally assessed real estate taxes, which are largely a matter of conjecture at this time. Such taxes are levied annually based upon the requirements of the districts. Assessed valuation beginning in the first full year of operation, which is now expected to be 1984, can only be estimated in a very general way. A number of revisions in Illinois property tax law have occurred in recent years and can be expected to continue. For example, Illinois farmland is now assessed at lower levels than other property, which has shifted some of the tax burden to non-agricultural properties. Limited exemptions have been granted on residential properties to reduce taxes on such property. In the corporate sector personal property taxes were abolished in 1979 and were replaced by a statewide income tax and a tax on the invested capital of public utilities. An unresolved controversy exists over what property is currently assessable as real estate subsequent to the abolition of personal property.

It is therefore impossible to accurately forecast the tax liabilities requested. The figures presented in Table 8.1-2 should be considered within these limitations. These figures relate to Clinton Unit 1 only since too many unsettled questions exist to allow tax estimates on Unit 2. The taxing districts shown in the table will be the ones primarily effected by Clinton Unit 1. The site including the lake area is located in certain other taxing districts which are not materially effected and are therefore not listed.

This response is incorporated into the text on pages 8.1-3 and 8.1-4.

Question 310.7

Are there any substantial changes in the station external appearance or layout which have been made subsequent to the description in Sections 2.1 and 3.1 of the CP-FES? If so, please describe.

Response

There are no substantial changes. The current site layout is discussed in Subsection 2.1.1 of the Environmental Report-Operating License Stage (ER-OLS) and shown in ER-OLS Figures 2.1-1 through 2.1-7. The current design and appearance of the station is discussed in ER-OLS Section 3.1. ER-OLS Figure 3.1-1 shows a new color rendering of how the station will look when it is completed.

Question 310.8

Using the 1980 census count, update the population figures presented in Table 2.1-2 and Table 2.2-3 of the ER-OL.

Response

Table 2.1-2 has been revised to show the 1980 population of cities, towns, and villages within 50 miles of the Clinton Power Station. The 1980 population of DeWitt County was 18,108.

The breakdown of the 1980 population into age groups, needed to update Table 2.1-3, will not be prepared by the U.S. Bureau of the Census until the fall of 1981. Table 2.1-2 has been changed in the text.

Question 310.9

Using the 1980 census count, update the projected population figures presented in Figures 2.1-11, 2.1-12, 2.1-13 and describe the methodology used for updating.

Response

The 1980 census counts which are currently available (PL-94 tapes) are not used as input data to the projections shown in Figures 2.1-11, 2.1-12, and 2.1-13. The U.S. Bureau of the Census are currently preparing the MARF tapes which are used as input to the computer program used for projecting the population. The MARF tapes will not be ready until the fall of 1981.

Question 310.10

Provide the 1980 transient population use of the Lake Clinton recreation area and the projected use for the next five years.

Response

The Illinois Department of Conservation has estimated that in 1980 the site was visited by 520,212 people. Their projected estimates for the next five years are as follows:

1981	-	650,000
1982	-	750,000 (includes campers)
1983 and beyond	-	1,000,000

This response is incorporated into the text on page 2.1-12.

Question 310.11

Provide a current listing of recreation facilities which have been completed in the Lake Clinton recreation area. Provide a list of additional facilities that are expected to be completed and the estimated times of completion. Provide a copy of the latest Management Plan which relates to the lease agreement.

Response

Figure 2.1-15A shows the status of development of the recreational facilities at Lake Clinton. A copy of the lease agreement between IP and IDOC that describes the management arrangements was previously submitted to the NRC.

Question 310.12

Update the recreation information provided in the CP-FES on pages 5-45 and 5-46 relating to Section 5.6.5 Impact on Recreational Capacity of Area. Provide a copy of reference 79 cited on page 5-49 of the CP-FES entitled "Illinois Department of Business and Economic Development, Priority and Planning Elements for Developing Illinois Water Resources" May 1970 or the most current revision.

Response

The recreational development plan for Lake Clinton and its associated recreational area is discussed in Subsection 2.1.3.3 of the CPS-ER(OLS). The recreational activities provided include boating, swimming, fishing, camping, picnicking, hunting, hiking trails, and snowmobiling.

