ENHANCING THE USE OF EASTERN AND MIDWESTERN COALS BY GAS REBURNING-SORBENT INJECTION

ENVIRONMENTAL INFORMATION VOLUME

for

Illinois Power Company, Hennepin Station Boiler No. 1

Submitted by:

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TABLE OF CONTENTS

1.0 INTRODUCTION

On December 19, 1985, President Reagan signed Public Law No. 99-190, which provides funds to conduct cost-shared clean coal technology projects between industry and government. To implement this law, the Department of Energy (DOE) has instituted a Clean Coal Technology Program. The goal of this program is to evaluate emerging technologies that are designed to displace oil and natural gas, or to utilize coal more cleanly, efficiently or economically than currently available technology. Individual clean coal projects are intended to demonstrate the feasibility of future commercial applications of emerging technologies. This volume is concerned with a clean coal project combining gas reburning with sorbent injection for the purpose of in-boiler control of oxides of nitrogen and sulfur.

The Energy and Environmental Research Corporation (EER) is currently making preparations to conduct a demonstration project involving cofiring pulverized coal with natural gas in combination with sorbent injection and/or coal cleaning to:

- Allow for cost effective control of NO_x and SO_2 emissions from coal-fired boilers constructed prior to requirements for New Source Performance Standards (NSPS) [40 CFR Part 60].

- Provide the utility industry with increased flexibility in coal purchasing.

The combination of technologies to be demonstrated, gas reburning with sorbent injection (GR-SI), involves introduction of natural gas above the main heat release zone to produce a homogeneous, slightly oxygen-deficient zone. At the downstream end of this rich zone, burnout air and calcium based sorbent are injected into the gas duct. Gas reburning is effective in the reduction of NO_x emissions by the reaction of hydrocarbon radical species with NO to form nitrogenous intermediates which react in the oxygen deficient atmosphere to produce N_2. The sorbent injection process can be viewed as a sequential coupling of an activation step, in which the calcium based sorbent (limestone or hydrate) calcines to produce CaO, and a heterogeneous sulfation step, where the CaO reacts with gas phase SO_2/SO_3 to form calcium sulfate. The calcium sulfate is subsequently removed by the plant particulate control equipment. Upper furnace sorbent injection will be used in this project.

The technology demonstration program conducted by EER will focus on three Illinois utility boilers representing the range of pre-NSPS boiler technology:

- Illinois Power Co., Hennepin Station, Unit 1; 80 MW_e tangentially fired.
- Central Illinois Light Co., Edwards Station, Unit 1; 117 MW_e front wall fired.
- Springfield CWLP, Lakeside Station, Unit 7; 40 MW_e cyclone fired.

This volume details the actions to be taken at Edwards Station and the environmental impacts of these actions.

The purpose of this Environmental Information Volume is to facilitate DOE's preparation of the environmental documents required for compliance with the National Environmental Policy Act of 1969 (NEPA). This report has been prepared in accordance with the guidelines provided by DOE in Appendix J of the Clean Coal Technology Program Opportunity Notice (PON) and contains all relevant information requested therein. The goal of this document is to provide a project description as well as an analysis of all applicable environmental, health, safety, and socioeconomic (EHSS) issues. Current air permits and National Pollutant Discharge Elimination System (NPDES) permits are also described, as well as anticipated permit modifications.

2.0 PROJECT DESCRIPTION

This section describes the existing facility at Hennepin Station, presents a brief technical description of the GR-SI technology demonstration project, describes anticipated project activities, defines project resource requirements and discharges, and lists EHSS areas that could potentially be impacted by the project. All data requested in Appendix J of the DOE PON are addressed; however, only cursory treatment is afforded those factors for which this retrofit technology demonstration makes applicability tenuous.

2.1 Existing Facility

2.1.1 Site Description

Hennepin Power Station is a 533 acre facility located on the Illinois River in Putnam County, approximately 2 miles northeast of Hennepin, Illinois and about 85 miles west-southwest of Chicago, as indicated in Figures 2-1 and 2-2. The layout of the station is illustrated in the aerial view of Figure 2-3, and specific site features are identified on the station plot plan presented in Figure 2-4.

Hennepin Station is accessible by rail, truck, and barge. The New York Central Railroad (Conrail) line runs adjacent to the site and a siding to the site is in place. Truck access is via Interstate highway 80/180 which runs to within about 1.5 miles of the plant; county roads lead from Interstate 180 to the plant site. The Illinois River, which forms the north boundary of the Hennepin site, is a major navigation and commerce channel connecting with the Mississippi River. Water supplies for the Hennepin site are taken from the Illinois River and from groundwater via on-site deep wells. Natural gas service is in place on site and Unit 1 has the capability of firing up to 100 percent gas.

Hennepin Station has two coal-fired steam electric generating units. The GR-SI technology demonstration will be conducted in Unit 1. Coal is delivered to Hennepin Station by barge and unloaded into a storage pile which

★ Hennepin Power Station, Putnam County, Illinois

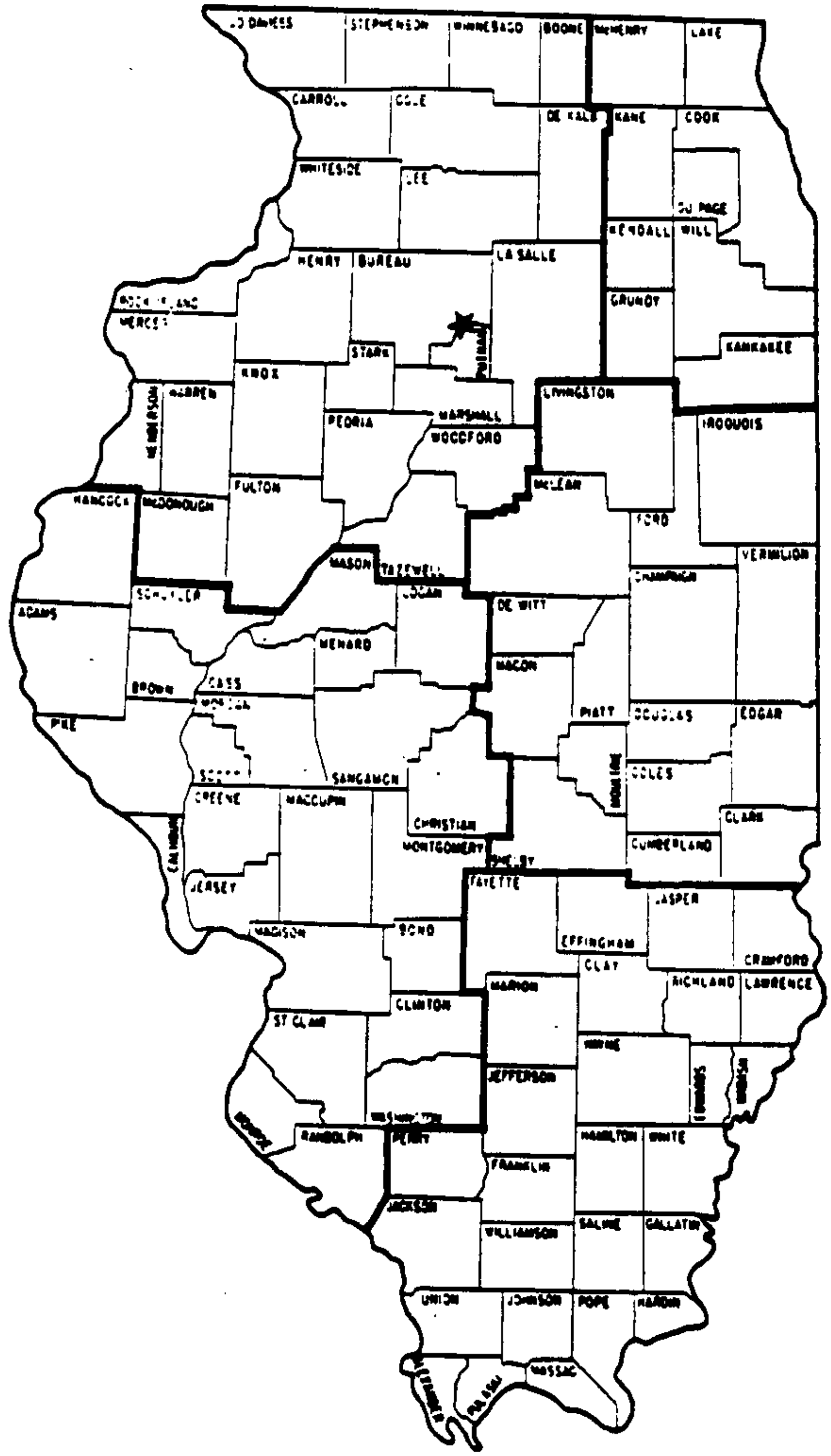


Figure 2-1. Location of Hennepin Station.