DeWitt County is in a 16-county Illinois Department of Conservation (DOC) administrative region (Region 3P) consisting of the following counties: DeWitt, Piatt, Macon, Shelby, Moultrie, Coles, Cumberland, Clark, Edgar, Douglas, Champaign, Ford, McLean, Livingston, Iroquois, and Vermillion. The DOC divides Illinois into seven regions and ranks each region by the adequacy of outdoor recreation opportunities available in the region in 1976. The DOC ranking showed that Region 3P was inadequately supplied in most water sports, and ranked sixth or seventh in such activities as swimming, motorboating, canoeing, and sailing; all of which are offered at Lake Clinton. In 1976 the 16-county region was served by 8 public and 10 private beaches, and on lakes and ponds on which motorboating was allowed there were 11,100 acres for unrestricted motorboating and 12,710 acres for motorboating restricted to 10 horsepower or less. There were 24,312 acres of lakes and ponds for fishing, and 6,978 acres of river fishing area.[1] The DOC statistics indicate that the Lake Clinton recreational facilities will fill a need and improve the adequacy of outdoor recreational opportunities in the region.

The Illinois Department of Business and Economic Development (BED) has been reorganized and is now the Illinois Department of Commerce and Community Development. The BED publication "Priority and Planning Elements for Developing Illinois Water Resources," May 1970, was not updated by the new department. The publication is available from the Illinois State Library in Springfield, Illinois.

This response is incorporated into the text on page 8.2-1.

[1]Illinois Department of Conservation, Outdoor Recreation in Illinois: Statewide Comprehensive Outdoor Recreation Plan, Springfield, Illinois, 1978.

Question 310.13

During CPS construction which roads in the site vicinity were improved, relocated or closed permanently? Briefly describe the road modifications, identifying the road by its numerical designation and the approximate length of modification. Include bridge changes in the response.

Response

During construction of the lake and Clinton Power Station it was necessary to vacate certain roads and to dedicate new roads. Illinois Power Company negotiated with the State of Illinois, Department of Transportation to lay out and build new bridges and approaches across North Fork of Salt Creek (Route 54), Salt Creek (Route 48), and raised the elevation of Route 10 at a location where the arm of the lake crosses under the highway. All of the above work was designed, contracted for, supervised, and built by the Department of Transportation and paid for by Illinois Power Company.

A section of County Highway 14 was relocated and built which includes three bridges (two over the lake and the other over the discharge flume) along with the connecting roads, a distance of approximately 7,000 feet. (Section 30 - 31 - Township 20 North, Range 4 East - 3rd Principal Meridian, DeWitt Township.) The old section of County Highway 14 of approximately 4900 feet, along with the old bridge over Salt Creek, was vacated.

In Harp Township (Township 20 North, Range 3 East) we vacated approximately 8.6 miles of road and dedicated and built approximately 3.6 miles of new roads which included one new bridge over North Fork of Salt Creek and the removal of three old bridges (Section 15, 23, 25, 26, 28, 29, 33, 34, 35 and 36).

In Creek Township (Township 19 North, Range 3 East) we vacated approximately 1.9 miles of road and dedicated and built approximately two miles of new roads and the removal of one old bridge.

In DeWitt Township (Township 20 North, Range 4 East) we vacated approximately 4.9 miles of road and dedicated and build approximately 5.9 miles of new road. We also built one new bridge and removed two old bridges.

In Nixon Township (Township 19 North, Range 4 East) we vacated approximately 0.1 mile of road and dedicated and built approximately 1.9 miles of new roads.

All of the above roads and bridges were built according to the State of Illinois Department of Transportation Standard Specifications for Road and Bridge Construction Manual, adopted July 2, 1973. All roads vacated and right of way dedicated by the Company were by the rules and regulation manual of Road and Bridge and other Related Laws of Illinois, published by the State of Illinois, Department of Transportation, 1973 Edition. We followed the general procedures which included Petition signed by legal voter, notice of public hearing in local paper, hearing on petition, surveys, inducements, damages, and the Final Order of the County Superintendent of Highways and/or the Township Road Commissioner accepting all the roads and bridges. All of the above was done at no expense to the taxpayer of the township involved or the county.

Question 310.14

Identify any impacts to cultural resources on the plant property which could potentially result from the operation and maintenance of the plant.

Response

Although future development and related plant projects could impact the archaeological sites still remaining on the plant site, it should be noted that the present plans do not call for any construction activity in the areas of these remaining sites. Thus no adverse impacts are anticipated. This response is incorporated into the text in Section 2.6.

Question 310.15

Provide a detailed description of the research design developed for cultural resource site identification on all plant properties and all methods utilized in the field reconnaissance. Describe the kinds of field strategies utilized in areas with different topographic and vegetational settings, and include a discussion of the field conditions at the time of the field work.