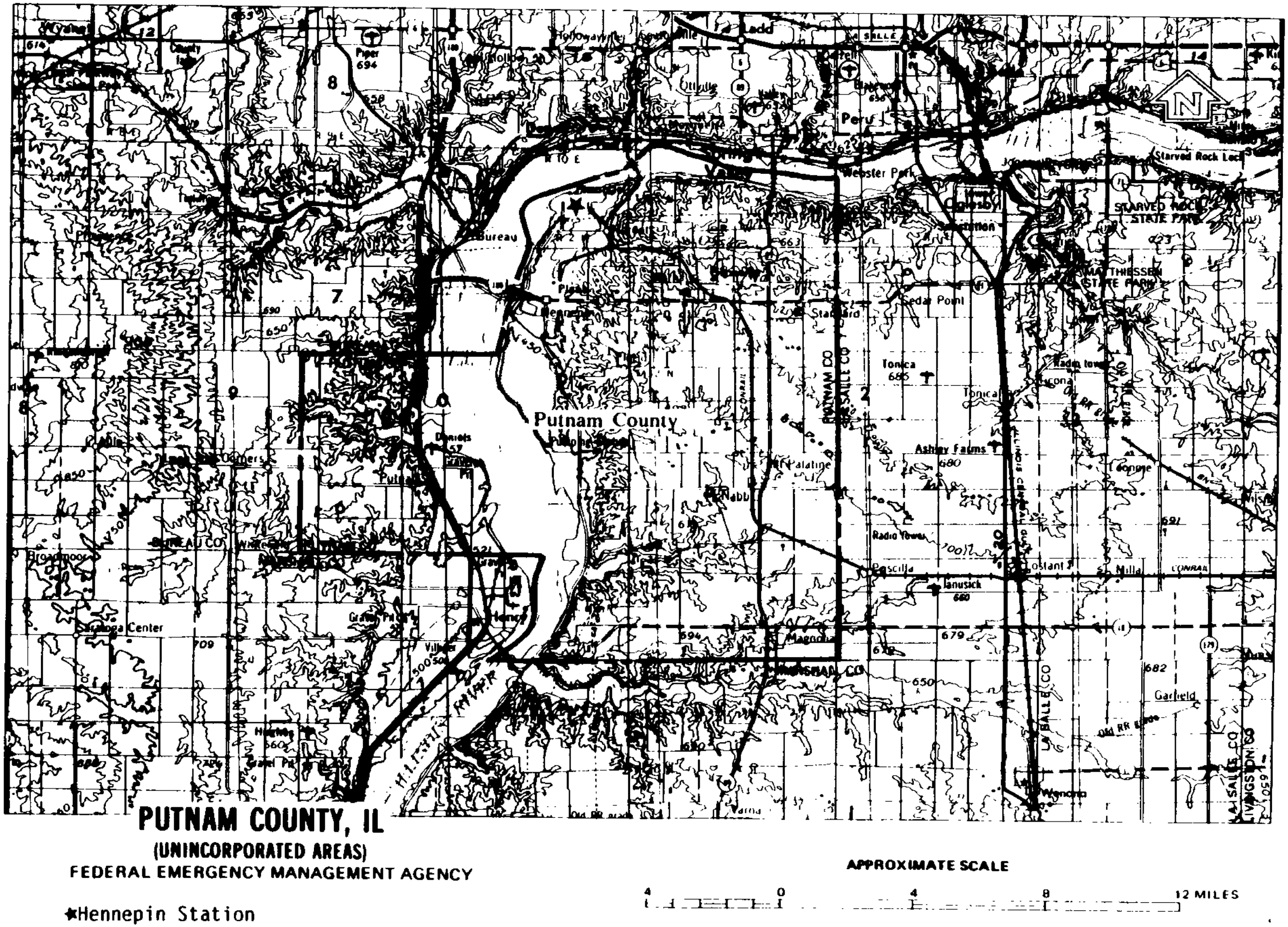
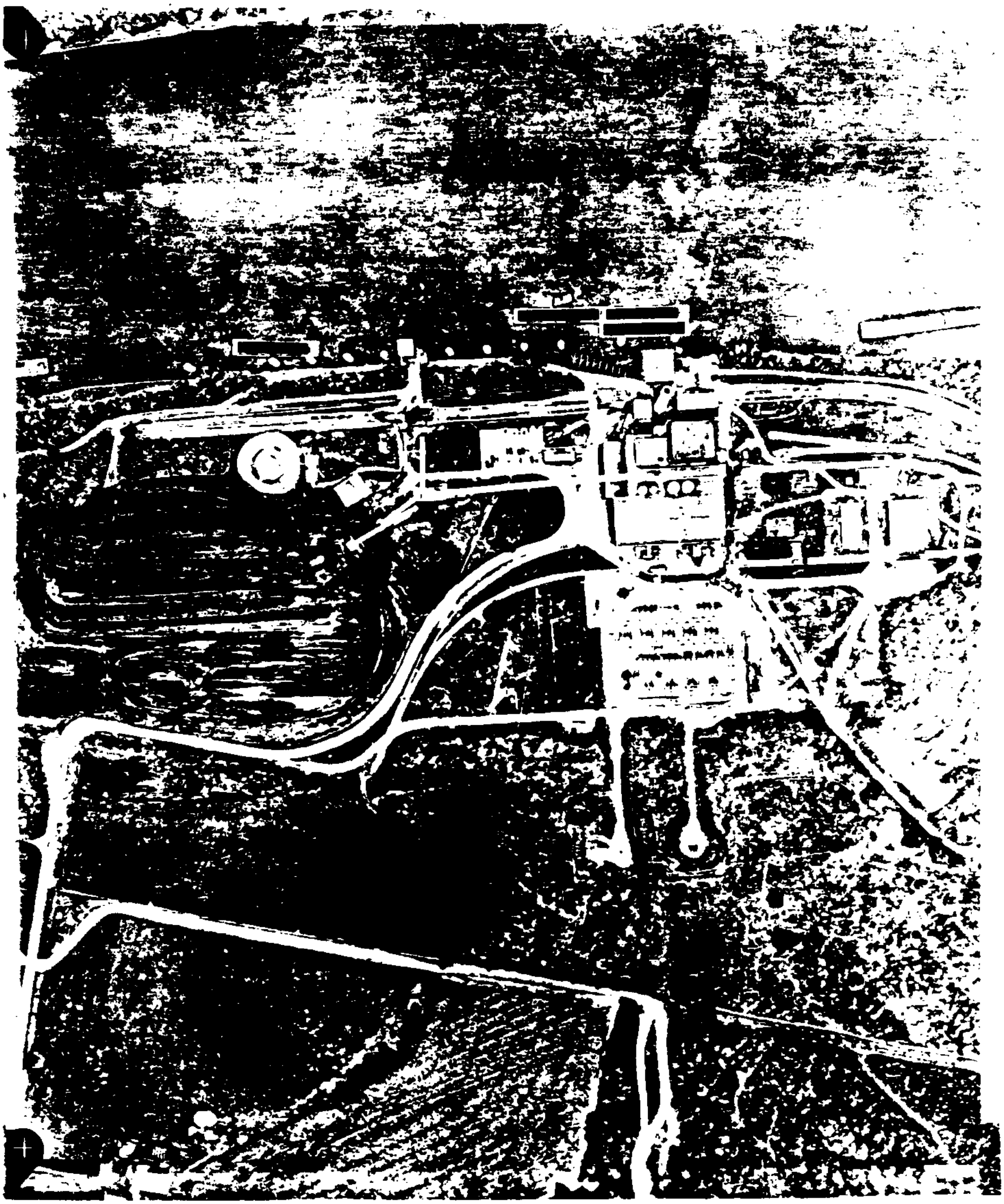


Figure 2-2. Map of Putnam County.



is maintained at a level sufficient to supply both units' coal requirements for fifty to ninety days. The coal pile covers a ground surface of approximately 8 acres. Coal pile runoff is intermittent and has an annualized average flow rate of 0.0186 million gallons per day (MGD), based on measurements made by Hennepin Station personnel in 1986. Runoff is received by an ash pond separate from the pond receiving wastes from Unit 1. Overflow from each pond is discharged directly into the Illinois River.

2.1.2 Description of Existing Process

Hennepin Station contains two coal-fired steam electric generating units with a total net generating capacity of 310 MW_e. The project will be conducted in Unit 1, an 80 MW_e tangentially fired boiler, as shown in Figure 2-5. Unit 1 fires coals from various Illinois mines, depending on price and availability. Coal and ash analyses for a coal typical of those fired by Unit 1 are given in Table 2-1. These analyses were done for the plant by Commercial Testing and Engineering Co. in 1986. Based on plant measurements, in 1986 Unit 1 fired coal at an average rate of 56,164 lb/hr. The maximum coal firing rate of Unit 1 is 71,500 lb/hr. Both units at Hennepin Station combined fired coal at a rate of 230,909 lb/hr in 1986. The capacity factor of Unit 1 was 67.6 percent in 1986.

An electrostatic precipitator (ESP) is used to control particulate emissions. The ESP is a cold side unit, which means that it operates downstream of the air preheater. The ESP has specific collection area of 223 $ft^2/(1000\ ft^3/min)$.

Solid waste streams from the boiler include the furnace bottom ash and the fly ash collected by the plant ESP. These waste streams are exempted from RCRA Subtitle C Hazardous Waste regulations and are sluiced to on-site ash ponds for disposal. Based on the flow rate and ash percentage of the coal, calculations indicate that the average flow rate of fly ash from Unit 1 to the ash pond is 4566 lb/hr. Average flow rate of bottom ash from Unit 1 to the ash pond is 1537 lb/hr. The average total station ash generation is 25,285 lb/hr.

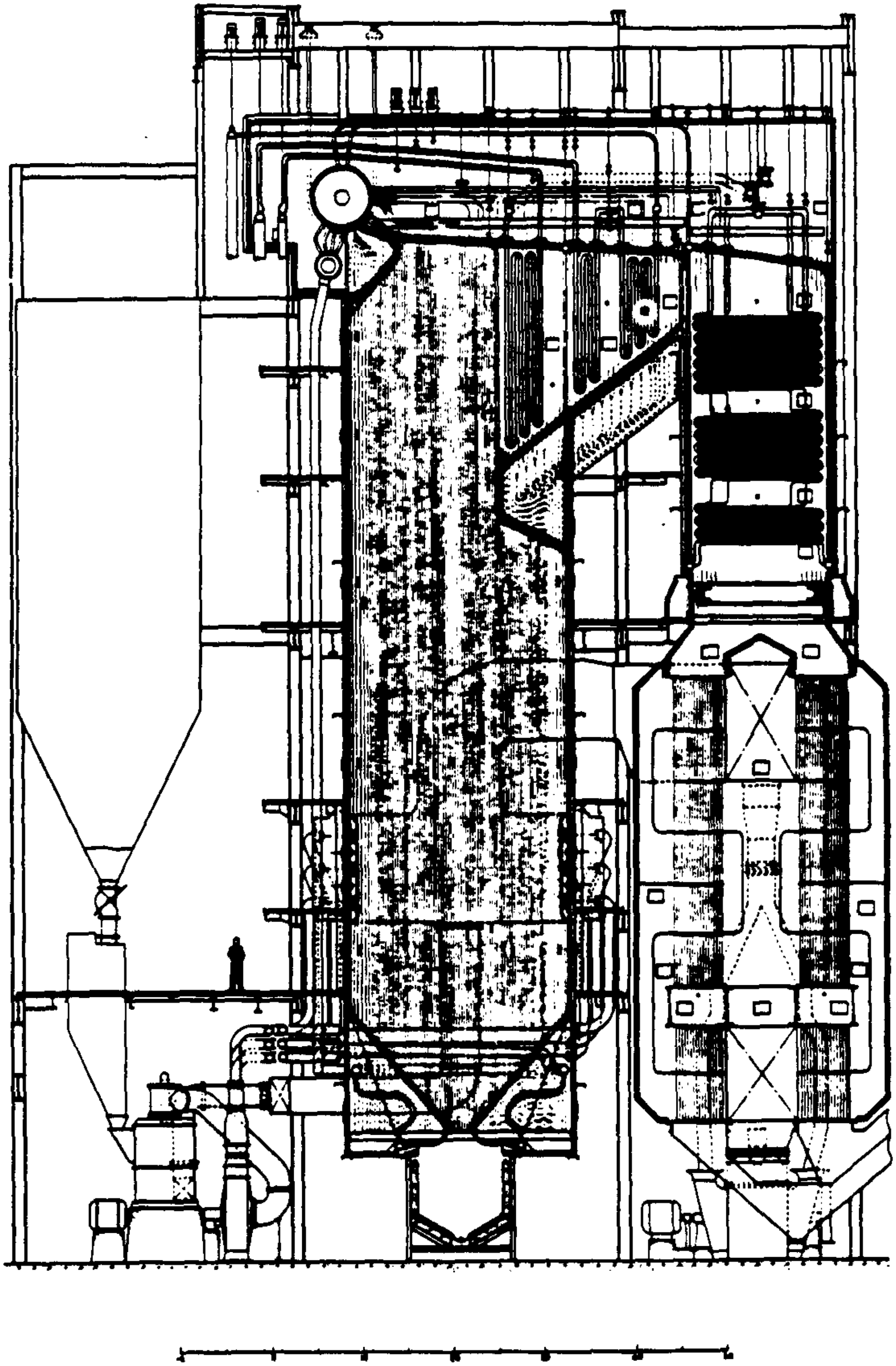


Figure 2-5. Schematic of Hennepin Station Unit No. 1 Boiler.

TABLE 2-1. COAL AND ASH ANALYSES

Fuel Properties	Typical Unit 1 Illinois Coal
Proximate Analysis (Dry)	
Fixed Carbon	48.57
Volatile Matter	38.74
Ash	12.69
Moisture (as received)	13.75
Heating Value (as fired) (Btu/lb)	10,717
Ultimate Analysis (as received)	
Carbon	59.69
Hydrogen	4.11
Nitrogen	1.07
Chlorine	0.12
Sulfur	2.89
Ash	10.95
Oxygen	7.42
Moisture	13.75
Sulfur Forms (Dry Coal Basis)	
Pyritic	1.62
Sulfate	0.04
Organic	1.70
Ash Fusion Temp, Reducing (^{o}F)	
Initial Deformation	2075
Softening (H = W)	2185
Softening (H = 1/2 W)	2285
Fluid	2390
Ash Density (g/cm^3)	2.2
Coal Grindability (Hardgrove)	52

Process water from the adjacent Illinois River is used for once-through non-contact cooling applications and for transporting fly ash and bottom ash. Boiler make-up water is provided by on-site deep wells and is treated in a demineralizing and silica removal plant. Process water flow rates as measured by the utility are summarized in Table 2-2. Fly and bottom ash are sluiced to an ash pond. Sluice water requirement varies from 0.72 MGD to 1.26 MGD. Annualized average sluice rate is about 1.0 MGD. These values are approximations made by the plant based on sluice pump rating and estimated hours of sluicing per day. Effluent water from the Unit 1 ash pond is discharged into the Illinois River. The plant's National Pollutant Discharge Elimination System (NPDES) permit requires the plant to monitor effluent water for flow rate, pH, total suspended solids, and oils and greases. Minimum, maximum, and average values of these parameters for a recent year are presented in Table 2-3. These values are derived from the plant's monthly NPDES monitoring reports for 1986. Effluent water flow rate has an average value of 0.353 MGD. Flow rate monitoring is done on an instantaneous, rather than time averaged, basis. Factors accounting for the discrepancy between sluice water entering the pond and discharge water leaving the pond include approximations in sluice pump rating and sluicing time, and the fact that effluent water flow rate, which varies with time depending upon the ash sluicing schedule and rain patterns, is estimated on an instantaneous basis.

During a 1986 emissions test, the Unit 1 flue gas volumetric flow rate was measured at 181,036 dry standard cubic feet per minute (dscfm). Air emissions of concern include SO_2, NO_x, and particulates. In 1986, the average SO_2 emission rate of Unit 1 was 5.10 pounds of SO_2 per million Btu (lb/MBtu). SO_2 emissions from Hennepin Units 1 and 2 are limited to an hourly SO_2 mass emission limit of 17,050 lb/hr, which is equivalent to 5.40 pounds of SO_2 per million Btu when both units are operating at full load. Full load particulate emissions were measured to be 0.062 lb/Mbtu (53.19 lb/hr) in 1986. NO_x emissions are estimated by the utility to be 0.69 lb/MBtu.

TABLE 2-2. PROCESS WATER FLOW RATES

Source	Flow Rate (MGD)
Unit 1 Circulating Boiler Water	1.68
Plant Cooling Water	230
Unit 1 Sluice Water	0.72-1.26
Plant Coal Pile Runoff	0.0186 (intermittent)

TABLE 2-3. AVERAGE UNIT 1 ASH POND EFFLUENT WATER PARAMETERS

Parameter	High	Low	Average
Flow Rate (MGD)	0.445	0.271	0.353
pH	8.8	8.4	8.6
TSS (mg/l)	15.6	6.0	9.8
Oils/grease(mg/l)	2.5	1.9	2.2

2.2 Technical Project Description

Laboratory-scale investigations of the reburning concept were originally conducted in the United States in the early 1970's (e.g. Wendt, J. O. L., Sternling, C. V., and Matovich, M. A., "Reduction of Sulfur Trioxide and Nitrogen Oxides by Secondary Fuel Injection." Fourteenth Symposium (International) on Combustion, The Combustion Institute, Pittsburgh, 1973, p. 897). More recently it has been demonstrated at full scale in Japan, but mainly with oil fired systems. Recent extensive research and pilot scale work at EER has demonstrated potential of the reburning concept, particularly when the reburning fuel is natural gas. Sorbent injection was also originally developed in circa 1960 and 1970 and was demonstrated at full scale in Tennessee Valley Authority's (TVA) Shawnee Power Plant in the early 1970's with rather poor results. Subsequently, TVA demonstrated that significantly higher capture levels could be achieved through use of proper injection locations and advanced sorbent materials. Large scale work at several U.S. and Canadian sites has begun to confirm the potential of this technology for SO_2 control.

EER's most recent pilot scale results indicate that 60 percent NO_x reductions can be achieved from typical pre-NSPS NO_x levels. Sulfur dioxide reductions of up to 70 percent can be achieved by combining reburning with sorbent injection if a hydrated sorbent is used. These data are typical of those obtained with optimized gas reburning-sorbent injection for a wide spectrum of primary fuels and they appear to be generally achievable in full scale systems.

The objectives of the current project are to provide a comprehensive data base demonstrating the performance of GR-SI in pre-NSPS utility boiler applications and to promote commercialization of this combination of technologies. Since the design and operating characteristics of pre-NSPS utility boilers vary widely, no single demonstration could adequately address the full population. Consequently, a total of three demonstrations will be conducted using three pre-NSPS utility boilers with widely varying characteristics. The GR-SI systems will be designed for optimum performance as applied to each specific host unit.

Figure 2-6 illustrates the application of GR-SI in a tangentially fired boiler. Natural gas is injected above the main heat release zone to reburn NO that is produced in that zone. NO is reduced by a hydrocarbon radical (CH) producing HCN which allows the formation of NH via NCO. Molecular nitrogen is produced by the reaction of NO with N at high temperature and with NH_2 at lower temperatures (<2200°F). The GR-SI system will provide 60 percent NO_x control. The pre-NSPS Hennepin unit does not have an NO_x emission constraint. Thus, this NO_x emission reduction could be useful to the plant in response to future NO_x regulations.

In Figure 2-6 four locations are shown for sorbent injection; three of these (A, B, and C) correspond to upper furnace injection. Upper furnace injection is necessary because an injection temperature of approximately 2250°F is required to maximize sulfur capture. Injection location D provides for duct injection of calcium hydroxide. A humidifier is also included since humidification can help both sulfur capture and precipitator performance. For the tangentially fired Unit 1 boiler, the SO_2 strategy will be to reduce SO_2 emissions by 50 percent while firing the existing medium and high sulfur Illinois coals. This emission reduction is not required by existing regulations but could be used for compliance with any future SO_2 regulations. The preliminary plan is to inject the sorbent into the upper furnace on this unit. Sorbent injection will increase the amount of solid material in the flue gas. Therefore, several ESP modifications and performance upgrades will be assessed during the detailed design phase of the project and implemented during the construction and startup phase. Among these possible modifications are flue gas humidification and SO_3 injection.

Solid waste will be managed using the plant's current wet handling system. The solid waste from GR-SI is a blend of a calcium sorbent with fly ash which, due to the presence of unreacted lime, has similar characteristics to lime/fly ash/scrubber sludge prepared for sludge disposal or the solid product from lime-based spray dryer systems. This waste hardens after

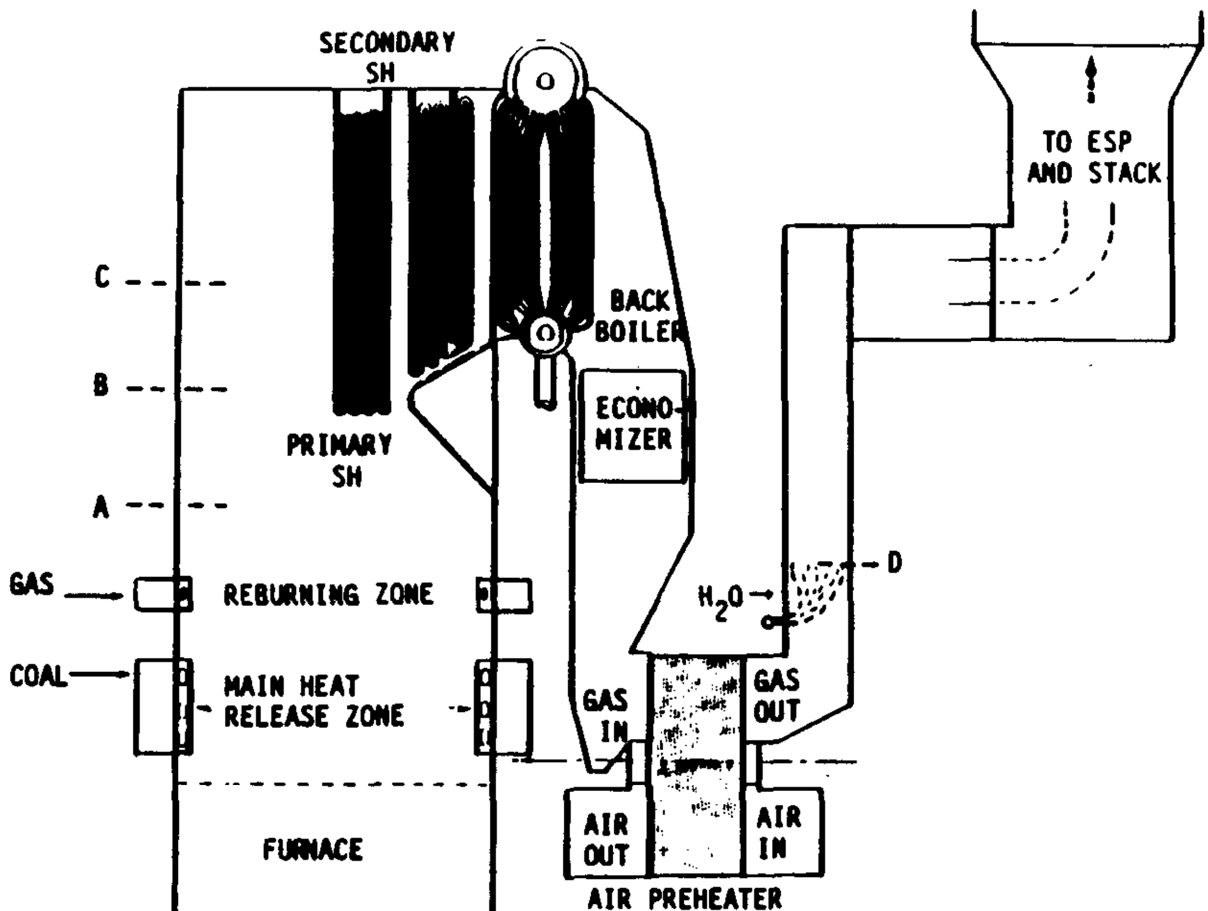


Figure 2-6. Application of gas reburning sorbent injection for NO_x/SO_x control.

placement and produces stable landfills. Such a blend may also have commercial value for construction applications.

2.3 Description of Activities

2.3.1 Description of Project Phases

The GR-SI project will take 53 months to complete. EER will conduct the technology demonstration project in three phases:

- Phase 1--Design and Permitting. This initial phase will culminate in the detailed design of gas reburning and sorbent injection systems for the Hennepin site. A program plan will be prepared for the equipment construction and demonstration testing. An industry panel will be established to initiate technology transfer.