Response

Bearing in mind that the initial correspondence and survey work was begun in 1971, there are no clear research goals described for this project. The initial survey by S. Lewis was simply to locate archaeological sites within the project limits and to record as many sites as possible. This was derived from the fact that no scientific work had been completed in the survey area previous to undertaking this study. Areas of high site probability were surveyed (S. Lewis - Progress Report No. 2). Survey methods consisted of walking over major portions of the project area. The survey was conducted during the spring and summer months when the project area had the best survey conditions. Area coverage was guided by cultivated fields which covered a major portion of the project area. No subsurface testing was conducted during the initial survey. It should also be noted that the upland prairie of central Illinois was an archaeological vacuum until the mid-1970's when various institutions began intensive archaeological investigations within this natural area. This response is incorporated into the text in Section 2.6.

Question 310.16

Provide a detailed description of the criterion used to evaluate the cultural resource sites identified on the plant properties. Describe each of these sites including the sites' structure, function, chronology, cultural affiliation and current condition. Which of these sites still remain on the plant property and what mitigative measures were used for those that do not remain? Provide a locational map for the remaining sites.

Response

Site significant was based upon three criteria:

1. The presence or absence of culturally diagnostic material,

2. The quantity of artifactual material present on a given site, and

3. Pending destruction of any site with the above characteristics.

A description of each of the eighteen sites discussed in the report by S. Lewis (1973) along with known information about those sites was submitted with the ER-CP. The large majority of these sites to be impacted by the plant and associated facilities were mitigated by further study. Information obtained during this additional archaeological work is reported by B. Lewis (1975). It should be pointed out that this 1974 testing of DW-32, the Pabst site, indicated a site worthy of National Register status. The site was nominated in 1974 and accepted in April, 1975. Subsequently a detailed excavation was accomplished at this site in 1975 and is reported by B. Lewis (1976). The following six sites and a brief description of their current condition follows:

1. DW-50 - Grass covered.

2. DW-82 - Tree area.

3. DW-95 - Under transmission line.

4. DW-104 - Tree area.

5. DW-138 - Cultivated field.

6. DW-140 - Cultivated field.

A locational map of these remaining six significant sites can be found in the report by S. Lewis (1973). In addition to these six sites there are also 31 sites that are still remaining on IP property. These other remaining sites were not deemed significant according to the above criteria. Records concerning these sites (and all other sites found during the Clinton studies) are on file at the Illinois State Museum.

This response is incorporated into the text in Section 2.6.

Question 310.17

Provide a detailed description of the settlement-subsistence system for all cultural phases known in the nearby area and a correlation of site type, cultural-phase and environmental setting over time.

Response

The settlement-subsistence system for the two drainages are described by R. B. Lewis (1975, 1976). The major utilization in this area was by archaic occupations, in particular the Late Archaic. During this period, a system of "basecamps and short term seasonal procurement camps" seem to have formed the settlment system. The subsistence system seem to be based upon terrestrial resources (rather than aquatic resources). Such a system is unlike general archaic procurement systems in the large river drainage systems, which rely more upon aquatic resources. The other occupations in the project area include Early, Middle, and Late Woodland and possibly Mississippian. The sites excavated were not intensive enough to furnish sufficient information to reconstruct their respective settlement-subsistence systems. The presence of these occupations, albeit sparse, does indicate utilization by these groups in an area and environment not previously well known. The extent and purpose is not known.

Since the original Clinton survey and exploration of the Pabst site, further research has been conducted in the Salt Creek drainage. This work was done by R. B. Lewis (1979) and S. Murphy (1979). (See "Hunter-Gatherer Foraging: Some Theoretical Explorations and Archaeological Tests," Lewis, May 1979; "Procurement Costs and Use - Life in Two Late Archaic Lithic Assemblages," Murphy, January 1979; and "Predictive Models in Illinois Archaeology - Report Summary," M. K. Brown (ed.), 1981.)

This response is incorporated into the text in Section 2.6.

Question 310.18

What are the major research problems for this general region? How do the nearby cultural resource sites relate to these problems? How do the sites located on the plant property relate to these problems and do they provide information contributing to a better understanding of the local culture history? Explain why.