- Phase 2--Construction and Startup. This phase will begin after Phase 1 is completed and will last 16 months. Following DOE approval, the gas reburning and sorbent injection equipment will be installed and checked out at Hennepin site. The process and engineering designs will be presented to the industry panel.

- Phase 3--Operation, Data Collection, Reporting, and Disposition. Phase 3 will begin concurrent with the final stages of Phase 2 and will last 29 months. Following DOE approval, the host unit will be tested for one year over a range of conditions. All data and test results will be compiled into a guideline manual which will be made available to industry. The project results will be presented to the industry panel.

The demonstration of GR-SI is not intended as a first generation of specific technology but rather it will build upon the results of several individual technology demonstrations now being conducted by the EPA and others.

2.3.2 Description of Installation Activities

The following section describes the specific installation tasks that will be undertaken as part of the GR-SI technology demonstration by EER personnel, plant personnel and local labor. Worker safety is a primary concern in any industrial project, since an employer has not only a financial liability, but an ethical responsibility to ensure that workers are not subjected to unreasonable risks. All appropriate occupational health and safety rules will be fully enforced throughout this program to minimize the risk of injury to workers.

The GR-SI equipment installation work at Hennepin site will be conducted in a series of five steps:

1. Procurement
2. Initial installation (normal unit operation)
3. Final installation (outage)
4. Checkout
5. Correction of deficiencies

Step three, final installation, must correspond to a normally scheduled outage and this is the key element determining the installation schedule. The specific outage schedule will depend on the utility's load requirements at the time and the condition of the unit. For example, if a fall outage is scheduled but the power demand is greater than anticipated in the fall and there are no major problems, the utility may elect to delay the outage until the low load period in the spring. The program must be flexible in this regard. To maximize schedule flexibility, EER will request authorization to procure long lead time items as soon as possible following the completion of the final design specifications.

Most of the equipment will be standard items such as piping, valves, silos, etc., and will be obtained directly from vendors. A limited number of items will need to be custom-fabricated to meet site specific requirements.

These include the gas and sorbent injectors, windbox modifications, etc. The general approach to the equipment procurement and installation will be to conduct the fabrication/assembly work off site to the maximum extent possible. This will limit the amount of time-consuming custom installation and fitting required during the short outage periods.

The on-site installation work will be divided into two steps: an initial installation step where all work is conducted during normal unit operation and the final installation step which requires a unit outage. The following equipment will be installed during normal unit operation:

1. Sorbent unloading and storage equipment.
2. Sorbent feeding and transport equipment.
3. Sorbent piping and injection equipment assembly.
4. Sorbent injection control assembly.
5. Instrumentation installation except for final connections.

A plot plan of Hennepin Station showing the location of the sorbent storage silo is shown in Figure 2-7.

The intent is to complete the initial installation in time to provide flexibility on completing the final installation during a scheduled outage. The following equipment must be installed during an outage:

1. Windbox modifications.
2. Furnace or duct penetrations for gas injectors, overfire air ports or sorbent injectors.
3. Final connections for control equipment.
4. Final gas plumbing.
5. Final instrumentation connections.
6. ESP upgrades.

Boiler tubes are lined with asbestos to minimize heat loss, and some asbestos handling will be required. All boiler modification work will be conducted by a contractor licensed to work with asbestos materials. EER will include in

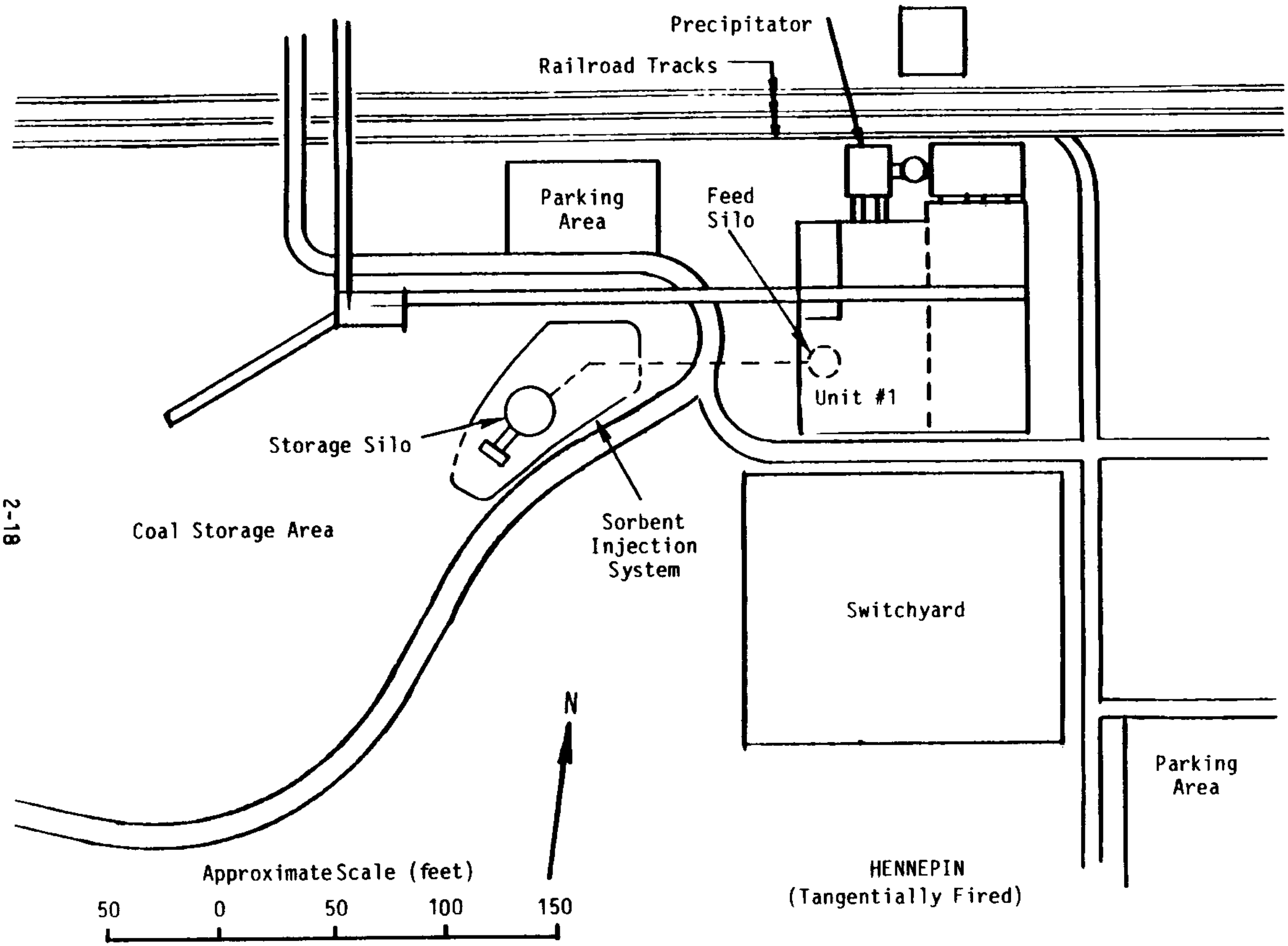


Figure 2-7. Plot plan of Hennepin Station.

the contractor's specifications a requirement that all applicable OSHA and EPA regulations be satisfied, including asbestos removal guidelines, air monitoring requirements, and proper disposal considerations.

It is not necessary that all final installation work be completed at a single scheduled outage following the initial installation. Consideration will be given to installing the furnace/duct penetrations, windbox modifications and ESP upgrades prior to the completion of the initial installation items if a scheduled outage becomes available. This would reduce the intensity of effort required during the final outage.

2.4 Project Source Terms

This section characterizes all of the source terms of the GR-SI technology demonstration project. Source terms can be divided into the categories of resource requirements and project discharges.

2.4.1 Project Resource Requirements

Project resource requirements include energy, land, water, labor, materials, and other resources. Figure 2-8 is a diagram detailing important process flow rates. The resource requirements associated with the GR-SI technology demonstration project are identified below.

Energy Requirements

Additional energy requirements associated with the GR-SI technology demonstration include electrical power to run sorbent equipment and natural gas required as reburning fuel. The estimated increase in electrical power consumption for the site is about 800 kW. It is estimated that the natural gas consumption rate for the host site at full operating capacity will be 1877 standard ft^3/min. Coal usage will decrease due to the added natural gas flow. Coal feed rate is expected to decrease by approximately 19 percent to 45,713 lb/hr.

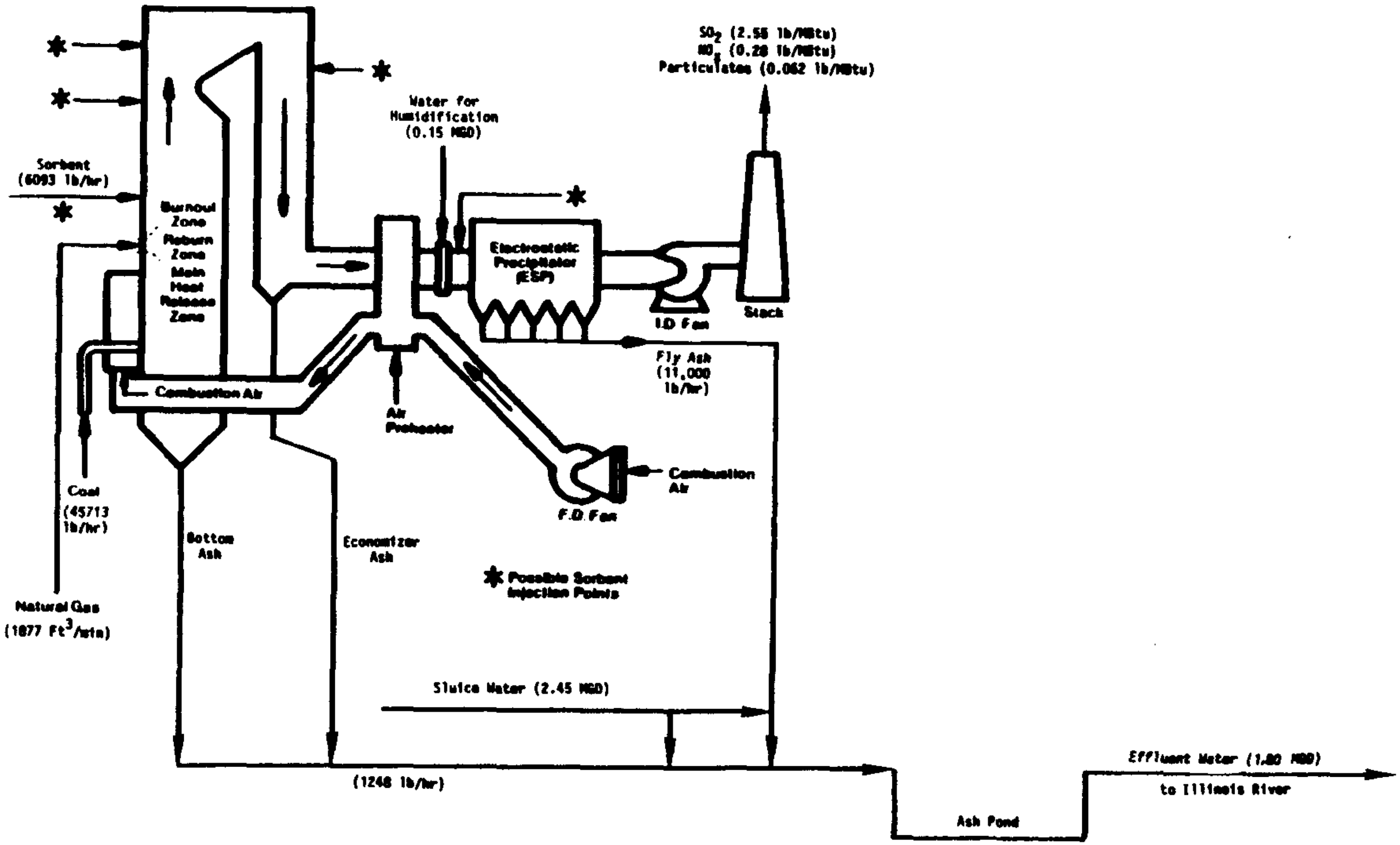


Figure 2-8. Process flow diagram for GR-SI.

Land Requirements

The GR-SI technology demonstration involves the retrofit of two emission control procedures on existing utility boilers. Since the technology itself is implemented within the existing boiler structure and the ancillary systems associated with GR-SI are relatively compact, there is no anticipated requirement of land outside the existing plant boundaries. The host site has been examined to ensure that adequate space is available on site for installation of the sorbent storage and feeding equipment. Sufficient space is available for convenient location of all required hardware.

Water Requirements

The GR-SI process does not require the utilization of water, per se. However, more sluice water will be required because the sorbent injection process will generate an increased amount of fly ash. Calculations by Hennepin Station and EER personnel indicate that the average sluice water requirement will increase from its current value of 1.0 MGD to about 2.45 MGD. Humidification water will also be needed to enhance ESP performance. Based on calculations made by EER assuming that the gas will be saturated, the flue gas humidification water requirement is expected to be about 0.15 MGD.

Labor Requirements

Labor will be required for installation of the GR-SI equipment, operation and maintenance of the hardware, and verification of system performance. Although the equipment installation represents the largest labor requirement, it is still a relatively small effort which can be managed by EER using locally available labor to provide both general and specialized skills. A breakdown of labor requirements is presented in Table 2-4.

Operation and maintenance of the GR-SI systems requires very little additional labor; it is anticipated that these tasks may be conducted by the existing plant operations staff upon completion of a brief training program.

TABLE 2-4. PROJECT LABOR REQUIREMENTS

Task	Duration (months)	Community-Supplied Labor (hrs)
Phase 1: Baseline Testing	1	240
Phase 2: Construction	16	8,310
Phase 3: GR-SI Testing	12	2,000
Total	29	10,550

During test periods, EER test crew personnel will also be available to oversee operation and maintenance procedures.

Performance verification tasks will be conducted by EER test crews. No additional labor will be required for these tests.

Materials Requirements

The primary material requirement for the GR-SI technology demonstration is a calcium based sorbent. During operation 6093 lb/hr of $Ca(OH)_2$ will be required. During the course of the program, 15,000 tons of sorbent are expected to be used at the site. Approximately 150 tons of sorbent will be stored in the site's sorbent silo. The raw material for sorbent is limestone for which the state of Illinois is a major producer. The sorbent to be tested will be selected as part of the demonstration process. However, two Illinois lime producers, Vulcan and Marblehead, generate sufficient quantities of calcium hydrate to easily supply the demonstration. The two Illinois lime manufacturers are located on the Illinois River with easy access to the Hennepin plant.

Construction materials will be purchased from local distributors. Construction materials include sorbent silo and handling equipment, piping and small hardware items. Sulfuric acid and CO_2 required for pH adjustment will also be purchased locally.

Transportation Requirements

The main factors impacting transportation are decrease in coal usage and increase in sorbent usage. The sorbent will be trucked in and will require approximately two trucks per day for delivery. Coal is currently delivered to Hennepin by means of barge. There are currently no trucks entering the plant for coal delivery. No substantive change in barge deliveries is expected.

2.4.2 Project Discharges

Significant waste discharge streams from the boilers employing the GR-SI technology include stack emissions and a solid waste consisting of fly ash and spent sorbent. At the technology demonstration site, emission reduction targets of 60 and 50 percent for NO_x and SO_2, respectively, have been established. NO_x emissions are expected to decrease to 0.28 lb/MBtu. Emissions of SO_2 would decrease to 2.55 lb/MBtu, based on 1986 average coal quality. No changes in CO, unburned hydrocarbons, or particulate emissions are anticipated. Flue gas flow rate will increase slightly to 181,515 dry standard ft^3/min.

Solid waste is expected to change in both flow rate and composition due to the addition of sorbent. Flow rate of fly ash collected by the ESP is expected to increase from its current level of 4566 lb/hr to about 11,000 lb/hr. This increase would occur since the sorbent injection rate would be greater than the amount of fly ash from coal that is being displaced by natural gas. The new composition of the fly ash will be 34 percent coal ash, 25 percent $CaSO_4$, and 41 percent $Ca(OH)_2$. Bottom ash flow rate, which GR-SI will not affect per se, is expected to decrease to 1248 lb/hr because of reduced coal consumption.

Changes are also anticipated in liquid effluent discharge from the ash pond. More sluice water will be required because GR-SI will generate an increased amount of solid waste. Based on the expected amount of sluice water increase, calculations show that average effluent flow rate will increase by about 1.45 MGD, thus making the new value 1.80 MGD. The addition of unreacted and spent sorbent to the fly ash will cause the waste stream to become more alkaline. The pH of the ash pond will be adjusted to meet the permit limit of 9. Monitoring of pH will be done during GR-SI operation. Possible neutralization measures to lower the pH level in the ash pond include injection with sulfuric acid or bubbling of carbon dioxide through the alkaline water. In both of these processes, the acid addition (CO_2

reacts in water to form carbonic acid) will lower the pH to within the permit limit of 9.

Oil and grease loadings are not anticipated to change. Total suspended solids will be maintained below the regulatory limit of 15 mg/l by increasing the residence time of the water in the pond or using chemical means to enhance settling rate. Sulfate concentration is expected to increase because the sorbent reacts with SO_2 to form calcium sulfate. Coal pile size is not expected to change and thus coal pile runoff will not change.

Coal usage will decrease as a result of the GR-SI project, and as a result coal-based metals loading will decrease. In general, metals contributions from sorbent are expected to be smaller than those from coal. In addition, pH is expected to remain at current levels or to increase slightly. Studies have shown that leachability of metals decreases with increasing pH (e.g. Cote, P. L. and Constable, T. W., "Development of Canadian Data Base on Waste Leachability, Special Technical Publication 805, ASTM, Philadelphia, 1984, p. 53). Since coal-based metals loading and leachability are both expected to decrease, there is expected to be no increase in metals levels in either effluent or groundwater as a result of the GR-SI project.

2.5 Potential EHSS Receptors

A number of environmental features could potentially be impacted by the proposed action. These include air quality, surface water quality, groundwater quality, land use, labor force, and energy resources. Section 3 focuses on characterizing the existing environment with respect to these probable impact receptors. Section 4 evaluates the probable impact of GR-SI on these receptors.

3.0 EXISTING ENVIRONMENT

This section provides a description of the environmental setting at Hennepin site, focusing on environmental features that might be impacted by the proposed action. The environment is divided into the six categories that were mentioned in Section 2.5. Each of these categories is characterized individually in this section.

3.1 Atmospheric Resources: Meteorology, Air Quality, and Noise

The area of central Illinois in which the demonstration site is located provides a typical continental climate with warm summers and fairly cold winters. Figure 3-1 shows 80-year average wind roses for Peoria and Moline for 4 months throughout the year. Peoria is about 50 miles south of Hennepin station and Moline is about 60 miles west of the site. According to the Illinois State climatologist, average annual precipitation in Peoria is 34.9 inches. The climate is typical of the entire midwestern states area and not representative of a local specialized environment.

The air quality in the area of Hennepin site is generally good. Putnam County is in federal air quality control region 71 (North Central Illinois Intrastate), and is an attainment area for all U.S. EPA criteria pollutants, including total suspended particulates, SO_2, and NO_2, according to the Geographic Designations of Attainment Status of Criteria Pollutants published in February 1985 by the Illinois EPA. A survey of Illinois EPA's Air Emissions Inventory revealed that in Putnam and Bureau Counties there are 95 businesses and industrial plants that emit air pollutants, of which 56 emit particulates, 10 emit SO_2, and 17 emit NO_x.

The area immediately surrounding the Hennepin site is not highly industrialized, but there are other industrial plants along the Illinois River. Current noise levels at the Hennepin plant are attributable to ongoing construction activities and normal plant operation (e.g. coal pile shaping and coal feeding).

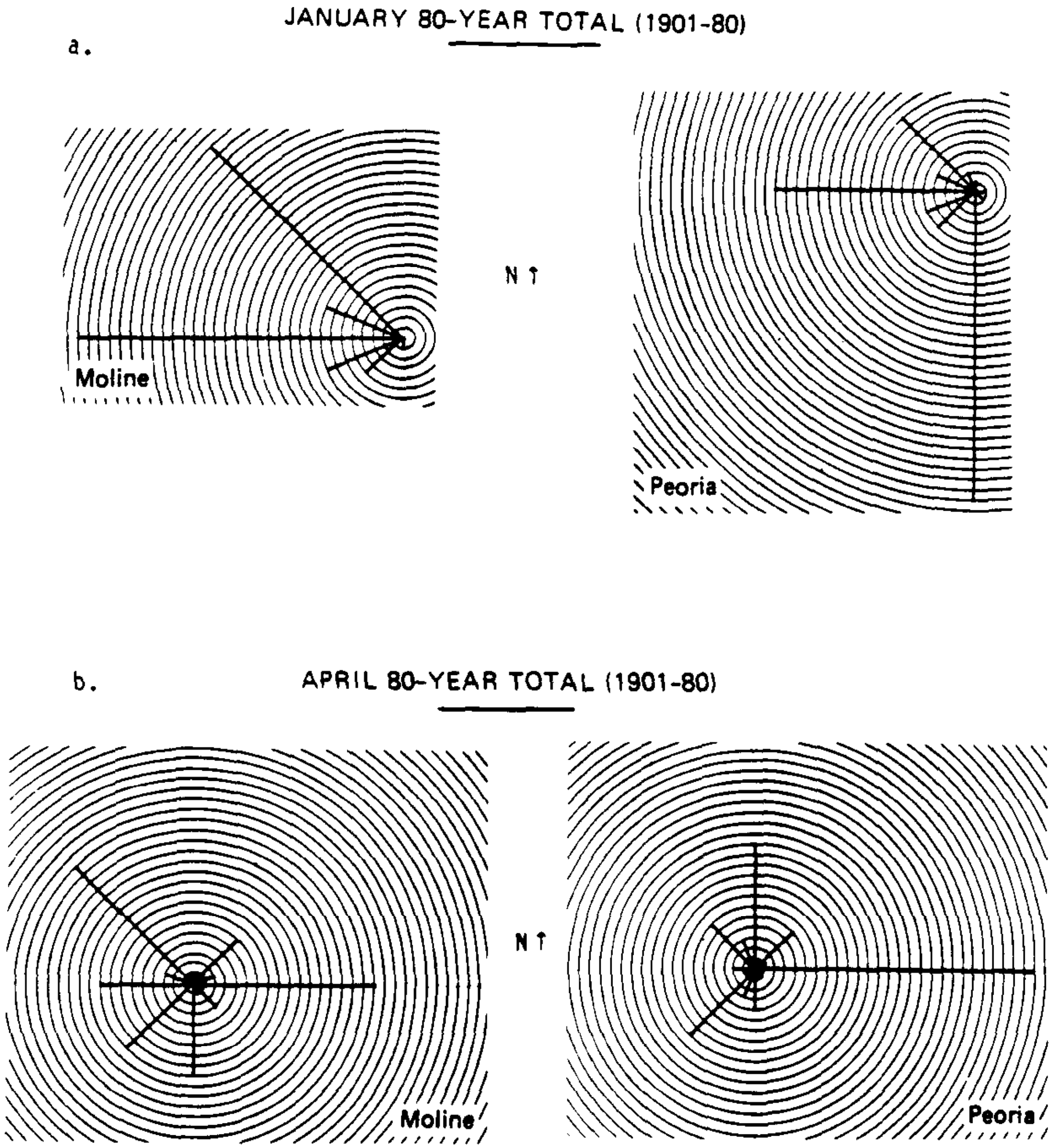


Figure 3-1. Wind roses for Moline and Peoria, Illinois.