Response

The major research problems for this region vary with different researchers but generally evolved around the time-specific cultural adaptations and in particular settlement-subsistence systems. However, as previously indicated, this area of Illinois was not well known until relatively recently, thus, space-time studies are a prelude to more processual questions. The studies conducted in the project area provide first scientific work and give some information on a poorly known and defined upland prairie drainage. In this sense they provide space-time data, initial data on cultural utilization, and specific data on the Late Archaic occupation with a reasonable reconstruction of this cultural settlement-subsistence system. This system is compared with similar cultural adaptations in the major drainage basins and is found to be significantly different in subsistence strategy. This research fills a significant gap in the cultural history of central Illinois by providing the above data (see B. Lewis 1975 and 1976).

Question 311.1

Table 2.1-1 lists 13 areas within the Clinton Power Station not owned. Exception Areas 1 and 13 are residence areas. All exceptions are shown on Figure 2.1-4.

Response

Table 2.1-1 along with Figure 2.1-4 is correct. This table lists tracts, not owned by Illinois Power Company, of which areas 1 and 13 are improved by residences.

Question 311.2

Paragraph 2.1.1.2 indicates there are four residential structures on the site property which are leased by IP. These are shown on Figure 2.1-5.

Response

Paragraph 2.1.1.2 along with Figure 2.1-5 is correct. This paragraph states that four residential structures on site property are leased by IP. These residences are on property owned by Illinois Power Company.

Question 311.3

Please amend Table 2.1-1 and Figure 2.1-4 to correct any inconsistency or explicitly identify which residences you own and their long-term usage. Please identify the length of Illinois Power Company's lease on these residences and their intended usage.

Response

Table 2.1-1 and Figures 2.1-5 and 2.1-4 are correct. Residences on Figure 2.1-5 are leased by Illinois Power Company on residence- and farm-leases which are for a term of one year and renewable by consent of both parties. Two of the four residences are located on property used in conjunction with our agricultural program. The other two are houses located on lots near Farmer City and are leased for residence use.

Question 320.1

Tables 1.1-1 thru 1.1-6 should be revised to show actual 1979 and 1980 data on peak load and energy consumption. If the forecasts for years thru 1990 require revision as a result of the differences between actual and forecast for 1979 and 1980, these forecast revisions should also be made.

Response

The revised Tables 1.1-1 thru 1.1-6 are included. Other parts of Chapter 1 have also been updated to reflect current data.

Question 320.2

What will the first year of commercial operation costs (fixed charges, fuel, O&M) be, in mills/kWh and dollars of the year in question? Break out these costs by unit, indicating in what year each unit will be commercially operating.

Response

The following costs are expected for the first full year of operation of Clinton Unit 1 (commercial operation beginning August 31, 1983):

	Millions of Dollars	Mills/kWh
Fixed Charges	371.2	70.30
Fuel	60.7	11.50
O&M	7.6	1.44
TOTAL	439.5	83.24

For planning purposes, the scheduled completion of Unit 2 is shown as 1995. The following costs are expected for the first year of operation:

	Millions of Dollars	Mills/kWh
Fixed Charges	Undetermined	Undetermined
Fuel	190.1	19.13
O&M	28.4	2.86

Question 320.3

What would the estimated economic impact be, in terms of replacement power cost, interest on capital and capital cost, and fuel carrying charges of non-operation of Clinton Units 1 and 2? Include assumptions made to develop these costs.

Response

In the event of non-operation of Clinton Unit 1, the following costs would be expected:

	Costs in Millions of Dollars	
	1984	1985
Replacement power costs	77.2	172.1
Interest on capital	118.0	127.3
Fuel carrying charges	6.9	7.5
TOTAL	202.1	306.9

In the event of non-operation of Clinton Unit 2, the following costs would be expected:

	Costs in Millions of Dollars	
	1995	1996
Replacement power	343.4	421.8
Interest on capital	Undetermined	Undetermined
Fuel carrying charges	Undetermined	Undetermined

Notes and Assumption:

1. The above costs are for IP's 80% share of the Clinton unit. The total costs of a delay would be even greater because of costs to the owners of the remaining 20% of the unit.

2. Installed costs of Clinton Unit 1 (IP's 80% share): $1,455,537,000.

3. AFDC rate: 7.75%

4. Replacement power costs were calculated using the probabilistic production cost model, PROMOD.

5. Unit 1 Fuel carrying charges are only for the initial core. Since a delay could also affect subsequent batches of fuel, the total impact may be much greater than that shown above.

Question 320.4

What is the applicant's estimate of fuel loading, date of criticality, and date of commercial operation for Clinton Units 1 and 2? (as of 1981).