JULY 80-YEAR TOTAL (1901-80)

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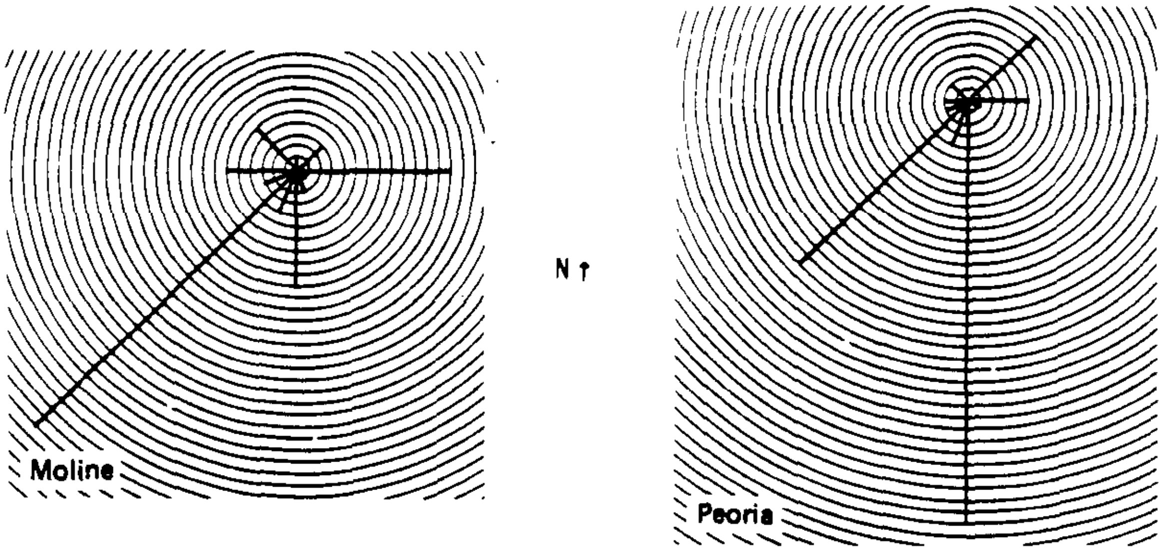
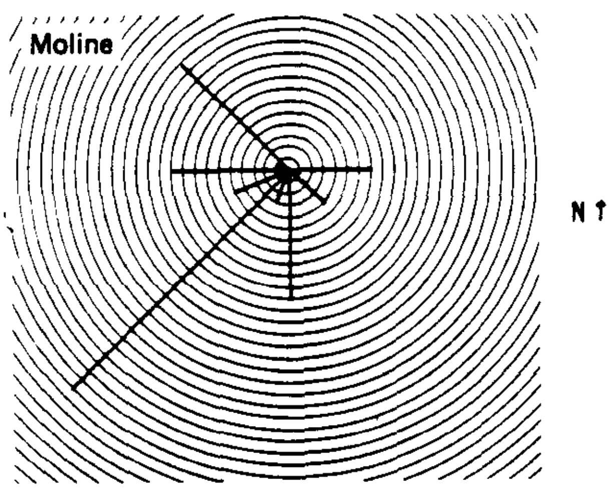
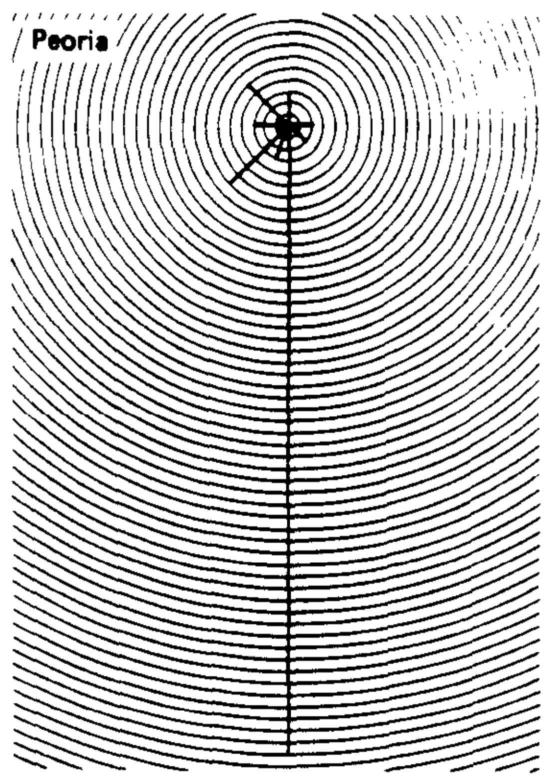


OCTOBER 80-YEAR TOTAL (1901-80)

d.





Key: For each concentric circle, the wind blows 1 percent of the time from the direction of the line. Thus, a line directed vertically downward from the city that passed through 10 circles would indicate that the wind blew from the south 10 percent of the time

Figure 3-1. Wind roses for Moline and Peoria, Illinois, (Concl.)

3.2 Land Resources

Hennepin Power Station is located in Putnam County, Illinois. The power plant is situated along the upper Illinois River in the Bloomington Ridged Plain of the Central Lowland Physiographic Province. The surrounding country is nearly level. There are no large hills in the vicinity, but rolling terrain is found near Spring Creek. The powerplant lies in the Illinois River floodplain composed of thick loess alluvian and glacial outwash underlain by Pennsylvania age bedrock. Hennepin Station is within the boundaries of the Village of Hennepin, which is a village for which flood zone maps have not yet been created by the National Insurance Agency. However, the unincorporated areas immediately surrounding the Village of Hennepin have been mapped. Hennepin Station is enclosed on the east and west by flood zone A13 areas, which are areas within the 100-year flood plain. Therefore, for the purposes of this volume, Hennepin Station will be considered to lie in a flood zone A13 area.

Because of the proximity of the plant to the Illinois River, there are wetlands in the area. A wetlands map as constructed by the Illinois Department of Conservation is shown in Figure 3-2. There is a wetland with the classification code PAB4FX on the site between the ash ponds and the Illinois River. This code indicates that the wetland is classified as a semipermanently flooded Palustrine aquatic bed. While there is a great deal of agricultural activity in the Hennepin area, according to the Putnam County Soil and Water Conservation District most of the soil surrounding Hennepin site is classified as moundprairie silty clay loam, which is of marginal agricultural use. There are no prime or unique farmlands immediately surrounding the Hennepin site.

3.3 Water Resources

Hennepin plant intakes water from and discharges to the Illinois River. Ambient water quality data for the Illinois River near Hennepin site are summarized in Table 3-1, including flow rates and concentrations of contaminants. From Table 3-1 it can be seen that copper, iron, mercury, and

Figure 3-?. Wetlands map of Hennepin plant area.

TABLE 3-1. WATER QUALITY DATA FOR ILLINOIS RIVER AT HENNEPIN (1985)

Parameter	High	Low	Average	Illinois General Use Water Quality Standard
pH	8.2	7.1	7.5	6-9
*Flow Rate (ft^3/s)	55,300	6990	17,700	-
Dissolved Oxygen (mg/l)	12.8	6.8	9.4	>6
Barium (mg/l)	0.1	0.03	0.05	<5
Boron (mg/l)	0.21	0.06	0.14	<1
Cadmium (mg/l)	0.009	<0.003	0.003	<.05
Chromium (mg/l)	0.018	<0.005	0.005	<1.0
Copper (mg/l)	0.024**	0.005	0.009	<0.02
Iron (mg/l)	11.0**	0.34	2.0**	<1.0
Lead (mg/l)	<0.05	-	<0.05	<0.1
Manganese (mg/l)	0.33	0.038	0.093	<1.0
Mercury (mg/l)	0.0023**	<0.0001	<0.0001	<.0005
Nickel (mg/l)	0.024	0.005	0.010	<1.0
Phosphorous (mg/l)	0.36**	0.13**	0.26**	<0.05
Zinc (mg/l)	0.15	0.05	0.10	<1.0

*7-day, 10-year low flow rate = 3519 ft^3/s.

**Valve exceeds water quality standard.

phosphorous at times exceed Illinois general use water quality standards. A survey of the Illinois EPA Waste Treatment Discharge Indices revealed that there are currently 26 plants discharging industrial effluent streams into the Illinois River in Putnam and Bureau Counties.

3.4 Ecological Resources

A variety of terrestrial and aquatic plant and animal species exist in the local/regional environment of Hennepin Station. The Illinois Natural History Survey has identified approximately 1130 species of flora within 25 miles of the plant. According to the Illinois Plant Information Network, no species of flora in Putnam or Bureau Counties are federally listed as endangered or threatened. The Illinois Natural History Survey has identified approximately 395 bird, fish, mollusk, amphibian, and reptile species within 25 miles of Hennepin Station. According to the Illinois Fish and Wildlife Information System, the species *Haliaeetus leucocephalus* (bald eagle) is a federally listed endangered species in Putnam and Bureau Counties. The presence of bald eagles in Putnam County has been confirmed in the past 5 years. No other animal species are listed as endangered or threatened.

The Midwestern Regional Endangered Species Department, which is a division of the U.S. Fish and Wildlife Service, has indicated that there are no federally designated critical habitats near Hennepin site. A search of the Illinois Natural Areas Inventory database yielded 26 sites within a 25 mile radius of Hennepin Station. Table 3-2 lists these natural areas and their locations are indicated on the regional map of Figure 3-3. The only natural area in the immediate vicinity of the plant is the Spring Lake Heron Rookery, which lies about 1 mile to the northwest of Hennepin Station. A heron colony at Depue Lake is within this rookery. The rookery is inhabited by by the Great Egret (*Casmerodius albus*) and the Great Blue Heron (*Ardea herodias*). The database lists the rookery as an aquatic habitat containing a state-listed endangered species, with this species being the Great Egret. Outstanding aquatic features include the lake, marsh land, a pond and the river. A study of heron nesting patterns done in 1987 determined that in the area near Spring Lake and Lake Depue, which lies about 1 mile to the

TABLE 3-2. NATURAL AREAS IN THE HENNEPIN STATION REGIONAL ENVIRONMENT

Reference Number	Area Name	Acreage
351	Hetzler Cemetery Prairie	1.3
50 *	Myers Forest and Game Preserve	20.0
409	Spring Valley Geological Area	9.0
1061	Spring lake Heron Rookery	899.0
382 *	Miller-Anderson Woods Nature Preserve	242.0
954	Bureau County S&WCD Woodland Preserve	7.7
137 *	Harper Woods	54.0
281	Putnam County Natural Lands Area	270.0
96 *	Park Memorial Woods Nature Preserve	80.0
824	Magnolia Hill Prairies	69.0
188 *	Sandy Creek Hill Prairies	169.0
731	Cameron Research Natural Area	177.0
189	Marshall County Conservation Area Hill Prairies	40.0
213	County Line Hill Prairie	80.0
81 *	Margery C. Carlson Nature Preserve	238.0
474	Deer Park South Geological Area	3.0
79	Matthiessen State Park	159.0
476	Illinois Valley College Geological Area	5.0
475	LaSalle South Geological Area	2.0
681	LaSalle East Geological Area	9.0
1010 *	Pecumsaugan Creek - Blackball Mine Area	173.0
677	Clark Run	55.0
1077	Starved Rock State Park	1485.0
674	Erant's Marsh	13.0
675	Environmental Center Marsh	20.0
170	LaSalle County Environment Education Center	333.0

* Dedicated Nature Preserve

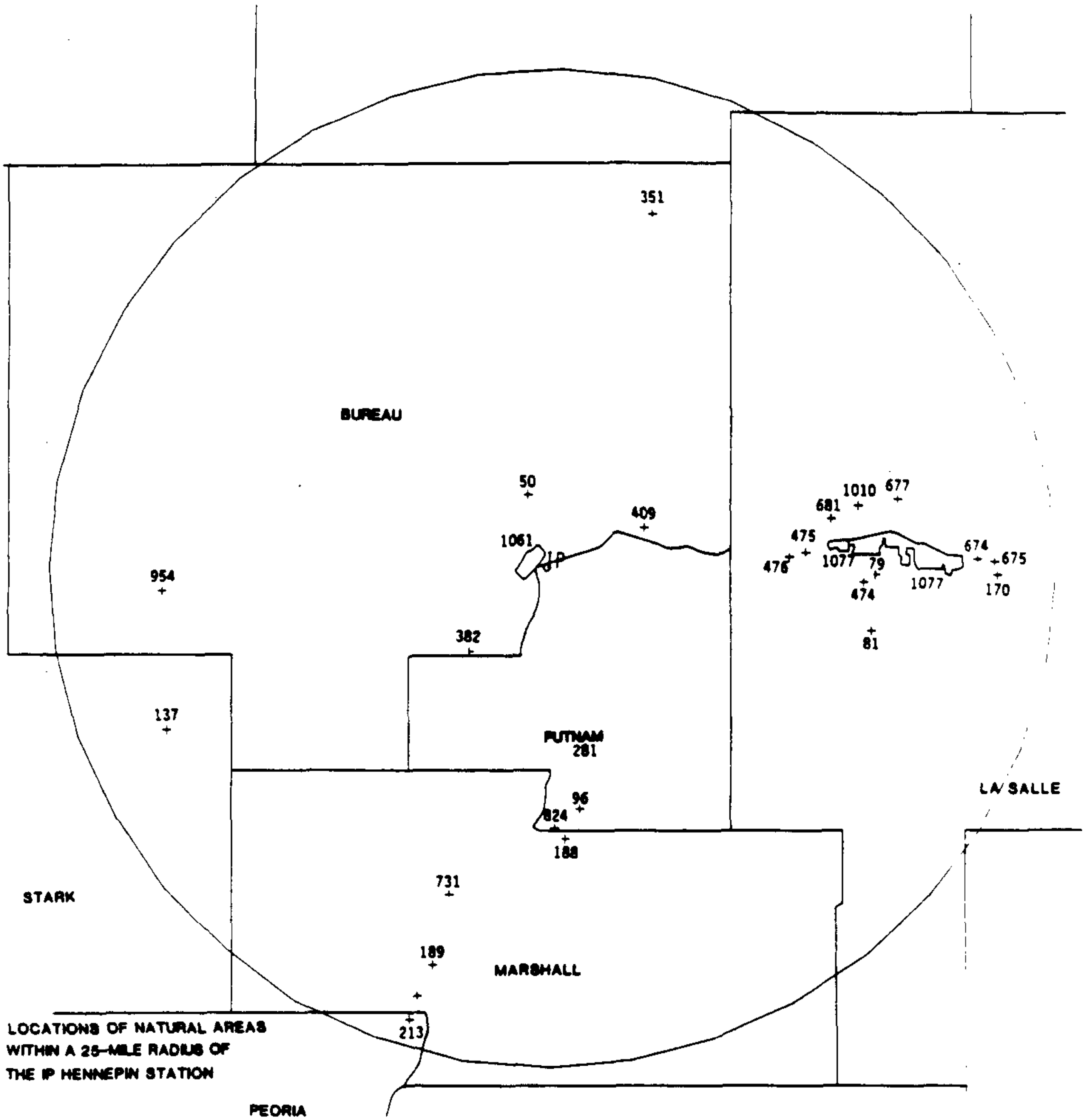


Figure 3-3. Natural areas in the Hennepin Station regional environment.

northeast of Spring Lake, there were 250 active Great Blue Heron nests and 25 active Great Egret nests (Kleen, V. M., "1986 and 1987 Report--Illinois Heron Colony Surveys," Illinois Department of Conservation, 1987). Birds generally fish in lagoons within 6 miles of their colony. They migrate to the south in September and October, and return north in March (Graber, J. W., Graber, R. R., and Kirk, E. L., "Illinois Birds: Ciconiiformes," Illinois Natural History Survey, Urbana IL, August 1978).

3.5 Socioeconomic Resources

Hennepin site is located within three miles of the towns of Hennepin, Bureau, and Depue. These and other cities in the area provide a population base of over 50,000 people within 15 miles of the plant. These cities provide an economic base of labor and materials to the Hennepin plant. Means of transportation of materials and manpower to the plant are provided by the Illinois River and nearby Interstate highway 80/180.

3.6 Energy and Materials Resources

The main material resources of interest for this project are limestone, coal, and natural gas. Limestone is in abundant supply, with capacity existing to deliver over 17 million tons per year to the United States market (Gutschick, K. A., Lime for Environmental Uses, ASTM, Philadelphia, 1987, p. 2). There are over 160 limestone quarries in Illinois and Missouri (Boynton, R. S., Chemistry and Technology of Lime and Limestone, Wiley, New York, 1980, p. 14). Coals are brought in by barge. Hennepin Station has contracts running through 1998 with its coal suppliers, and thus no problem is expected with coal availability. A natural gas pipeline already exists at the site. Natural gas is also in abundant supply, with capacity existing to deliver an additional 6.5×10^6 scfm beyond current consumption to the U.S. market (Natural Gas Production Capability--1986, American Gas Association, Arlington, VA, December 6, 1985).

4.0 CONSEQUENCES OF THE PROJECT

Demonstration of GR-SI technology in a pre-NSPS utility boiler has the potential to impact the environment in several ways. The discussion that follows considers the consequences of both construction and operation. Plans for mitigating possible detrimental impacts are also discussed. In this way it will be shown that this project will have no significant EHSS impacts.

4.1 Atmospheric Impacts

The GR-SI technology project is of insufficient scale to have an impact upon meteorology in the Hennepin area. During construction, the only air emissions are expected to be fugitive emissions from equipment installation and minor landscaping. These fugitive emissions should have a negligible impact upon air quality.

Several air quality impacts are anticipated during project operation. Emissions of NO_x and SO_2 are expected to decrease by 60 percent and 50 percent, respectively. In addition to the obvious public health benefits of these emission reductions, the utility plant could also benefit if stricter air pollution laws were passed. Particulate emissions from Unit 1 are expected to remain at present levels. This may require adjustments in the plant's electrostatic precipitation process, possibly including flue gas humidification or SO_3 injection. These options will be evaluated during Phase 2 of the project. Fugitive particulate emissions may decrease slightly due to the smaller quantity of coal which will be loaded to Unit 1.

The handling and use of dry, calcium-based sorbents presents several unique problems. Sorbent handling requires special care to prevent breathing of the dust or contact with the eyes, since the sorbent is not only abrasive, but somewhat alkaline. Also, the potential exists for fugitive dust emissions during the transportation and storage of sorbents. To minimize fugitive emissions, a dustless pneumatic handling system will be used. The only exposure of the limestone to the atmosphere will be through vents in the storage silo, and these vents will be equipped with bag filters. If a need arises for workers to handle limestone, mitigating measures to minimize risks to workers will include mandatory use of protective apparatus such as enclosed safety goggles and inhalation dust filters. These protective measures have proven very effective in operations with sorbents conducted at the EER test site in El Toro, California.

Noise from the addition of the GR-SI process will be generated by construction activities and truck traffic. Rule 208 of the State of Illinois Noise Pollution Control Regulations states that Rule 205, which regulates noise that is emitted from equipment, does not apply to equipment being used for construction. Therefore, construction activities will not violate Illinois noise regulations. Construction will be short-term and will not have a lasting effect on noise levels. Construction will also occur against a background of the ambient operational noise from other power plant activities. Incremental operational noise from the GR-SI project will be negligible in comparison to current plant noise. Noise due to increased traffic is expected; however, the traffic will increase along transportation routes and not in the Village of Hennepin, as can be seen on a road map, or in natural areas. Therefore, no significant impact of noise upon residences or the nearby heron rookery is expected.

4.2 Land Impacts

All construction activities will occur on-site. Thus, no impacts beyond plant boundaries on geology, farmlands, flood plains or wetlands are expected. There is a wetland on the plant site itself, lying between the ash ponds and the Illinois River. However, the size of the ash pond is not expected to change, and no construction activities are planned for the region immediately surrounding the pond. Therefore, the project should have no impact upon the wetland.

The rate of solids from Unit 1 entering the pond is expected to increase. While the physical dimensions of the ash pond will not change due to the proposed action, the pond will fill more rapidly due to the GR-SI process. The amount of increase in solid waste flow rate will depend on the amount of sorbent injected, the amount of coal displaced by natural gas and the amount of SO_2 and NO_x removed from the flue gas stream. This will be a matter for long-term consideration at the Hennepin site, but at present the ash pond has enough capacity to span beyond the scope of this project. In addition, studies have shown that coal fly-ash/spent-sorbent mixtures have good landfilling characteristics due to their pozzolanic properties, which allow the solid waste to harden into a cement-like substance after drying. Therefore, the solid waste will make a satisfactory landfill if it is decided at a future date to permanently use it for this purpose.

4.3 Water Quality Impacts

A negligible change in water usage is anticipated. The increase in overall water usage due to flue gas humidification and increased sluice water requirement is expected to be about 1.60 MGD. The main source of water usage at Hennepin Station is the condenser and cooling water flow, which for both Hennepin units is 230 MGD. Therefore, the increase in water usage due to GR-SI will be insignificant in comparison to total station water usage, which includes the cooling water and other flows.