Response

Unit 1 - Estimated fuel load date: January 1983

Estimated date of criticality: February 1983

Estimated date of commercial operation: August 1983

Unit 2 - For planning purposes, the scheduled completion of Unit 2 is shown as 1995.

Question 320.5

The Figures 1.3-1 and 1.3-2 portray the fuel use of the Illinois Power system, but do not specifically indicate the effect of Clinton Units 1 and 2 on reducing base load consumption of coal and oil. Please prepare such a table to so indicate.

Response

Table 320.5-1 shows the estimated fuel use of the Illinois Power system with and without Clinton Unit 1 in 1984 and 1985, and with and without Clinton Unit 2 in 1995 and 1996.

TABLE 320.5-1

PROJECTED ILLINOIS POWER GENERATION BY FUEL TYPE

(All Values in Gigawatt Hours)

	1984		1985	
	WITHOUT CLINTON UNIT 1	WITH CLINTON UNIT 1	WITHOUT CLINTON UNIT 1	WITH CLINTON UNIT 1
Oil and Gas	430	121	976	298
Coal	16,541	11,620	16,851	13,317
Nuclear	0	5,280	0	4,386[a]

	1995		1996	
	WITHOUT CLINTON UNIT 2	WITH CLINTON UNIT 2	WITHOUT CLINTON UNIT 2	WITH CLINTON UNIT 2
Oil	558	212	906	368
Coal	20,071	15,282	20,436	16,785
Nuclear	4,696	9,940	4,710	9,083[b]

Note: The above estimates reflect the impact of IP's share of Unit 1 and Unit 2 only.

[a] Clinton Unit 1 energy in 1985 reflects the effect of a scheduled 9-week refueling outage.

[b] Clinton Unit 2 energy in 1996 reflects the effect of a scheduled 9-week refueling outage.

Question 320.6

What is applicant's estimate of the capital cost of Clinton Units 1 and 2 based on the dates from Question 2 above? Separate capital costs for each unit (1 and 2).

Response

The installed cost of Illinois Power's 80% share of Clinton Unit 1 is estimated to be $1,455,537,000. This costs includes AFUDC and assumes a commercial operation date of August 31, 1983.

The projected installed cost of Illinois Power's 80% share of Clinton Unit 2 is undetermined at this time.

Question 320.7

Please provide a copy of the annual reports for Illinois Power for years 1980, 1979, 1978.

Response

One copy of each annual report was given to the NRC and Argonne National Laboratories at the CPS site on April 28, 1980.

Question 320.8

As a part of preparing an environmental impact statement in support of issuance of an operating license, we intend to compare the economics of system generation both with and without the proposed nuclear addition. To perform this analysis we will need the following information:

A production cost analysis which shows the difference in system production costs associated with the availability vs. unavailability of the proposed nuclear addition. Note, the resulting costs differential should be limited solely to the variable or incremental costs associated with generating electricity from the proposed nuclear addition and the sources of replacement energy. If, in your analysis, other factors influence the cost differential, explain in detail.

a. The analysis should provide results on an annual basis covering the period from initial operation of the first unit through five full years of operation of the last unit.

b. Where more than one utility shares ownership in the proposed nuclear addition, the analysis should include results for the aggregate of all participants.

c. The analysis should assume electrical energy demand grows at (1) the system's latest official forecasted growth rate, and (2) zero growth from latest actual annual energy demand.

d. All underlying assumptions should be explicitly identified and explained.

e. For each year (and for each growth rate scenario) the following results should be clearly stated: (1) system production costs with the proposed nuclear addition available as scheduled; (2) system production costs without the proposed nuclear addition available; (3) the capacity factor assumed for the nuclear addition; (4) the average fuel cost and variable O&M for the nuclear addition and the sources of replacement energy (by fuel type) - both expressed in mills per kWh; and (5) the proportion of replacement energy assumed to be provided by coal, oil, gas, etc.

Response

Tables 1.3-3 through 1.3-8 have been included in Chapter 1 in response to this question.

Question 451.1

Please provide the sources of the meteorological data (particularly wind direction frequency distribution) used as input to the analytical fog model (Section 6.1.3.2.3).

Response

Five to ten years of surface meteorological data including wind direction from the Peoria, Illinois, National Weather Service surface station were used as input to the analytical fog model. Their period of record used was within the period of record used for the Lake Clinton temperature analyses (1949-1971).