The project is expected to have some impacts upon the water that is discharged from the ash pond to the Illinois River. Average flow rate of pond effluent water is expected to increase to 1.80 MGD. The plant's current NPDES permit requires that pH be below 9.0. The lime sorbent will tend to increase the pH of the pond. Potential methods of pH adjustment will be assessed during Phase 1 of the project, when detailed design work will be done. Suitable mitigation measures such as addition of sulfuric acid or carbon dioxide will be used as needed for pH adjustment. the process will also generate an increased amount of total suspended solids (TSS) in the pond water. Potential measures to maintain TSS within the current permit requirement of 15 mg/l include modifying the pond system in order to increase the residence time of the water in the pond and adding chemical polymerizing agents. Oils and greases are currently well below the limit of 15 mg/l, and are expected to remain unchanged.

Concentrations of heavy metals in the effluent water are not expected to increase, as was discussed in Section 2.4.2. Coal-based metals loading will decrease, and pH will remain at current levels or increase due to the GR-SI project. Studies have shown that increasing pH decreases the leachability of metals. Therefore, the project is not expected to have a negative impact upon metals levels in either effluent or groundwater.

4.4 Ecological Impacts

Construction activities will contribute some noise and fugitive emissions to the environment. However, noise and emissions from these activities will have a negligible impact upon the biota in the area because construction will be of a short-term nature and will be in addition to other ongoing minor construction activities. Transportation noise will occur to the south and east of the plant, and thus will not affect the heron rookery that lies to the northwest. The GR-SI project is expected to improve air quality by reducing NO_x and SO_2 emissions, which should have a minor beneficial impact upon the area's biota.

Great Blue Herons and Great Egrets inhabit in Depue Heron colony as described in Section 3.4. These birds feed up and down the Illinois River, as well as in nearby lakes (Spring Lake, Depue Lake), sloughs, and backwaters. Birds feeding in the lakes and up river from the power plant would not be affected by any discharge from the Hennepin plant. However, the Illinois Department of Conservation has indicated that birds feeding downstream could be affected if the river's biota was harmed by changes in river contaminant levels (personal communication, Richard Lutz, January 1988). Metals levels are not expected to increase as a result of the project, as was discussed in Section 2.4.2. Since the project is expected to have no impact on Illinois River contaminant levels, there is anticipated to be no impact upon the river's biota, and thus the Spring Lake Heron Rookery will be unaffected.

4.5 Socioeconomic Impacts

The labor requirements for the GR-SI project were detailed in Section 2.4.1. The total amount of labor required from the local community is expected to be about 10,550 man-hours for construction, which will be spread over a 29-month period. Operation manpower requirements should remain at current levels. Since there are over 50,000 residents within 15 miles of Hennepin site, the GR-SI project should have a small positive impact upon the local labor pool. Even though the construction supervisors will be non-local EER personnel, no adverse impact on housing and support facilities is anticipated since the host site is within commuting distance of metropolitan areas. In addition, miscellaneous small pieces of equipment may be purchased locally. Thus, the GR-SI project should have a small positive impact upon the Hennepin area economy.

The GR-SI project will require two trucks per day for sorbent delivery. There are currently no deliveries of sorbent or coal by truck, but two trucks per day is insignificant compared to the several thousand vehicles per day that traverse nearby Interstate highway 180. Therefore the project will not significantly impact the environment in terms of either noise, diesel engine emissions or increased traffic.

The project is not expected to have any land impacts beyond plant boundaries. Therefore, there should be no archaeological, cultural or historical impacts of the project.

4.6 Energy and Materials Impacts

The estimated increase in electrical power consumption due to GR-SI is about 800 kW. Although this level of electrical consumption is not negligible, it represents only 1.0 percent of the total net generating capacity of the host unit. This additional energy requirement, then, will have minimal impact on the availability of electrical power beyond the plant boundaries. Also, the project will pay for the additional energy requirement, which will minimize the fiscal impact to the operating utility.

The possible areas of materials impacts are coal usage, natural gas usage, and sorbent usage. Implementation of GR-SI technology will result in direct replacement of approximately 19 percent of the baseline coal input with natural gas. Coal usage will decrease from 56,164 lb/hr to 45,713 lb/hr, which represents a decrease of 10,451 lb/hr. Therefore, the total station coal usage of 230,909 lb/hr will decrease by only 4.5 percent.

During operation, the project will require 1877 standard ft^3/min of natural gas. General availability of natural gas resources is not expected to present any problem; capacity exists to deliver an additional 6.5×10^6 scfm beyond current consumption to the U.S. market. This surplus represents 20 percent of the current U.S. consumption, and the increased consumption for the three GR-SI demonstrations amounts to less than 0.1 percent of the current excess capacity.

The GR-SI project will require the use of limestone based sorbent. The year-long test will require about 15,000 tons of sorbent. Capacity exists to deliver 17 million tons per year of limestone to the U.S. market. Therefore, the project will require only 0.09 percent of the U.S. limestone supply. Local limestone availability is not a problem because there are over 160 quarries in Illinois and Missouri.

4.7 Impact Summary

In summary, no significant EHSS impacts are anticipated during the construction and operation phases of the GR-SI technology demonstration, other than the beneficial impact of the reduction in NO_x and SO_2 emissions. Disposition of the GR-SI systems at the end of the demonstrations (if required by the host utilities) would incur the same types of impacts and levels of risk associated with the on-site construction activities; i.e., minimal to negligible EHSS impacts are anticipated for the disposition activities.

5.0 REGULATORY COMPLIANCE

This section describes current permit requirements and regulations governing plant operation, and then outlines the anticipated permit modifications and the process by which they will be obtained.

5.1 Regulations and Permit Requirements

Demonstration of the GR-SI technology will be on a retrofit basis for the Hennepin boiler; therefore, the host site currently has all necessary permits for air emissions, land use, water use, and water discharges.

The Division of Air Pollution Control of the Illinois Environmental Protection Agency (IEPA) has issued a permit to Illinois Power Company for operation of Unit 1 at Hennepin Station. The only limit imposed by this permit is an SO_2 emissions limit of 17,050 lbs in any one hour period from Units 1 and 2 combined. There are reporting requirements to verify that this limit is being met. The permittee is required to submit quarterly reports showing daily coal and coke usage, and sulfur, ash, Btu, and moisture contents. They must also maintain records of any excess emissions and report these excess emissions to IEPA.

Fly ash and bottom ash wastes from the boiler are handled by wet transport to a settling pond. The ash pond discharges to surface waters are regulated under the National Pollutant Discharge Elimination System (NPDES). The Illinois EPA Division of Water Pollution Control has issued an NPDES permit to Illinois Power to regulate ash pond discharges to the Illinois River. The existing permit contains concentration limits of various species, as well as monitoring requirements. The monitoring requirements and the limits imposed are described in Table 5-1.

TABLE 5-1. EFFLUENT FROM ASH POND FOR UNIT #1 AT HENNEPIN--
MEASUREMENT PLAN AND PERMIT LIMITS

Parameter	Sampling Method	Measurement Frequency	Permit Limit	
			30-Day Avg.	Daily max.
Flow Rate	Single Reading	Once/Week	-	-
pH	Grab Sample	Once/Week	6-9	6-9
Total Suspended Solids	24-Hour Composite	Twice/Month	15.0 mg/l	30.0 mg/l
Oil and Grease	Grab Sample	Once/Week	15.0 mg/l	20.0 mg/l

5.2 Anticipated Permit Modifications

5.2.1 Air Permit Modifications

The GR-SI technology is designed to simultaneously reduce both NO_x and SO_2 when applied to coal fired utility boilers without increasing particulate emissions. The federal authorization for regulation of air emissions arises from the legislative Clean Air Act of 1963 which was amended in 1967, 1970, and 1977. The 1970 amendments established a National Ambient Air Quality Standard (NAAQS) and required states to implement plans to achieve and maintain NAAQS.

The two major sections of the 1970 amendments which influence the commercialization of GR-SI are:

110--State Implementation Plan--requires each state to develop an implementation plan outlining the state program for attaining ambient air quality standards.

111--New Source Performance Standards--requires the EPA to establish limits on the emission of primary pollutants from a select list of new stationary sources.

The requirement for State Implementation Plans (SIP) is one of the most important amendments. Air quality control regions have been established and classified according to the degree of air pollution that exists in the particular region. In the 31 states east of the Mississippi River there are 38 air quality control regions which are non-attainment for SO_2, 132 non-attainment regions for total suspended particles, and one non-attainment region for NO_x. Each state has been required to develop an SIP on a regional basis that would maintain or achieve NAAQS.

The Hennepin plant is located in Putnam county which is designated as an attainment area for all criteria pollutants. Therefore, stringent limitations which may apply to retrofit situations in other areas will not apply to Hennepin Station. However, modifications to the host boiler air emissions permit will be required since the existing system will be changed with the implementation of GR-SI technology.

After reviewing the nature of the GR-SI technology demonstration, the Illinois EPA indicated that modifications to existing air permits, rather than new permits will be required (personal communication, Pat Dennis, September 1987). In applying for these permit modifications, it will be necessary to describe to EPA all design and operating changes, as well as emissions changes. Specifically, required information will include descriptions of boiler modifications, sorbent storage and injection equipment, projected coal input, ESP modifications and estimated efficiency, trucking changes, and fugitive dust control measures.

It may also be necessary to obtain a variance for emissions resulting from initial startup and testing of the GR-SI process. Since startup and testing will be relatively short-term, IEPA has indicated that there should be no difficulty in obtaining such a variance. In applying for a variance, it will be necessary to submit a schedule of construction and testing activities.

All preparation, including engineering calculations and design work, will be done so that permit modification applications will be ready for submittal at the end of Phase 1 of the project. EPA is required to respond to permit applications within 90 days. In the experience of the utility, 60 to 90 days is usually required for permit approval. Sufficient lead time will be allocated for permit applications to allow Phase 2 construction and startup activities to begin as scheduled.

5.2.2 Solid Waste/Water Permit Modifications

Management of the fly ash/sorbent waste generated during this program will be conducted in accordance with all applicable federal, state, and local regulatory requirements. The specific waste management processes to be utilized will be defined during Phase I of the evaluation. Solid waste streams from coal firing and flue gas emission control procedures are exempt from classification as hazardous wastes under both federal (40 CFR 261.4) and Illinois (35 Ill. Adm. Code 721.104) regulations.

The current method of ash disposal by wet transport to a settling pond will be used for disposal of the GR-SI system waste. Therefore, the NPDES limits on ash pond discharge will be applicable to the generated waste. The Illinois EPA Division of Water Pollution Control indicated that a new NPDES permit will not be required, and that modifications to the existing permit will be sufficient (personal communication, Gary Cima, September 1987).

In applying for NPDES permit modifications, it will be necessary to describe to IEPA all projected changes in the water and solid waste entering the ash pond, and in the effluent water leaving the ash pond. Permit modification applications will be prepared at the end of Phase 1 and then submitted early in Phase 2. In the experience of the utility, 60 to 90 days is usually required for permit approval.

5.2.3 Other Required Permits

All of the GR-SI equipment will be installed within the boundaries of the plant; thus, zoning and land use issues do not apply. Construction permits for installation of the equipment will be obtained from the state and local authorities. In general, it is anticipated that demonstration of GR-SI technology can be conducted in an environmentally sound manner in complete compliance with all applicable environmental regulations without the imposition of extraordinary control measures.