After seven areas of interest were identified in the immediate vicinity of Lake Clinton, the Peoria meteorological data were screened for conditions that would significantly reduce visibility at the seven locations. Parameters considered in the screening process included wind direction, wind speed, stability category, and temperature-dew point difference. The fog analysis was then conducted under the conditions that would affect the areas of interest.

This response has been incorporated into the text on page 6.1-20.

Question 451.2

Provide an assessment of the predicted impact of steam fog/ice on the County Road 14 bridge that crosses the discharge flume.

Response

While steam fog/ice could be a problem on the bridge, the severity of the problem cannot be predicted because of such variables as the distance between ground level and water level in the flume and the effect at the letdown structure near the bridge. IP has committed to the Illinois Department of Transportation to install driver aides and warnings as necessary.

Question 451.3

What specific measures will be taken to mitigate the effects of steam fog/ice on road (and bridge) conditions and traffic safety in the immediate vicinity of Clinton Lake?

Response

IP has committed to the Illinois Department of Transportation to install driver warnings and aids as necessary to minimize any hazardous impact of the lake on the driving public. These may include warning lights, signs, covered bridges, etc.

Question 470.1

Provide the following additional information, which is necessary to estimate population doses and maximum individual doses, due to atmospheric releases. (Information should reflect 1980-81 surveys.)

Response

1. Fraction of the year leafy vegetables are grown.

   Leafy vegetables can be grown between May and October, or up to 50% of the year.

2. Fraction of the year cows are on pasture.

   Milk cows are on pasture from May to October, about 50% of the year.

3. Absolute relative (%) humidity over growing season (average value).

   The average daily maximum relative humidity during the growing season (May-October) is 83.6%.

4. Average temperature over the growing season.

   The average temperature over the growing season (May-October) is 18.8° C.

5. Fraction of the year beef cattle are on pasture.

   Beef cattle can be outside year around. Grass for grazing grows from May to October, 50% of the year.

6. Annual milk production from site boundary out to 5 miles.

   A survey taken in the last quarter of 1980 revealed no milking cows or goats within a 5-mile radius of the station.

7. Annual mutton and lamb production from site boundary out to 5 miles.

   There is no mutton or lamb production within a 5-mile radius of the station.

8. Annual vegetable production from site boundary out to 5 miles. Provide separate values for leafy vegetables such as spinach and non-leafy types such as corn or potatoes.

   The estimated vegetable production within 5 miles of the plant is 38,000 kg/yr. The fraction of leafy vegetables is negligible.

9. Separate Table 2.1-18 into leafy and non-leafy components.

Leafy vegetables make up a very small fraction of the vegetables grown in this area. The annual weight yield to leafy vegetables is insignificant compared to the values in Table 2.1-18.

10. Describe the location of the nearest milk cow and nearest meat animal in each sector.

Our most recent survey showed no milk cows or goats (milk for human consumption) within 5 miles of the station. Figure 2.2-9 in the CPS Environmental Report---Construction Permit Stage shows the results of an older survey which is still valid for relative locations of dairy cows within 15 miles of the station.

Concerning meat animals, the data in the Environmental Report-OLS is the only information we have available.

11. Reconfirm that the data in the following tables represent 1980-1981 values; 2.1-11, 2.1-14, 2.1-15, 2.1-16, 2.1-17, and 2.1-18.

The data in these tables has not changed significantly from the time when the information was gathered.

Question 470.2

Provide the following additional information, which is necessary to estimate population doses and maximum individual doses due to radioactive releases to the hydrosphere. (Information should reflect 1980-81 surveys.)

a. Estimates of commercial fishing and sport fishing catch downstream of the plant (to 50 miles). Include bases for each estimate and representative dilution values.

b. Estimates of recreational use downstream including shoreline use, boating use, and swimming use. Units should be person-hours/yr. The bases for each estimate should also be provided. Include representative dilution values for each estimate.

c. Reconfirm that no consumption or irrigation of downstream water is occurring, or is expected to occur in the near future.

Response

a. The commercial fish harvest reported to the state of Illinois from the Sangamon River in 1979, the most recent available year, is as follows:

Buffalo	1,330
Catfish	850
Carp	820
Drum	100

Commercial fishing is not allowed on Salt Creek.

Quantitative data on recreational fishing in Salt Creek and the Sangamon River is not available.

b. Quantitative data on the recreational use of Salt Creek and the Sangamon River is not available.

c. There is no municipal or industrial use of Salt Creek downstream of the Clinton Power Station. There is no known irrigational use of the creek, and none is expected in the near future.

Ths response is incorporated into the text on page 5.2-4.